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" Captura de tecnologías y estrategias innovadoras del rubro apícola en Inglaterra e Irlanda (Apimondia), con énfasis en sanidad, aplicables al proceso de implementación de Buenas Prácticas Apícolas en Chile"

Agosto 2005

VISITAS REALIZADAS

NATIONAL BEE UNIT, CENTRAL SCIENCE LABORATORY

- NBU, DEFRA, CSL. National Bee Unit
- NBU, DEFRA, CSL. Managing Varroa.
- NBU, DEFRA, CSL. *Tropilaelaps*: parasitic mites of honey bees.
- NBU, DEFRA, CSL. The Small hive beetle.
- NBU, MAFF. Foul brood disease of honey bees: recognition and control.
- NBU, MAFF. Statutory procedures for controlling foul brood.

YORK & DISTRICT BEEKEEPERS ASSOCIATION

- YORK & DISTRICT BEEKEEPERS ASSOCIATION, Website information, Welcome.
- YORK & DISTRICT BEEKEEPERS ASSOCIATION, Anaphylactic shock - what to do.
- BRITISH BEEKEEPERS ASSOCIATION ADVISORY LEAFLET NUMBER 4, Collecting a Swarm.
- BBKA News, the news of the British beekeepers" association
- YORK & DISTRICT BEEKEEPERS ASSOCIATION, Glossary of beekeeping terms. Setting up an apiary
- YORK & DISTRICT BEEKEEPER"S ASSOCIATION, Sumer Programme 2005
- YORK & DISTRICT BEEKEEPER"S ASSOCIATION
- COMBINGS. The magazine of the York and District Beekeepers Association. Number 10 june 2004

APICULTURE AND SOCIAL INSECT LABORATORY. UNIVERSITY OF SHEFFIELD

- HONEY BEE RESEARCH, LASI: Laboratory of apiculture & Social Insect. UNIVERSITY OF SHEFFIELD.

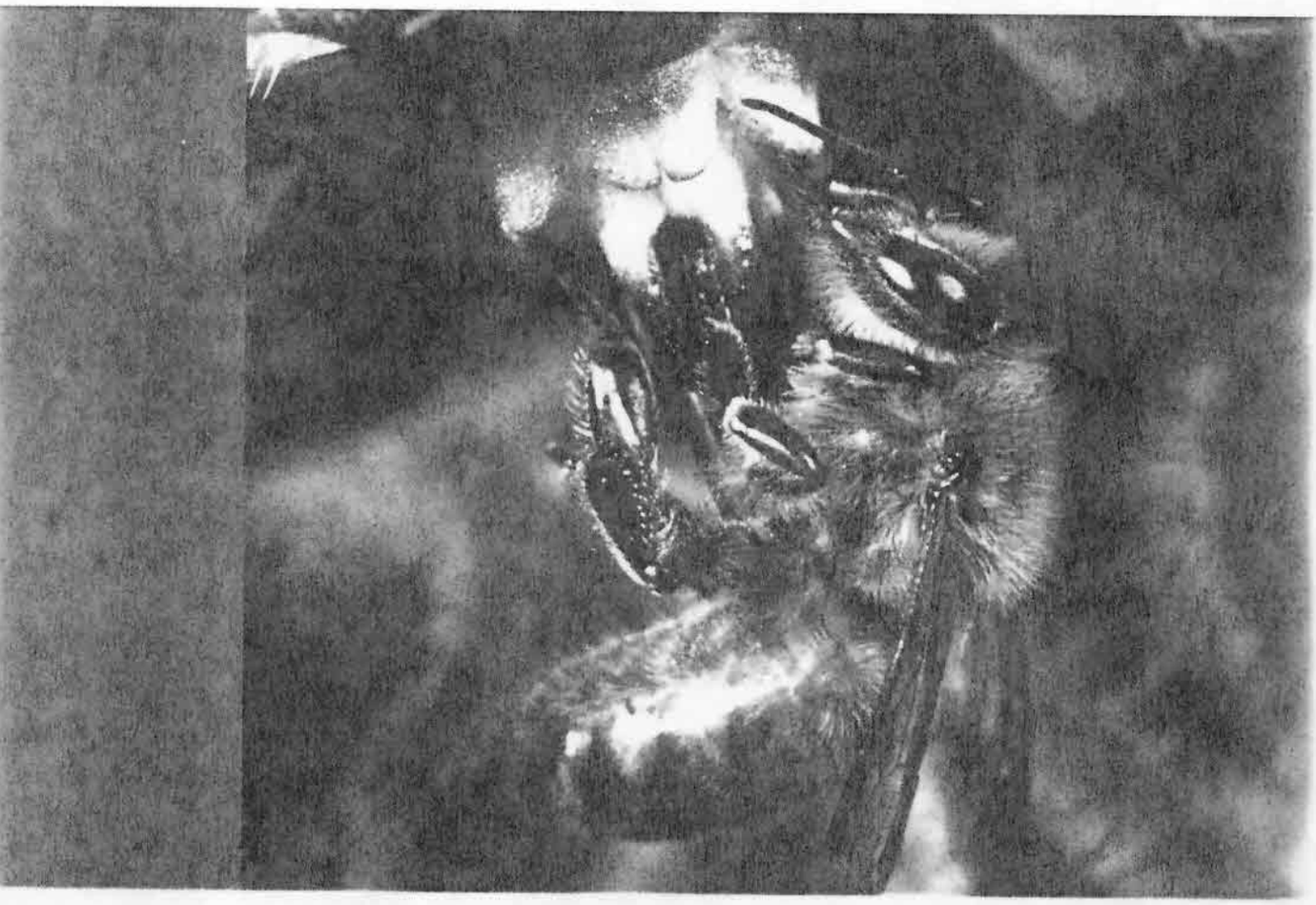
BEE IMPROVEMENT AND BEE BREEDERS' ASSOCIATION

- BIBBA, Guide to Managing Apidea mini - nucs.
- THE WILDLIFE TRUSTS, Our native honeybee lives!.

APIMONDIA

- ABSTRACTS. 39th Apimondia International Apicultural Congress, Dublin. Ireland. August 2005

NATIONAL BEE UNIT



National Bee Unit

Our role

We protect the honey bee, an essential pollinator of crops and wild plants, and support the beekeeping industry through:

Controlling serious endemic pests and diseases to minimise the economic and environmental impact as much as possible

Advising beekeepers on the recognition and control of pests and diseases to make the industry more self sufficient

Minimising the risk of importation of exotic pests and diseases and managing the risks should serious exotic organisms be discovered

The National Bee Unit (NBU) does this using an integrated programme of apiary inspections, disease diagnosis, research, training and extension, provided by a team of scientists and experienced, practical beekeepers.

We also provide specialist advice and technical consultancy services on bee health to government departments, beekeepers and industry.

Our staff

Our highly specialised team includes skilled technical staff that are either apiculture specialists or scientists trained in beekeeping. Some have experience working abroad, including managing beekeeping businesses and providing consultancy services to overseas governments. Such work leads to extensive national and international contacts in apiculture, insect pathology and environmental science, and membership of international groups working in related areas.

The NBU runs about 150 professionally managed honey bee colonies to support both statutory and commercial work.

Bee health inspection

NBU Regional Bee Inspectors organise bee health inspections using a staff of highly skilled beekeepers as Seasonal Bee Inspectors, under the guidance of the National Bee Inspector. The Bee Health Inspectorate not only looks for and treats notifiable diseases, but also trains beekeepers, assists with field trials and research, and provides first hand up-to-date information on industry issues.

The team completes a targeted statutory disease inspection programme for Defra and the Welsh Assembly Government, comprising 5,000 to 6,000 apiary visits each year, inspecting between 24,000 and 29,000 colonies, approximately 10% of colonies in England and Wales.

A sophisticated IT system supports the bee health programme, including custom designed databases comprising mapping, Geographical Information Systems (GIS) and spatial analysis capabilities. This aids the routine work of the NBU, and also provides valuable information that feeds into research programmes and pest risk analysis services.

Contact: +44 (0) 1904 462 510 nbu@csl.gov.uk

Research and development

The NBU has an active research programme, with the aim of providing beekeepers with the best advice for disease control. Many aspects of disease prevention and management are investigated using the very latest technologies, such as real-time TaqMan® Polymerase Chain Reaction (PCR) and Geographical Information Systems (GIS). Our extensive field team plays a major role in undertaking our research.

Much of the work is directly applicable to beekeeping in the field, such as development of rapid test kits for both American and European foul brood known as lateral flow devices or LFDs, and a user-friendly internet-based calculator for varroa loads in colonies. Our aim is to make beekeepers as self-reliant as possible; the NBU's research is aimed at providing the tools to make this possible.

Consumer and environmental protection

The NBU is contracted to take honey samples directly from beekeepers on behalf of the Veterinary Medicines Directorate (VMD) as part of Defra's statutory residue monitoring programme - the National Surveillance Scheme. Food samples are also collected on behalf of the Food Standards Agency. Each EU Member State has a statutory responsibility to monitor food for residues to ensure safety for the consumer. This scheme helps to protect consumers by minimising the risks of residues in harvested honey entering the food chain.

The NBU also works for Defra's Wildlife Incident Investigation Scheme (WIIS) which monitors the effects of pesticides on wildlife, pets and beneficial insects (such as honey bees and bumble bees). This scheme sets the standard internationally for environmental monitoring of its kind and is held in very high regard.

Commercial services

The NBU has full Good Laboratory Practice (GLP) compliance, an internationally recognised standard for production of regulatory data. This has enabled us to develop and conduct toxicity tests with honey bees for pesticide registration purposes for several years, using our professionally managed apiaries. We have significant expertise in this area, which we use to design customised tests both in the UK and overseas. The NBU is vastly experienced in testing the efficacy and safety of veterinary medicines such as varroacides on honey bees. These can be done either in the laboratory or the field. Environmental impact studies, such as assessing the impact of agrochemicals on the environment and honey bees, are also undertaken.

Laboratory tests

Laboratory toxicity tests on adult worker honey bees are conducted in accordance with international guidelines. We also have the ability to assess the acute contact and oral toxicity of chemicals to bumble bees. In the past few years, this area has been expanded to encompass assessments of the effects of insect growth regulators and other substances on honey bee brood. Although there are no agreed international guidelines for screening effects on larvae, the NBU is amongst the most experienced in Europe in directing these studies and is a leader in this new and developing area.

Semi-field and field tests

On a larger scale, semi-field tests with honey bees or bumble bees are undertaken in bee-proof polytunnels or in computer-managed glasshouses. We have licensed spray applicators as well as horticultural experts, and can undertake work on all aspects of a study, including in-house residue analysis. We can also conduct full-scale field trials. Our network of Bee Inspectors gives us access to a wide range of field sites throughout the UK.

Contact: +44 (0) 1904 462 510 nbu@csl.gov.uk

Want to find out further information?

The NBU has a website, regularly updated with the latest news and information, at www.nationalbeeunit.com. The website gives a great deal of information about the NBU and its work. There is also a general e-mail address, nbu@csl.gov.uk, to which you can send any enquiries about honey bees.

About CSL

Central Science Laboratory is the UK's foremost public sector laboratory in the fields of agriculture, food and the environment. As an Executive Agency of the Department for Environment, Food and Rural Affairs, our main role is to carry out research in support of Government objectives. Our support for protection of the nation's food and rural environment includes responding to emergencies in the food supply chain through risk assessment, analysis and remedial actions. Our knowledge of UK and EU regulations is first hand due to our contributions to policy making, ensuring we remain alert to emerging issues.

Central Science Laboratory
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t. +44 (0) 1904 462 000 f. +44 (0) 1904 462 111
science@csl.gov.uk

History of the NBU

The first Government involvement into the beekeeping industry was in the 1940s when the Ministry of Agriculture and Fisheries (MAF) regulated the provision of sugar to beekeepers under wartime rationing. The first legislation applied to beekeeping was the Foul Brood Disease of Bees Order, 1942. Since then there have been several changes in legislation; the current UK law on bees is administered under the Bees Act 1980, the Bee Disease Control Order 1992 and the Importation of Bees Order 1997 as well as being governed by European law. This UK legislation will be updated in 2005 to take account of the notifiable status of the small hive beetle and *Tropilaelaps* mites within the EU.

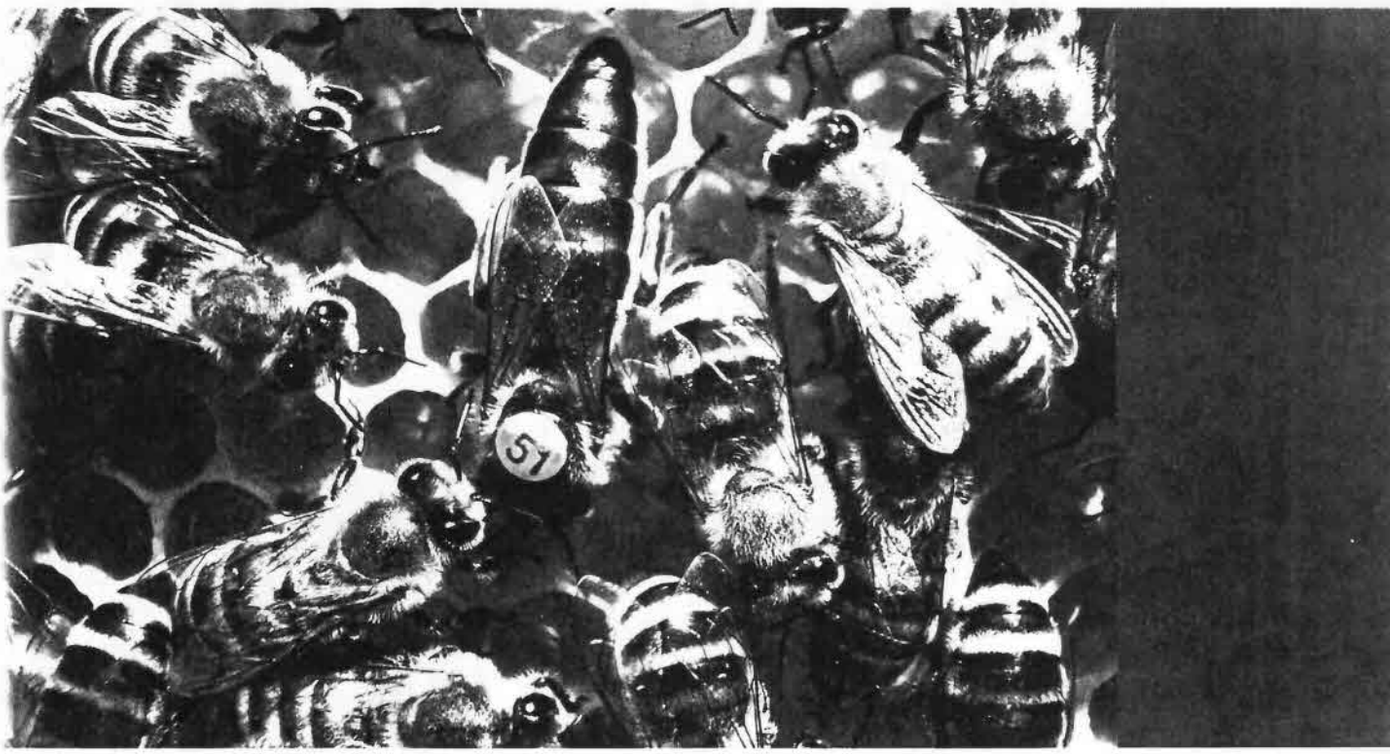
In the 1950s the National Agricultural Advisory Service (NAAS) was responsible for bee health work. Based at Rothamsted Lodge, Harpenden, Hertfordshire, and Trawscoed in Wales, the primary remit of the bee units was disease monitoring and control of bee diseases.

In 1979 the units were amalgamated to form the Agricultural Development and Advisory Service (ADAS) National Bee Unit (NBU), located at Luddington Experimental Horticulture Station, just outside Stratford-upon-Avon. The ADAS NBU provided statutory and advisory services to MAFF and beekeepers throughout England and Wales on all aspects of apiary management and bee health, as well as carrying out R&D work.

In 1991, following the privatisation of ADAS, the NBU joined CSL. In 1994 the unit took on the responsibility of the MAFF Bee Disease Inspection Service, and in 1995 the service in Wales.

The NBU moved to York in 1996 when CSL relocated to a new, purpose-built laboratory on the outskirts of the city.

www.nationalbeeunit.com



Our services

Bee health inspection

Contingency planning and surveillance

Advice and consultancy

Pest and disease diagnosis

Training and extension

Research and development

Consumer and environmental protection

Commercial services

Our quality standard

The NBU is certified as compliant with the OECD principles of Good Laboratory Practice (GLP), a much sought after, externally audited, international standard for assuring the quality of science management. This ensures that all our customers benefit from a consistent, tightly managed and well-documented approach to all our work.

Managing Varroa

defra
Department for Environment
Food and Rural Affairs

About this leaflet

Since its discovery in England in 1992 the parasitic mite, *Varroa destructor*, has spread to infest colonies of honey bees throughout the UK. Its management has now become a routine part of bee husbandry. The recent development of strains of mite resistant to treatments used against them poses new challenges to beekeepers. This leaflet describes the biology of the mite, how it can be recognised and monitored, the latest approaches beekeepers can use to control the infestation in their hives and a look ahead to the future.

Varroa destructor was first reported in Western Europe in the late 1970s. The mite causes varroosis, a very serious and complex infestation of honey bees. It has caused massive economic losses and expense for beekeepers and its destructive power is evident from the huge number of colonies lost since it first arrived in Europe. Varroa remains the number one management problem for beekeepers and scientists alike. The onset of resistance to the treatments available and the potential impact of secondary infections will make controlling the mite more difficult in the future and it will continue to be a serious threat to the long-term sustainability and prosperity of European apiculture and to the environment through the disruption to pollination.

Managing Varroa

Acknowledgements

This leaflet has been updated and revised by James Morton, Richard Ball, Mike Brown and Selwyn Wilkins of the CSL National Bee Unit on behalf of Defra Horticulture and Potatoes Division.

Cover photograph: Garry Fry, CSL.

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Introduction to varroa

This page gives a simple introduction to the varroa mite, its presence in the UK, and it's management by beekeepers. The concepts you will find below are explained in more detail later in the leaflet.

- **What is Varroa?**
  The varroa mite, *Varroa destructor,* formerly known as *Varroa jacobsoni*, is an external parasite of honey bees. Originally confined to the Asian honey bee, *Apis cerana*, it has spread in recent decades to the Western honey bee, *Apis mellifera*.

- **Why is it a problem?**
  Unlike *Apis cerana*, our honey bee has few natural defences against varroa. The mites feed on both adult bees and brood, weakening them and spreading harmful pathogens such as bee viruses. Infested colonies eventually die out unless control measures are regularly applied.

- **Where is it found?**
  Varroa has spread through movement of infested bees far outside its natural range in Asia and is now present on all continents except Australia. First found in the UK in 1992, it has since spread to affect nearly all apiaries in England and Wales, and is now widespread in Scotland and Northern Ireland. Eventually, almost all UK apiaries will become infested with varroa.

- **How did it get to the UK?**
  We do not know for certain how varroa reached the UK. Inadvertent movement of infested bees in imported goods is thought to be the most likely cause, although deliberate illegal importation of bees from infested countries is also possible.

- **Do I have to report the presence of varroa in my colonies?**
  Currently, varroa is a statutory notifiable disease under UK bee health legislation. However, once varroa is removed from the list of notifiable diseases in 2005 beekeepers will no longer be obliged to report its presence in their colonies.

- **Can varroa be eradicated or controlled?**
  Varroa cannot be completely eradicated but beekeepers can successfully keep productive bees despite the presence of the mite. Varroa can be controlled by monitoring the infestation in their colonies and the use of appropriate control methods to keep mite numbers below levels that are harmful.

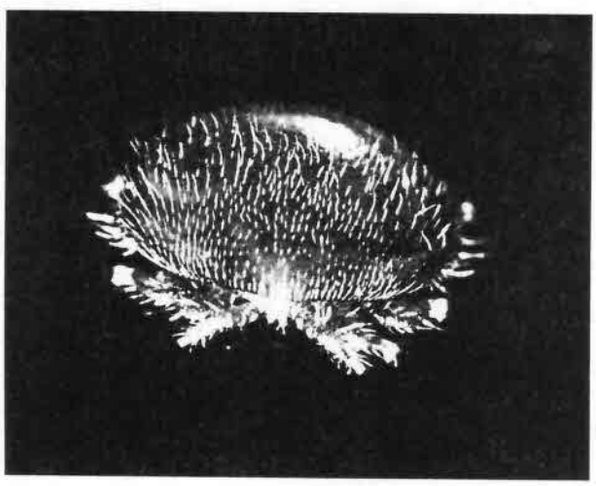
- **How do I know how badly infested my colonies are?**
  The signs of infestation may not be obvious until your colonies are heavily infested – by which stage they are at great risk. However, there are several methods that can be used to detect the mites and estimate their numbers at a much earlier stage. These include counting dead mites that collect on the hive floor and counting mites inside sealed brood cells. These methods help you plan the control methods to use.

- **What control methods are available?**
  Control methods can be divided into two groups: management methods ('biotechnical methods') and chemical controls ('varroacides'). In practice, the best controls result from using a combination of methods at different times of the year depending on the level of infestation. This is commonly known as 'Integrated Pest Management' or 'IPM'.

- **What are 'pyrethroid resistant' mites?**
  In recent years varroa mites in some areas have developed resistance to pyrethroids – the active ingredients in the varroacides until now most commonly used to control them. As pyrethroids do not kill such mites other treatments need to be used instead. Resistance is expected to spread widely over the next few years – posing a new and significant challenge for beekeepers.

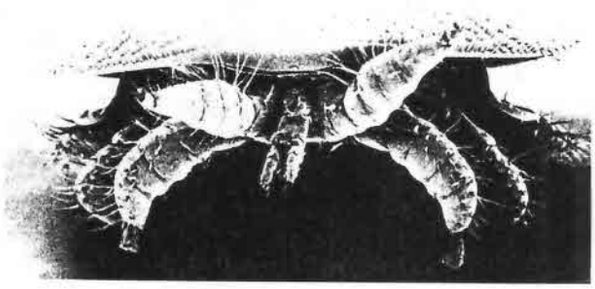
Varroa biology

Varroa destructor (Acari: Varroidae) is a species of mite – an animal group more closely related to spiders and ticks than to insects. Varroa lives as an external parasite of honey bees.



Garry Fry, CSL Photography Dept.

Figure 1: Close up of adult female varroa mite



Garry Fry, CSL Photography Dept.

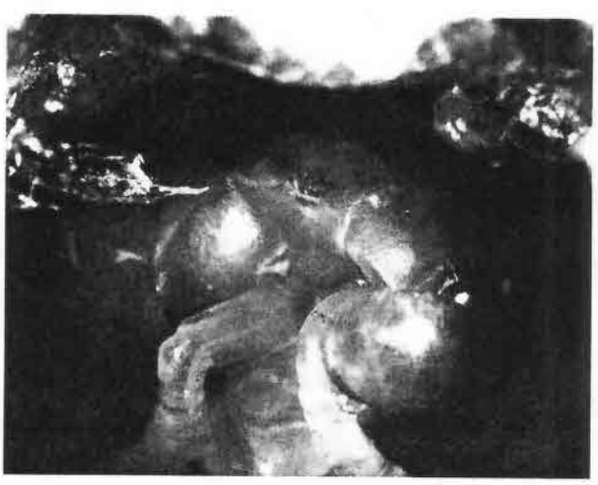
Figure 2: Scanning electron microscope (SEM) of adult female varroa mite

Feeding

Varroa can feed and survive on both adult bees and their brood. The mites feed on their host's haemolymph (blood) through punctures made in the body wall with their sharp mouthparts.

James Morton, CSL National Bee Unit

Figure 3: Varroa mites in different stages of development on a worker pupa



David Crossley, CSL Photography Dept.

Figure 4: Immature mites on pupa

Reproduction

The entire life cycle of *Varroa destructor* mites occurs within the bee hive. It consists of a phoretic stage (transport phase) as a parasite on adult bees and a reproductive stage inside the sealed brood cells. To breed, an adult gravid female mite (carrying eggs) enters occupied brood cells just before the cell is capped over, where she remains in the brood food under the larva until the cell is sealed. Mites prefer to breed in drone brood (10-12 times more frequently), but will also breed in worker brood. About four hours after capping she then starts feeding on the immature bee and establishes a feeding site on the developing bee that her offspring can feed from as they develop. You will see if you look carefully spots of white faeces or feeding sign of varroa around this site, usually towards the hind end of the developing pupa. These spots will also be seen on the cell walls. About 60-70 hours after capping the female lays the first of her eggs. For further details please see the life-cycle diagram.

Mating between male and female mite offspring occurs within the cell. Development of the mite is through two juvenile stages known as the protonymph and deutonymph before becoming an adult. Development time from egg to adult for males is 5-6 days and for females 7-8 days. Each female lays 5-6 eggs, the first being a male followed by 4-5 female eggs laid at regular 30-hour intervals. The varroa male emerges first, and the oldest daughter moults to adulthood 20 hours later. By laying only one male egg, varroa increases the number of females that can reproduce at the next generation. Since the males do not survive outside the cell, females must be fertilised before the bee emerges from the cell, otherwise they remain sterile.

The duration of each reproductive cycle is limited by the development time of the bee, so not all reach maturity and mate by the time the bee emerges from the cell. Males and any remaining immature females die, unable to survive outside the sealed cell. With heavy infestation, two or more female mites may enter the same cell to breed, and female mites may produce more than one generation.

Mature female mites leave the cell when the host bee emerges. Some of these may produce a second or third generation of mites by entering new brood cells. The success rate of reproduction (new mature female mites) in worker brood is about 1.7 to 2 but increases to between 2 and 3 in drone brood due to the longer development period. The development and status of a colony affects mite population growth, and depending on circumstances mite numbers will increase between 12 and 800 fold. This means that mite levels can return to a previous level 1 year after a high efficacy treatment has been applied.

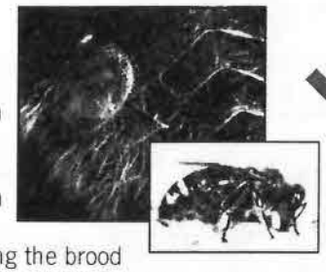
Life-span

The life expectancy of varroa mites depends on the presence of brood and will vary from 27 days to about 5 months. During the summer varroa mites live for about 2-3 months during which time, providing brood is available, they can complete 3-4 breeding cycles. In winter, when brood rearing is restricted, mites over-winter solely on the bodies of the adult bees within the cluster, until brood rearing commences the following spring.

How varroa spreads

Varroa mites are mobile and can readily move between bees and within the hive. However, to travel between colonies they depend upon adult bees for transport – through the natural processes of drifting, robbing, and swarming. Varroa can spread slowly over long distances in this way. However, the movement of infested colonies by beekeepers is the principle means of spread over long distances.

Life cycle of the Varroa mite *(Varroa destructor)* in the European honey bee *Apis mellifera*.



1 Varroa feed on the haemolymph (blood) of the bees by making punctures through the body wall with their sharp mouthparts. Mites have a preference for nurse bees. During the summer mites live for 2-3 months and readily transfer from bee to bee and brood cell to brood cell. In winter mites live much longer and over-winter on adult bees within the cluster until re-entering the brood the following spring. Feeding of the mites can weaken and damages bees and brood.

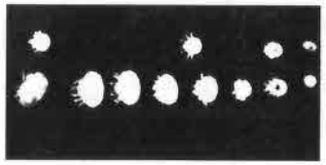
2 To breed, an adult female mite enters a brood cell just prior to capping, where she remains in the brood food under the larva until the cell is sealed. Mites prefer drone brood but will also breed in worker brood.

3 Four hours after capping the female mite begins to feed off the developing bee, and establishes a feeding site for her offspring. After 60-70 hours after capping the female lays the first of her eggs.

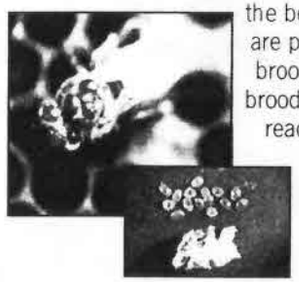
4 Each female mite lays 5-6 eggs, the first always being a male egg followed by 4-5 female eggs laid at regular 30 hour intervals. The male hatches first followed by the females. The male mite then mates with the female offspring within the cell.

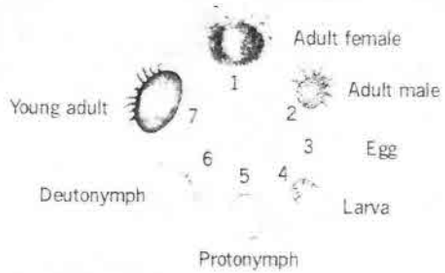
(Photograph courtesy of Wolfgang Ritter, CVUA Freiburg)

5 Development of the mite (from a larval stage formed within the egg) is through two principal juvenile stages: the protonymph and deutonymph before becoming an adult. Time from egg to adult for males is 5-6 days and for females 7-8 days.



6 The duration of each reproductive cycle is limited by the development time of the bee, so more mites are produced in drone brood than in worker brood. Not all females reach maturity and mate by the time the bee emerges from the cell. Mature female mites leave the cell with the emerging bee. Immature females and the males do not survive outside the cell. Severe damage is caused by the mites' feeding activities.

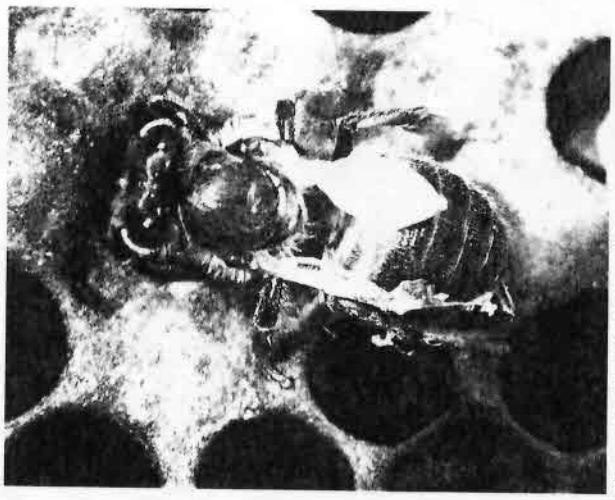




The entire life cycle takes place within the bee hive. It consists of a phoretic stage (transport phase) as a parasite on adult bees and a reproductive stage inside sealed brood cells.

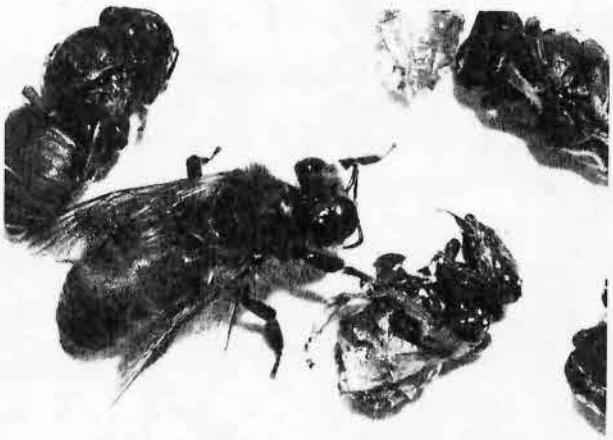
Effects on individual bees

Individual bees infested with varroa during their development usually survive to emergence but may show signs of physical or physiological damage as adults. These include shorter lifespan, weight loss, shrunken and deformed wings and reduced natural resistance to infections.



Richard Ball, CSL National Bee Unit

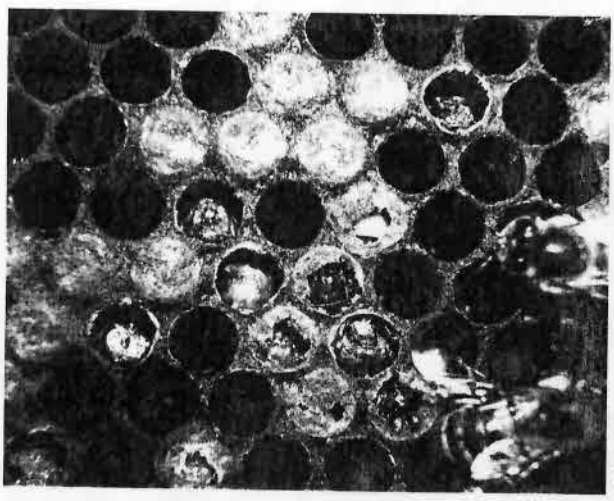
Figure 5: Worker bee with damaged wings caused by varroa feeding on the developing bee



Mike Brown, CSL National Bee Unit

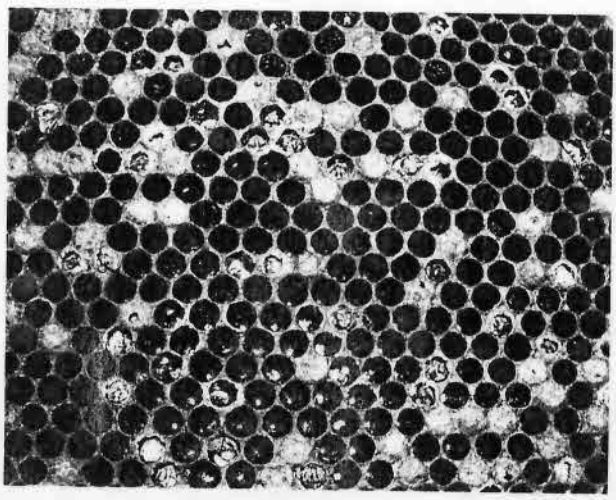
Figure 6: Varroa damage: normal bee on left, deformed bee on the right

Some brood infested by varroa may die, usually at the pupal stage of their development, and remain in the cell until removed by adult bees.



Mike Brown, CSL National Bee Unit

Figure 7: Damaged brood in a comb from a collapsing colony



Mike Brown, CSL National Bee Unit

Figure 8: Damaged brood: signs of severe infestation, also known as bee parasitic mite syndrome

Varroa, viruses and other pathogens

There are many bee viruses which are naturally present in the bee population at a low level without normally causing significant harm. As varroa feeds, as well as taking essential nourishment away from the developing bee, the mite, acting as the vector, can aid virus spread so that in heavily infested colonies they become much more widespread and potentially harmful by reducing the bees lifespan. Varroa may also worsen the harmful effects of other common bee diseases such as Acarapisosis (caused by the tracheal mite, *Acarapis woodi*).

Effects on colonies

Small numbers of varroa mites infesting a colony will usually cause it no obvious harm. However, as the level of infestation rises, the risk of harmful effects also rises.

In poorly managed colonies where infestation is allowed to increase, signs of damage to the entire colony start to become evident. Severe infestation slows the replacement of old adult bees with healthy young bees, and may lead to the rapid spread of harmful bee viruses in the colony. At this stage, the normal processes of foraging, brood rearing and colony defence diminish and the colony's entire social organisation begins to deteriorate – a process known as colony collapse.

Frequently colony collapse is very rapid (taking only a few weeks) and may affect even strong colonies that have shown no outward signs of damage. However, a closer look would reveal many mites on adult bees (with deformities) and heavily infested sealed drone and worker brood, often with many mites per cell.

Colony collapse can occur at any time of the year but in the UK seems to occur most often in August and September. However, spring colony collapse, which in turn leads to mite invasion of neighbouring colonies, can be quite common in March, April possibly into May. These mites add to varroa populations already present, which could mean that colony collapse could occur earlier than anticipated i.e. before the end of the summer. It is important to check mite levels in spring to verify whether invasion has occurred.

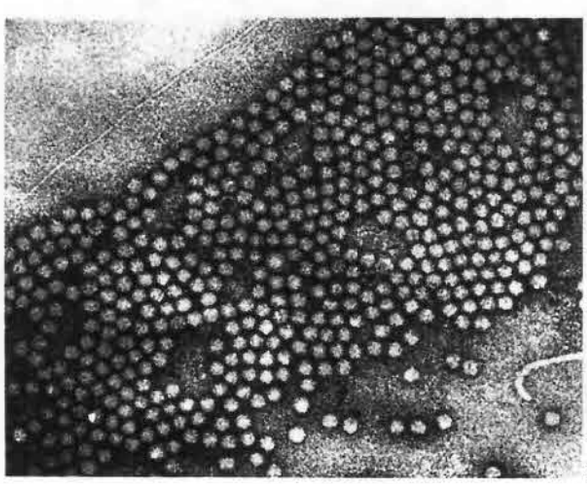
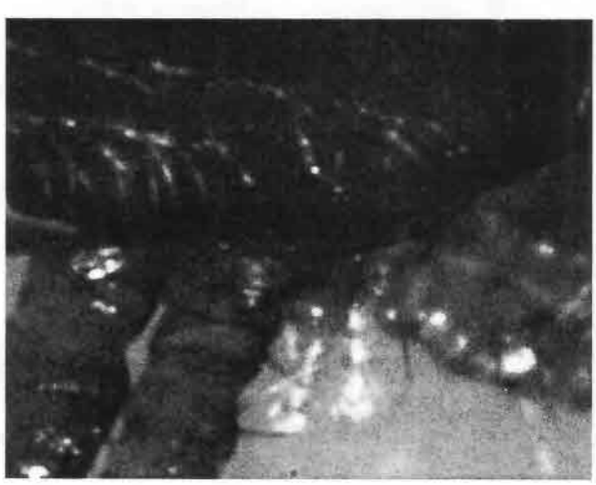


Photo courtesy of Brenda Ball, Rothamsted Research

Figure 9: Electron micrograph of particles of Acute Bee Paralysis Virus (ABPV), representative of any 30nm virus particles in bees



David Crossley, CSL Photography Dept.

Figure 10: Feeding of the mites transmits virus particles

The signs of colony collapse

- A sudden decrease in the adult bee population, usually with few dead adult bees present.
- Bees with deformed wings and abdomens.
- Numerous varroa mites on remaining bees, on worker and drone pupae, and on the hive floor.
- Various abnormalities of the brood (e.g. bald brood, poor brood pattern, patches of neglected and dead brood often discoloured brown and partly removed by the bees. *Caution: make sure that these signs are not caused by foul brood infection (See CSL/Defra leaflet 'Foul brood disease of honey bees: recognition and control' PB3053.)*

Harmful mite population threshold

There is no clear harmful threshold at which a mite population suddenly causes harm. A mite population that causes no obvious damage to one colony may prove very damaging to another. This can be due in part to differences in the levels and types of bee viruses and other pathogens present in the colonies and the bees' natural ability to tolerate varroa, as well as environmental factors.

However, in the UK researchers agree that it is wise to aim to keep the varroa population below about 1000 mites; above this level the risk of damage from the mites, associated pathogens and the effect of feeding on the bees can quickly become very significant. In Europe and parts of the United States higher threshold levels of around 4000-5000 mites are generally used.

Mite invasion pressure

The movement of mites between colonies, spread by adult bees, can play a key role in the mite population build-up. It can occur at any time of the year when bees are active. In areas of high colony density with heavily infested colonies, the rate of mite invasion can be extremely high, and populations may build up to damaging levels in a short time – sometimes in a matter of a few weeks or months.

Varroa population increase

Varroa populations in infested colonies increase naturally through two processes – the reproduction of mites in brood cells, and the influx of new mites into the colony through invasion.

Figures 11 to 13 illustrate these two processes. To keep them simple they are based on the assumption that mite populations double through mite reproduction approximately every four weeks – although in reality the situation is more complicated as many factors (such as the amount of worker and drone brood present) influence the rate of mite reproduction.

Figure 11 illustrates the increase in the mite population for colonies infested with differing numbers of mites at the start of the season (and without any mite invasion from outside). During the 180 days shown, mite populations build up steadily. Where only very few mites are initially present the mite population remains well below the harmful threshold of 1000 mites for the entire period shown. However, colonies starting with larger numbers of mites build up to harmful levels much faster. It is essential to ensure mite populations are as low as possible at the beginning of the active rearing season.

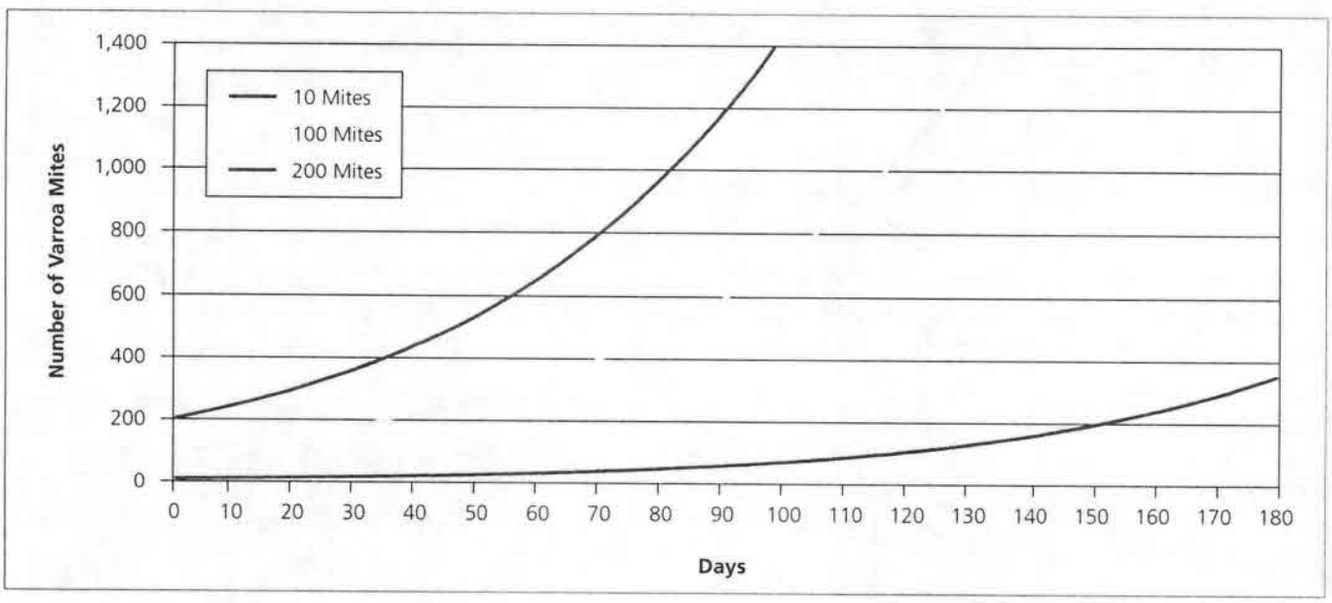


Figure 11: Effect of initial mite numbers on subsequent population growth

Figure 12 illustrates the effect of mite invasion. Where a small number of mites are present at the start of the season and no mite invasion occurs the mite population remains below 1000 during the whole period shown. However, mite invasion early in the season causes the mite population to reach harmful levels much more quickly – depending on how many mites invade the colony.

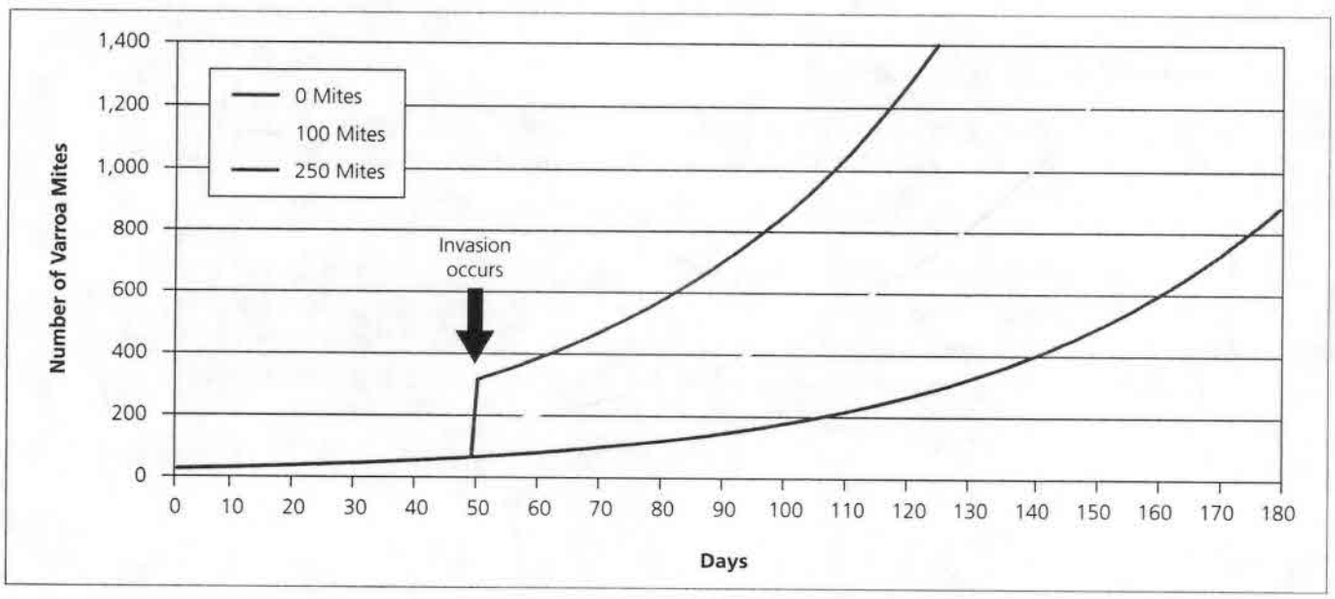


Figure 12: Effect of mite invasion on subsequent mite population growth

Figure 13 shows the increase in the mite population that occurs following treatment (for example with a varroacide). The fall in the mite population when treatment is applied depends on the treatment's efficacy. The mite population takes much longer to return to a harmful level when a very effective treatment is applied than when less effective treatments are used. Understanding these principles is essential for you to successfully use the principles of varroa monitoring and control described later in this leaflet.

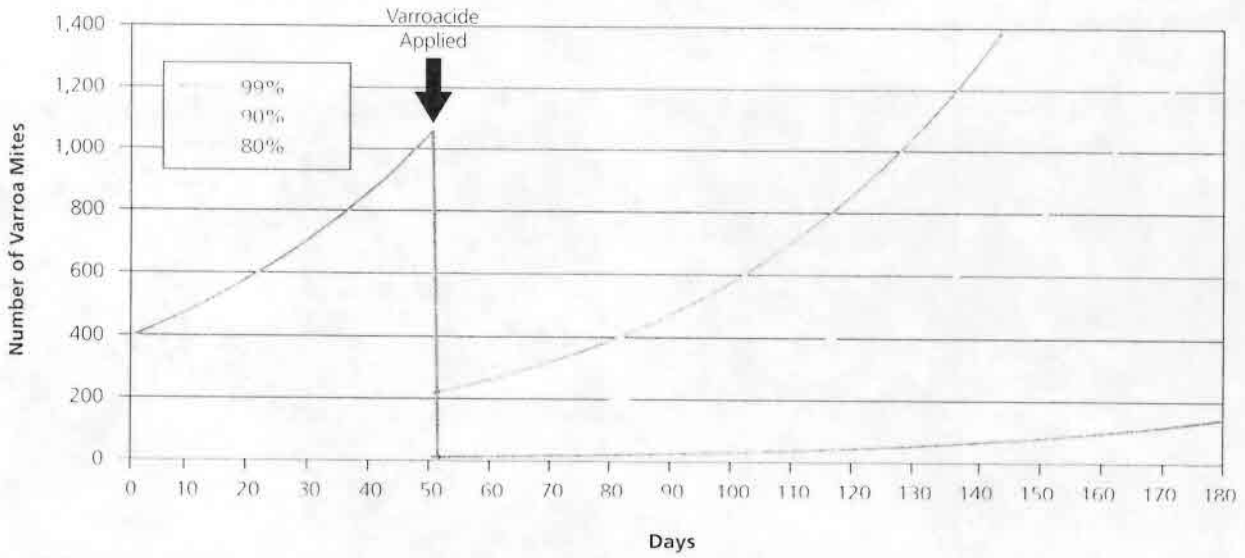


Figure 13: Effect of treatment efficacy on subsequent mite population growth

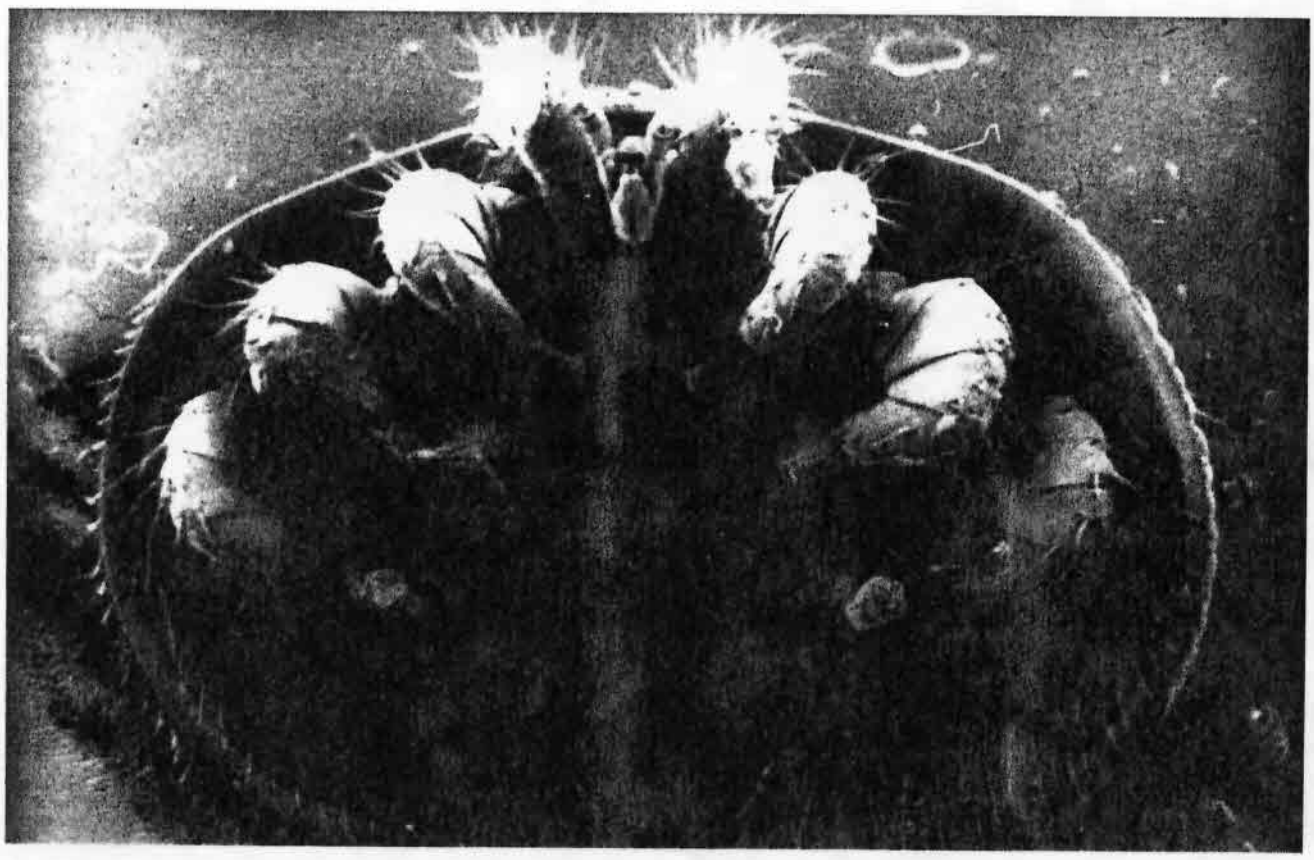


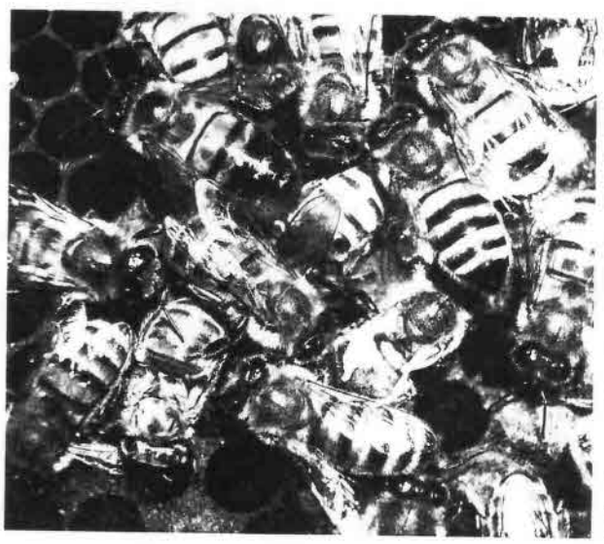
Figure 14: SEM varroa mite showing mouth parts, legs and ventral surface

How to recognise and monitor varroa

Varroa management is an essential part of contemporary beekeeping. All beekeepers need to make sure that they are able to recognise varroa mites in their hive, and to have one or more methods at their disposal for estimating how serious the infestation is.

Garry Fry, CSL National Bee Unit

Figure 15: Close-up of adult female varroa mite



Mike Brown, CSL Natioal Bee Unit

Figure 16: Varroa mites clearly visible on thorax of worker bees

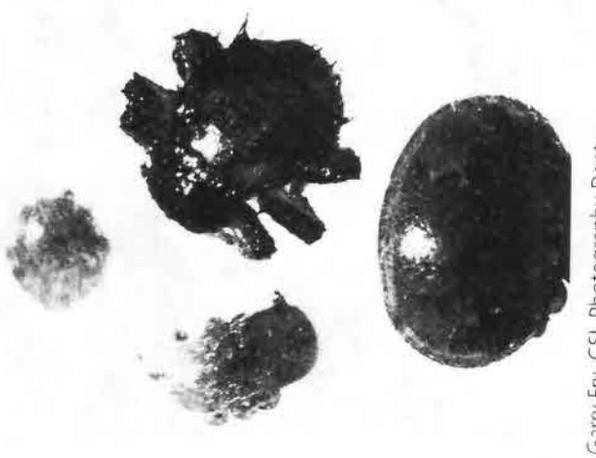
Recognising varroa

Female varroa mites are easily recognised by their flat, reddish-brown oval bodies (1.6 x 1.1mm). Immature female mites and male varroa mites exist only in brood cells and are smaller and pale in colour.

Since varroa mites are very small, if you wear glasses for reading, you will probably need to wear them to see varroa. Some beekeepers find a hand lens helpful too.

James Morton, CSL National Bee Unit

Figure 17: Braula coeca



Garry Fry, CSL Photography Dept.

Figure 18: Braula coeca compared to varroa, Tropilaelaps and Melittiphis

The bee-louse, *Braula coeca* (a wingless fly that lives harmlessly on adult bees) may be confused with varroa. It can be distinguished from varroa by its more rounded shape and its six legs which are readily visible on both sides of its body. Two other mites that beekeepers need to be able to

distinguish are *Tropilaelaps* spp. (bottom image Fig 18) and *Melittiphis alvearius* (far left image Fig 18). Tropilaelaps is a serious exotic pest of honey bees and is notifiable (please see CSL/Defra leaflet Tropilaelaps: parasitic mites of honey bees PB 10780). Melittiphis mites are predatory mites, preying on scavenger mites that occur in bee hives. They do not harm honey bees or their brood.

Monitoring varroa

When you find varroa for the first time, you must learn to regularly estimate the level of infestation throughout each season. Infestation will build up more quickly in some years than in others and more quickly in some apiaries than others. A control programme that was effective one year will not always be effective in another.

Monitoring your colonies routinely can tell you how mite infestation is developing. You can then use this information to decide what and when control methods will be appropriate.

A range of monitoring methods is available to use – ranging from the quick and approximate through to the complex and more accurate. You will have to decide which of these suit your own individual beekeeping practices.

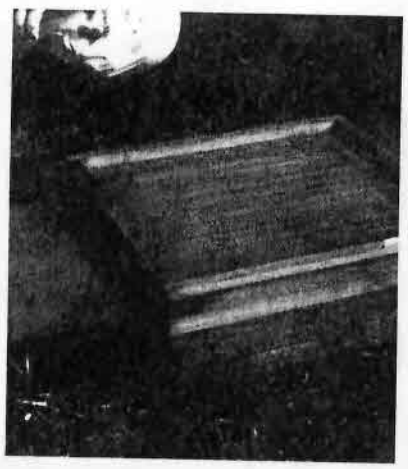
Monitoring tips

How often should I monitor?

Ideally, you should aim to monitor at least four times each season: early spring, after the spring honey flow, at the time of honey harvest, and late autumn. If you think significant mite invasion is taking place then the frequency with which you monitor should be increased.

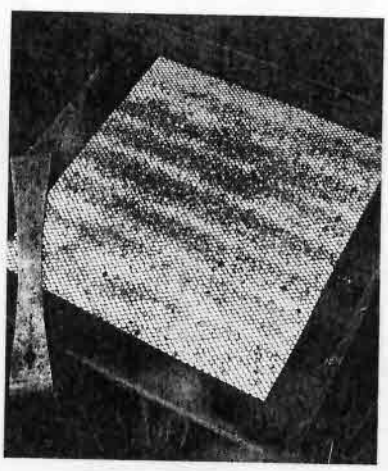
How many colonies should I monitor?

Mite levels vary significantly between colonies so ideally you should monitor all of your colonies. However, this may be impractical for larger scale beekeepers who should instead monitor a representative proportion of colonies in each apiary. Make sure you include some of the strongest colonies as these often have the highest mite populations.



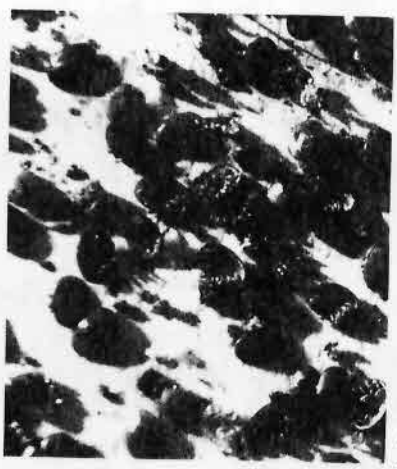
Medwin Bew, CSL National Bee Unit

Figure 19: A screened floor suitable for monitoring natural mite fall. A typical floor will have 3mm metal mesh and a mite catching drawer/tray underneath



Mike Brown, CSL National Bee Unit

Figure 20: Varroa floor with insert covered in hive debris



Mike Brown, CSL National Bee Unit

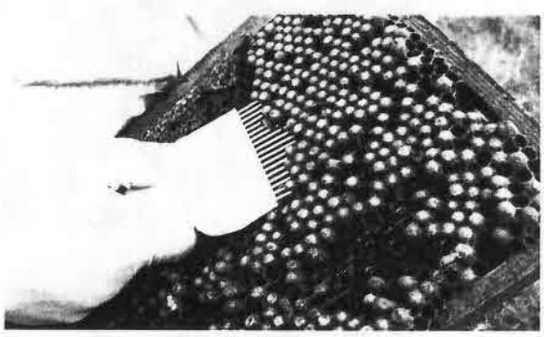
Figure 21: Hive floor debris containing mites

How to monitor colonies for varroa

Table 1: Some commonly used varroa monitoring methods

Method: Monitoring natural mite mortality ('mite drop')	Pros and Cons
1. Maintain the colony on a varroa-floor with a sampling drawer/tray underneath. 2. Remember to remove debris from the drawer/tray regularly during the summer to prevent severe wax moth infestation. 3. At intervals examine the floor debris and count the number of varroa mites. Convert this to a daily 'mite drop' figure by dividing by the number of days since the last measurement. 4. If there is a lot of debris (e.g. after winter) mites will be very difficult to find. Mix the debris with methylated spirit in a large container. Most dead mites will float to the surface whereas wax and propolis particles will sink. 5. Research work in the UK and overseas has shown a natural mite drop in a colony is related to the size of the varroa population. 6. UK research suggests that colony collapse is very likely before the end of the season if average daily mite drop for a normal colony exceeds the following: winter/spring=0.5 mites; May=6 mites, June=10 mites, July=16 mites, Aug=33 mites, Sep=20.	✓ sensitive method capable of detecting very few mites ✓ can give a good idea of infestation level ✓ colony is not disturbed ✘ needs additional equipment ✘ monitoring takes several days ✘ encourages wax moths if debris accumulates

Method: Drone brood uncapping	Pros and Cons
1. Select an area of sealed drone brood at an advanced stage (pink-eyed) as this is least likely to disintegrate when removed. 2. Slide the prongs of a honey uncapping-fork under the domed cappings, parallel to the comb surface, and lift out the drone pupae in a single scooping motion. (see Figures 22-25 below and Figure 51 on page 29). 3. Varroa mites are easily seen against the pale drone bodies. Repeat until at least 100 cells have been examined. 4. Estimate the proportion of pupae that have varroa mites on them. 5. Very roughly, if more then 5-10% of drone pupae are infested, then the infestation is serious and the colony collapse may occur before the end of the season.	✓ quick and easy to use ✓ can be used during routine colony inspections ✓ gives instant indication of infestation level ✘ unlikely to detect a very light infestation ✘ results are approximate



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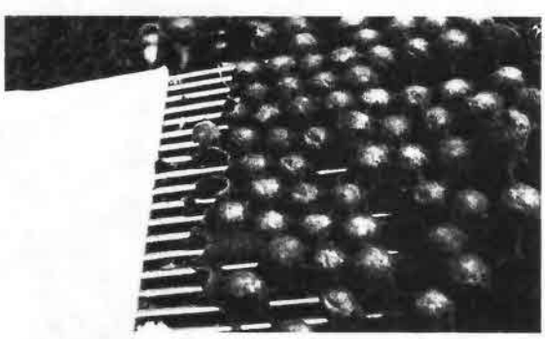

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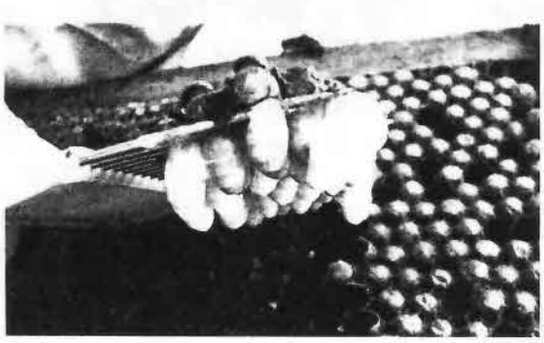

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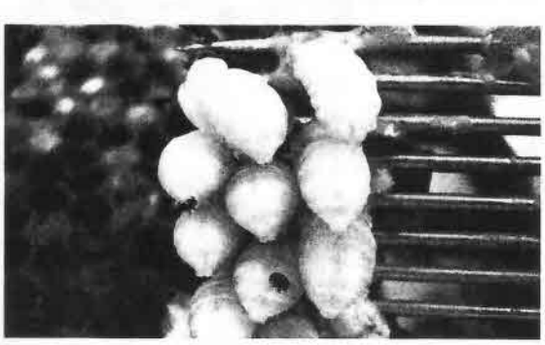

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Figs 22 to 25: Drone brood uncapping

The aim of varroa control

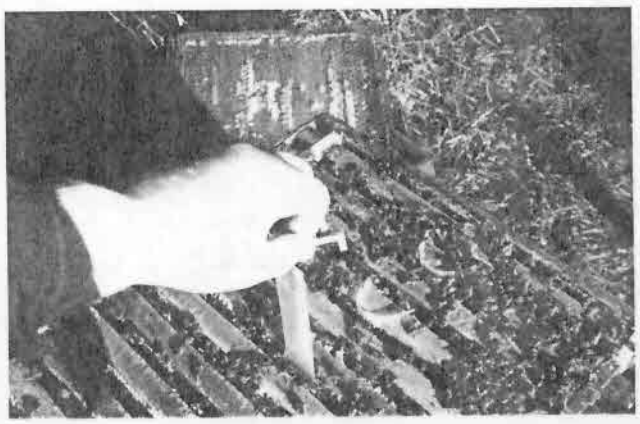
The fundamental aim of varroa control is to keep the mite population below the level where harm is likely, (known as the economic injury level), therefore maintaining healthy colonies of bees for the production of honey and other hive products, and for pollination. It is not necessary to kill every single mite for effective control and it is not usually desirable to attempt this. However, the more mites that are left behind, the quicker they will build up to harmful levels again (see Figure 11). With 80% efficacy the danger level (of 1,000 mites) is reached again in only 65 days, with 90% in 100 days and with 99% population growth is slow so that assessments can be made the following season.

Types of controls

Current control methods used by beekeepers against varroa can be divided into two main categories:

'Varroacides' – The use of chemicals to kill mites (or otherwise reduce their numbers). These are applied in feed, directly on adult bees, as fumigants, contact strips or by evaporation. These may include authorised proprietary veterinary medicines and unauthorised generic substances.

'Biotechnical Methods' – The use of methods based on bee husbandry to reduce the mite population through physical means alone. Many of the most popular and effective methods involve trapping the mites in combs of brood which are then removed and destroyed.

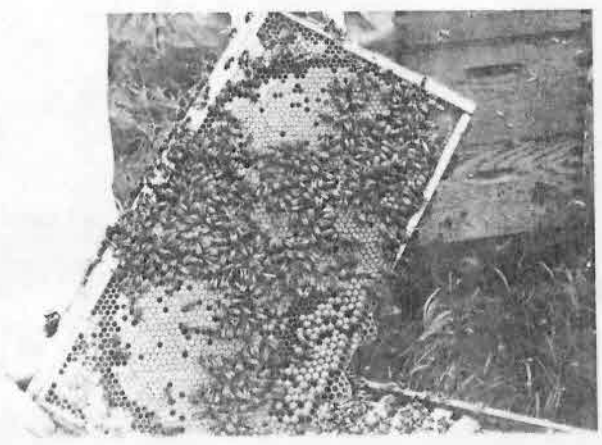


Richard Ball, CSL National Bee Unit

Figure 26: Beekeeper putting in varroacide medicament strips

Mike Brown, CSL National Bee Unit

Figure 27: Oil seed rape, a major UK honey crop



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Figures 28 to 30: Successful beekeeping depends on effective varroa management

Table 2: Advantages and disadvantages of biotechnical methods and varroacides

	Advantages	Disadvantages
Biotechnical methods	✓ Do not require the use of chemical varroacides ✓ Can be combined with summer management ✓ Inexpensive or free	✘ Can be time-consuming ✘ Some need a high level of beekeeping skill ✘ Generally not sufficient if used alone ✘ Misuse can harm colonies
Authorised varroacides	✓ Proven efficacy ✓ Proven safety ✓ Convenient to use	✘ Mites likely to develop resistance ✘ Residue problems in bee products if misused ✘ Can be expensive
Unauthorised varroacides (generic substances)	✓ Some can be very effective ✓ Usually relatively cheap ✓ Natural substances (usually) ✓ Many present low residue risk ✓ Some offer control options not currently provided by biotechnical or authorised varroacides	✘ Use not approved by law in most situations ✘ Efficacy may be low/variable ✘ Safety typically not proven: some present serious risks to bees and beekeeper ✘ Some present risk of residues in bee products

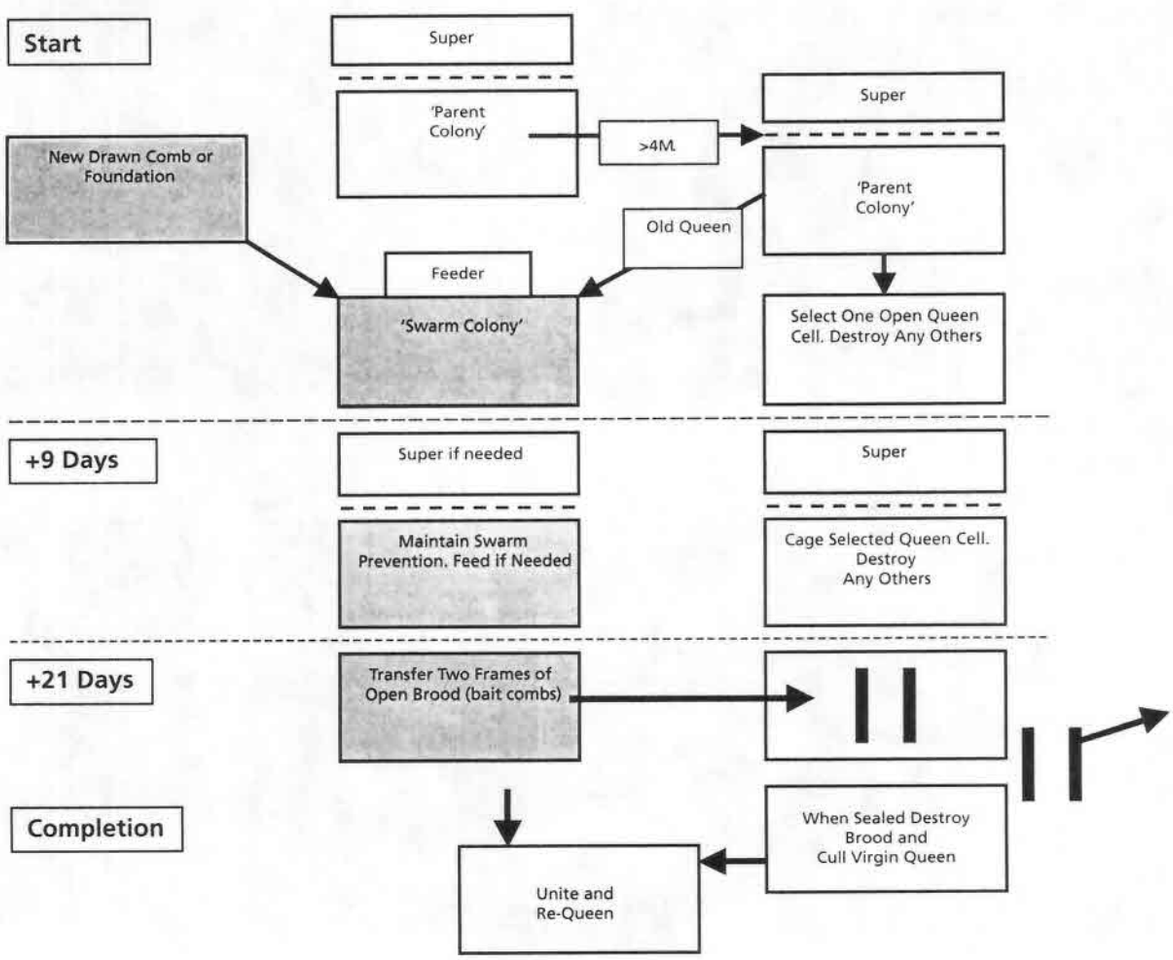


Figure 31: Diagram illustrating the control of varroa using an 'Artificial Swarm' (see page 15 opposite)

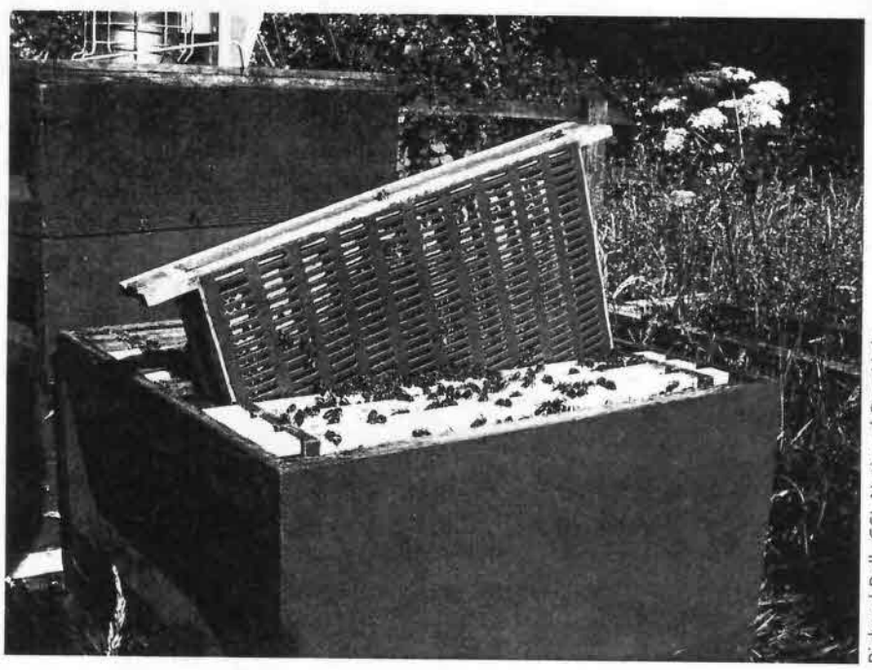
Table 3: Some commonly used biotechnical methods

Method	How to use	Main features
Drone brood removal (see Figures 34 and 35)	1. Place two shallow combs in the brood chamber in spring, and allow the bees to build natural drone comb beneath them. A good time to put these in the colony is when the queen first begins to lay up drone brood. Place the combs in the colony one at a time and alternate at 9 day intervals (a run of alternating pair of frames). Another option is to use an empty deep frame fitted with a starter strip of foundation to avoid possible misshapen comb. 2. When a drone comb is full of sealed drone brood (infested with varroa), cut it from the frame **before it emerges** and destroy it. Failure to do this will breed more mites. The frame can be re-used immediately. 3. Repeat the process several times in the season for maximum effectiveness.	✓ easy to use ✓ no special apparatus required ✓ no varroacide used ✓ well tolerated by colony ✘ time-consuming ✘ useful, but limited efficacy
Comb trapping (see Figures 32 and 33)	1. Confine the queen to a worker comb 'A' using a purpose-made comb-cage (available commercially). 2. After 9 days confine her to a new, empty comb 'B' and leave comb 'A' in the brood chamber to become infested with mites. 3. After a further 9 days remove comb 'A' (now sealed). Confine the queen to a new comb 'C', leaving comb 'B' in the brood chamber. 4. After 9 more days remove comb 'B'. Release the queen (or re-queen by introducing another queen) leaving comb 'C' in the brood chamber. 5. After 9 more days, remove comb 'C'.	✓ can be very effective ✓ no varroacide used ✓ more bees recruited to foraging ✘ time-consuming ✘ requires good beekeeping skill ✘ can harm/weaken the colony if used without regard to time of season (e.g. late summer)
Artificial swarm (see Figure 31)	1. Move parent colony to one side of the original site, at least 4 metres away. 2. Place a second hive containing newly drawn combs and the queen (alone) on the original site to house the artificial swarm. Foragers will return to this hive creating the artificial swarm. 3. After 9 days remove all but one queen cell from the parent colony. The cell can be protected in a queen cell nursery cage which prevents the virgin queen from leaving the hive to mate, but allows worker bees access to care for her. 4. After 3 weeks all brood in the parent colony will have hatched. Transfer two bait combs of unsealed brood from the artificial swarm to the parent colony, and when they are capped, remove and destroy them. At this stage, cull the virgin and introduce a new queen to the parent colony. 5. The old queen in the swarm can later be removed and the two colonies reunited.	✓ combines swarm control with varroa control ✓ removes a high proportion of varroa mites present ✓ new queen introduced ✘ only suitable for use in the swarming season ✘ it may be necessary to take precautions to prevent absconding in the artificial swarm – such as placing a queen excluder below the brood chamber for a few days
Open mesh Floors (see Figure 19)	1. Fit a mesh varroa-monitoring floor (without a collection tray) to the hive. 2. Many of the mites falling from the colony are alive. The mesh floor allows these to drop out of the hive rather than returning to the colony. 3. Used in conjunction with other control methods this method helps keep mite numbers down.	✓ open mesh floor removes some live varroa ✓ no debris on floor to encourage wax moths ✓ improves hive ventilation ✓ can use collection tray to measure mite drop when required ✘ not sufficient if used alone

Using biotechnical controls

Biotechnical control methods allow beekeepers to control varroa without the use of chemical varroacides. This makes them especially useful during the active season when supers are on the hive and using a varroacide may not be appropriate. By using biotechnical methods, beekeepers can keep their use of chemical varroacides to an absolute minimum – or enable them to use varroacides that they may prefer but which have relatively low efficacy.

Some sophisticated biotechnical methods such as **'comb trapping'** (see Table 3 and Figure 33) can be extremely successful, with an efficacy similar to that of proprietary varroacides. However, such methods tend to be relatively time consuming and complicated to use and are critically dependant on good timing, so are most suitable for experienced and small-scale beekeepers.



Richard Ball, CSL National Bee Unit

Figure 32: Comb trapping – an effective biotechnical control method

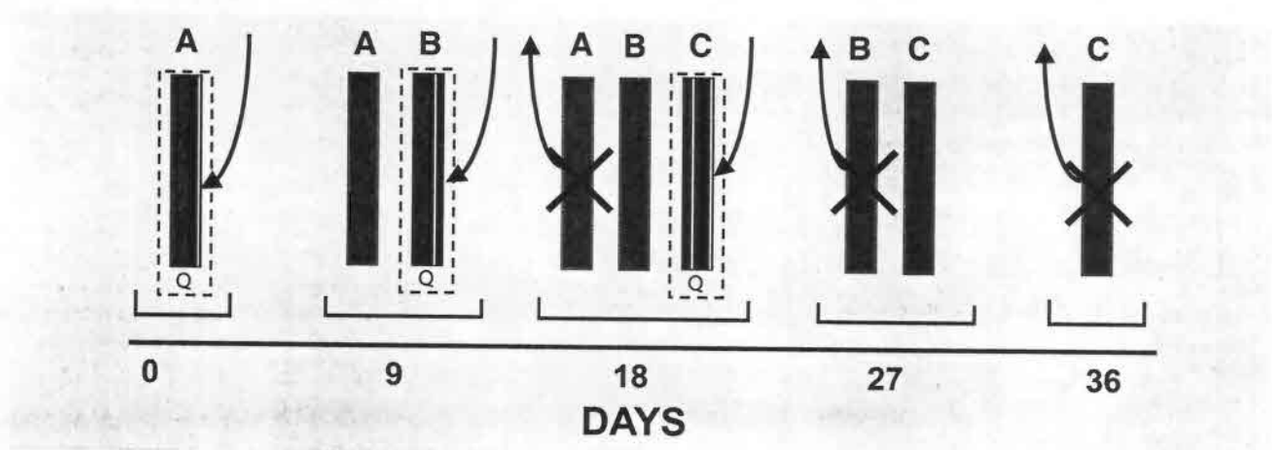


Figure 33: Comb trapping timetable. The queen ('Q') is caged for 9 days on three combs ('A', 'B' and 'C') in succession. These each remain in the colony for a further 9 days while varroa mites enter the brood cells to breed. The combs containing mites 'trapped' in sealed brood are then removed. See 'Comb Trapping' (page 15) for details

Other methods, such as **'drone brood removal'** (see Table 3) are much quicker and less complicated to use. Although less effective, they can play a valuable role in slowing mite population build-up and so reducing the frequency that other control methods need to be used.

One of the advantages of biotechnical controls is that their use can often be naturally combined with other beekeeping operations. For example, drone brood removal fits in well with routine swarm control inspections. There are some very effective methods that combine swarm-control with varroa control (see Table 3). Such methods are likely to grow in popularity as beekeepers become more familiar with them.

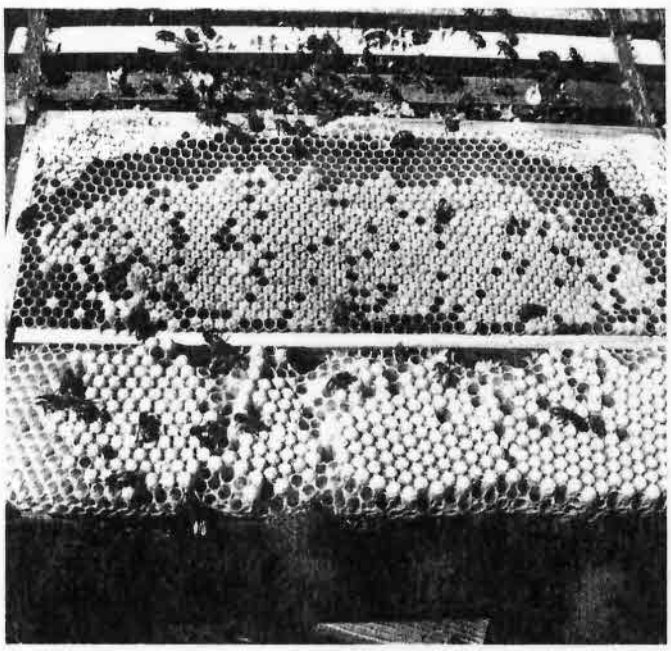


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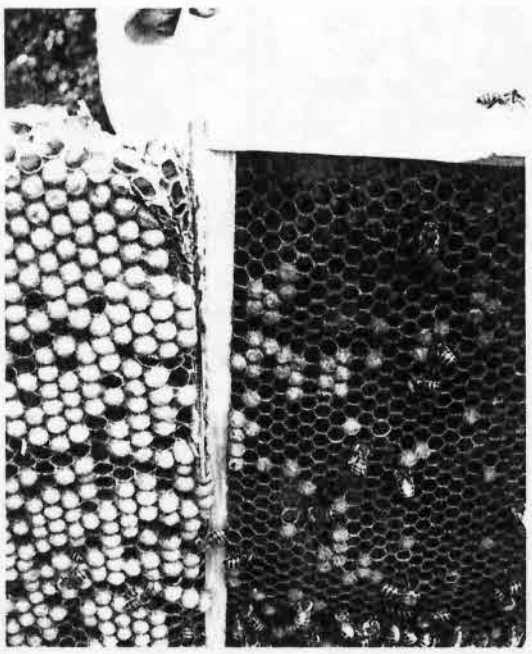
Figure 34: Drone brood removal



Mike Brown, CSL National Bee Unit

Figure 35: Drone brood removal, cutting away the capped drone brood

Despite these advantages, as a result of their nature, most biotechnical methods are only suitable for restricted periods of the year. Outside these periods they may be ineffective and harmful to the colony. As a general rule, in heavily infested apiaries biotechnical methods are unlikely to provide sufficient control of varroa if used alone and so will need to be used in conjunction with chemical varroacides.

'Hard' versus 'soft' varroacides

For most beekeepers, varroacides are a key element of their varroa control programme. Some beekeepers like to distinguish between varroacides by calling them 'hard' varroacides (synthesised proprietary chemicals) or 'soft' varroacides (chemicals that may be synthesised but which are also found in nature e.g. formic acid, essential oils). This is misleading. Many so-called 'soft' chemicals are quite harmful in concentration. A better distinction is between authorised varroacides (veterinary medicinal products fully tested for efficacy and safety) and unauthorised alternative varroacides (use of natural, generic substances in non-approved applications).

Authorised varroacides

Under EU law, veterinary medicinal products must be authorised in the Member State concerned before they may be marketed or administered to honey bee colonies. Authorisation requires a thorough scientific assessment of data to show that the product meets statutory levels of quality, efficacy and safety (to the user, bees, consumers of bee products and the environment). In the UK, the Veterinary Medicines Directorate (VMD), an agency under Defra, has responsibility for the authorisation and control of veterinary medicines.

The veterinary medicines legislation does not allow a veterinary medicinal product authorised in one Member State to be automatically authorised in another. This is because there may be differences in beekeeping techniques, disease patterns, or environmental factors that may affect its safe and effective use. However, under the principle of 'mutual recognition' a simplified procedure can apply to the authorisation of a varroacide that already has a marketing authorisation in another Member State. In order to obtain an authorisation an application must be submitted in accordance with the requirements in the legislation.

Use of non-approved generic substances

In many European countries, including the UK, some beekeepers have used generic naturally occurring substances including organic acids (such as formic acid, lactic acid and oxalic acid) and essential oils (such as thymol) as part of their varroa control programme.

In most cases, no formal testing of efficacy or safety of these substances has taken place, and therefore there is a danger that they might be ineffective, harmful to bees, the environment or the user, or leave harmful or otherwise undesirable residues in bee products. Beekeepers contemplating their use need to be aware that personal protective clothing (such as gloves, face and eye protection, and respiratory protection) may be necessary. Beekeepers should also be aware that they may be liable to be prosecuted should the routine sampling and testing of products for residues find positive results.

The legal position relating to the use of such generic substances is complex, and is likely to be affected by changes in the veterinary medicines legislation due to come into force in October 2005. This legislation controls the manufacture, marketing, supply, administration and residues of veterinary medicinal products (VMPs).

Under the existing legislation, it is not legal to market or to administer a VMP that is not authorised by the VMD. However, an exception exists under the 'prescribing cascade'. Where no VMP is authorised for a condition in a particular species this allows a veterinary surgeon to prescribe or administer certain other defined categories of medicine under controlled conditions of use. In circumstances where a veterinarian concluded, on the basis of his/her professional and clinical judgement, that an authorised product was not appropriate in a particular case (because of problems with resistance for example), this may currently allow the use of lactic acid, but not formic acid and oxalic acid.

In the new legislation it is anticipated that a provision will be included to allow a veterinarian acting under the cascade to use a product authorised in another Member State (subject to certain conditions and restrictions) or to use an extemporaneous preparation provided the active ingredient has a Maximum Residue Limit (MRL) defined. As lactic, formic, and oxalic acids all are listed as not requiring an MRL (in Annex II of Council Regulation (EEC) No 2377/90) they will be able to be used under prescription by a veterinarian in accordance with the prescribing cascade provisions. Further information on administration controls and the prescribing cascade is available on the VMD website (www.vmd.gov.uk). Advice on the current provisions is in AMELIA guidance note no. 8 and on the new provisions in Veterinary Medicines Guidance Note 15.

Misuse of agrochemicals

The active ingredients of many proprietary varroacides were originally developed to control pests of crops or livestock. When marketed as varroacides, they are specifically formulated for safe and effective use with bees. Under the authorisation process the specific formulation, along with the container and packaging (which may affect chemical stability) and the labelling, is assessed for use in accordance with the manufacturer's instructions. Home-made concoctions made with the active ingredients of these (often available as agrochemicals) should never be used. These pose serious risks to the user, to bees and can leave harmful residues in bee products. Furthermore, misuse of this sort has been attributed to rapid development of resistance in countries overseas.

Chemical residues in bee-products

Any chemical substance applied to bee colonies has the potential to leave residues in bee products. The risk of these being harmful can be minimised by the following rules.

- Use authorised products with proven track record in preference to alternatives that may lack reliable residue data.
- Always follow the label directions supplied with all authorised products.
- Never treat immediately before or during a honey-flow, or while supers are on the hive unless the label directions of an authorised product specifically permit this.

Residues monitoring programme

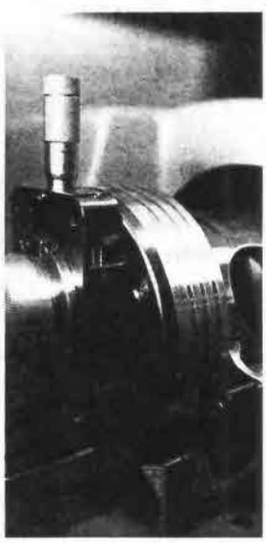
In the UK, the VMD carries out a National Surveillance Scheme to protect consumers against potentially harmful residues of veterinary medicines and other contaminants in food. Samples for the honey monitoring programme are collected on behalf of the VMD by CSL Bee Inspectors during their apiary visits and are analysed for a range of possible contaminants including residues of varroacides. Individual results are given to the beekeepers concerned and the overall findings of the programme are published annually by the VMD.

Beekeepers should be aware that they may be liable to be prosecuted should the routine sampling and testing of products for residues find positive results. Keep accurate records of what treatments you give your bees, including all relevant details such as dates, dose, product name and batch number. In the event of a later problem, this legal requirement is your proof that you acted properly.

Mike Brown, CSL National Bee Unit

Figure 36: 'Bagged and securely tagged' honey sample, collected as part of the statutory residue monitoring programme

Garry Fry, CSL Photography Dept.



Garry Fry, CSL Photography Dept.

Figures 37 and 38: Testing honey samples for residue analysis

Varroacides and your responsibilities under the law

- Use UK Authorised Varroacides and follow strictly the manufacturer's instructions for their use. By doing so, you can be quite sure that you are remaining within the law.
- The rules for use of generic substances in bee colonies are complex and changing. Make sure that you have reliable and up to date information on the legal status of any other treatment you may be considering.
- Keep accurate records of what treatments you give your bees, including all relevant details such as dates, dose, product name and batch number. In the event of a later problem, this legal requirement is your proof that you acted properly.
- You may be requested to provide a sample of your honey for residue analysis as part of the VMD's residue monitoring programme.

Table 4. Some varroacides commonly used by beekeepers in the European Union

Name	Authorised	Active ingredient (a.i)	How applied	How spread within the bee colony	When normally applied	Significant features
Bayvarol® (Bayer)	**UK**	flumethrin (synthetic pyrethroid)	Plastic strips hung between brood combs	Contact	Autumn or early Spring for 6 weeks	Highly effective >95%; can be used during honey flow; too similar to Apistan to use with it as alternating treatment
Apistan® (Vita Europe)	**UK**	tau-fluvalinate (synthetic pyrethroid)	Plastic strips hung between brood combs	Contact	Autumn or early Spring for 6-8 weeks	Highly effective >95%; can be used during honey flow; too similar to Bayvarol to use with it as alternating treatment
Apiguard® (Vita Europe)	**UK**	thymol (terpene)	Slow release gel matrix (25% a.i.); two 50g pack treatments with 10-15 day interval	Evaporation, contact, ingestion	Spring or late Summer after honey harvest for 4-6 weeks.	90-95% efficacy with optimum conditions; depends on temperature and bee activity. When using ensure varroa mesh floors are closed and vents in crownboards are covered
Apilife-VAR® (LAIF)	**Not UK**	thymol, eucalyptol, menthol, camphor	Vermiculite carrier matrix	Evaporation	Autumn for 8 weeks	Temperature dependent; high efficacy up to 70-90% but some variability; Easy to apply
Apivar® (Biové)	**Not UK**	amitraz	Plastic strips hung between brood combs	Contact/ systemic	Autumn or Spring/early Summer for 6 weeks	Highly effective; can be used during honey flow
Exomite *Apis*® (Exosect)	**Not UK**	thymol in electrostatically charged powder	Powder in application tray at hive entrance	Contact	Spring or Autumn after honey harvest for 24 days	Efficacy not fully evaluated
Perizin® (Bayer)	**Not UK**	coumaphos (organophosphate)	Solution trickled over bees	Contact/ systemic	Late Autumn/Winter and broodless periods	Ideally needs broodless conditions
Formic acid (generic)	**Not UK** (Note 1)	formic acid (60 or 80% solution)	Evaporator kits (commercially available)	Evaporation	Late Summer/Autumn	Kills mites in sealed brood cells; temperature dependent; efficacy up to 80 to 90% (2 treatments) but high variability; brood and queen loss if misused; highly corrosive
Lactic acid (generic)	**Not UK** (Note 2)	lactic acid solution	Acid solution sprayed over combs of bees	Contact	Winter and broodless periods	Ideally needs broodless conditions; Causes skin burns; respiratory irritant
Oxalic acid (generic)	**Not UK** (Note 2)	oxalic acid solution	3.2-4.2% acid solution in 60% sucrose trickled over combs of bees; 2.5ml per brood comb	Contact (not ingestion, despite sugar presence). Sublimation	Winter and broodless periods	Ideally needs broodless conditions; 90% average efficacy possible; sugarless solutions have poor efficacy; danger of significant colony weakening; more scientific trials needed; highly toxic by inhalation, ingestion or skin absorption

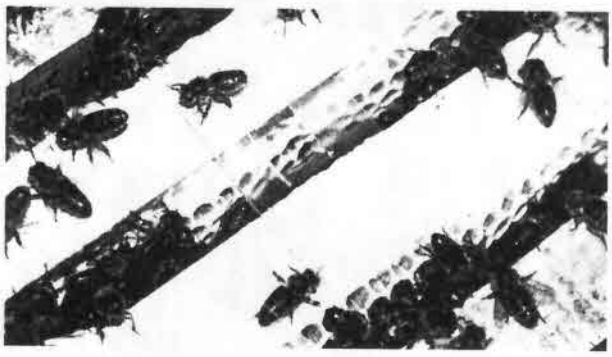
Note 1 Not authorised in any EU Member State, except in Germany when used in conjunction with Illertisser mite plates or Nassenheider evaporators only.

Note 2 Not authorised in any EU Member State, but tolerated in many countries.

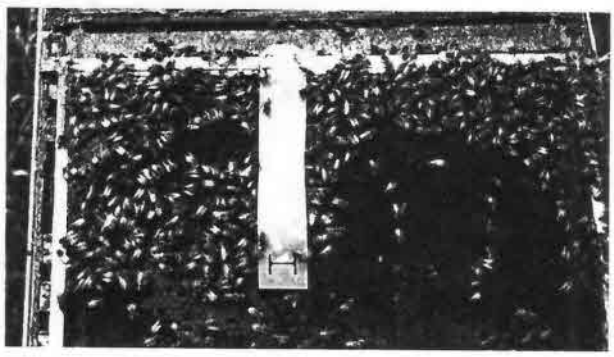
Contact the Defra Veterinary Medicines Directorate for up-to-date information on which varroacides are authorised for use in the UK. See address at end of leaflet.

When should you treat?

There is no single ideal time for treatment with varroacides. However, for most beekeepers the main treatment time is late summer to early autumn – between harvesting honey and preparing colonies for winter. At this time colony size will be reducing while infestation will be continuing to increase. The aim of treatment is to significantly reduce the mite population to protect the last few brood cycles that produce the young bees needed for successful colony survival over winter.



Richard Ball, CSL National Bee Unit

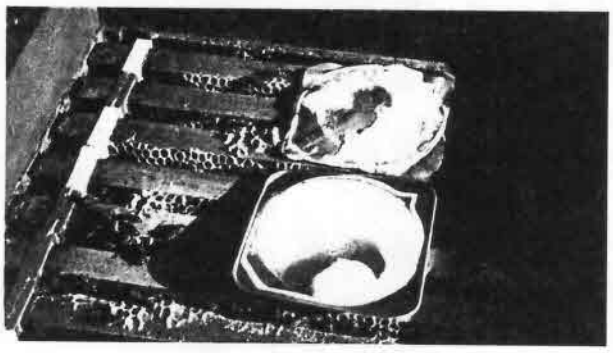


James Morton, CSL National Bee Unit

Figures 39 and 40: Proprietary Varroacide treatment strips in use (currently in the UK either Apistan or Bayvarol)

It is also relatively common to treat colonies in the spring – especially where monitoring suggests that they have emerged from winter with a mite population that will pose a serious risk before the late summer treatment.

The choice of treatment may dictate when treatment is applied. Some (e.g. Apiguard) may require warm conditions for maximum efficacy. Others (oxalic and lactic acid) require broodless periods to be effective and so are usually applied very late in the year.



Richard Ball, CSL National Bee Unit

Selwyn Wilkins, CSL National Bee Unit

Figures 41 and 42: Apiguard treatments

Generally beekeepers prefer to avoid treating during the active season when supers are on the hive to minimise the risk of leaving residues in bee products. However, some proprietary treatments (e.g. Apistan and Bayvarol) can be used quite safely during a honey flow if necessary (although not during comb honey production). This is useful if unexpected serious infestation demands emergency treatment.

No mention of alternative, unauthorised, products in this leaflet should be taken as an endorsement of efficacy, safety, or a recommendation to treat. They are referred to because they are commonly available.

How does resistance arise?

Varroa populations will eventually develop resistance to any chemical varroacide. Individual variation within a mite population may result in small numbers of mites with resistant traits (e.g. a thicker cuticle that prevents entry of the active ingredient or a metabolism that may break down the treatment before it does the mite damage). These characteristics are genetic and heritable, although often the mites with these unusual traits are reproductively weaker and are initially present as only a tiny proportion of the entire population.

When strong selection pressure is placed on the mite population such resistant traits may begin to dominate. This can happen when a population of mites is repeatedly exposed to a varroacide leaving more of the resistant mites alive to breed. Over many generations these mites will tend to become increasingly common until ultimately they comprise the majority of the mite population.

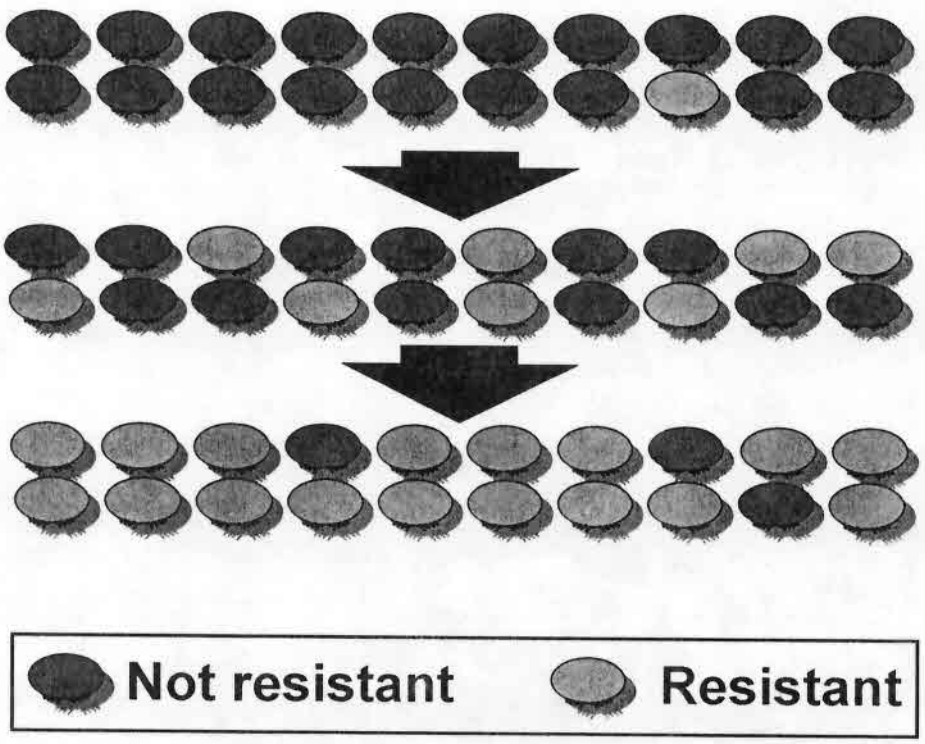


Figure 43: Development of varroacide resistance. Initially only a very few mites are varroacide resistant. However, these mites and their offspring will survive successive treatments, and so over a period of time become more abundant. Eventually they will comprise the majority of the mite population

How long this process takes to occur depends on how often varroa mites are exposed to a varroacide and at what dose. Frequent treatments, especially when misused or when treatment strips are left in the colony for longer than recommended, accelerate the development of resistance.

Avoiding Resistance

To delay the development and spread of resistance beekeepers should:

- ✓ treat with the specified dose
- ✓ treat for the period specified
- ✓ treat as little as necessary
- ✓ alternate treatments (where possible) with one or more unrelated treatments

Pyrethroid resistance in the UK

It was always anticipated that varroa would develop resistance to pyrethroids, the active ingredients of Apistan and Bayvarol, both controls widely used by beekeepers against them. In 2001, CSL's resistance surveillance programme found the first confirmed cases of pyrethroid resistance in Devon.

At the time of writing (spring 2005), resistance is very well established in the South West of England. Pockets of resistance have also been found in other parts of England and Wales. Over the next few years resistance will spread further and eventually become widespread.

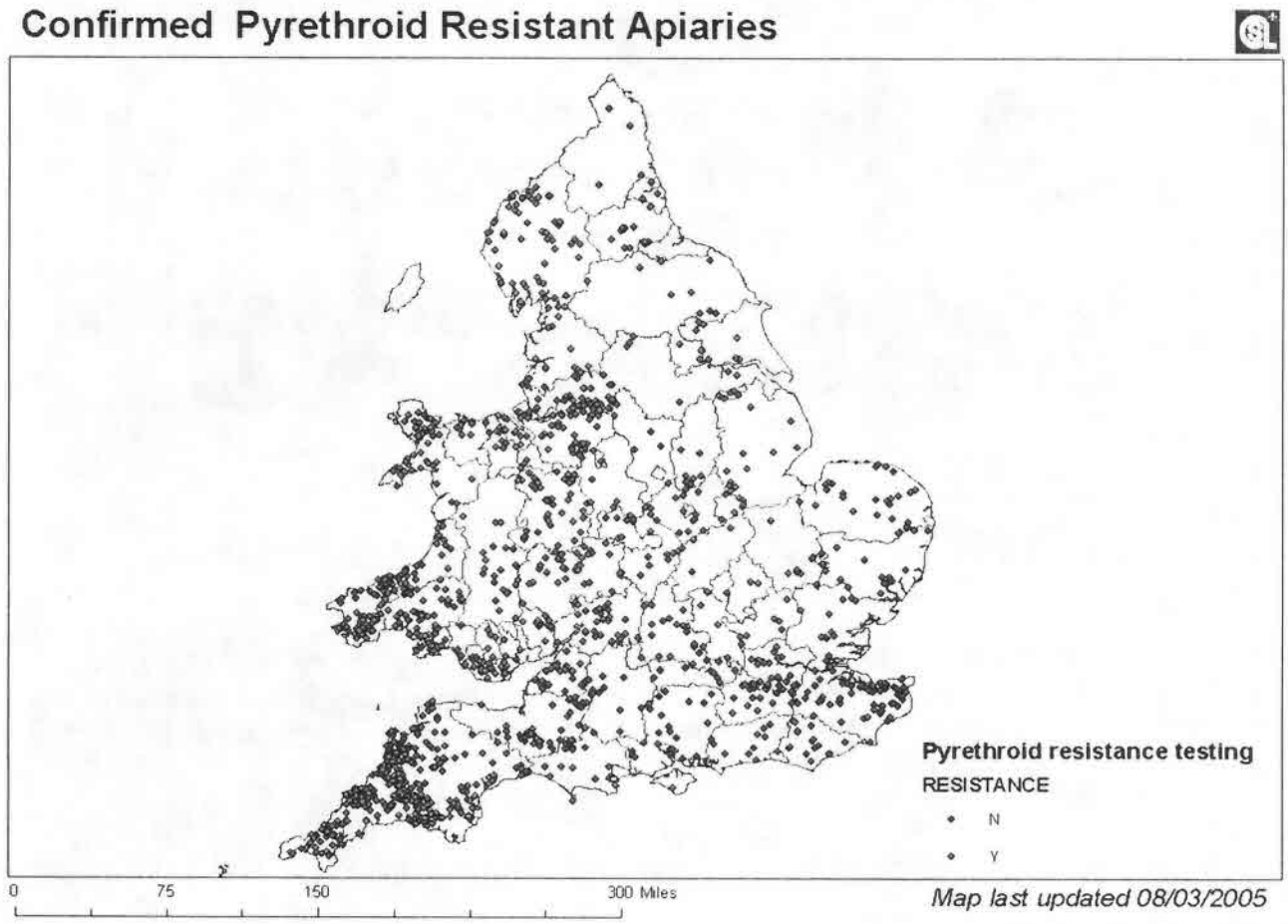


Figure 44: Map showing confirmed pyrethroid resistance in England and Wales (as of March 2005)

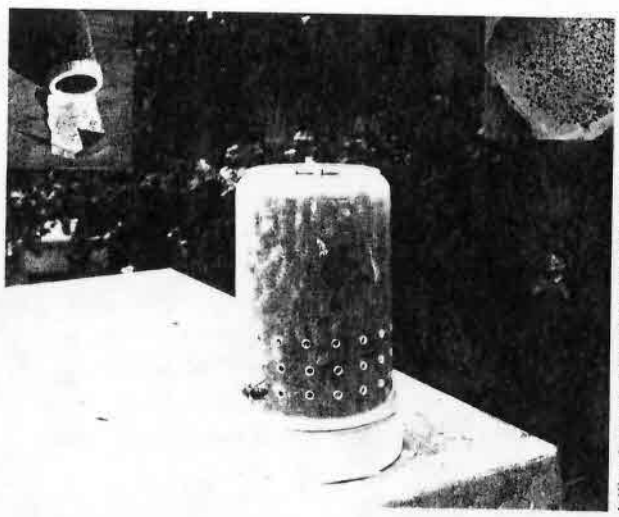
Responding to resistance spread

Beekeepers who have not yet detected pyrethroid resistant varroa in their colonies should start preparing for their arrival without delay. Unless their presence is identified through resistance testing, the first obvious sign is likely to be the collapse of colonies after pyrethroid treatment fails to control them.

By the time resistant mites are identified in an apiary they generally comprise the vast majority of the mite population. Beekeepers who know they have resistant mites should stop using pyrethroids at once. These will no longer provide effective control and their continued use will only cause resistance problems to worsen. Instead, they should use a non-pyrethroid treatment, biotechnical methods, or both – ideally as part of an Integrated Pest Management (IPM) programme.

In the future, when pyrethroid resistance is widespread and most beekeepers are using alternative non-pyrethroid varroacides, there is a significant risk that varroa will develop resistance to these also. This is the situation that now exists in several countries worldwide.

The strategies advocated in this leaflet to delay the development of pyrethroid resistance will apply equally to other varroacides that may be used in the future. Ultimately, resistance monitoring is likely to be required for these also.

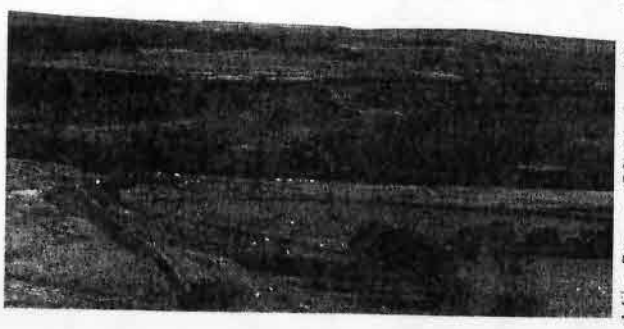


Mike Brown, CSL National Bee Unit

Figure 45: Pyrethroid resistance test kit in use

Mike Brown, CSL National Bee Unit

Figure 46: Mites knocked down onto sticky insert



Mike Brown, CSL National Bee Unit

Figure 47: Heather moors: an important UK honey crop but also areas where intensive migratory beekeeping is practised

Mike Brown, CSL National Bee Unit

Figure 48: Movement of colonies will speed up the spread of resistance. Be careful before moving or purchasing bees

Testing for pyrethroid resistance

Method: USDA Beltsville Test

1. Cut a 9mm x 25mm piece from an Apistan strip and staple to centre of a 75mm x 125mm index card. Place card in 500ml jar with strip facing inwards.
2. Prepare a 2–3mm light metal mesh cover for jar.
3. Shake bees from 1–2 combs of a colony into an upturned roof. Scoop 1/4 cup of these (about 150) and place in jar.
4. Place a sugar cube in jar. Cover with mesh lid and store upturned in dark, at room temperature.
5. After 24 hours hit upturned jar with your palm over white paper three times. Count dislodged mites.
6. Place upturned jar in a freezer, until bees are dead (1–4 hrs). Count the remaining mites.
7. Calculate % mite kill. Less than 50% indicates you may have resistant mites.

Caution: This method gives a crude indication of resistance, and further confirmatory tests are advisable. Discard results if the total number of mites per jar is below five.

Method: NBU Resistance Test

The NBU field resistance test is a modification of the Beltsville test using a purpose made test cage and low dose Apistan 'Package Bee Strips' (see Figures 45 and 46). The method used is similar. However, a larger sample of bees are taken (approx 200), the test takes a shorter period (4 hours) and the bees are killed by immersion in soapy water after which dead mites and bees are separated with a stream of water in coarse and fine sieves.

Method: Checking post treatment varroa mite mortality

1. Maintain colony on a mesh varroa floor with collection tray beneath.
2. Treat as usual with pyrethroid strips for 6 weeks.
3. Clean tray and check daily mite drop immediately after treatment finishes.
4. Significant mite drop indicates a mite population remains and therefore your treatment may not have been effective – requiring further investigation.

What is Integrated Pest Management?

Integrated Pest Management (usually abbreviated to 'IPM') is a principle now widely used in agriculture, especially where it is desirable to keep chemical inputs to a minimum. Significantly, no attempt is made to completely eradicate the pests. Instead, the aim is to keep them below the level where they cause significant harm by using a combination of controls applied at different times of the year. More or fewer controls are employed depending on the levels of pests present.

This is a much more effective approach than the alternative of waiting until pest numbers have reached a damaging level before applying controls, or applying the same controls each year regardless of pest numbers.

An IPM programme for varroa

IPM can be readily applied to control many bee diseases and to varroa in particular. Potential benefits include:

- Control at several points of the year makes it harder for the mite population to reach harmful levels.
- Use of management methods can reduce the need for varroacides.
- Using two or more unrelated varroacides will delay the development of mite resistance.
- Control strategies can be easily altered to reflect changing infestation levels.

Unfortunately, there is no single IPM varroa programme suitable for all circumstances. This is because there are enormous variations in infestation level, mite invasion, climate and beekeeping practices.

Figure 49 shows some of the combinations that are commonly used by beekeepers in the UK and overseas. Note that it would not normally be necessary or appropriate to use all the options. As a rule when infestation is serious more control and monitoring will be needed than at other times.

Good husbandry

Good husbandry should be a starting point for IPM control of varroa. Keep a close eye on the health of your bees, and in particular make sure you can recognise the signs of varroa infestation. Maintain apiaries to minimise the effects of robbing and drifting. Aim to keep strong vigorous colonies and try to select strains that seem to show some varroa tolerance.

Slow mite population growth

Employ methods that slow the growth of the varroa population in your colonies – such as drone brood removal and use of mesh floors. These will have a less dramatic effect than other controls, but will delay the point when the infestation reaches a damaging level and so allow you to treat a little later, or to use less efficacious varroacides.

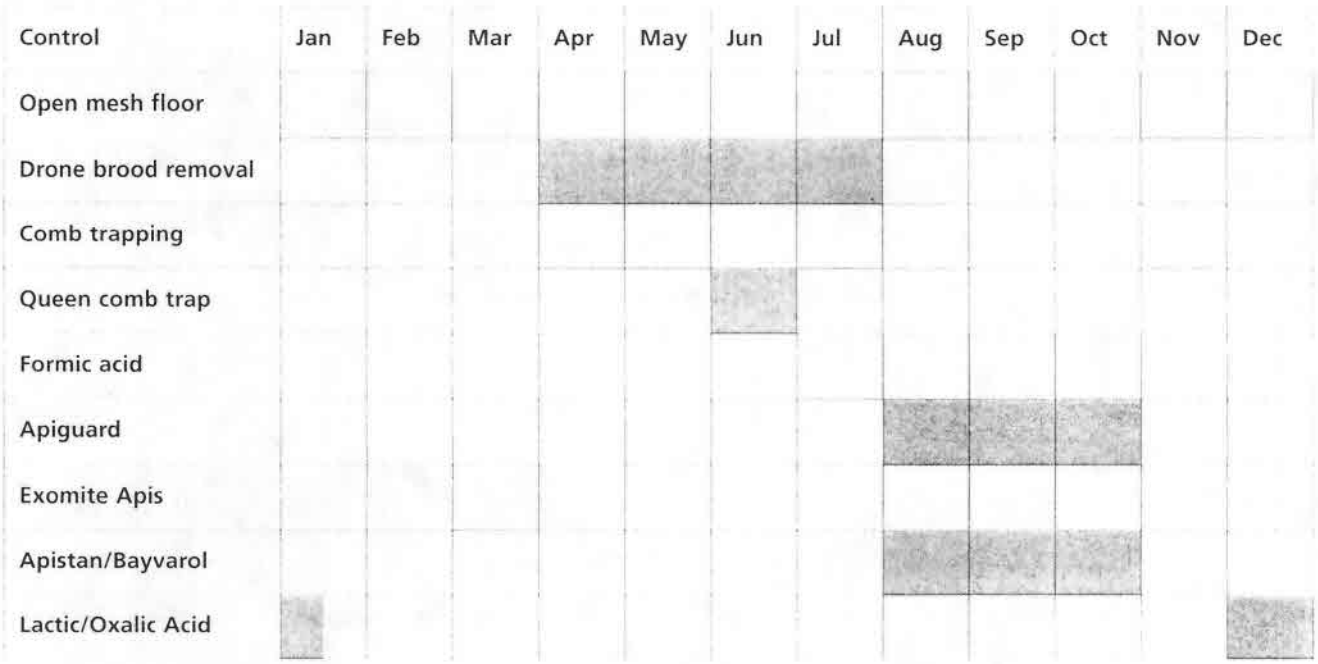


Figure 49: Examples of integrated control methods used throughout the year by UK and EU beekeepers (See Table 4 for information about authorisation for use of varroacides in Member States)

Using monitoring to choose the level of controls to employ

An important principle of IPM is to adjust the level of control to suit the level of infestation. Low mite levels need no action; intermediate levels may require some moderate intervention; high mite levels require more urgent and effective action.

The monitoring methods shown in Figures 19 to 21 illustrate these principles using daily mite drop to assess the severity of infestation and determining what action should be taken. Table 5 illustrates the same principle applied to monitoring using drone brood uncapping. They are based on the Central Science Laboratory's mathematical model of mite populations, and aim to maintain a level of less than 1000 mites during the beekeeping season. However, be aware that if an invasion of mites occurs then mite levels could increase rapidly.

In this context, **light control** means using biotechnical methods or varroacides that have a relatively low efficacy and therefore have a fairly limited effect on the mite population. **Effective control means** using varroacides or biotechnical methods that are very effective and greatly reduce the mite population.

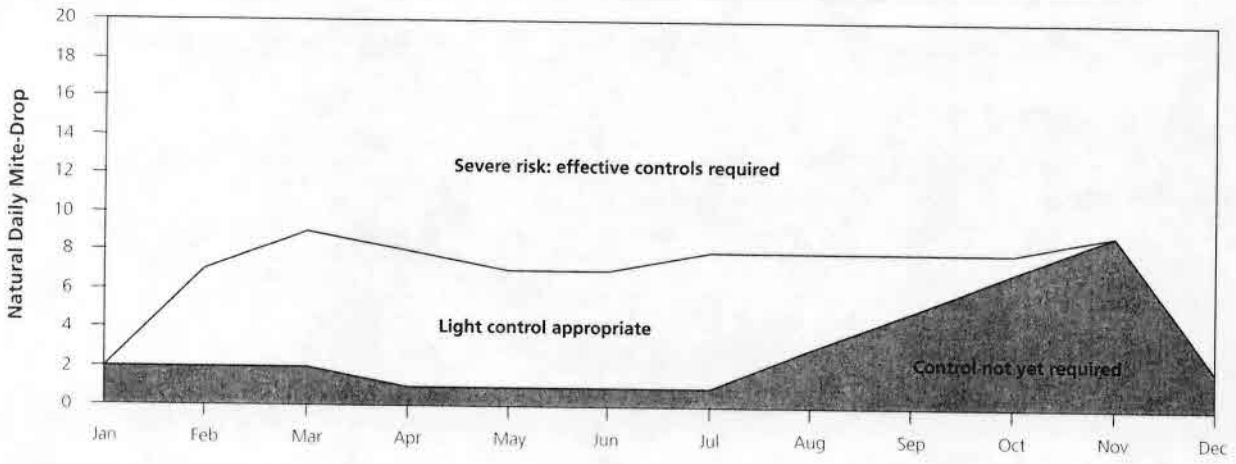
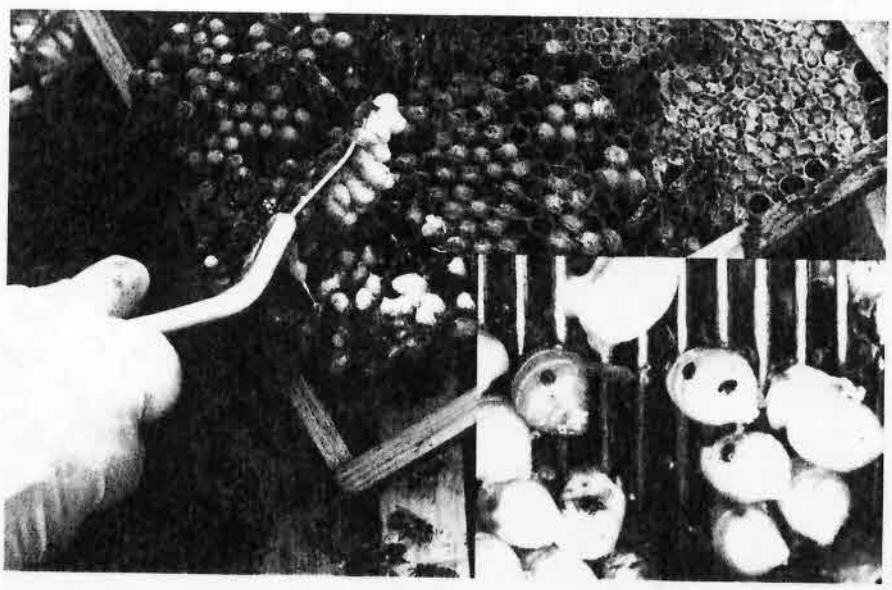


Figure 50: Using mite drop monitoring to decide appropriate level of controls to employ

Table 5: Using drone brood monitoring to decide appropriate level of controls to employ

	Proportion of infested drone pupae		
April, May, June	**Less than 2%** (<1 mite in 50) No action	**2% – 4%** (Between 1 mite in 25 and 1 in 50) Plan controls for season	**More than 4%** (>1 mite in 25) Consider control
June, July	**Less than 3%** (<1 mite in 30) No action	**3% – 7%** (Between 1 mite in 15 and 1 in 30) Light control	**More than 7%** (>1 mite in 15) Effective control Severe risk
August	**Less than 5%** (<1 mite in 20) No action	**5% – 10%** (Between 1 mite in 10 and 1 in 20) Light control	**More than 10%** (>1 mite in 10) Effective control Severe risk



Mike Brown, CSL National Bee Unit

Figure 51: Drone brood uncapping, a popular and easy method for routine varroa monitoring. Varroa mites are easily seen against the pale drone bodies

High Infestation

	April	May	June	July	Aug	Sept	Oct	Nov
Mite levels	>8			>10	>4		>8	
Drone Brood Removal								
If the mite drop in a colony is >15 mites per day you must do something and treat immediately								
Other Management Methods								
High Efficacy Varroacide								
Lactic/Oxalic Acid								

Medium Infestation

	April	May	June	July	Aug	Sept	Oct	Nov
Mite levels	>4<8			>6<10	>4		>8	
Drone Brood Removal								
Other Management Methods								
Appropriate Varroacide								
Lactic/Oxalic Acid								

Low Infestation

	April	May	June	July	Aug	Sept	Oct	Nov
Mite levels	<2			<6	<4		<8	
Drone Brood Removal								

Figure 52: IPM control options selected taking into account mite levels (as assessed by monitoring daily mite mortality) and the time of year – as used by beekeepers in European countries

Living with varroa

The experience of beekeepers in the UK dealing with varroa has changed significantly over the period since its initial discovery.

For the first few years, most beekeepers found varroa relatively easy to control with a single autumn treatment, often applied quite late in the season. However, this was followed by an acute phase in which varroa became much harder to control as mite levels were unexpectedly found to increase quickly. In particular this occurred where untreated managed and feral colonies were causing mite invasion problems. Beekeepers then found that it was vital to treat quickly after the end of the honey flow in late summer and in some cases again in the spring. Many who delayed treatment or used controls that were not sufficiently effective lost their bees – up to 50% of colonies in some areas.

After this phase of widespread losses, beekeepers found that varroa again became somewhat easier to control – probably because mite invasion had reduced following the loss of feral and poorly managed colonies. For a period of several years colony losses due to varroa were relatively infrequent. However, mite levels sometimes still increased requiring a swift and effective response.

More recently, the development and spread of pyrethroid resistant varroa has presented beekeepers with serious and significant new challenges. Beekeepers in affected areas have again found varroa difficult to control, and some have lost their colonies to the infestation.

As resistance spreads, all beekeepers will have to learn and adopt new methods of monitoring and controlling the infestation in their hives. However, the experience of beekeepers overseas successfully coping with the development of resistance in their countries demonstrates that they are able to adapt to the changing circumstances to continue beekeeping as successfully as ever.

Mike Brown, CSL National Bee Unit

Figure 53: It is vital that honey bee colonies go into the autumn and winter with young healthy bees and low mite populations

Key strategies for effective varroa control

1. Monitor the infestation in your hives. You need to know if the mite population is building up faster than you thought or your treatments are not proving effective. Don't just treat and leave it to chance.
2. Talk to other local beekeepers about the varroa problems you experience and the control strategies you are using. It may then be helpful to work together – for example in co-ordinating treatments.
3. Practice Integrated Pest Management (IPM) using a combination of varroacides and biotechnical methods. This will give the most effective control.
4. Slow the development and spread of resistant varroa, and minimise the risk of treatment residues by treating no more often than is necessary – monitoring will help you decide how often this should be.
5. Use UK authorised varroacides. These have proven efficacy against varroa, and proven safety for bees, beekeepers, consumers and the environment. Always follow the label instructions.
6. Where possible rotate the use of two or more unrelated varroacides. This is an effective strategy to slow the development of resistance. Avoid using the same varroacide year after year.
7. Remember that the use of unauthorised chemicals in your colonies or the misuse of authorised varroacides may leave harmful and detectable residues in your bee products.
8. Be prepared for pyrethroid resistant varroa. Learn to test for resistance and gain experience of using other controls. When resistance arrives you will have to stop using pyrethroids and rely on alternatives.
9. Be flexible and adaptable in your control of varroa. Methods that work well in some circumstances may not work well in others.
10. Keep up to date with new developments in the control of varroa – as the situation develops you need to make sure you have the latest information to help you respond appropriately.
11. Select for and retain bees that appear to show increased tolerance to varroa.

Looking ahead

Over the coming years we can expect new developments that will change the way we control infestation with varroa. These are likely to include:

- **New varroacides**
  Most are likely to be based on active ingredients of existing veterinary medicines and pesticides re-formulated for varroa control. Novel varroacides based on other (often naturally occurring) active ingredients are also under development.

- **New treatment systems**
  The development of new methods of administering existing varroacides, particularly organic acids, to allow safer and more effective controls with fewer adverse effects.

- **Pheromones**
  The development of synthetic pheromones (natural chemical messages) to provide control over varroa – for instance by inhibiting their feeding or reproduction.

- **Biological controls**
  Research continues in the UK and USA to identify naturally occurring fungi and bacteria that could kill varroa mites within the bee colony, and to develop these into practical control methods.

- **Biotechnical techniques**
  Development of more sophisticated and effective biotechnical controls. These are likely to become part of routine colony management.

- **Tolerant bees**
  Breeding programmes in many countries are aiming to select and develop bees that are more tolerant of varroa. These bees may either be able to naturally maintain better control over the mite population, or may be more tolerant to the presence of the mites and their associated pathogens.

Garry Fry, CSL Photography Dept.

Figure 54: In the future bees may become more tolerant of varroa and mites may become less virulent leading in time to more of an equilibrium between host and parasite

Further help and advice

National Bee Unit

The National Bee Unit (NBU) is part of the Defra Central Science Laboratory, a research agency. Established in 1946, it has a long history in practical beekeeping and bee health, providing research, diagnostic, consultancy and extension services to government departments, commerce and beekeepers in the UK and overseas.

Current research interests include European foul brood control, development of diagnostic kits for foul brood, varroacide development and molecular methods for bee disease diagnosis, including exotic pests, in support of surveillance programmes and contingency planning.

The NBU's network of Regional and Seasonal Bee Inspectors provides an inspection service for foul brood and exotic pests, advice and assistance to beekeepers year round, training courses in disease control and bee husbandry.

Although varroa is now endemic in the UK and from 2005 will no longer be a statutory notifiable disease, the NBU will continue to offer advice on its control as it does for other serious non-statutory diseases.

Beekeeping Associations

In many areas beekeeping associations operate local disease control schemes and provide practical advice to members on bee disease recognition and control. Contact your local beekeeping association for details.

Mike Brown, CSL National Bee Unit

Figure 55: Training beekeepers at CSL Sand Hutton

Useful addresses

CSL National Bee Unit (NBU)
Central Science Laboratory
Sand Hutton
York YO41 1LZ
Tel: 01904 462510
Fax: 01904 462240
General email: nbu@csl.gov.uk
Web: www.csl.gov.uk
Web: www.nationalbeeunit.com

Department for Environment Food and Rural Affairs (Defra)
Horticulture and Potatoes Division
Eastbury House
30/34 Albert Embankment
London SE1 7TL
Tel: 020 7238 1047
Web: www.defra.gov.uk
Web: www.defra.gov.uk/hort/bees.htm

Welsh Assembly Department for Environment Planning and the Countryside (DEPC)
Animal Identification Branch
Penrallt
Caernarfon Divisional Office
Gwynedd
Wales
LL55 1EP
Tel: 01286 662012
Tel: 01286 662027
Web: www.wales.gov.uk

Scottish Executive Environment and Rural Affairs Department (SEERAD)
Pentland House
47 Robbs Loan
Edinburgh
EH14 1TY
Tel: 0131 244 3377
Web: http://www.scotland.gov.uk/who/dept_rural.asp

Scottish Agricultural Science Agency (SASA)
82 Craigs Road
East Craigs
Edinburgh EH12 8NJ
Tel: +44 (0) 131 244 8863
Fax: +44 (0) 131 244 8940
Email: info@sasa.gsi.gov.uk
Web: www.sasa.gov.uk

Department of Agriculture and Rural Development, Northern Ireland (DARDNI)
Dundonald House
Belfast BT4 3SB
Northern Ireland
Tel: 02890 525112
Web: www.dardni.gov.uk

Agriculture and Food Science Centre
Newforge Lane
Belfast
Northern Ireland
Telephone 02890 255288

Defra Veterinary Medicines Directorate
Woodham Lane
New Haw
Addlestone
Surrey
KT15 3LS
Telephone +44 01932 336911
Web: www.vmd.gov.uk

British Beekeepers Association (BBKA)
National Beekeeping Centre
Stoneleigh Park, Stoneleigh
Warwickshire
United Kingdom, CV8 2LG
Tel: 02476 696679
Web: www.britishbeekeepers.com

Welsh Beekeepers' Association
(county and local beekeeping associations) General Secretary, Pentrebwlen, Llanddewi brefi, Tregaron, Ceredigion, SY25 6PA

Scottish Beekeepers Association
(county and local beekeeping associations)
Web: www.scottishbeekeepers.org.uk

World Organisation for Animal Health, Office International des Epizooties (OIE)
Web: www.oie.int

Ulster Beekeepers Association
Web: http://www.ubka.org/

Bee Farmers Association (BFA)
Web: www.beefarmers.co.uk

International Bee Research Association
18 North Rd
Cardiff
Wales, CF10 3DT
Tel: 02920 372409
Web: www.ibra.org.uk
Email: ibra@cardiff.ac.uk

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Hants RG21 7NE
Telephone +44 (0)1256 473175
Fax +44 (0)1256 473179
Web http://www.vita-europe.com/

Bayer (UK and Ireland) Ltd
Web: http://www.bayer.co.uk/

Biové
Laboratoires Biové
Rue de Lorraine
P.O.Box 45
62510 Arques
France
Web: http://www.beekeeping.com/biove

European Community and UK Legislation
The Stationery Office
51 Nine Elms Lane
London
SW8 5DR
Telephone +44 0870 600 5522
Web: www.hmso.gov.uk/stat.htm

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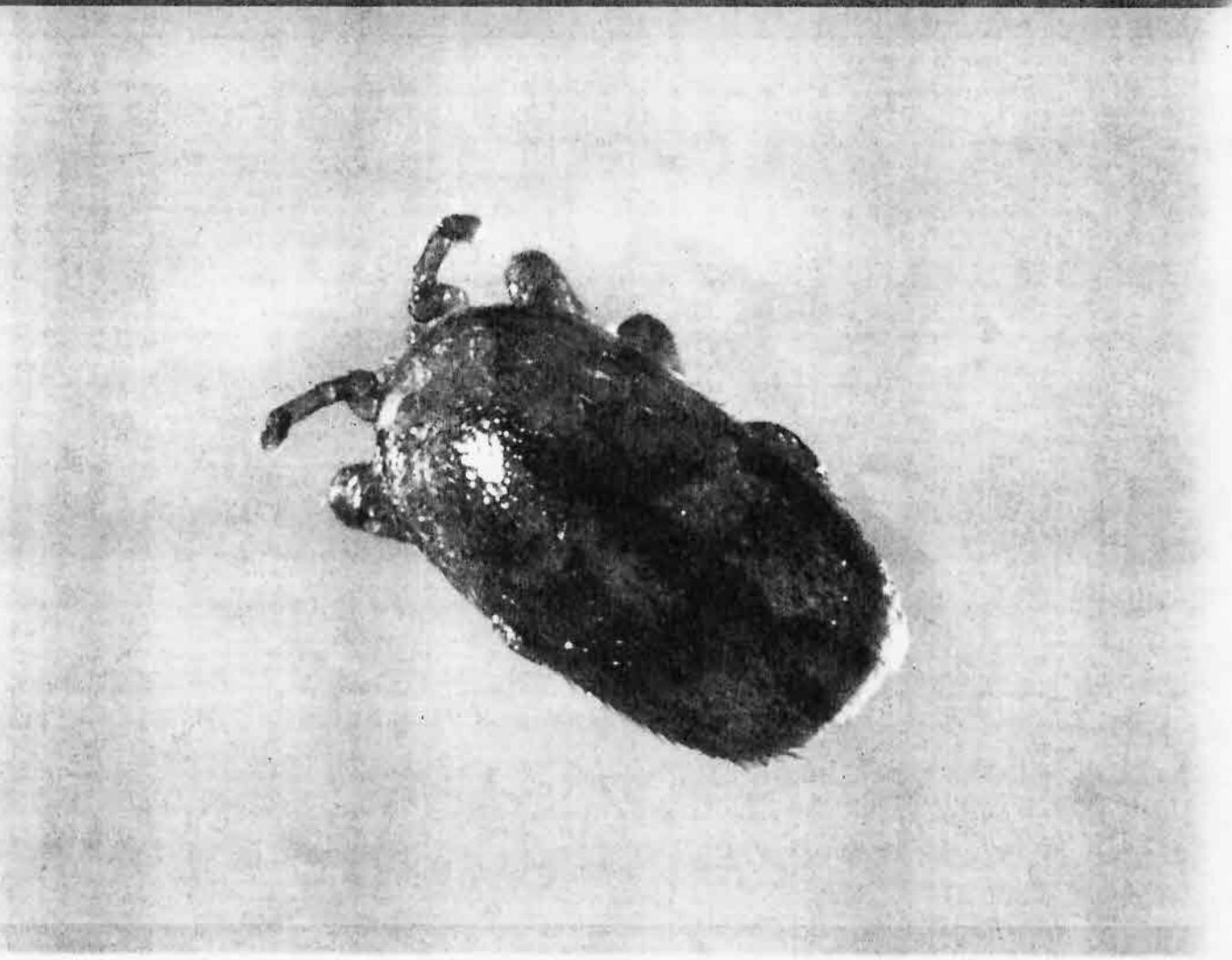
Tropilaelaps: parasitic mites of honey bees



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About this leaflet

This leaflet describes the Asian bee mites *Tropilaelaps* spp., (*T. clareae* and *T. koenigerum*) that are potential new threats to UK beekeeping. The mites are native to Asia and have spread from their original host the giant honey bee, *Apis dorsata,* to the European honey bee, *A. mellifera*. There is a serious risk of their accidental introduction into the UK. Tropilaelaps mites are notifiable pests under European Community legislation. All beekeepers should be aware of the details of the life cycle and how the mites can be recognised and controlled.

Tropilaelaps: parasitic mites of honey bees

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Central Science Laboratory
National Bee Unit
Sand Hutton
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YO41 1LZ
Tel: 01904 462510

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Tropilaelaps: parasitic mites of honey bees

Introduction

What are Tropilaelaps mites?

There are currently two species of Tropilaelaps mites documented, *Tropilaelaps clareae* and *Tropilaelaps koenigerum*. Ongoing molecular research being carried out on this genus in Asia may identify other species. For ease, they will be referred to in this leaflet as Tropilaelaps.

They are serious parasitic mites affecting both developing brood and adult honey bees. Parasitisation by these mites can cause abnormal brood development, death of both brood and bees, leading to colony decline and collapse, and can cause the bees to abscond from the hive. The natural host of the mite is the giant Asian honey bee, *Apis dorsata*, but Tropilaelaps can readily infest colonies of *Apis mellifera*, the Western honey bee. It is also associated with other Asian honey bees, including *Apis laboriosa*, *Apis cerana* and *Apis florea*. The furthest west it has been found is in Iran close to the Pakistan and Afghanistan borders and the furthest east is Papua New Guinea. In 1982, *T. koenigerum* was reported as a new species of parasite infesting *Apis dorsata* in Sri Lanka. *T. clareae* has not been reported on the island. *T. koenigerum* has also been found in association with *A. laboriosa*, *A. cerana* and *A. mellifera* in Kashmir, and was recently detected in Nepal, Borneo and Thailand. Thought to be restricted to tropical or sub-tropical regions of Asia, their exact geographical range is unknown and is emerging.

Figures 1 & 2. Apis dorsata,* the natural host of *Tropilaelaps

At the time of writing, Tropilaelaps has not been found in the UK or the rest of Europe, but if it was introduced through imports of bees and became established, could potentially cause major economic damage and losses to beekeeping, and, as a consequence, to agriculture and the environment through disruption to pollination services.

Do I have to report Tropilaelaps if I find it in my colonies?

Yes, Tropilaelaps is a statutory notifiable pest of honey bees. Beekeepers in England and Wales must report any suspected presence of the mite in their colonies to the CSL National Bee Unit. Beekeepers in Scotland and Northern Ireland should notify their appropriate government Department (see 'Useful addresses').

Tropilaelaps biology

Parasitic mite: ***Tropilaelaps clareae, Tropilaelaps koenigerum***

Place of Origin: Asia

Natural Host: *Apis dorsata*

Characteristics: The mites are reddish brown, about 1mm long and 0.6mm wide, with a life cycle similar to that of varroa. The mites move freely and rapidly on combs, and rely on brood for feeding; the mouthparts are not capable of piercing the membranes of adult bees. Thought to be unable to survive in broodless colonies.

Damage: In colonies with high mite levels, Tropilaelaps causes damage similar to varroa, resulting in irregular brood patterns and stunted adults with deformed wings and shrunken abdomens. This may lead to absconding or colony loss.

Detection: Visually, by examination of hive debris or brood, or by application of a diagnostic "knock-down" treatment onto hive inserts.

The Mites

The females of *T. clareae* are light-reddish brown and about 1.0 mm long x 0.6 mm wide. The males are almost as large as the females but less sclerotised. *T. koenigerum* is slightly smaller than *T. clareae*, the adult female is 0.7 mm long x 0.5 mm wide, oval and light brown. Adult males are considerably smaller.

Figure 3. T. clareae* on adult *Apis dorsata

Figure 4. T. clareae* on pupa of *A. dorsata

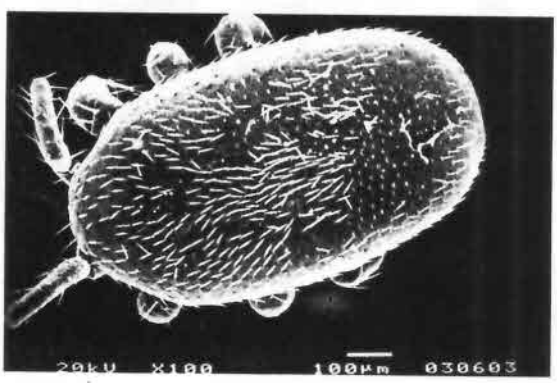

Figure 5.* Electron micrograph of *T. clareae

Life cycle

The life cycle and parasitism of *A. mellifera* by Tropilaelaps is similar to that of *Varroa destructor* although there are slight differences. Tropilaelaps has a higher reproductive rate than varroa as it has a shorter life cycle. This is because they have a faster development time and a shorter phoretic phase (non-reproductive transport phase, time spent on the adult bees) between reproductive cycles. Consequently, when both types of mite are present in the same colony Tropilaelaps populations build up far more rapidly than varroa, by a factor of 25:1 in favour of Tropilaelaps.

Adult mites enter cells containing larvae where reproduction takes place within sealed brood cells, particularly those of drones. The mites can reproduce in both worker and drone cells, but as with varroa there is a preference for drone brood, but this is not as marked. Typically, the mother mite lays three to four eggs on mature bee larvae 48 hours after cell capping, about one day apart. The eggs hatch after around twelve hours, then the larva goes through nymphal stages (protonymph, deutonymph) before reaching the adult stage. Once hatched, all stages of both female and male mites feed on the haemolymph (blood) of the developing bee, causing damage through feeding by depriving the developing bee of essential nourishment required for growth.

Development from egg laying to the adult stage takes approximately 6 days. When the adult bee emerges, both adult male and female mites and the original invading mother mite exit the cell to search for new hosts. Up to 14 adult mites and 10 nymphal stages of mite have been recorded in a single cell. With varroa infestations, immature females and the male mites die in the cell.

Unlike the varroa mite, Tropilaelaps cannot feed on adult bees because its mouthparts are unable to pierce the body wall membrane of the bees. The mites depend on the developing brood for food, and move from the adult bees to feed on the larvae as quickly as possible after emergence, so the phoretic stage is much shorter than that of varroa, and may only be between 1-2 days. Gravid female mites (carrying eggs) will die within two days unless they deposit their eggs. Tropilaelaps is therefore less well adapted for survival in hives where there are long broodless periods.

Figure 6. **Migratory beekeeping, for example to heather moors, has the potential to rapidly spread pests and diseases long distance. It is essential to check before moving that your bees are healthy**

Means of spread

Tropilaelaps mites are mobile and can readily move between bees and within the hive. However, to move between colonies they depend upon adult bees for transport through the natural processes of drifting, robbing, and swarming. Mites can spread slowly over long distances in this way. They are also spread within apiaries through distribution of infested combs and bees through beekeeping management. However, movement of infested colonies of *Apis mellifera* to new areas by the beekeeper is the principal and most rapid means of spread.

The harmful effects of Tropilaelaps infestation

A. mellifera colonies heavily infested with either Tropilaelaps or varroa show similar damage. The infestation and feeding activities of the mites causes brood mortality and a reduction in the lifespan of any adult bees that survive the parasitised brood stage. Individual bees infested during their development that survive to emergence may show signs of physical or physiological damage as adults. These include a shorter lifespan, lower body weight, with shrunken and deformed

wings and legs. These bees may be seen crawling at the entrance to the hive. Other signs include: irregular and poor brood patterns with patches of neglected brood and perforated cappings (due to worker bees attempting to clean out sick or dead larvae); in severe infestations up to 50% of the developing brood may be killed (in some infested colonies there may be so much dead brood that you will notice the smell of decaying pupal and larval remains). At this stage colonies may abscond and so aid the spread of the mite.

Figure 7. **Deformed pupa (*Apis dorsata*) from *T. clareae* infested colony**

Could Tropilaelaps survive in the UK?

Yes, although the brood requirements of Tropilaelaps are the limiting factors in its establishment in the UK. In areas of the UK that are warmer, for example in the south and east, where there is brood in colonies all year round, the mite will survive, even in very small areas of brood. As long as bees rear some brood the mites can survive, and as the amount of brood reduces, many adults enter single brood cells but do not breed. Tropilaelaps is unlikely to survive where there is complete brood interruption during the winter. Predictions are that climate will become warmer in the future. The warmer winter temperatures, with more colonies continually rearing brood, could increase the potential for Tropilaelaps spread and impact.

How to check colonies for Tropilaelaps

Distinguishing between species of Tropilaelaps and varroa is relatively straightforward, particularly with the help of a magnifying glass. Varroa mites are larger, crab shaped and wider than they are long, and they move relatively slowly. The body of Tropilaelaps is elongated, and it is a fast-running mite, moving rapidly across the brood combs, often catching the eye of the observer. It is therefore easier to spot than varroa. Tropilaelaps mites also "hide" in brood cells rather than on adult bees, which makes diagnosis of an infestation easier. Adult female mites may be seen walking rapidly out of the cells and along the face of the comb; immature mites are pale and remain motionless when feeding on their hosts in the brood cells.

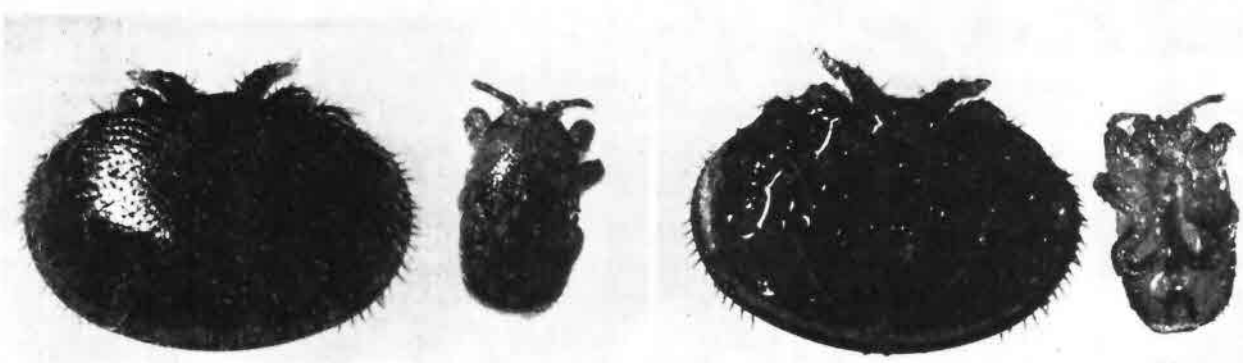

Figure 8. **Dorsal and ventral views of *Varroa destructor* (left) and *Tropilaelaps clareae* (right)**

As the life cycles of varroa and Tropilaelaps are similar, the main detection methods used for finding varroa can be readily applied to Tropilaelaps. Regular collection and examination of floor debris and hive inserts, examination of the bees and brood (e.g. uncapping brood), and the use of a proprietary acaricide as a diagnostic tool are the best approaches for identification of infestations; see the tables below for more details of the techniques. These methods are now familiar to UK beekeepers from years of experience of monitoring varroa.

Table 1. Methods of detection

A. Monitoring natural mite mortality	Pros and cons
1. Maintain the colony on a mesh floor (commonly known as a varroa floor) with a collecting drawer underneath. 2. Remove floor debris regularly during the summer. 3. If there is a lot of debris (e.g. after winter) mites will be very difficult to find. Mix the debris with methylated spirit in a large container. Most dead mites will float to the surface whereas wax and propolis particles will sink.	✓ capable of detecting very few mites ✓ can give a good idea of infestation level ✓ colony is not disturbed ✘ needs additional equipment ✘ monitoring takes several days ✘ encourages wax moths if debris accumulates
B. Brood uncapping	**Pros and cons**
1. Select an area of sealed brood (drone or worker) at an advanced stage (pink-eyed), as this is least likely to disintegrate when removed. 2. Slide the prongs of a honey uncapping-fork under the cappings, parallel to the comb surface, and lift out the pupae in a single scooping motion. (Fig 9). The younger mite stages are whitish and may be almost motionless while feeding on their hosts' bodies, as their mouthparts and front legs are fixed to the cuticle of the bee host. Mature mites, which are darker, are easily seen against the pale bodies of the pupae.	✓ quick and easy to use ✓ can be used during routine colony inspections ✓ gives instant indication of infestation level ✘ unlikely to detect a very light infestation ✘ results are approximate
C. Using proprietary acaricides	**Pros and cons**
1. Use a purpose-made mesh floor, or a sticky card or plastic insert to cover the existing hive floor, with a 3 mm mesh to stop bees removing dead mites. 2. Apply the acaricide treatment following the label instructions. 3. Look for dead or dying mites on the floor after 24 hours.	✓ sensitive, capable of detecting very few mites ✓ gives a good idea of infestation level at same time as treatment ✘ dependent on chemical use

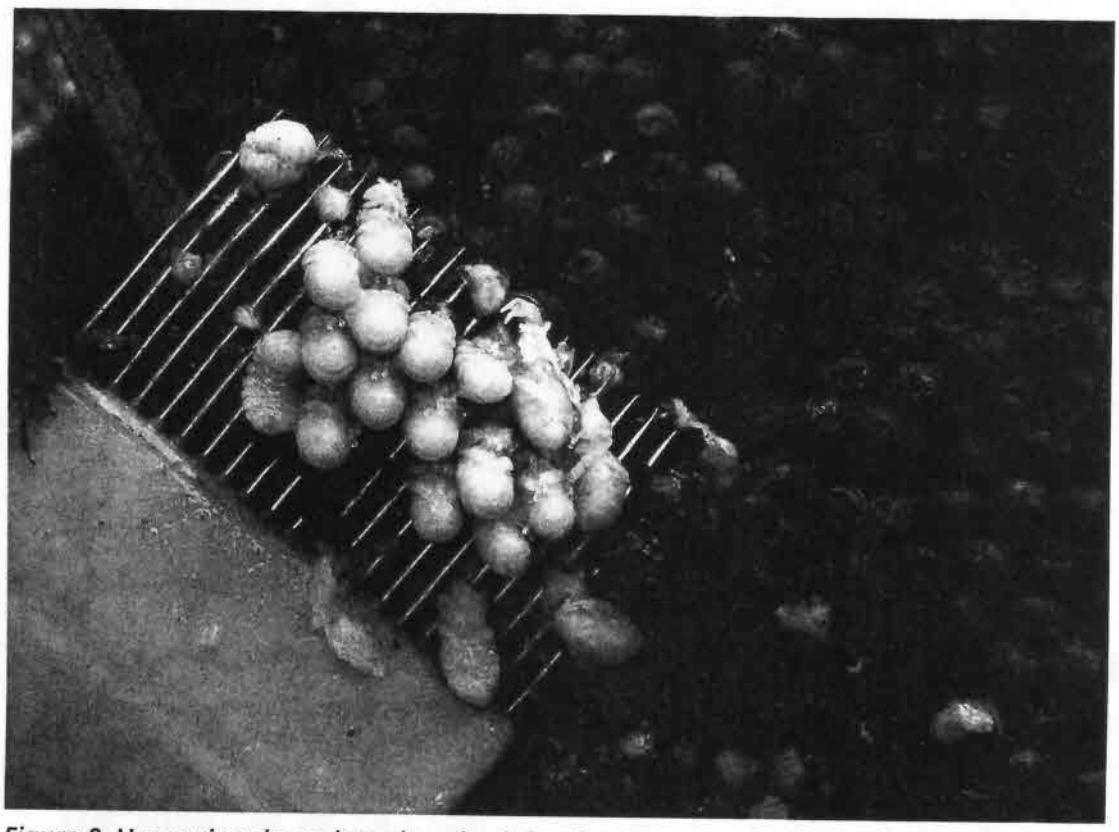

Figure 9. **Uncapping drone brood to check for the presence of mites. They will be clearly seen against the white background of the pupae**

Control

The fundamental aim of mite control is to keep the population at all times below the economic injury level where harm is likely. A combination of both veterinary medicines (acaricides or varroacides) and biotechnical methods can be used to control Tropilaelaps.

'Acaricides' are medicines that kill mites. These are applied either in the feed, directly on adult bees, as fumigants, contact strips or by evaporation. Many of the same acaricides used for varroa are also likely to be effective against Tropilaelaps. Although currently there are no products specifically approved for the control of Tropilaelaps in the UK, in the event of the mite being discovered, contingency plans would be implemented and emergency approvals sought from the Defra Veterinary Medicines Directorate (VMD) to use varroacides against Tropilaelaps.

'Biotechnical Methods' use bee husbandry to reduce the mite population through physical means alone. Many of the effective methods involve trapping the mites in combs of brood, which are then removed and destroyed.

Tropilaelaps is considered relatively straightforward to control using husbandry methods that simulate broodless periods. The inability of Tropilaelaps to feed on adult bees, or to survive outside sealed brood for more than a few days, is a weakness in the mites' life cycle, which can be exploited to control it. In areas where the mite is present, methods such as queen caging, the use of artificial swarms and comb trapping, to create breaks in the brood, should be effective to reduce numbers of mites.

Surveillance

The National Bee Unit (NBU) inspectorate carries out surveillance for exotic bee pests such as the small hive beetle and Tropilaelaps, targeting "At risk" apiaries, e.g. around ports and container freight terminals. Beekeepers are strongly encouraged to monitor their hives for Tropilaelaps as part of routine colony management. Debris samples submitted to the NBU laboratory are routinely screened for exotic pests. These are either in the form of debris samples or hive inserts collected and sent to the Bee Unit by Appointed Bee Inspectors (ABIs) (statutory samples) or beekeepers (voluntary samples) throughout England and Wales.

Should Tropilaelaps be discovered in England or Wales, emergency measures would be implemented. The essential aspects of these are communication, assessment of the extent of infestation, eradication and containment or control. The approach taken for control would depend highly upon the extent of the infestation; if restricted, an eradication method could be used. Otherwise, a containment scheme would be implemented. Similar arrangements should apply in Scotland and Northern Ireland.

What should you do?

It is difficult to predict the impact of Tropilaelaps on beekeeping if it was introduced to the UK. However, it must be considered a significant threat that could have serious consequences for the UK beekeeping industry, particularly in conjunction with the other pests and diseases we already manage. Beekeepers should prepare for the possibility of its arrival. It is important that they make themselves aware of the main features of Tropilaelaps and the possible risks, and make surveillance and monitoring for the mites a routine part of their beekeeping programme. Although it may appear that Tropilaelaps is a long way off and will not affect the UK, experience elsewhere has shown how easy it is for a pest to be moved into an area where it was not previously indigenous; prior to 1996, the small hive beetle was unheard of for most of the world's beekeepers.

In the event that Tropilaelaps is introduced into the UK, the early detection of the mite is essential for control and containment measures to be implemented and allow for any eradication attempt. If Tropilaelaps is found after it is established and widespread, then beekeepers will need to learn how to live with the mite and control it, just as we have done with varroa. If you find anything suspicious contact the National Bee Unit or your local Bee Inspector for advice. All suspect samples should be sent to the NBU for identification – together with your name, address and apiary details (sampling forms and details are available on the NBU website).

If you are going to import queens or bees make sure that you do so only from countries permitted under current legislation and from reputable producers. Do not be tempted to import bees illegally – the risks are just not worth it. If you have any queries or need advice or further information contact your local Bee Inspector or the National Bee Unit, or take a look at the NBU website www.nationalbeeunit.com.

Further help and advice

National Bee Unit

The National Bee Unit is part of the Defra Central Science Laboratory, a research agency. Established in 1946, it has a long history in practical beekeeping and bee health, providing research, diagnostic, consultancy and extension services to government departments, commerce and beekeepers, in the UK and overseas.

Current research interests include European foul brood control, varroacide development and molecular methods for bee disease diagnosis using real time TaqMan PCR. The NBU's network of Regional and Seasonal Bee Inspectors provides an inspection service for statutory pests and diseases, advice and assistance to beekeepers year round, and training courses in disease control and bee husbandry.

Beekeeping Associations

In many areas beekeeping associations operate local disease control schemes and provide practical advice to members on bee disease recognition and control. Contact your local beekeeping association for details.

The Bee Health Advisory Panel

CSL hosts a panel of independent beekeeping experts, including representatives from national associations. The aim of the panel is to keep the official bee health programme under review, suggest improvements to it and to recommend research and training likely to be of direct benefit to beekeepers.

Useful addresses

CSL National Bee Unit (NBU)
Central Science Laboratory National Bee Unit, Sand Hutton, York, North Yorkshire, YO41 1LZ
Tel: 01904 462510 Fax: 01904 462240 Email: nbu@csl.gov.uk
Web: www.nationalbeeunit.com

Department for Environment, Food and Rural Affairs (Defra)
Horticulture and Potatoes Division, Eastbury House, 30/34 Albert Embankment, London SE1 7TL
Tel: 020 7238 1047
Web: www.defra.gov.uk
Bee health pages: www.defra.gov.uk/hort/bees.htm

Welsh Assembly Department for Environment Planning and the Countryside (DEPC) Animal Identification Branch
Penrallt, Caernarfon Divisional Office, Gwynedd, Wales, LL55 1EP
Tel: 01286 662012 or Tel: 01286 662027
Web: www.wales.gov.uk

Scottish Executive Environment Rural Affairs Department (SEERAD)
Pentland House, 47 Robb's Loan, Edinburgh, Scotland EH14 1TY
Tel: 0131 2443377
Web: http://www.scotland.gov.uk

Scottish Agricultural Science Agency (**SASA**),
82 Craigs Road, East Craigs, Edinburgh EH12 8NJ
Tel: 0131 244 8863 Fax: 0131 244 8940
Email: info@sasa.gsi.gov.uk
Web: www.sasa.gov.uk

European Union *(website for details of European Community legislation in force)*
Web: http://www.europa.eu.int/eur-lex/en

European Commission
Web: http://europa.eu.int

Department of Agriculture and Rural Development, Northern Ireland (DARDNI)
Dundonald House, Belfast BT4 3SB, Northern Ireland
Tel: 02890 525112
Web: www.dardni.gov.uk

Agriculture and Food Science Centre
Newforge Lane, Belfast, Northern Ireland
Tel: 02890 255288

Defra Veterinary Medicines Directorate (VMD)
Woodham Lane, New Haw, Surrey KT15 3LS
Tel: 01932 336 911
Web: www.vmd.gov.uk

The Stationery Office (*European Community and UK Legislation*)
51 Nine Elms Lane,
London SW8 5DR
Telephone 020 7873 9090
Web: www.hmso.gov.uk

British Beekeepers' Association *(county and local beekeeping associations)*
National Beekeeping Centre, Stoneleigh Park, Stoneleigh, Warwickshire,
United Kingdom CV8 2LG
Tel: 02476 696679
Web: www.britishbeekeepers.com

Welsh Beekeepers Association *(county and local beekeeping associations)*
General Secretary, Pentrebwlen, Llanddewi brefi, Tregaron, Ceredigion, SY25 6PA

Scottish Beekeepers Association *(county and local beekeeping associations)*
Web: www.scottishbeekeepers.org.uk

Bee Farmers' Association
Web: www.beefarmers.co.uk

International Bee Research Association *(library and beekeeping information services)*
18 North Road,
Cardiff, Wales
CF10 3DT
Tel: 029 2037 2409
Web: www.ibra.org.uk

World Organisation for Animal Health, Office International des Epizooties (OIE)
Web: http://www.oie.int

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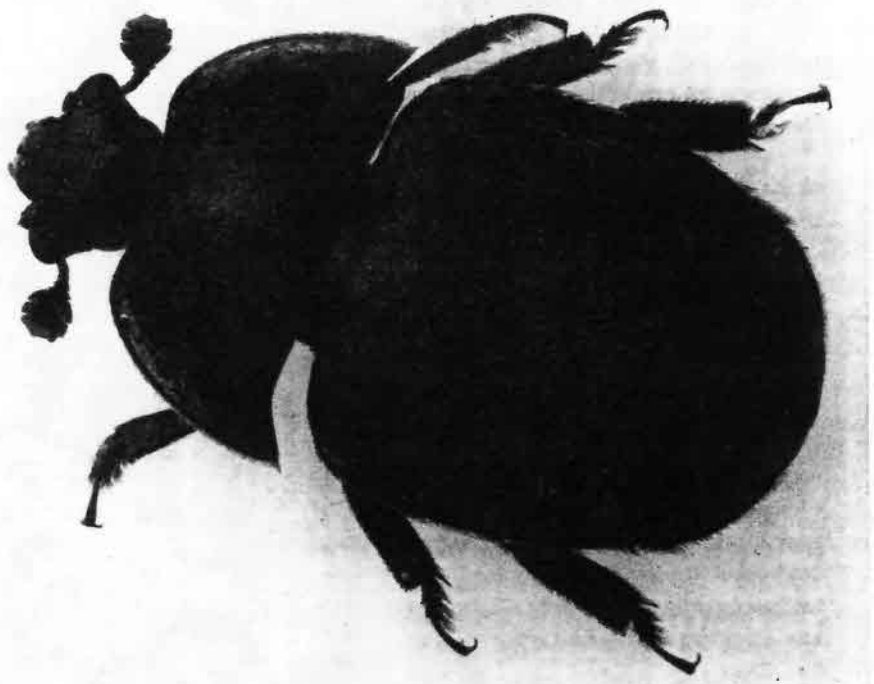
The Small Hive Beetle

A serious new threat to European apiculture



About this leaflet

This leaflet describes the Small Hive Beetle (*Aethina tumida*), a potential new threat to UK beekeeping. This beetle, indigenous to Africa, has recently spread to the USA and Australia where it has proved to be a devastating pest of European honey bees. There is a serious risk of its accidental introduction into the UK. All beekeepers should now be aware of the fundamental details of the beetle's lifecycle and how it can be recognised and controlled.

Latin Name	*Aethina tumida* (Murray).
Common name	The Small Hive Beetle (often abbreviated to "SHB").
Host	Mainly lives and breeds on its primary host the honey bee - in colonies, stored comb and beekeeping equipment, but it can also survive and reproduce on certain types of fruit, particularly melons.
SHB lifecycle	Adult beetles lay large numbers of eggs in the hive. Beetle larvae eat brood, pollen and honey. Larvae crawl out of the hive to pupate. Pupation usually occurs in soil outside the hive. Preference for warm sandy soils. Adults can fly at least 5 miles to infest new colonies.
Current distribution	Indigenous to Africa. First found in United States (Florida) in 1998. Now widespread in the USA. First found in Australia (Queensland, New South Wales) in 2002. Well established. Detected in Canada (Manitoba) in 2002. Not yet established.
UK status	Exotic pest not currently considered present in the UK. Quarantine pest status with surveillance programmes in place.
Methods of spread	Spread by movement of package bees, honey bee colonies, swarms, honeycomb, beeswax, soil and fruit. Adults can survive for two weeks without food and water, 50 days on used comb and several months on fruit.
Damage caused to beekeeping	In Africa it is a minor pest to beekeeping as native African bees have natural defences. For European honey bees in America and Australia (and therefore almost certainly the UK) the SHB is an extremely serious problem. The beetles multiply to huge numbers, their larvae tunnel through comb to eat brood, ruin stored honey, and ultimately destroy infested colonies or cause them to abscond.
Control methods used overseas	The SHB cannot be eradicated once well established. In the USA, beekeepers control SHB by using pesticides within the hive and in the surrounding soil, together with improved bee husbandry and changes to honey handling procedures.

The small hive beetle belongs to a family of scavenger beetles known as the Nitidulidae. Many of them are pests of fruit and stored food, and some like the SHB have a close association with social hymenoptera (bees, wasps and ants).

Adult beetle anatomy

Adult beetles are oval in shape, 5-7 mm long and 3-4.5 mm wide. Immediately after emergence they are coloured reddish-brown, but darken to dark brown or black when fully mature. There is some variation in size but they are about one-third the size of a worker bee. They have club shaped antennae, their bodies are broad and flattened dorso-ventrally, their wing cases (elytra) are covered with fine hairs and are short so that a few segments of the abdomen are visible.

Fig 4. View of beetle's head and club shaped antennae

Fig 5. View of beetle's abdomen showing shortened wing case (elytra)

Fig 6. Adult small hive beetle on hive floor

Egg laying

Adult beetles are attracted to bee colonies to reproduce. Once inside, adult beetles lay eggs in irregular masses in hive crevices or brood combs containing pollen or brood. The eggs are pearly white and about 1.5 x 0.25 mm, two-thirds the size of honey bee eggs. Each female beetle is capable of laying an enormous number of eggs, and so it takes relatively few beetles to produce a severe infestation.

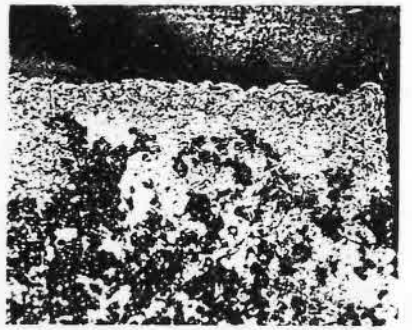


Fig 7. Masses of larvae and adult beetles on hive floor

Larval development

After 2-6 days SHB eggs hatch, and the young beetle larvae begin to feed. Both larvae and adults prefer to eat bee eggs and brood but they will also eat pollen and honey. As the larvae grow they burrow through brood combs, often in enormous numbers, causing great damage and ultimately consuming the colony's brood nest.

SHB larvae have characteristic rows of spines on the back and 3 pairs of tiny prolegs near the head (which distinguishes them from wax moth larvae). After 10-14 days, the larvae have completed their growth and measure 10-11 mm in length. There is no webbing or 'frass' (particles of comb debris) as found with wax moth infestation, but instead infested combs have a "slimy appearance".

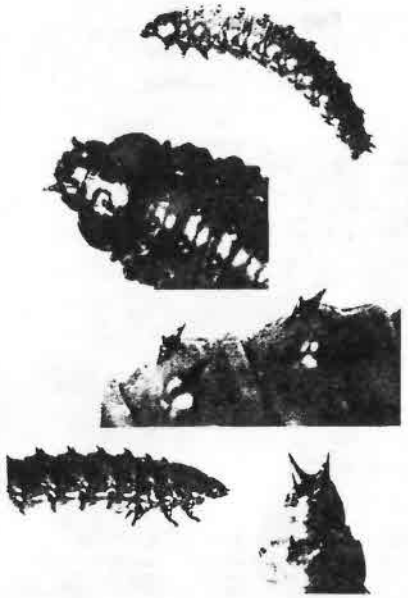


Fig 8. Views of small hive beetle larvae showing three pairs of prolegs and distinctive rows of spines, with two large spines protruding from the rear

Pupation

The next phase of the SHB's lifecycle takes place in the soil. Mature larvae will often mass on the hive bottom board and in corners of frames before moving outside the hive. They move towards the light at the hive entrance and then exit the hive and burrow into the soil close to the hive entrance constructing smooth-walled earthen cells in which they pupate. Pupae are white and darken as metamorphosis takes place.

They have a preference for sandy soils, so apiaries on these soils are particularly prone to attack. Pupation is a vulnerable time for the SHB and there is probably high natural mortality. This is a point in their lifecycle where they could be eliminated by the beekeeper - for instance using pesticides or a biological control method.

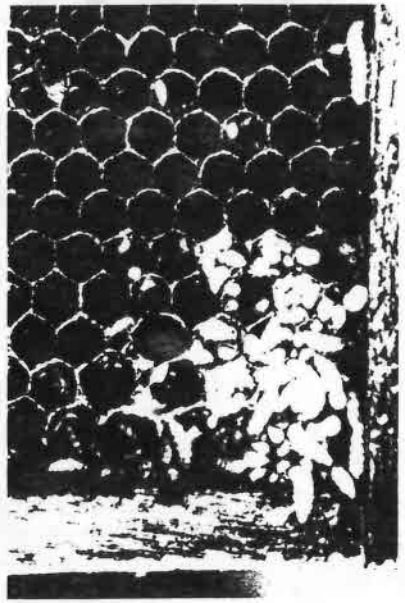


Fig 9. SHB larvae in corners of brood frame. Adult SHB also visible in the top left hand corner

Emergence of adults

Adult beetles first emerge on average 3-4 weeks later but pupation can last from 8-60 days depending on environmental conditions.

About one week after emergence adult beetles search for colonies in which to lay eggs. They disperse rapidly over large distances (perhaps 5-10 miles). The adult beetles are attracted by the odours from the hive, adult bees and brood. Beekeepers in the USA have observed that the day following an apiary inspection there is often a huge influx of beetles, suggesting that colony odours released serve as a stimulus for beetles to "home-in" on the apiary. Opening the hive triggers beetles already present in the hive to lay eggs. The beetle has been detected in swarms and is thought to travel with or follow them.

The chemical signals the SHB uses to locate apiaries are currently being investigated, and potentially form the basis of future control methods, such as pheromone bait traps.

Reproductive potential

Small hive beetles have a huge reproductive potential. Individual female beetles are capable of producing up to a thousand eggs during their 4-6 month life. In South Africa as many as five generations a year are possible, a new generation being produced every 5-12 weeks. Under ideal conditions, the SHB population is capable of very rapid growth.

Warm temperatures (above 10°C) are however required for completion of the life cycle. Where the ground temperatures remain low for much of the year, the population will build up more slowly. This is likely to be the case under UK conditions.

Alternative diets

Beetles can survive and lay eggs not only in bee colonies but also on a range of fruit, particularly melons. However, it is not known if beetles regularly eat fruit as an alternative food source, or whether this is important for their spread.

Adult beetles are able to survive for up to 2 weeks without food or water. On used brood combs they are able to survive up to 50 days.

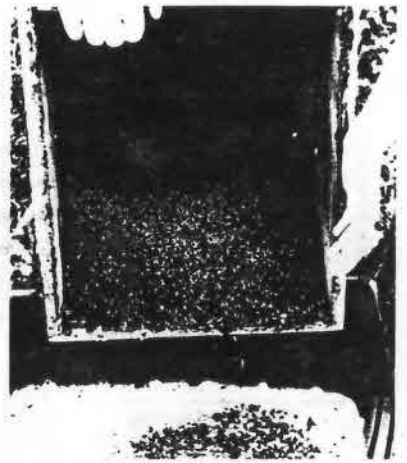


Fig 10. Thousands of larvae from a dead colony being poured into soapy water to kill them. Infestation levels can reach 30,000 larvae per colony, 6,000 per brood frame

Fig 11. Pictured is a pre-pupal larva, pupa and newly emerged adult SHB. The reddish colour is typical and will darken as the beetle emerges from the soil and flies off to locate a bee hive

Harmful effects of the small hive beetle

SHB and African Bees

In Africa, the SHB is considered to be a very minor economic pest of weak honey bee colonies and stored honey supers. There it is a scavenger beetle, consuming dead colonies, in much the same way as wax moth in the UK.

African bees have strong house cleaning and defensive traits, which include:

- preventing the beetles access to the colony by aggressively harassing them
- filling cavities where the SHB could hide with propolis
- removing SHB larvae and by confinement of beetles to 'propolis prisons'

Such behaviour limits SHB reproduction in African colonies and so keeps the beetle population down to manageable levels and below damage thresholds.

SHB and European Bees

Unlike African bees, European bees - as are present in the UK, USA and Australia - generally have fewer natural defences against the small hive beetle. Consequently, the beetle reproduces very successfully and the population grows much larger than in African colonies, and with far more harmful consequences.

Weak colonies are at the greatest risk of infestation. Strong colonies will actively remove larvae (much as they can deal with wax moth larvae), but they are not able to deal with adult beetles due to their hard exoskeleton and their defensive behaviour.

In the USA colonies vary in their ability to resist the SHB. Scientists and bee breeders believe that bees that display these defensive traits and the ability to incarcerate beetles in propolis prisons should be selected for.

Damage to the colony

SHB larvae do the most damage in the colony, burrowing through brood combs and consuming the brood and stores.

The level of harm to the colony depends on the number of beetle larvae present. Once present in large numbers, the survival of the colony is at great risk. Queens stop laying and colonies can quickly collapse.

In heavy infestations, tens of thousands of SHB larvae may be present within the colony. In such cases there can often be up to 30 larvae per cell. Such large numbers can generate enough heat inside the hive to cause combs to collapse and subsequently for the colony to abscond.

Fig 12. SHB larvae burrowing through comb, all the pollen and brood has been consumed

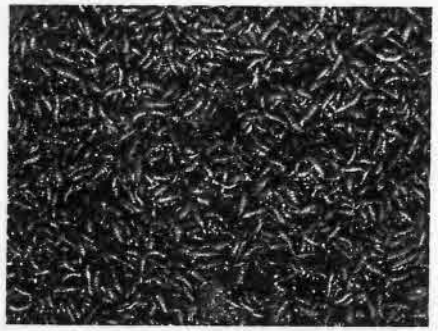


Fig 13. A severely infested colony

Fig 14. Honey spoilage. Damaged and spoiled honeycomb, with a "slimy" appearance caused by SHB larval feeding and defaecation

Honey spoilage

Defaecation of adult beetles and larvae in honeycomb causes the honey to ferment and drip out of cells. Affected combs become slimy and have a characteristic odour reminiscent of "rotten oranges". These combs are repellent to bees and can also cause absconding.

Honey supers removed from colonies and stored before extraction are at great risk from the SHB, particularly if they are stored in a warm room, and contain pollen or brood. They can quickly be rendered useless for extraction and the honey within completely ruined and unfit for sale.

Small hive beetle and bumble bees

It has also been demonstrated in quarantine facilities that small hive beetles can parasitise bumble bee colonies (*Bombus* spp.) causing very serious damage. This could have important ecological consequences if the beetles became established in the UK. However, it is not known if the beetles can find and infest these nests in the wild.

Fig 15. Fermented honey ("slime") that has leaked out of frames onto the hive floor

Fig 16. Bumble bees may also be affected by the SHB

Your responsibilities as a beekeeper

What should we be doing now?

The experience of the USA and Australia shows us that despite our wishes and efforts to the contrary, sooner or later the small hive beetle may arrive in the UK. It is important that beekeepers prepare for this possibility.

1. Make sure you only import bees through the proper channels and with appropriate health certification. Do not be tempted to import bees illegally.
2. Make sure you understand the essential details of the beetle's lifecycle, and how to recognise larvae and adult beetles.
3. You should keep an eye out for the SHB when you examine your bees - this should become part of routine colony management. If the beetle does enter the UK, early detection will allow control action to be targeted promptly where it is most needed and help reduce the spread of this pest throughout the country.
4. Aim to stay informed and up to date on the spread and emerging biology of the SHB and the methods used to control it overseas. If it does enter the UK, you will be ready to start to deal with it.

There is currently a great deal of new information on the small hive beetle, emerging from infested countries (see further help and advice section). The National Bee Unit (NBU) will provide regular updates to beekeepers as part of its bee health advisory work.

Small hive beetles and the law

At the time of writing, the SHB is not subject to legislation in the UK. However, proposals to amend UK bees legislation are likely to include and make notifiable a number of exotic pests and diseases of particular quarantine concern such as the SHB.

Import regulations are our main defence against the introduction of the SHB (and other very serious bee pests and diseases) from overseas to the UK, and it is absolutely essential that all beekeepers abide by them.

Contact the NBU, or your appropriate government agriculture department for details of the import regulations.

Sending suspect SHB samples to the NBU

Suspect SHB adults or larvae should be sent to the NBU for examination in a sealed container, such as a plastic tube or stiff cardboard box.

Please provide as many details as possible - such as your name, the apiary name and location (including, where possible, its Ordnance Survey map reference).

Do not send live beetles in the post. Kill them first by keeping them in a freezer overnight or by putting them in 70% ethanol (e.g. methylated spirits).

Sampling forms and details are available to download from the NBU website www.nationalbeeunit.com or contact your local bee inspector.

How to check your hives for the small hive beetle

Method: Scanning combs and boxes

Remove the hive roof and place it upside-down next to the hive. Remove the supers and upper brood chamber (in double brood chamber colonies) and place them on the upturned roof for a few minutes. Place the crown board on top. A few minutes later lift the boxes out of the way and scan for beetles on the inner surface of the upturned roof.

When hives are opened adult beetles quickly scuttle away from the light, so look for adult beetles moving inside the hive, running across combs, crown boards and the hive floor.

In warm weather, adult beetles will be mostly on the hive floor; in colder weather they hide themselves in the cluster for warmth. Look for clusters of eggs (two-thirds the size of bee eggs) in irregular masses usually in cracks and crevices in the hive.

Look for larvae in the combs or on the bottom board. Remove combs one at a time and carefully examine each of them for evidence of SHB larvae or adults. Although they may at first glance look like wax moth, they can easily be distinguished after close examination.

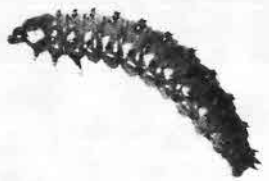


Fig 17. SHB larvae are maggot-like, with 3 pairs of prolegs near the head

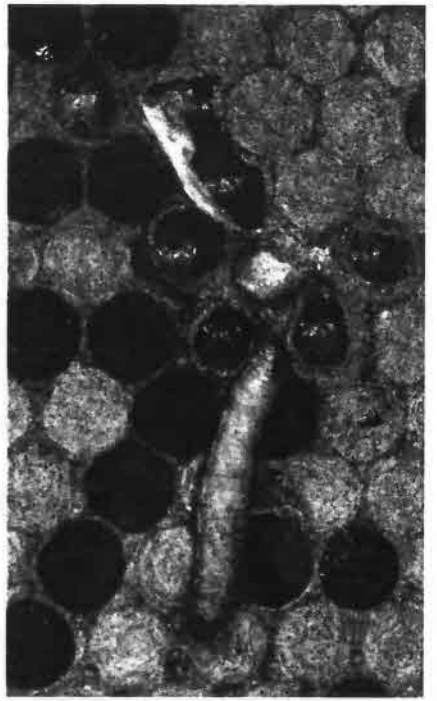


Fig 18. Wax moth larvae have small pairs of legs on each segment (like all caterpillars)

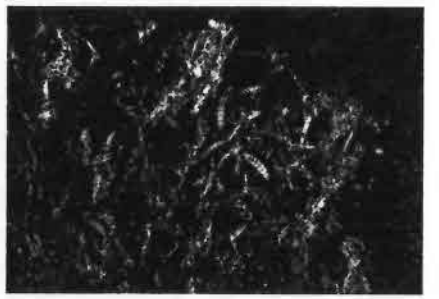


Fig 19. Wax moth larvae move away from the light and spin silken galleries, whereas SHB larvae are active in the light and do not spin webbing

Method: Using corrugated cardboard hive floor inserts

A simple detection method using cardboard hive-floor inserts has been used successfully in the United States for detecting the SHB. This exploits the beetle's tendency to seek dark crevices in which to hide.

A corrugated cardboard insert (with the paper removed on one side to expose the corrugations) is placed corrugated side down on the bottom board towards the rear of the hive. (Corrugated plastic can also be used and is longer lasting).

Regularly examine the debris under this insert for evidence of adult beetles or eggs in crevices on the hive floor.

CSL small hive beetle surveillance

The SHB is not thought to be present in the UK. However, from 2003, CSL bee inspectors are increasing statutory surveillance programmes to monitor for SHB presence. The NBU will use Geographical Information Systems (GIS) to prioritise this programme and target apiaries identified as "At risk". For instance, apiaries situated:

- in warmer parts of the country (where soil temperature exceeds 10°C)
- on sandy soils (suitable for SHB development)
- close to civilian and military airports
- close to freight depots and ports of entry - for instance for fruit and other foodstuffs
- close to other apiaries containing imported bees from countries where the SHB is known to be present or, if the SHB is found here, apiaries containing bees moved from declared infested areas

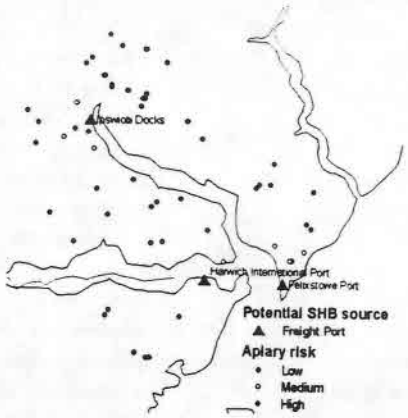


Fig 20. Use of GIS to identify apiaries at potential risk

Have I found a small hive beetle?

Many types of beetle, insect eggs and larvae may sometimes be found in bee hives. Check to see if those you have found match the key identification points below.

Adult beetles

- size: 5-7mm
- colour: black
- clubbed antennae
- behaviour: hides from the light
- short wing cases

Larvae

- size: 10-11mm
- colour: beige
- spines on dorsum
- 3 pairs prolegs
- Absence of frass and webbing

Eggs

- size: 1.5 x 0.25 mm (two-thirds size of honey bee eggs)
- colour: white
- location: masses of eggs, e.g. in hive crevices or hive floor

Small hive beetle control methods

SHB control overseas

This section provides information on the current treatment and husbandry methods used overseas to combat the small hive beetle and reduce its impact. In the UK at present there is no product registered for use against any life stage of the SHB. Products used abroad are included here for information only. No mention should be taken as an endorsement of safety, efficacy or a recommendation for use.

Experience from the USA has shown that the best line of defence is good management and there are a number of techniques that can reduce the impact of the beetle. These include:

- good bee husbandry, good hygiene practices and apiary management
- changes to extraction and honey handling procedures to limit delays
- use of pesticides to kill beetles in the hive and surrounding soil

Using bee husbandry to control SHB

- Manage strong colonies - weak colonies are more vulnerable, because there are not enough bees to protect comb and defend the brood nest (just as with infestation of wax moths)
- Avoid static sites, particularly if these are on light sandy soil, as this will allow the beetle population to increase steadily. It may be preferable to move the colonies to new sites periodically
- Look for and select bees that seem to have lower beetle populations. There is likely to be genetic variation in the ability of colonies to resist SHB infestation and by selecting for colonies with this characteristic, fewer other controls may be required

SHB control using pesticides

Beekeepers in the USA with SHB infested apiaries have used pesticides to kill the beetles.

The main in-hive control method adopted employs treatment strips, originally approved for use against varroa mites. The strips are fixed to the underside of cardboard floor inserts to kill adult and larval beetles that are attracted there. Appropriate precautions need to be taken to prevent possible contamination of honey and other hive products with treatment residues.

To kill soil-based stages of the SHB's life cycle, a soil-drench is applied to the ground around the hives in the apiary.

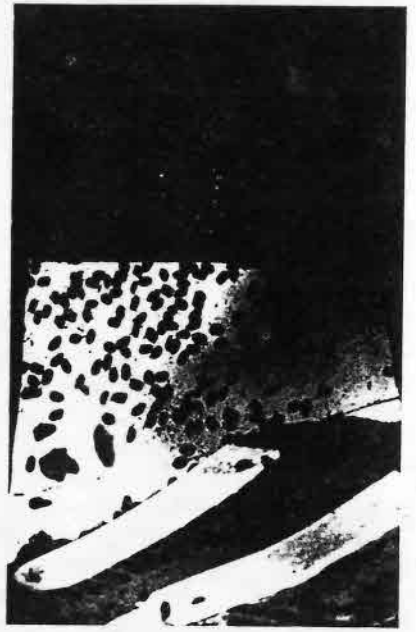


Fig 21. Cardboard trap combined with treatment

Precautions in the extraction room

The SHB can be a serious problem for supers containing honey prior to extraction or combs in storage, kept in the protected environment of the extraction room.

- Beekeepers should always use queen excluders in hives to prevent queens from laying in supers. Otherwise, if brood is brought into the extraction room with the honey crop, any SHB larvae hatched from eggs laid in supers will rapidly cause spoilage of the honey and destruction of comb
- Maintain efficient practices in the extraction room. Supers should be extracted rapidly after harvesting from hives to give the SHB the minimum time to cause damage. Freezing of honeycomb kills all life stages It is common practice for many beekeepers (usually small producers) to put super frames through the freezer prior to extraction or storage for wax moth control. Stored comb should be regularly checked for signs of infestation
- It is important to employ good hygiene around the extraction room, clear up thoroughly after extraction
- Do not leave comb or wax cappings lying around for beetles to lay eggs in
- Keep relative humidity down to below 50% where honey is stored prior to extraction. This inhibits SHB egg hatching and eliminates larval damage to honey. This can be done by circulating air down through stacks of supers raised up off the ground on pallets (using a fan or dehumidifier)
- Fluorescent light sources placed on the floor of the extraction room at night attracts larvae looking for soil in which to pupate. These can be swept up and destroyed by pouring into scapy water

Future research into SHB biology and control

As the small hive beetle has only been subjected to intensive scientific study for a comparatively short time, there are still significant gaps in our understanding of many aspects of its biology. These include, for instance, mating behaviour, natural enemies, methods of host location, and flying range.

As more research is carried out, our understanding of the beetle's habits will undoubtedly increase and this could suggest new methods that might in the future be used to control it. So far chemical measures to control the SHB have not been fully effective and are considered short-term measures.

Research work is being carried out to find alternative methods - such as beetle traps within or outside the hive, chemical lures and biological controls using natural enemies - that may in the future provide more effective and preferably more environmentally friendly means of control.

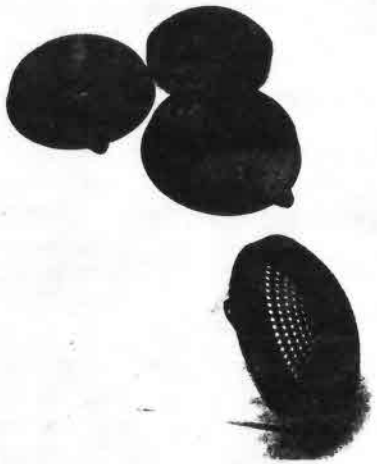


Fig 22. PC™ Floor Trap and PC Trap (PC stands for Pitfall Cone) developed by CSL. Examples of trapping systems

Further help and advice

The National Bee Unit

The Central Science Laboratory National Bee Unit (NBU) provides a statutory and advisory service to beekeepers in England and Wales. It provides diagnostic, consultancy and research services to the Department for Environment, Food and Rural Affairs (Defra), National Assembly for Wales Agriculture Department (NAWAD), commerce and beekeepers. The Unit has modern facilities, including laboratories with first class computer support, as well as 150 colonies and the apiary buildings to support them.

Fig 23. Central Science Laboratory, Sand Hutton, York

NBU Laboratories are fully compliant with the international Good Laboratory Practice (GLP) quality scheme to ensure a high professional standard. All staff are trained practical beekeepers supported by teams of scientists in CSL: analytical chemists, agricultural specialists, entomologists, pest and disease population modellers, pest risk analysts and pest management specialists.

The NBU has a bee health support service operating in England and Wales, comprising a network of Regional Bee Inspectors who manage teams of Seasonal Bee Inspectors. In addition to apiary inspections for statutory bee diseases, bee inspectors provide advice and assistance to beekeepers on a range of bee health topics and run training courses for beekeepers on disease recognition and control, usually in conjunction with local beekeeping associations. Bee inspectors also assist with field trials within the NBU's experimental programmes.

For further information, contact the NBU who will put you in touch with the appropriate bee inspector for your area, or visit the NBU website (www.nationalbeeunit.com)

Beekeeping Associations

In many areas, beekeeping associations operate disease control schemes and provide practical advice to members on bee disease recognition and control. Contact your local beekeeping association for details or your local Disease Liaison Contacts (DLC).

Fig 24. Beekeepers training session at the NBU's teaching apiary at Sand Hutton

The Bee Health Advisory Panel

CSL hosts a panel of independent beekeeping scientific experts including representatives from national beekeeping associations. Its aim is to keep the official bee health programme under review, suggest improvements to it and advise on research and training likely to be of direct help to beekeepers.

UK information sources

CSL National Bee Unit (NBU)
Central Science Laboratory
National Bee Unit
Sand Hutton, York
North Yorkshire
YO41 1LZ
Tel: 01904 462510
Fax: 01904 462240
email: nbu@csl.gov.uk
Web: www.csl.gov.uk
Web: www.nationalbeeunit.com

Department for Environment, Food and Rural Affairs (Defra)
Horticulture and Potatoes Division
Eastbury House
30/34 Albert Embankment
London
SE1 7TL
Tel: 020 7238 1047/1045
Web: www.defra.gov.uk
Bee health pages:
Web: www.defra.gov.uk/hort/bees.htm

National Assembly for Wales Agriculture Department (NAWAD)
Agricultural Policy Division
Crown Buildings, Cathays Park Cardiff, CF1 3NQ
Tel: 02920 825111

Caenarfon Divisional Office
Penrallt
Caenarfon
Gwynedd
LL5 1EP
Tel: 01286 662 012
Web: www.wales.gov.uk

Bee Farmers Association of UK
Web: www.beefarmers.co.uk

British Beekeepers Association (BBKA)
National Agricultural Centre
Stoneleigh, Warwickshire
United Kingdom, CV8 2LZ
Tel: 01203 696679
Web: www.bbka.org.uk

International Bee Research Association (IBRA)
18 North Rd
Cardiff
Wales, CF10 3DT
Tel: 02920 372409
Web: www.ibra.org.uk
Email: ibra@cardiff.ac.uk

Overseas information

NSW Department of Agriculture, Australia
Web: www.agric.nsw.gov.au/reader/16402

Queensland Department of Primary Industries, Australia
Web: www.dpi.qld.gov.au/bees

Department of Entomology, University of Georgia, USA
Small Hive Beetle Fact Sheet
Web: www.bugwood.org/factsheets/small_hive_beetle.html

Florida Department of Agriculture and Consumer Services, USA
Web: doacs.state.fl.us/~pi/enpp/ento/aethinanew.htm

United States NAPIS Cooperative Agriculture Pest Survey Programme
Web: www.ceris.purdue.edu/napis/pests/shb/

USDA Bee Research Laboratory
Beltsville, Maryland, USA
Web: www.barc.usda.gov/psi/brl/

USDA Beneficial Insects Research Center
Weslaco, Texas, USA
Web: weslaco.ars.usda.gov/biru.html

ARC Plant Protection Research Institute Honey Bee Research
Stellenbosch, South Africa
Web:
www.arc.agric.za/institutes/ppri/main/divisions/beekeeping/honeybeeresearch.htm

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York,
North Yorkshire,
Y04 1LZ

Telephone: 01904 462510

British Beekeeper's Association

(county and local beekeeping associations)

National Agricultural Centre,
Stoneleigh,
Kenilworth,
Warwickshire,
CV8 2LZ

Telephone: 01203 696679

Scottish Office Agriculture, Environment and Fisheries Department (SOAFED)

Pentland House,
47 Robbs Loan,
Edinburgh,
EH14 1TY

Welsh Beekeepers' Association

c/o Mr B. D Rowlands
Trem-y-Clawdd
Fron Isaf
Chirk
Wrexham
LL14 5AH

Department of Agriculture for Northern Ireland

Agriculture and Technology Division,
Greenmount College of Agriculture and Horticulture,
22 Greenmount Road,
Antrim,
BT41 4PU

Bee Disease Insurance Ltd

c/o Mr B. White,
36 Shaw Gardens
Guiseley,
Leeds,
LS20 9JH

HMSO

(For copies of the Bee Diseases Control Order 1982)

Orders Department
PO Box 276
London
SW8 5DT

International Bee Research Association

(library and beekeeping information services)

IBRA,
18 North Road,
Cardiff,
CF1 3DY

MAFF Ministry of Agriculture Fisheries and Food

Ministry of Agriculture, Fisheries and Food
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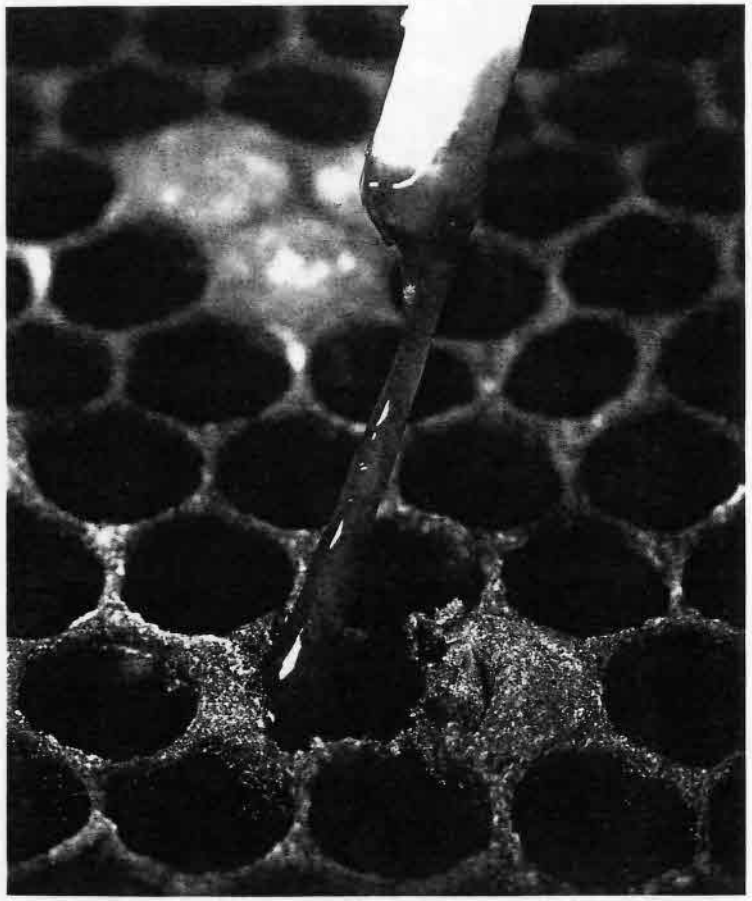
Foul brood disease of honey bees: recognition and control



AFB ropiness test

Honey bee colonies are subject to a number of diseases that affect their brood. This leaflet describes the recognition and control of the two most serious of these, American foul brood and European foul brood, along with other common but less serious brood disorders.

Honey bees and disease

Honey bees play a vital role in the environment by pollinating both wild flowers and many agricultural crops as they forage for nectar and pollen. The value of such crops grown in the UK is estimated at billions of pounds annually - and this is in addition to production of honey and beeswax worth millions of pounds. The essential and valuable activities of bees depend upon beekeepers maintaining a healthy population of honey bees.

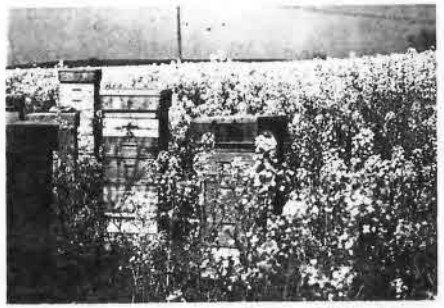


Fig 1 Honey bee colonies pollinating Oil Seed Rape

As with other forms of livestock, honey bees are subject to a range of harmful diseases. Some of these affect adult bees, others affect immature stages of the bees' development (larvae and pupae) and these are referred to as brood diseases. There are several such brood diseases that affect honey bee colonies in the UK. These include the two extremely serious and infectious foul brood diseases together with a range of common and less harmful disorders.

Foul brood

The term 'foul brood' covers two diseases of the honey bee larvae, one known as American foul brood (AFB), and the other European foul brood (EFB). The names bear no relation to the geographical distribution of the diseases: both occur in the British Isles and the damage done by them annually to our beekeeping industry is considerable. American foul brood is considered the most destructive brood disease in Great Britain. However, European foul brood is currently the most widespread, and where it occurs it often spreads rapidly and is difficult to eradicate unless prompt measures are taken.

Minor brood diseases

There are several other brood diseases and disorders that, although much less serious than foul brood, are extremely widespread. It is essential that beekeepers are able to recognise these and distinguish them from foul brood.

Varroosis

Infestation of honey bee colonies by the parasitic mite *Varroa jacobsoni* is the subject of a separate CSL/WOAD/MAFF leaflet, *Varroosis - a parasitic infestation of honey bees* (PB 2581).

Beekeeper responsibility

All colonies in the UK are at risk of contracting foul brood. If disease occurs but is not detected and controlled, the infection will normally spread quickly through the apiary and into adjacent apiaries belonging to other beekeepers. However if the infection is spotted at an early stage, no further spread is likely to occur.

As a beekeeper you have a responsibility to ensure that your bees are healthy and that you are not unwittingly spreading any infection through your beekeeping practices.

You should be familiar with the signs and causes of the diseases that may affect your bees, the methods used to control them, and the measures you should take to help keep your colonies healthy and productive.

The Bee Inspectors from the CSL National Bee Unit (NBU) cannot examine all colonies of bees each year and it is therefore essential in the control of foul brood for you to regularly inspect your own colonies for signs of brood disease. If you suspect foul brood you must contact the NBU for assistance. It is also very good practice to inform other local beekeepers of the problem so that they can check for signs in their own bees.

10 RULES FOR FOUL BROOD CONTROL

1. Make sure you are familiar with the signs and causes of foul brood and other brood disorders.
2. Inspect your colonies every spring and autumn, specifically to check for brood disease. If you are unsure, seek expert advice.
3. Never transfer combs between colonies, or divide colonies, without first checking for signs of brood disease.
4. Never bring colonies, combs or beekeeping equipment into the apiary unless you are sure that they come from a disease-free source.
5. Never buy old combs. Always sterilise second-hand hives by thoroughly scorching with a blow lamp before use.
6. Control robbing in the apiary. Never leave combs or honey exposed to robbing bees. Never feed honey from another source to your bees.
7. If a colony of bees dies out at any time, seal the hive to prevent the remaining stores being robbed out, pending examination of the brood combs for signs of disease.
8. If any colony appears not to be thriving, and the reason is not already known, examine the brood for signs of disease.
9. Be suspicious of stray swarms. hive them on foundation rather than drawn comb, and inspect them for disease once they have become established.
10. Regularly and systematically replace old brood combs in the apiary by melting them down and replacing them with frames fitted with foundation.

UK bee disease legislation

Both AFB and EFB are subject to statutory controls in the UK. The Bee Diseases Control Order 1982 empowers the appropriate Agriculture Departments of Great Britain to take measures to control both diseases. Beekeepers should be familiar with the provisions of the Order (SI 1982 No 107), copies of which are available from HMSO.

Any beekeeper in England or Wales who suspects the presence of either AFB or EFB in a colony for which they are responsible is legally required either to contact the Central Science Laboratory National Bee Unit (NBU) to have the colony officially examined, or to submit a suspect disease sample for analysis. Beekeepers elsewhere in the UK should contact the local office of the relevant Government Agriculture Department.

The National Bee Unit operates an apiary inspection programme in England and Wales. CSL Bee Inspectors inspect bee colonies for foul brood, free of charge. When disease is suspected, a sample is taken for laboratory analysis and a Standstill Notice is issued, prohibiting the removal of bees and equipment from the apiary. If foul brood is confirmed an inspector returns to carry out the necessary disease control measures. For further information, see the CSL/WOAD/MAFF leaflet *Statutory procedures for the control of foul brood* (PB 3054).

Further details about the National Bee Unit and its advisory and training services for beekeepers are given at the end of this leaflet.

Fig 2 Bee disease recognition training

How to examine a honey bee colony for brood disease

- Wear full protective clothing and have a smoker well lit.
- Keep the colony subdued with smoke.
- Remove the hive roof and place it on the ground by the hive.
- If there are supers on the hive, remove them and place them on the upturned roof, keeping them covered to prevent robbing.
- Remove any queen excluder and examine the underside for the queen. If she is present return her to the colony.

Fig 3 Opening the hive for disease inspection

- Where two boxes are used for the brood nest examine the bottom one first.
- Remove the outside comb, which is unlikely to contain brood, and lean it against a front corner of the hive - you will then have room to work.
- Take each comb in turn, and holding it by the lugs within the brood chamber, give it a sharp shake. This will deposit the bees on the bottom of the hive without harming them, the queen or brood.

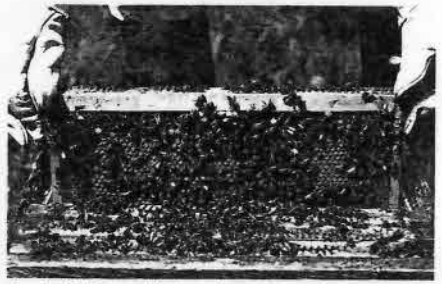


Fig 4 Shaking adult bees from the comb into the hive

- Any bees on a comb may be concealing infected brood from the beekeepers' view. On combs free from bees, any abnormality is easily spotted
- Examine the brood, both sealed and unsealed, quickly but carefully, for any signs of abnormality - such as discoloured larvae or perforated cappings.
- Look for AFB scales (see page 7) by holding the combs towards the light and scanning the bottom walls of any open cells.

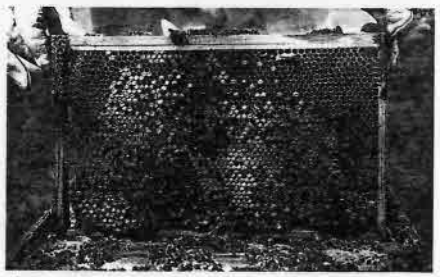


Fig 5 With bees removed the brood is clearly visible

- Look inside any sealed cells with abnormal looking cappings after opening the cell with a corner of the hive tool.
- To establish the consistency of any dead remains present, probe these with a matchstick. Dispose of the used matchstick in the smoker.
- Continue until you have examined all the brood combs; then reassemble the hive.
- **If you suspect EFB or AFB may be present, contact the NBU immediately for assistance** (see page 14 for details).

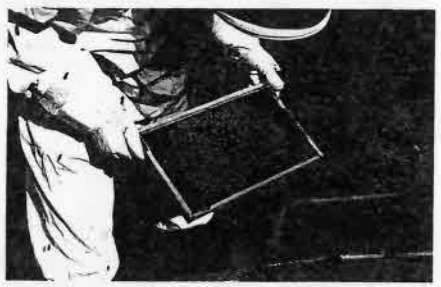


Fig 6 Examining the comb for scales

HEALTHY BROOD

All beekeepers should be familiar with the appearance of healthy worker brood, so that they can recognise abnormalities which may indicate the presence of foul brood or other brood diseases.

- The queen lays eggs at the base of cells in the brood nest. These hatch after three days and develop into tiny translucent larvae lying at the base of the cell in a bed of milky brood food.

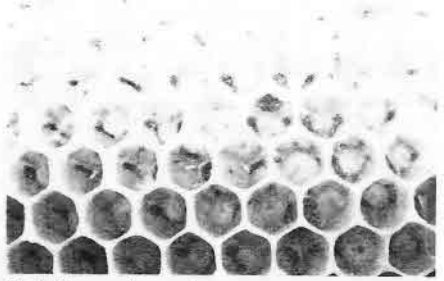


Fig 7 Eggs and young larvae

- After several further days of development, the larvae have increased in size to almost fill the base of the cell.
- Healthy larvae are **pearly-white** in colour.
- They lie in a distinct **'C' shape**, with the head and tail curled towards one another.
- The body of the larva can be seen to be divided along its length into a series of segments.

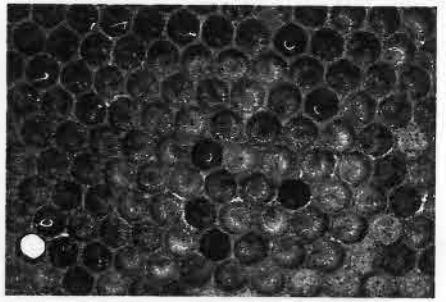


Fig 8 Healthy larvae shortly before sealing

- When larvae are nine days old, the cell opening is sealed by adult bees with a cap of wax, and development into an adult bee occurs inside the sealed cell.
- The wax cappings on healthy worker brood vary in colour from very light to dark brown, and they are dry looking and slightly convex.
- Drone brood can be distinguished from worker brood by its larger cells and domed cappings.

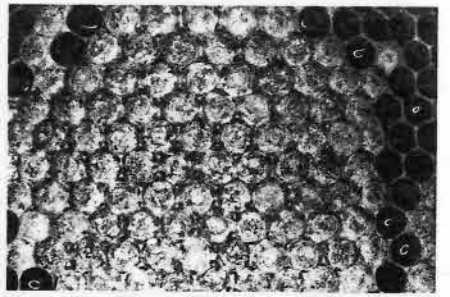


Fig 9 Sealed healthy brood

- A good brood pattern, with very few empty cells within patches of brood suggests that the queen is laying well and nearly all the larvae are developing normally.
- Even where the brood pattern is more haphazard, as results from an old or failing queen for instance, the individual larvae and cell cappings should still have a normal appearance.

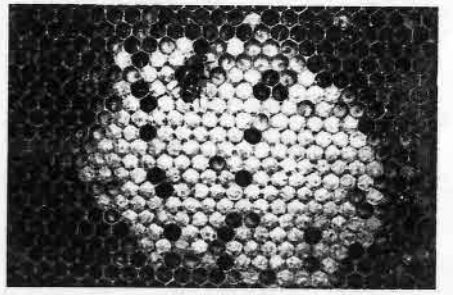


Fig 10 Healthy brood in all stages

AMERICAN FOUL BROOD

Cause

American foul brood is caused by a spore-forming bacterium called *Paenibacillus larvae*. Young honey bee larvae become infected when they consume *P. larvae* spores in their food. The spores germinate in the gut; bacteria then move into the tissues, where they multiply enormously in number. Infected larvae die after their cell is sealed, and millions of infective spores are formed in their remains. These remains dry to form 'scales' which adhere closely to the cell wall and cannot easily be removed by bees. Consequently brood combs from infected colonies are inevitably severely contaminated with bacterial spores.

The spores are very resistant to extremes of heat and cold, and to disinfectants. They retain their powers of germination for many years in honey, in old combs kept in store, or in derelict hives, skeps or boxes.

Once a colony is infected the disease will progress until most of the brood is affected. The colony then becomes unable to replace the ageing adult bee population, causing it to become weakened, and finally to die out. The disease may develop for months before the colony succumbs, and death may occur at any time of the year.

Spread

The beekeeper is the chief spreading agent of the disease. If combs, honey or hive equipment are transferred from an AFB-infected colony to a healthy colony, it becomes infected. The disease is also transmitted by bees robbing honey from infected colonies. Swarms from infected colonies may also carry infection with them and become diseased after they are hived.

Control

AFB is a notifiable disease under the Bee Diseases Control Order 1982 and is subject to official control by a programme of apiary inspections and compulsory destruction of infected colonies. For confirmation of AFB a sample brood comb is sent to the NBU laboratory where larval remains are examined microscopically for the presence of the causative bacteria.

Infected colonies are destroyed by burning under the supervision of a bee inspector. The bees are killed, and together with the combs are burned in a deep pit (fig. 11).

Hives and appliances can be sterilised by thoroughly scorching them with a blowlamp. Gloves, overalls, footwear and the smoker are washed in hot soapy water.

Methods of control of AFB using antibiotics that are used in some overseas countries are not effective, as they suppress signs of the disease without eradicating it, and they are not permitted in the UK.

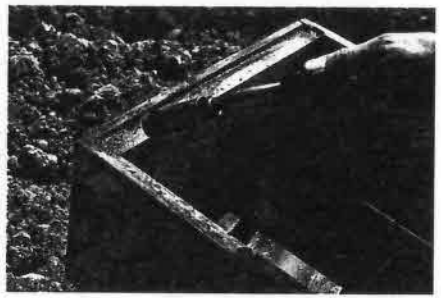


Fig 11 Destruction of AFB infected colony and sterilisation of hive boxes

Signs of American foul brood

- AFB affects only sealed brood. When infected larvae die within the sealed cell, the appearance of the cell cappings changes.
- Cappings become sunken and perforated when adult bees nibble holes in them. These perforations tend to be jagged and irregular in shape.
- Some cappings may become moist or greasy looking and slightly darker in colour than other cells.

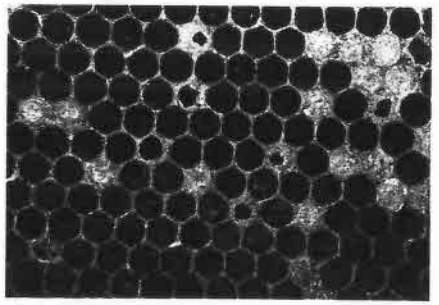


Fig 12 AFB - perforated cappings

- At first only very few cells may show signs of disease, and the colony will appear normal in other respects.
- Eventually much of the sealed brood will become affected by the disease, causing a patchy or 'pepper pot' brood pattern. There may then be an unpleasant smell.
- At the sunken capping stage the dead larval remains are light to dark brown in colour, and have a slimy consistency.

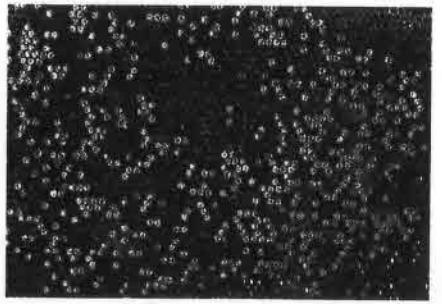


Fig 13 AFB - 'pepper pot' brood

- If a matchstick is inserted and slowly withdrawn, the remains can be drawn out in a brown, mucus-like thread or 'rope' 10-30mm long. This is called the 'ropiness' test and is a reliable test for AFB.
- The ropy condition is followed by a tacky stage as the larval remains in the cell gradually dry up and the colour changes to dark brown.
- The proboscis of dead pupae may sometimes remain intact, protruding upwards from the bottom edge of the cell.

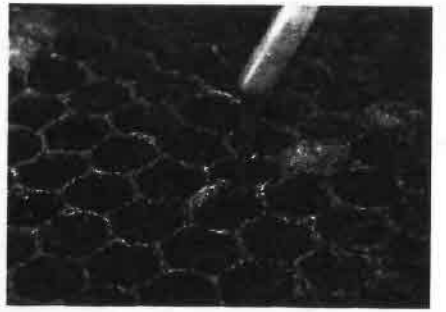


Fig 14 AFB ropiness test

- Further drying leads to the final stage, which is a very dark brown, rather rough scale lying on the lower side of the cell and extending from just behind the mouth of the cell right back to the base.
- The scales can be detected if the comb is held facing the light: they reflect the light from their rough surfaces and can easily be seen, even when their colour is almost the same as the comb itself.

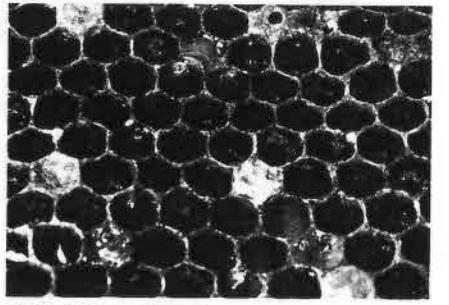


Fig 15 AFB scales in comb

EUROPEAN FOUL BROOD

Cause

European foul brood is caused by the bacterium called *Melissococcus pluton*. The bacteria multiply in the mid-gut of an infected larva, competing with the larva for its food. They remain in the gut and do not invade the larval tissue; larvae that die from the disease do so because they have been starved of food. This normally occurs shortly before their cells are due to be sealed. Subsequently other species of bacteria may multiply in the remains of dead larvae as 'secondary invaders'.

Progression of the disease

The development of the disease within a colony is complex, and still not fully understood. It appears that infection can develop over a period of months or years, debilitating but not killing the colony. During this time, signs of the disease may become more or less severe, or disappear altogether. Frequently there is a seasonal pattern, with signs becoming most obvious in late spring.

This is thought to be because when there are many larvae relative to the number of nurse bees, larvae tend to receive less brood food overall, and those infected with EFB are more likely to suffer from starvation. At other times, larvae that are infected but receive an abundance of brood food may survive the infection, and develop into healthy adult bees. However, when such larvae pupate, they void their gut contents into the cell, contaminating the comb with millions of infective bacteria. Eventually the disease is likely to reach the stage where a high proportion of the brood is affected and the colony will be weakened and ultimately killed.

Spread

The beekeeper is the chief spreading agent of the disease. If combs, honey or hive equipment are transferred from an EFB infected colony to a healthy colony, it is likely to become infected. The disease is also transmitted by bees robbing honey from infected colonies. Swarms from infected colonies may also carry infection with them and become diseased after they are hived.

Diagnosis

European foul brood cannot be reliably identified visually, as the disease signs can easily be confused with various other brood abnormalities. A sample brood comb is sent to the NBU laboratory where larval gut contents are examined microscopically for the presence of the causative bacteria (fig. 16).

Control

EFB is a notifiable disease under the Bee Diseases Control Order 1982 and is subject to official control by the examination of colonies for signs of disease and compulsory treatment or destruction of diseased colonies. Weak colonies and colonies with a high proportion of diseased brood are destroyed, as with American foul brood, but lightly diseased colonies may be treated with an antibiotic. Treatment must be carried out only by an Appointed Officer under the Order, using drugs officially dispensed following confirmation of European foul brood in a disease sample submitted for diagnosis at an approved laboratory.

Fig: 16 Disease diagnosis at the NBU laboratory

Signs of European foul brood

- EFB affects mainly unsealed brood, killing larvae before they are sealed in their cells.
- The EFB infected larva moves inside its cell instead of remaining in the normal coiled position characteristic of a healthy larva of the same age.
- When it dies it lies in an unnatural attitude - twisted spirally around the walls, across the mouth of the cell or stretched out lengthways from the mouth to the base.

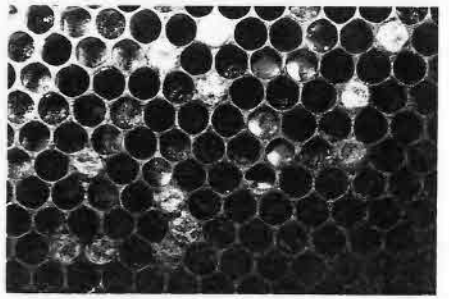


Fig 17 EFB affected unsealed brood

- The dead larva often collapses as though it had been melted, turning yellowish-brown and eventually drying up to form a loosely attached brown scale.
- The gut of infected larvae may be visible through the translucent body wall of the larvae. It has a creamy white colour caused by the mass of bacteria living within it.

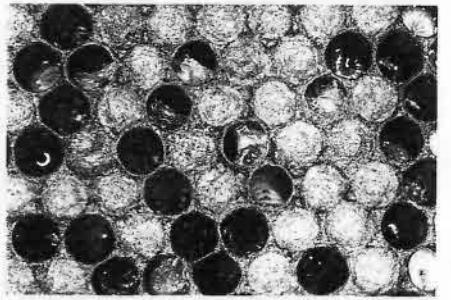


Fig 18 EFB - twisted and discoloured larvae

- When a high proportion of the larvae are being killed by EFB, the brood pattern will often appear patchy and erratic as dead brood is removed by the bees and the queen lays in the vacant cells.
- A very unpleasant odour may sometimes accompany severe EFB infection, depending on the presence of certain other species of bacteria in the remains of dead larvae.

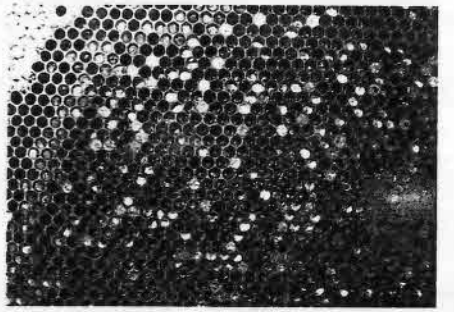


Fig 19 EFB - severe infection and patchy brood pattern

- A minority of infected larvae may die after the cell is sealed. In such cases, there may be sunken perforated cappings resembling AFB infection. However, the cell contents although brown and sticky can not be drawn into a 'rope' as with AFB.
- Where larval remains dry to form scales, these are variable in colour, loose within the cell and somewhat rubbery, unlike the hard black firmly attached scales of AFB.

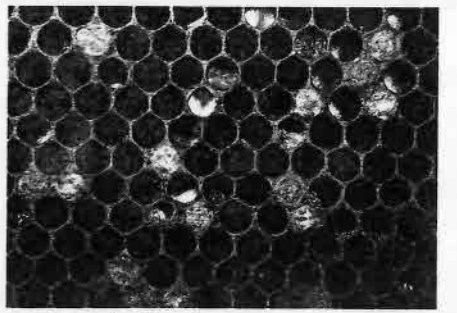


Fig 20 EFB - dead brood with scales

COMMON BROOD DISORDERS

In addition to the foul brood diseases, there are also less serious honey bee brood disorders such as sacbrood, chalkbrood, bald-brood, laying workers and drone-laying queens. It is important that beekeepers are able to distinguish between these and foul brood.

SACBROOD

Sacbrood is a very common virus disease affecting brood. In most diseased colonies relatively few larvae are visibly affected, and it rarely causes measurable harm to colonies. However, its signs can sometimes be mistaken for those of AFB.

Disease signs

Larvae that have died from sacbrood become like fluid-filled sacs, stretched on their backs with their heads towards the top of their cells. They are eventually uncapped by adult worker bees.

Diseased larvae turn from the normal pearly-white colour to pale yellow and the head curls up as the body dries to a thin, dark brown scale lying along the bottom wall of the cell. These are referred to as 'Chinese Slippers'

Fig 21 Sacbrood infected larva (cell mouth enlarged for photograph)

The scale of a sacbrood infected larva has a distinctive gondola shape and is easily removed in one piece from its cell using a matchstick

Treatment and control

There is no specific treatment for sacbrood. When much of the brood is obviously affected, the queen should be replaced by one from a colony showing no signs of the disease. Combs can be re-used; any sacbrood virus present on them becomes non-infectious within a few weeks.

Fig 22 Sacbrood 'Chinese slipper' (removed from cell for photograph)

VARROOSIS

Colonies that are severely infested with varroa mites (*Varroa jacobsoni*) frequently suffer from death of brood. This is normally most apparent in colonies that are very severely infested, especially those that are collapsing from the infestation. The damage results not from the mites themselves, but from viruses that are triggered by the infestation or, in the case of collapsing colonies, from the bees failing to care adequately for their brood.

Disease signs

Signs of damage to brood in varroa infested colonies can be very variable. Most commonly sealed brood appears affected, with dead and discoloured brood in various stages below perforated cappings. The larval remains may be firm or watery, but **never** ropy (as with AFB).

Close examination will reveal numerous varroa mites in floor debris, brood cells and on adult bees.

Fig 23 Varroa - comb from collapsing colony

CHALKBROOD

Chalkbrood is an extremely common brood disease caused by the fungus *Ascosphaera apis*. The thread-like, vegetative growths ('hyphae') of the fungus invade the body tissues of infected larvae, killing them after they have been capped over in their cells.

Disease signs

Adult bees usually tear down the brood cell cappings to remove the dead larvae. These appear as hard, chalky-white or mottled grey remains ('mummies') lying along the length of the cell.

Infected larvae often take on the hexagonal shape of the cell itself before shrinking in size, at which point the bees are able to remove them from the comb. They are often noticeable on the hive floor or at the hive entrance.

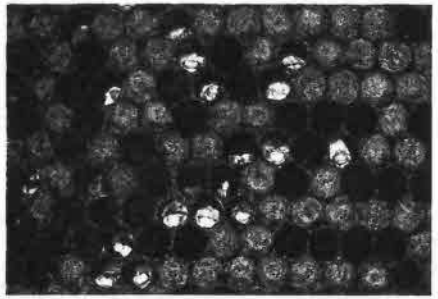


Fig 24 Chalkbrood infected brood

The spread of chalkbrood

Larvae affected by chalkbrood may release millions of spores that all have a sticky coating, enabling them to adhere to combs and to adult bees. These are the dormant phase of the fungus and can remain infectious for three years or more.

Fig 25 Chalkbrood 'mummies' on hive floor

Both the transfer of combs by the beekeeper and the drifting of bees transmit chalkbrood spores between colonies.

Signs of chalkbrood are probably present in the majority of colonies at some time, and spores of *A. apis* can be detected even in apparently unaffected colonies. However, it is rarely a serious disease, and the effect on most colonies is slight. Chalkbrood is most likely to be serious in colonies that are finding it difficult to care adequately for their brood, and is therefore most prevalent in weak colonies and during early spring.

Treatment and control

There are no specific treatments for chalkbrood. The most effective control results from avoiding the conditions favourable to its increase by maintaining strong and vigorous colonies. In severe cases, re-queening with a queen from a chalkbrood-free colony is recommended.

BALD BROOD

Normally pupae are sealed in their cells under wax cappings until they are ready to emerge as adults. Colonies with bald brood may have small patches of live and normal looking pupae in cells that are incompletely capped. The partial capping frequently has a raised lip that protrudes from the comb.

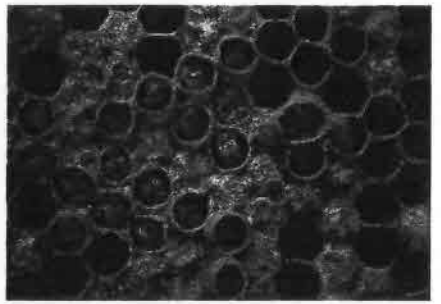


Fig 26 Bald Brood

The cause of bald brood is not always clear; however the most common reason is infestation of brood combs by wax moth larvae. These can often be found tunnelling below the surface of the comb close to patches of bald brood.

DRONE BROOD IN WORKER CELLS

The characteristic domed cappings of sealed drone brood are present in virtually all colonies during the summer months on areas of drone comb, usually situated at the edge of the brood nest. However, there are common abnormalities that can cause drone brood to be reared in worker cells along with, or in place of, worker brood. Such drone brood is usually very irregular; capped pupae are interspersed with either vacant cells or cells containing larvae at every stage of development. There are two possible causes - a drone-laying queen or laying workers. Beekeepers often confuse these conditions with serious brood diseases.

Drone-laying queen

Worker bees develop from eggs that have been fertilised, before they are laid, by sperms stored in the queen's sperm sac (spermatheca). If the supply of sperm becomes exhausted, only unfertilised eggs are laid, which develop into drone brood. Hence, queens may become drone-layers in later life or earlier if they have not properly mated. Such queens should be replaced with one of proven fertility.

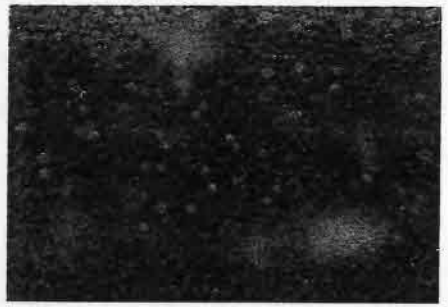


Fig 27 Domed cappings of drone brood in worker cells

Laying workers

When colonies lose their queen and have no young worker brood from which to rear a replacement, the workers may develop functional ovaries and begin to lay eggs. These eggs, being unfertilised, develop into drones; the signs are similar to those of the drone-laying queen, except that the brood pattern is often less compact. Also, there may be several eggs present in some cells, often on the walls as well as at the bottom of the cell. Colonies with laying workers are very difficult to requeen, and are usually in poor condition. It is generally advisable to unite them with a strong colony, or to destroy them.

CHILLED BROOD

Sometimes relatively large areas of brood in all stages die at the same time and turn very dark in colour. This is usually diagnosed visually as 'chilled brood'. However, even young larvae can survive for several hours at temperatures well below the brood nest heat of 35°C. It is probable, therefore, that 'chilling' of brood is the result of brood becoming isolated from the adult bees and being neglected by them. As a result the brood dies from a combination of starvation and prolonged low temperatures. No pathogenic organism is responsible.

Examining colonies in cold weather should not cause chilled brood. Chilled brood can be prevented by keeping colonies in thriving condition with ample bees to cover and nurture the brood.

DISEASES OF UNCERTAIN ORIGIN

Eggs, larvae and pupae sometimes die for reasons unconnected with infectious disease, and the cause of the death is often difficult to establish. A patchy brood pattern might be the result of poor egg-laying by the queen, or caused by a genetic defect in some of her eggs, preventing them from hatching or developing from larvae into adults. Usually the dead brood is quickly removed by the workers. Brood death of this kind may happen in many colonies, however, the numbers of abnormal eggs or larvae are probably so low that they are removed by the bees before the beekeeper even notices.

If a genetic defect or a faulty queen appears to be the cause of a brood disorder then replacing the queen with another is probably the most effective course of action.

SUMMARY OF BROOD DISEASE SIGNS, CAUSES AND CONTROL

	SIGNS OF DISEASE	CONTROL
Normal brood	Uncapped: Pearly white, 'C' shaped larvae. Capped: Uniform brown colour, domed cappings	None required.
American foul brood *(Paenibacillus larvae)*	Affects only sealed brood sunken concave cappings, uneven brood pattern, 'pepper pot' or mosaic pattern, scales on bottom walls of open cells, brown decomposing larvae that 'rope' using matchstick test, moist dark perforated cappings.	**Notifiable disease** Infected colonies are burned by a CSL Bee Inspector and the hives sterilised by scorching.
European foul brood *(Melissococcus pluton)*	Affects mainly unsealed brood. Infected larvae discoloured yellow-brown lying in abnormal positions in cell with 'melted' appearance. Some dark sunken cappings may be present, but cell contents will not form a 'rope'.	**Notifiable disease** Lightly infected colonies are treated by a CSL Bee Inspector with antibiotic. Severe cases of EFB are destroyed as with AFB.
Chalkbrood *(Ascosphaera apis)*	Affects only sealed brood. Perforated cappings over cells containing hard white or mottled grey chalk like remains ('mummies').	No specific treatment. Keep strong colonies. Requeen severely affected colonies.
Sacbrood *(sacbrood virus)*	Affects only sealed brood. Perforated cappings. Larvae become yellow-brown fluid filled sacs ('Chinese slipper'). Watery contents will not form 'rope'.	No specific treatment. Requeen severely affected colonies.
Bald brood	Abnormal cell cappings over sealed brood. Affected cells have round hole in capping sometimes with a slight protrusion. Pupae have normal appearance. Signs of wax moth larvae may be visible in comb.	No specific treatment. Control wax moth infestation.
Drone laying queen or laying workers	Domed drone cappings over worker cells. Abnormally small drone pupae within cells. May be multiple eggs per cell. Unsealed brood may be neglected and dying.	Replace drone laying queen. Unite colony with laying workers to another colony.
Chilled brood	Dead brood usually present in all stages. Unsealed brood turns very dark brown or black in colour.	Avoid conditions that prevent bees being able to care for brood.
Varroa infestation	Signs vary. Sealed brood may be partially uncapped, dead pupae discoloured brown or black, watery or firm, but never ropy.	Control varroa infestation using appropriate treatment.

FURTHER INFORMATION

What to do if you suspect foul brood

1. Close the hive
2. Reduce the size of the entrance and take any other steps necessary to prevent the hive being robbed by other colonies
3. Disinfect gloves and beekeeping equipment before examining other colonies

   Either:

   a) contact the NBU to arrange a visit by your local bee inspector

   b) Send a whole comb containing diseased brood wrapped in several layers of paper and sealed in a cardboard box **so that it can not leak honey** in transit to the NBU, with a note stating your name and address, the location of the apiary and the identity of the affected hive.

5. You must not remove any hives, bees, or equipment from the apiary until the disease, if present, has been controlled.

Sterilising hives and equipment

It is very good practice to sterilise spare and empty hives routinely before re-use. This applies particularly to second-hand equipment and that which might have been associated with foul brood infection, but also will help to reduce the likelihood of transmitting foul brood or other diseases between colonies, if applied as part of normal apiary management.

Heat

Wooden hive parts can be sterilised by first scraping off brace comb and propolis, and then scorching with a blowlamp until the wood reaches a uniform coffee-brown colour. Particular attention needs to be paid to the corners and any cracks or crevices. Such treatment will destroy the infective stages of all the bee diseases. Alternatively, empty hive boxes and frames can be sterilised by immersion in molten paraffin wax heated to 150°C for 10 minutes.

Chemical sterilisation

There are no chemicals that have been shown to be suitable for the sterilisation of stored combs against foul brood. The spores of AFB in particular are strongly resistant to virtually all sterilising agents. Combs can, however, be sterilised to destroy the spores of chalkbrood (and Nosema disease of adult bees), using acetic acid vapour. In general it is better practice to melt down or burn old combs and replace them with new frames fitted with foundation.

Irradiation of equipment

Equipment such as stored supers and empty combs which may have been associated with colonies infected with foul brood, but do not show any disease signs, can be sterilised by gamma rays from a radioisotope of cobalt. This will kill the spores of the bacteria that cause disease without damage to equipment. Infected combs must not be irradiated if scales or other disease signs are present as these would remain indistinguishable visually from infectious untreated disease signs.

Firms specialising in irradiation use 25 kiloGrays (kGy) to kill *Paenibacillus larvae* (AFB) and its spores on combs and hive equipment. Currently there is no recommendation for the treatment with irradiation for *Melissococcus pluton* (EFB), but it is likely that 25 kGy is sufficient to kill *M. pluton*.

The National Bee Unit

The Central Science Laboratory National Bee Unit provides a statutory and advisory service to beekeepers in England and Wales. It provides diagnostic, consultancy and research services to MAFF, WOAD, commerce and beekeepers. The Unit laboratories are fully compliant with the international Good Laboratory Practice (GLP) quality scheme to ensure a high professional standard. All staff are trained practical beekeepers as well as scientists, and are supported by teams of analytical chemists and agricultural specialists in the rest of CSL.

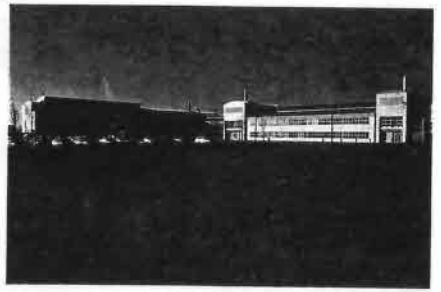


Fig 28 Central Science Laboratory, Sand Hutton, York

Fig 29 Disease control coordination from the NBU

Further help and advice

The NBU has a bee health support service, operating in England and Wales, comprising a regional network of 10 Regional Bee Inspectors (RBIs) managing teams of Seasonal Bee Inspectors. As well as the control of foul brood through a programme of apiary inspections, the bee inspectors provide advice and assistance to beekeepers on a range of bee health issues and run training courses for beekeepers on disease recognition and control, usually in conjunction with local beekeeping associations. For further information contact the NBU, who will put you in touch with the appropriate bee inspector for your area.

In many areas, beekeeping associations operate local disease control schemes, and provide practical help and advice to members on bee disease recognition and control. Contact your local beekeeping association for details.

Bee Diseases Insurance Ltd

An insurance scheme to compensate against losses incurred through destruction of foul brood infected colonies is organised by Bee Diseases Insurance Ltd, a specialist insurance company operating with the aim of reducing the incidence of the foul brood diseases. Beekeepers can take out insurance either individually or through their local beekeeping association.

Acknowledgements

Leaflet written by James Morton with assistance from Michael Brown, Central Science Laboratory National Bee Unit on behalf of MAFF Horticulture and Potatoes Division.

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Produced by the Ministry of Agriculture, Fisheries and Food in association with the Central Science Laboratory on behalf of the Ministry of Agriculture, Fisheries and Food and the National Assembly for Wales

Statutory procedures for controlling foul brood

Inspecting a colony for foul brood disease

This leaflet explains the procedures used by the Ministry of Agriculture, Fisheries and Food (MAFF) and the National Assembly for Wales (NAW) to control foul brood diseases of bees, which are serious, notifiable infections. These procedures are undertaken on behalf of MAFF and NAW by the National Bee Unit (NBU), part of the Central Science Laboratory (CSL), an executive agency of the Ministry.

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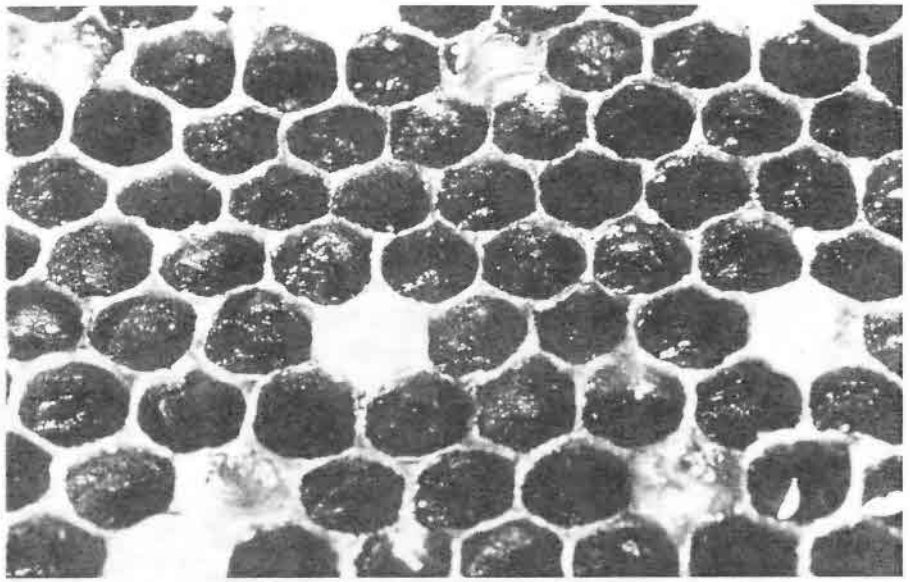
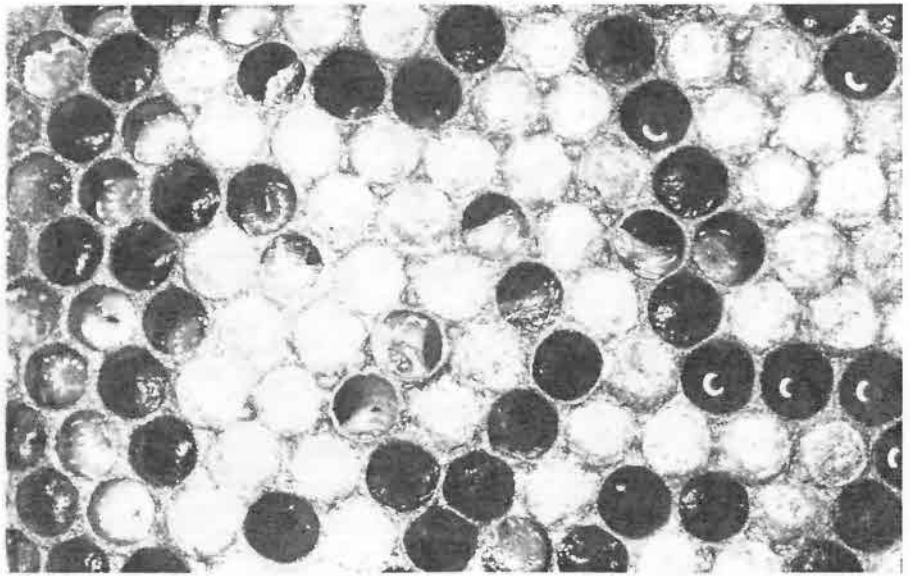


American foul brood (AFB). Heavily infected comb showing remains of infected larvae or 'scales'



European foul brood (EFB). Heavily infected comb showing twisted and discoloured larvae

What is foul brood?

There are two foul brood diseases of honey bees, European foul brood and American foul brood, controlled by Agriculture Departments under the Bee Diseases Control Order 1982. Despite their similar names they are caused by two unrelated bacteria which need to be controlled using two different approaches. Ask your NBU Bee Inspector for the latest copy of any MAFF/NAW/CSL brood disease leaflet for details of these diseases.

The Bee Disease Inspection Service

The MAFF department responsible for bee health policy in England, including the Bee Disease Inspection Service, is Horticulture Division (HRP'A' Division). In Wales the responsible department is the National Assembly for Wales (see *Useful Addresses*). The National Bee Unit (NBU) manages the inspection service on behalf of MAFF in England and on behalf of NAW in Wales, using well established standard operating procedures. It employs several full time Regional Bee Inspectors (RBI) who manage teams of seasonally employed Bee Inspectors and also organise training for beekeepers in disease control.

The inspection

Regular inspection of your bee colonies for signs of serious disease is really your responsibility as their owner or keeper. However we recognise that not everyone has the confidence or experience to do this and we organise routine inspections in most areas to help out. Nevertheless, you must learn how to recognise disease for yourself. Your local Bee Inspector will be able to help you or point you in the direction of courses or lectures on the subject.

NBU Inspectors have powers to enter any apiary at any time to inspect colonies, especially if disease is thought to be present. However, these powers are only rarely enforced, inspectors always preferring to work alongside beekeepers with their full co-operation. Before the inspection begins, you should ask to see the Inspector's identity card, which contains his photograph and details of his authority to do the work.

Each Inspector is also an experienced beekeeper, trained to find and control foul brood and provide help and advice to beekeepers. They usually carry out their inspections during the active beekeeping season, although suspect disease reported by beekeepers outside this period will be dealt with by the Inspectorate as promptly as conditions allow.

What if disease is suspected?

If suspected foul brood disease is found in one of your colonies the Inspector will immediately issue a Statutory Notice to you, called a Standstill Notice. This prohibits you from moving from the apiary any equipment or bees that may be infected. The Bee Inspector then sends a sample, usually a representative suspect comb, by first class letter post or courier to the NBU laboratory for diagnosis. This sample is sent along with an apiary inspection report detailing your contact address, the apiary size and location and the condition of the colony.

The Standstill Notice remains in force until statutory control measures are complete and the apiary is clear of obvious signs of foul brood. Although we make every effort to minimise the standstill period it may remain in place for many weeks, depending on circumstances. However, you will still be able to move all the equipment that you need to look after the colonies, on to the site, and in most cases a licence can be issued by the Inspector to allow honey to be harvested or colonies to be moved to a new standstill site if, for example, the land owner wants to spray pesticides. Simply apply to your local NBU Inspector.

The Laboratory Examination

The NBU laboratory aims to complete each sample examination and its diagnostic report on the day the sample is received. A copy of the report, together with the recommended action necessary, is sent by first class post to both yourself and the bee inspector who will also contact you to explain procedures.

Laboratory diagnosis for foul brood

What if no foul brood is found?

If no foul brood is found in the sample a Withdrawal of Standstill Notice is issued to you by the Bee Inspector and you are then free to move bees and equipment as you wish.

What if European foul brood (EFB) is confirmed?

If EFB is found you will receive either a Treatment Notice, if the infection is light enough to respond to antibiotic treatment, or a Destruction Notice, if the infected colony is considered to be too weak or too heavily infected. These statutory notices, usually sent with the diagnostic report, explain your responsibilities. The Bee Inspector will contact you to discuss what needs to be done. If you wish to destroy a colony recommended for treatment then your decision will be respected. However, a recommendation for destruction will not normally be reversed.

The decision to recommend treatment or destruction is based upon the size of the colony and the extent of infection. If the percentage of diseased larvae in the sample comb, and the percentage of apparently infected brood combs in the colony, is 50% or greater, then destruction is recommended. Lighter infections are usually treated. However, a colony in which treatment has been ineffective is destroyed whatever its condition or level of infection.

We aim to deal with the vast majority of infected colonies within 10 days of laboratory diagnosis. However, if there are postal delays or if large numbers of colonies are involved this period may have to be extended.

Antibiotic treatment of colonies

If the NBU Bee Inspector and laboratory consider treatment is appropriate, an antibiotic, normally oxytetracycline (OTC), is administered to the EFB infected colony by the Bee Inspector. This drug is prescribed and dispensed by the MAFF Veterinary Laboratory Agency (VLA) and delivered directly to the Bee Inspector. *Its use is restricted to authorised officers only* and is usually applied by trained Bee Inspectors.

Normally a single one gram dose of OTC suspended in a small volume of sugar syrup is sprinkled on to the area immediately around the brood nest. Nucleus colonies, or developing colonies early in the season, covering five British Standard (BS) deep combs or less, will normally be given a half dose. However very weak or heavily infected colonies will always be destroyed.

The Bee Inspector will advise you on any work you need to do to follow up the treatment. For example, in most cases, you will need to feed colonies with 5-10 litres thick sugar syrup immediately after treatment to ensure the antibiotic is distributed slowly and widely throughout the colony unless the bees are on a significant nectar flow.

Treating contact colonies

Treatment of every colony in an EFB infected apiary as a precaution is not usually necessary, only for those colonies showing obvious signs of disease. Antibiotics are prescriptive medicines and should be used only when absolutely essential. However, treatment of contact colonies may be desirable in exceptional cases where, for example, there are large numbers of colonies in the apiary (usually more than 12) and the infection is persistent, or where the risks of re-infection are very high. The Bee Inspector will advise you as and when contact treatment is necessary, after consultation with the laboratory. Contact treatments are only carried out in the period up to 31 May in the season in which disease is confirmed in the apiary. This is because the practical benefit of contact colony treatment is only apparent during the early part of the beekeeping season.

Checking the success of treatment

The Standstill Notice on your apiary will be left in force for a minimum period of eight weeks following antibiotic treatment of a colony, during which time honey must stay on the hive. This allows the OTC time to do its work and for its residues to break down naturally before any honey is harvested and consumed by anyone. All the colonies in your apiary will be re-inspected by the Bee Inspector as soon after this 8 week period as possible and the standstill withdrawn if he finds no further signs of EFB.

If your infected colony is destroyed the standstill remains on the apiary for a minimum of six weeks to allow time for any infection not obvious at the first inspection to develop and become visible. The Inspector will then re-inspect the apiary and withdraw the standstill when satisfied that all remaining colonies on the site are clear of obvious signs of foul brood. See Figure 1.

What if American foul brood (AFB) is confirmed?

Colony destruction has proved to be the most effective way of controlling AFB. Antibiotic treatments are not permitted under the Bee Diseases Control Order 1982 because the bacterium responsible for the disease forms highly resistant spores that will survive in the colony to re-infect it long after any antibiotic has ceased to be active.

When AFB is confirmed, you will have to destroy the infected colony by burning all its bees, combs, honey, quilts and crown boards, usually in a pit dug in or near the apiary. The Bee Inspector will supervise this work. The hive bodies must be sterilised using a blow lamp and may then be re-used. The standstill will remain in force for a minimum of six weeks after the destruction, after which the Inspector will re-inspect the apiary and withdraw the standstill notice if no further signs of disease are obvious. See Figure 2.

What if AFB and EFB are found in the same apiary?

This is rare, but if AFB is found at the same time in an apiary as EFB then we will not use antibiotics in that apiary, even if the AFB is found in a different colony. OTC masks the signs of AFB, but does not destroy the organism that causes the disease. If we used antibiotics we could be masking signs of AFB that would otherwise have become apparent if the colony was left untreated.

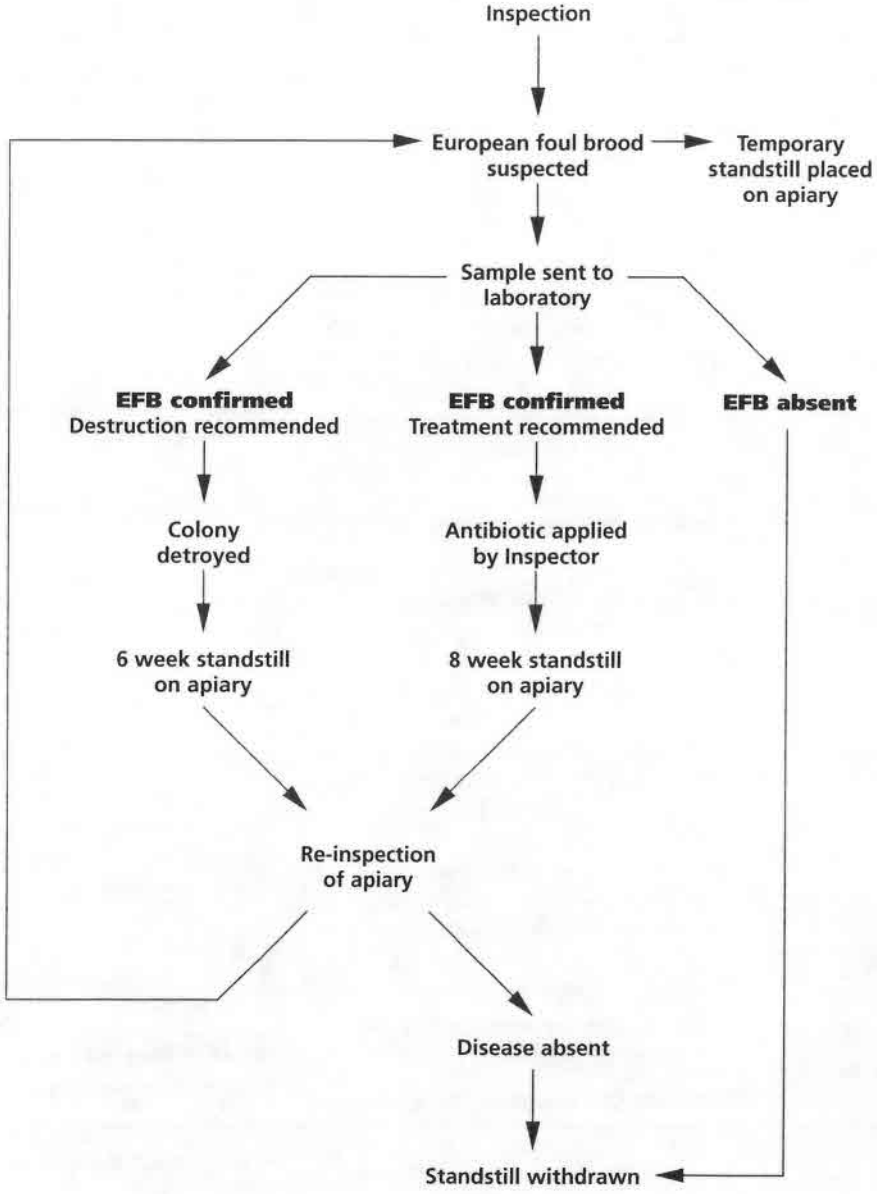


Figure 1 Summary of EFB statutory control schedule

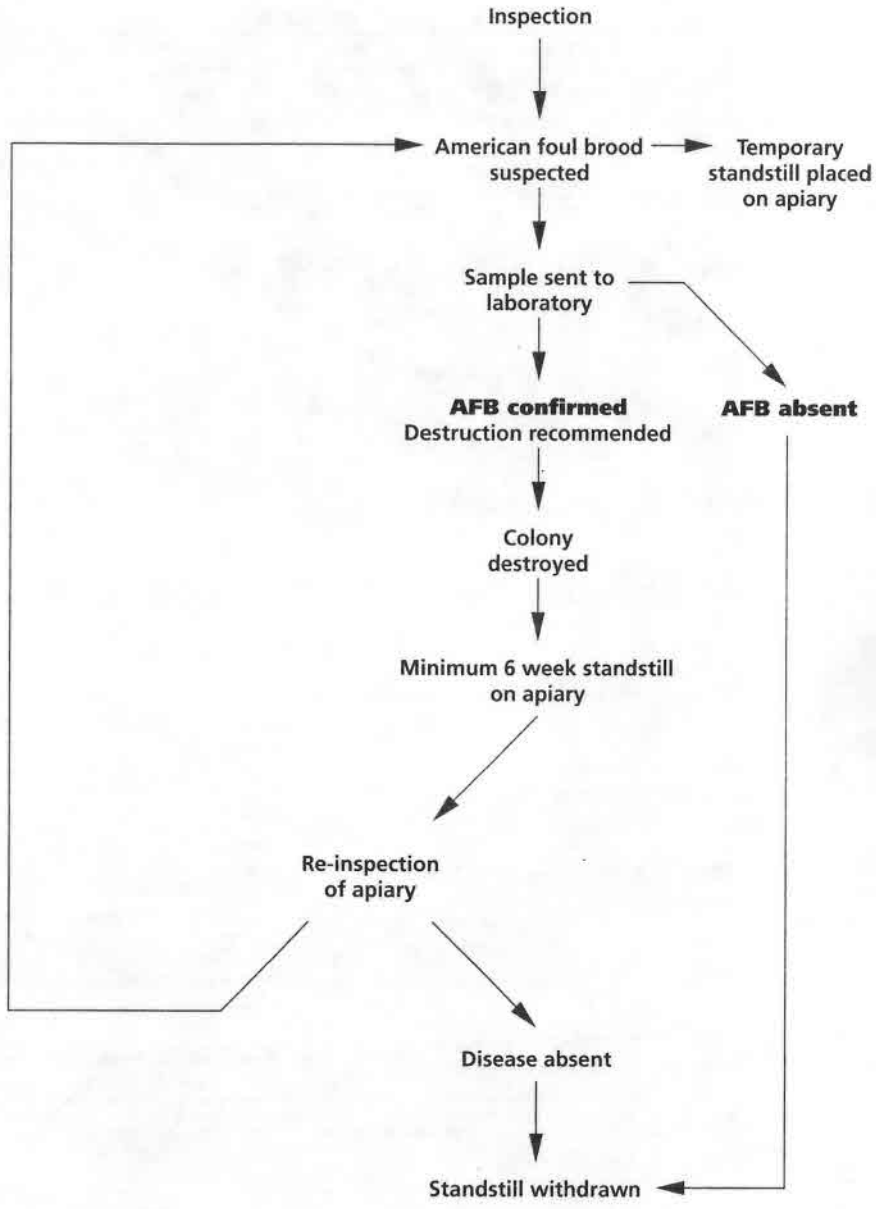
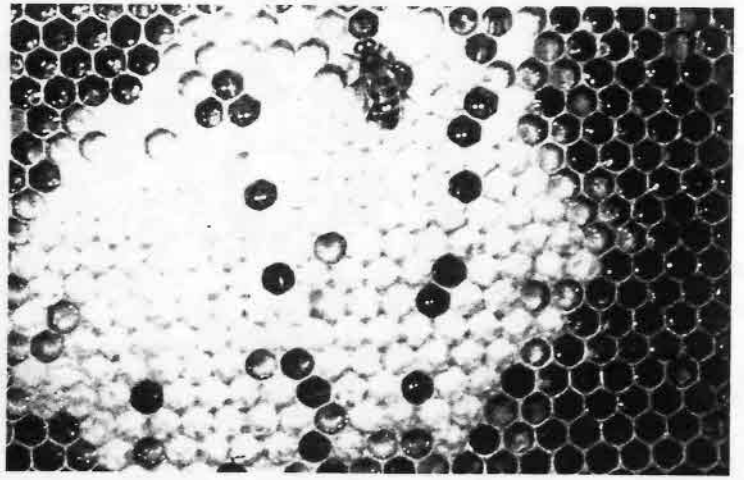


Figure 2 Summary of AFB statutory control schedule



Frame of healthy brood

Foul brood follow up inspections

Bee Inspectors will usually try to schedule a follow up inspection of your apiaries for the season after you have had a confirmed case of foul brood dealt with. This is simply a precaution against possible recurrence of disease.

Confidentiality

Inspectors will also check known apiaries owned by other beekeepers in the immediate area of a recent outbreak of foul brood in case the problem has spread any further. However, the Inspector will keep details of your case strictly confidential unless you specifically instruct us otherwise. Information about the geographical location of disease incidents is published either as maps with affected 10km squares indicated on them or as reports with OS 10km square references. Occasionally, upon request, details of parishes infected with foul brood are released but only where this information does not identify a beekeeper.

What can I do if I am unhappy about the service I have received?

We aim to be as helpful and responsive as possible. However, if you feel that our service has fallen short of the standards we aim to achieve, or if you are unhappy about the way you have been treated, we would like to hear from you. If your complaint relates to action underway you will clearly wish to act urgently. You should initially take your grievance up with your Regional Bee Inspector and ultimately with the NBU headquarters if you are still not satisfied. Your complaint will be thoroughly investigated and you will have a full response within 15 working days. If this is not possible, then we will write to you explaining why and letting you know when you may expect a reply. You may ask your Member of Parliament to take up your complaint with the Minister of Agriculture, Fisheries and Food at MAFF.

You can also write to any Member of Parliament, and ask for your complaint to be passed to the Parliamentary Commissioner for Administration (the Parliamentary Ombudsman) who is entirely independent of Government.

On the other hand, if you are satisfied with the services we have provided, or wish to praise some exceptional performance, we would be happy to hear from you. Should you have any suggestions about how we can build upon the services we have provided, these will be welcomed.

This does not affect any rights you may have to pursue any matter through other channels.

What are your responsibilities?

- You should learn how to recognise foul brood diseases. Your Bee Inspector or local beekeepers' association can help.
- You must regularly examine your colonies for foul brood, at least each autumn and spring.
- Report any suspect foul brood you find to your local Bee Inspector or directly to the NBU laboratory. You are obliged to do this by law. If you are unsure then do not worry; report the problem in any case. Warn your neighbours to check their own bees.
- Placing bees on new comb or foundation after EFB infection can help considerably in reducing the risk of re-infection.
- Keep your colonies well maintained and hives in good order. Do not leave honey, supers or brace comb lying around accessible to bees; this could induce robbing and lead to further spread of disease.
- Follow the advice of the Bee Inspector. They probably have more experience than you in dealing successfully with foul brood.
- Keep any varroa infestation under control. Varroa mites can severely reduce a colony's ability to cope with other infections. Infestation will also weaken colonies considerably if left unchecked. If this happens an enforced destruction will be the most likely recommendation if EFB is present. Ask your local bee inspector for details of leaflets available on varroa control.
- Make sure you have adequate insurance to cover loss due to foul brood. Ask your local beekeepers' association or Bee Inspector for advice.

Good Enforcement Concordat

The NBU have implemented the government's Good Enforcement Concordat. Performance standards for bee health enforcement activities run by the NBU have been agreed between MAFF, NAW, the NBU and industry. The concordat sets out a blueprint for fair, practical and consistent enforcement across the country.

The agreed performance standards are set out below:

- Laboratory analysis turn around times for foul brood samples - 95% within one working day.
- Response time from request for inspection where disease suspected (noting that beekeeper's availability is out of NBU control) - 24 hours.

Central Science Laboratory, Sand Hutton, York

Response to include either response by telephone or by the sending of a sample box to the beekeeper.

- Initial response time for responding to formal complaints to NBU Headquarters at Sand Hutton made either by telephone or by letter - 24 hours. This will cover any complaints about the NBU action deemed unreasonable. NBU response may be undertaken by telephone, letter or ant necessary action.
- Response time between receipt of foul brood diagnosis to treatment of infected colonies (taking into account delays by weather, beekeeper availability, request and supply of antibiotics) - 95% within 10 working days.
- Response time between receipt of foul brood diagnosis report to assisting beekeeper in destruction of infected colonies (noting delays by weather and beekeeper availability) - 95% within 10 working days.

Each year the NBU's performance will be assessed against the agreed standards and industry will be advised of the outcome, starting in the year 2000.

USEFUL ADDRESSES

Central Science Laboratory
National Bee Unit
Sand Hutton
York
YO41 1LZ

Tel: 01904 462510
Fax: 01904 462240
email: science@csl.gov.uk
Website: http://www.csl.gov.uk/environment/level 3/nbu.htm

MAFF
Horticulture Division (HRP 'A')
Eastbury House
30/34 Albert Embankment
London
SE1 7TL

Tel: 020 7238 3000

NAW
Agricultural Policy Division
Crown Buildings
Cathays Park
Cardiff
CF1 3NQ

Tel: 02920 825111

CSL REGIONAL BEE INSPECTORS

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All counties

Leaflet written by Medwin Bew, revised by Michael Brown of the CSL National Bee Unit

YORK AND DISTRICT BEEKEEPERS ASSOCIATION

www.ydbka.org.uk

YORK & DISTRICT BEEKEEPERS ASSOCIATION

Website Information

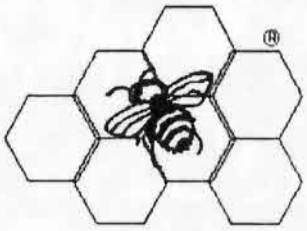
York & District Beekeepers Association

Welcome!

The York & District Beekeepers Association has, with fluctuating membership, existed since 1921.

It caters for beekeepers not only in York but also those living in a wide area of the surrounding countryside. As a result communication between our Association members relied upon a small programme of events, usually sent out by post as well as the occasional leaflet containing additional information as and when necessary.

During the winter of 2001/2002 John Fuller, one of our committee members, decided to produce a quarterly newsletter called the "Combings".



During the Autumn of 2002 I realised that to reach a wider audience, we would have to use additional and new methods of communicating with people, therefore during the Association's Christmas Dinner I brought up the subject of developing a possible website for this age of mass communication.

Colin Hattee, our Association Secretary, readily agreed to the idea. I was lucky insomuch as my wife, Linda, had gained experience at her workplace, being involved in a local Intranet system. With the help of Microsoft Front-Page and along with Margaret Langstaff, an IT specialist and committee member, our website was born!

Over the past two years Linda has steadily developed the site, incorporating the Association's Programme of Events, and archive section containing present and past editions of the "Combings" (our In-House Magazine). It has also a number of links to other sites of interest and has been entered in the *Apimondia* competition in the website category.

Should you wish to visit the Association's website, log on to: www.ydbka.org.uk where you can navigate round the website and visit the links.

Enjoy your visit and I hope you find it both rewarding and informative.

On behalf of the York & District Beekeepers Association we offer you our best wishes and a safe onward journey.

Russell Carey

Don't forget to visit our website:

www.ydbka.org.uk

York & District Beekeepers Association.

ANAPHYLACTIC SHOCK - WHAT TO DO.

Anaphylaxis occurs when there is a severe allergic reaction invading the whole body. It is easy to recognise. Within minutes of being stung the person will show signs of:-

(1) Itching (2) Generalised redness and flushing of the skin. (3) Hives (lumps) anywhere on the body. (4) Faintness and weakness (drop in blood pressure) (5) Increased heart rate. (6) Tight chest. (7) Difficulty in breathing. (8) Collapse and unconsciousness.

Bee sting anaphylactic shock is rare and you may never see it,but if you know what to do you can quickly and calmly swing into action.

(a) Ring for an ambulance, or send someone to ring for an ambulance. If you are alone with the patient, do the first aid and positioning described below and then telephone for an ambulance.

(i) Give the address of the house or farm clearly and then give the grid reference, if known.

(ii) Say it is a bee sting reaction. This will alert the paramedics to have adrenaline ready.

(b) Move the patient away from the bee hives.

(c) Scrape out the stings as quickly as possible in order to stop any further injection of venom.

(d) Position the patient:-

(i) **IF CONSCIOUS.** Loosen tight clothing at the waist and neck. Sit the patient on the ground, leaning against a wall, tree or the side of a car. Make the patient as comfortable as possible to help their breathing (see illustration 1).

The patient may be short of breath, feeling sick or feeling faint, and may be very frightened. Stay with the patient, talk quietly and encourage them to breath in and out regularly.

illustration 1.

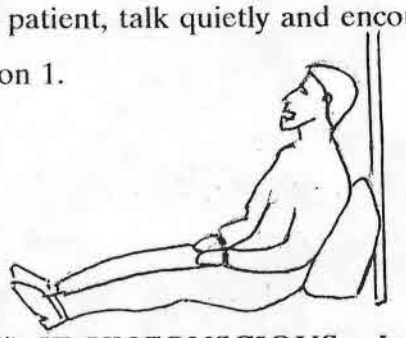
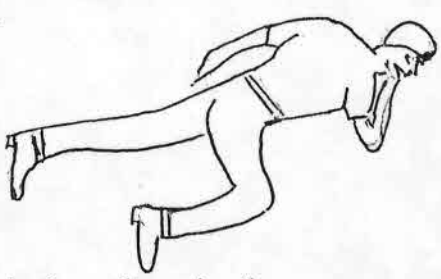


illustration 2.



(ii) **IF UNCONSCIOUS.** Loosen tight clothing and place them in the recovery position (see illustration 2) on their side. Tilt the head back for a good airway. Uppermost leg across with knee and lower leg on the ground to support the position. Underneath arm behind the back. Check that they are breathing. Check that they have a pulse in the side of the neck. If you have help with you send them to the road to flag down the ambulance. Do not give the patient any food or drink. Do not give the patient any medication. If the patients heart stops or the breathing stops resuscitation should be carried out by a trained first aider.

- If the new colony shows any adverse characteristics (aggression, following etc), re-queen from a known colony.
- Manage the new colony, and all others in your apiary, to reduce the incidence of swarming and so reduce the need for future swarm collection by yourself or someone else. *(see the BBKA Advisory leaflet B3 "Swarm Control for the beginner")*

Notes

BBKA Public Liability insurance covers members for claims arising from their beekeeping hobby, but not for commercial purposes. All charges for swarm collection should therefore be in respect of expenses incurred rather than a service fee or charge. Voluntary donations to the member's association funds are, of course, always acceptable.

If the "swarm" turns out to be wasps the owner/occupier should contact the Local Authority Pest Control Officer.

Where bumblebees or solitary bees are reported, emphasise that they are rarely a nuisance, and are environmentally very valuable. An explanation of their limited life cycle often allays fears. An open box or similar protection can sometimes be fixed around the entrance to keep livestock and young children at a distance. *(The BBKA Public Information leaflet "The bees and wasps in your garden" provides a useful reference.)*
In extreme circumstances there are beekeepers and naturalists who will relocate bumble bee nests and such contacts should be cultivated by the "Swarm Liaison Officer," through the local naturalist group. However in view of the environmental pressures on both solitary and bumble bees destruction of these nests is not recommended.

This leaflet is provided for general interest and information only.
No liability is accepted for any injury or loss arising out of the contents of this leaflet.

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British Beekeepers Association Advisory Leaflet Number 4

Collecting a Swarm

A stray "Bee Swarm" can cause anxiety and alarm to members of the public, and beekeepers are frequently asked to remove a settled swarm. This leaflet advises on how such a request should be handled.

Initial Contact

Many beekeeping associations appoint one or more "Swarm Liaison Officers" whose names and contact details are given to the local police stations and the Council Offices for the area. Sometimes a member of the public already knows of a local beekeeper and telephones direct for help or advice. The initial contact should wherever possible ascertain from the caller :-

- Whether the creatures are honeybees. Many calls turn out to be about wasps' nests, bumble bees at ground level in gardens or solitary bees in walls or the ground. (*see p.4*)
- The height and position of the cluster, (tree, eaves etc). Will a ladder be necessary?
- When the swarm arrived.
- The size of the cluster (*e.g.*: football, tennis ball, golf ball)
- The address/location of the swarm and the phone number of the owner/occupier.

Responsibility

There is no legal obligation on a beekeeper to respond to a swarm call but it is an opportunity to perform a service to the community and thus to enhance the public standing and understanding of beekeeping, while at the same time increasing one's own colony numbers. If the initial enquiries leave you in doubt you might arrange, without obligation, to inspect the swarm on site and to give advice. This might lead to a recommendation that the swarm should be destroyed by the Pest Control Officer, or a licensed contractor, who can use chemicals not available to beekeepers. UNDER NO CIRCUMSTANCES SHOULD YOU AGREE TO ATTEMPT SOMETHING FOR WHICH YOU ARE NOT QUALIFIED, SKILLED, EQUIPPED AND INSURED (e.g. Demolition, building work, poisoning, tree-felling etc)

Preparation

Before attending to remove a swarm

- Explain to the owner what will be happening and emphasise that whilst every care and skill will be exercised you cannot guarantee a successful outcome.
- Agree a time to attend.
- Confirm any costs/charges that collection will incur *(see p4)*
- Ask that the immediate area be cleared of people prior to your arrival.
- If you are going to need help get another beekeeper to assist you. Only persons insured against Third Party Liability, (either through BBKA or otherwise) should take part in the collection.
- Make sure you have ALL the equipment you are likely to need (ladder, secateurs, large sheet, skep or swarm box, string, smoker, fuel, matches, protective clothing etc)

Collection

- Once you approach a swarm with the intention of collection and removal it becomes your property and your responsibility to protect bystanders.
- Advise the closure of all nearby windows and doors (including vehicles).
- Wearing protective clothing, approach the swarm and shake/ brush/detach it from its position, directly into the skep if possible, or on to a large sheet laid on the ground below.
- Place the skep on the sheet, raised at one side by about 100 mm and leave until the remaining bees in the cluster and the flying scout bees have followed the queen into the skep. This might well be later in the day or early evening, and could require a re-visit.
- Tie the sheet over the skep to make it bee-tight and remove to your vehicle.
- Explain that any remaining bees will not survive for long or become a nuisance.
- Leave your phone number in case of unexpected problems (*e.g.* you did not collect the queen!)

Disposal

In most cases there will be a ready taker for a new swarm, either as a new colony or as reinforcement for a weak one. However , certain precautions should be observed.

- Wherever possible the swarm should be quarantined while disease checks are carried out to avoid infecting an existing apiary.
- Re-hive the swarm on clean frames and new foundation, in a nucleus hive if small, and after 48 hours feed until wax-building and foraging are well in progress. This ensures that any honey brought by the bees from the parent colony which might be contaminated with disease organisms is used immediately to initiate wax secretion and will not be stored. However if the swarm had been hanging for some time in cold conditions immediate feeding will be necessary.

BeeNews

The News Letter of the British Beekeepers' Association www.britishbeekeepers.com No. 135 JUNE 200

The Buzz on Chinese Honey

In January 2002 the Food Standards Agency announced the suspension of importation of all animal products from China.

This stringent action took place after a visit of a team of EU veterinary drugs inspectors, the European Commission's Standing Veterinary Committee (ECSVC), to China. They found that the monitoring programme, designed to check for pesticide residues in animal foodstuffs, was not being implemented. As a result all animal food products from China that came under the Veterinary Drugs Act were banned from EU countries. This included honey, recently classified as an animal product because it is produced by bees.

Originally the ban was a purely preventative measure, following the discovery of unauthorised antibiotic residues in frozen shrimps from China. However, the Food Standards Agency then carried out routine tests on honey samples and found traces of the antibiotic Streptomycin. Although permitted in other foodstuffs, these traces were above the 50ppb (parts per billion) level allowed in honey.

At the end of February the FSA then announced that they had also found traces of Chloramphenicol, a strong antibiotic with potential side effects, in ten out of sixteen honey samples.

The Honey Association immediately advised all its members to withdraw any blends containing Chinese honey for further testing. Within hours of the FSA announcement, just speciality and single source honeys were left on the retail shelves.

In its ensuing statement the FSA advised consumers that the issue was not one of food safety, but rather a legal one. It was still safe to eat honey already in the home, and thus an immediate over reaction by consumers was avoided.

Meanwhile, honey packers were informed that Chinese honey could only be resold after testing negative, and any honey testing positive for Chloramphenicol should be destroyed immediately. Since the UK import a substantial amount of honey from China every year, thousands of tonnes already in the UK in jars or drums were suddenly worthless.

The importers set out to source alternative origins from around the world, and the search continues. Shipment delays of new stock mean that honey is taking longer than usual to reach supermarket shelves. There will be enough honey to meet consumer demand in the medium term, but filling up the 'pipeline' again takes much longer. Thus, although supermarkets are still being supplied, honey is selling at a faster rate than usual and the shelves are still looking empty.

The shortage of honey on supermarket shelves has obviously had an advantageous knock on effect for English honey producers. Many beekeepers have seen sales soar over the last few months, and it is difficult to keep up with demand.

The packers do not expect the ban on Chinese honey to be lifted for at least twelve months, possibly even longer and prices will rise. The cost of raw honey from other origins, such as Argentina, Mexico and Australia, has already increased more than 50% over the last few months. Fortunately the consumer still sees honey as a desirable source of natural energy and an essential for daily life. This confidence has not been shaken by the recent Chinese honey scare, thanks in no small way to the management of the crisis by the Honey Association.

Visit www.honeyassociation.com

Disposal of Chinese Honey

This is an important issue. There have been a number of enquiries on this from beekeepers and inspectors around the country, particularly when the story first broke. Due to the potential risks of disease spread we acted immediately with DEFRA to find out the disposal advice through the Food Standards Agency (FSA).

The FSA made advice available for local authorities about disposal of withdrawn stocks. The preferred method of disposal is by incineration, in accordance with the Animal By-Products Order 1999. If incineration is not possible, disposal to a licensed secure landfill site might be an option. However, in such circumstances, the food authority or company needing to dispose of the honey should consult the local authority (usually the trading standards department) about compliance with the Order. Local beekeeping associations can and have been reinforcing this message by drawing the attention of their own local authority and supermarkets to the need for appropriate disposal. It is understood that there is still honey waiting for disposal.

Mike Brown, NBU, CS

BBKA Technical Committee News

Paul Metcalf has been appointed to the NBU Bee Health Advisory Panel.

Leaflets in Preparation are:

- Advice on Selling and Buying Bees.
- How to Manage Bees with Minimum Medication.

Both these require considerable research and publication dates have not been set.

A report from 6 February 2002 meeting with the DEFRA GM Unit was considered. After debate at the meeting, it was agreed that any discussion of the six-mile limit should involve the Honey Association. Inconsistencies in the definitions of "organic" and "GM free" were discussed. Raising public attention to the fact that honey may have "negligible" GM content could cause problems. However, it is acknowledged that there is no evidence to support the separation rule. Norman Carreck pointed out that if and when GM commercial planting is introduced the rule will be impossible to observe and the question could be asked why was it necessary before if the separation distance is ignored after.

A presentation from Dr Bill Lankford of Aventis Crop Science Ltd enabled BBKA to endorse their product DECIS as safe to bees when used in accordance with instructions.

Glyn Davi

PRESENTATION SLEEVES

For 8oz. cut comb containers • Strong and convenient to use
Enhances the marketability of comb honey
For samples send 3 first class stamps to:
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It is Said....

Swarms can contain as many as 50,000 bees or as little as 1,750 bees.

News from the BBKA Chairman

Well, it has been an exceptional Spring, and not just the weather. A warm, dry month with good flows from willow and plum blossom and now we have great weather for dandelion and oil seed rape.

Colony losses seem to have been light and those that survived are healthy, vigorous with plenty of stores and of course swarming has started. April swarms surely are easily prevented. In my view they must be due to cramped conditions in brood chambers. Honey stores in such quantity that queens have insufficient space to lay; inadequate ventilation with severely reduced entrances, late supering – but this is not the place for a lecture on bee management. What else has been happening in this "exceptional" spring?

What about the UK honey shortage? The demand for our own honey has never been greater and the price is rising. Our honey is now a very precious commodity. So, as I explained in my last letter, now is the time to increase production. The weather is being good and I have got a comfortable feeling about the summer; so all that is needed is equally good management. *"Keep 'em healthy and keep 'em at home"*. I have just returned from the exceptional Stoneleigh Convention. The huge amount of equipment sold and the amazed, highly satisfied suppliers surely means beekeepers believe that now is the time to invest in the craft. Wonderful news!

The shortage of honey has been the worry of our colleagues in the Honey Association. I must say that in spite of their worries, with large amounts of Chinese honey for disposal and the inevitable costs involved, the Honey Association has been most considerate for the well being of UK beekeepers and honeybees. They have informed all their members of the need to keep dumped honey sealed when disposed of, it will be in authorised landfill sites. This unwanted imported honey is sure to be a rich source of AFB spores and bees will ignore landfill "Keep Out!" signs. I have to say that official authorities not usually linked to beekeeping have seemed less concerned that honey containers, including glass ones, should be well buried straight way. As I write I am waiting for a response from several agencies who have an interest or a responsibility in this matter. I fear there are a great many fingers being crossed at the moment. AFB figures in twelve months time will make interesting reading. Meanwhile, check regularly for the early signs. BBKA is trying to identify actual landfill sites involved so that beekeepers "at risk" can be alerted.

Relevant to this matter is the official notification that the NBU has been instructed by the Veterinary Medicines Directorate to collect samples of honey from producers this year, which will be tested for the presence of antibiotics. This seems a draconian inconvenience but I am sure it will greatly benefit the reputation of UK honey. There is no chance that such residues will be found in our members' honey - Is there? Please co-operate willingly if you are asked to provide a sample. VMD have decided that no charge will be levied on honey producers for this year. Other food producers are obliged to pay for this statutory testing so we do have a concession here and I am sure that this action is in the best interest of good quality, wholesome honey.

News on the spread of resistant mites is slow in appearing. I fear this might be a case of no news is bad news although I have been present at three satisfactory testings in Devon. Please do carry out the advised monitoring wherever you are in the country and make sure your result is sent to NBU. Official forms are available. More advice can be obtained from your association secretary, your SBI or RBI and BBKA HQ. The web sites for BBKA and NBU also have information. Information on alternative treatments, in addition to the management systems already published, is imminent.

Over half of our associations have now signed up to the new members register. Please be assured that BBKA is run only by fellow beekeepers, nominated by their own association and elected into office at an ADM. There are no links or connections with any other authority or agency. We all value our privacy and to pass on names of our members even to NBU would be illegal as well as immoral. The potential to serve our great, historical craft and its members will be greatly increased when this list is established. I know some members are anxious but please be reassured. I do not want to spend my valuable beekeeping time behind bars, not even those serving ale!

Glyn Davies, Chairman

Brussels - Here We Come

It seemed almost like yesterday that I had volunteered (will I ever learn) to be part of the group representing UK Bee Farmers at a demonstration of all EU beekeepers in Brussels. So here I was at 3.00 in the morning being driven to Stansted Airport.

At Stansted I met up with our party "journalist" Claire Waring and also with our leader Ged Marshall and Norman Davis. The journey was uneventful to Charleroi (near the site of Waterloo) and then by coach to the appropriately named "Wild Geese" pub in Brussels (after all we were travelling by the Irish airline Ryan Air).

Brussels was wet and dismal (not typical English weather but Belgium we were told!). Eventually we found the very luxurious HQ of COPA-COGECA and witnessed the Honey Working Party discussing the points to be put to the Council of Ministers that afternoon. The discussion was to be in Spanish and English but naturally the French insisted on their own language. All very interesting and instructive. Apparently everything had to be presented to the Rapporteur who if he thought fit would present our points to the Agricultural Commissioner who in turn if he thought fit would put our points to the Council of Ministers (Agricultural Ministers from the different EU Countries.)

After some much needed sustenance we proceed to the rally point and were astonished to see thousands of beekeepers from France, Spain, Italy etc. However Norman dressed up as a bee, so it was a bumble, but it was a bee! I was in my rain-soaked Sherriffs beesuit (very English) to guide Norman at the head of the procession for the few hundred metres down to the EU Parliament Buildings. What a noise with drums, trumpets and chanting plus placards and banners everywhere. The Union and English flags which Norman and I were carrying attracted enormous attention. Everywhere there were photographers and TV crews from all over Europe (but not from England) plus rows of Belgium riot police. We were pleased to see Michael Badger looking very smart representing the BBKA on the Parliament's steps.

The day finished with all the demonstrators mingling and exchanging information about beekeeping in their respective countries. What a learning experience to find out directly amongst other things about Gaucho and the established honey analysis procedures. Everyone assumed that the UK was following the same honey sampling procedures as, say, Belgium.

What happened? The Rapporteur and the National representatives were able to report that all our suggestions regarding funding to stop the pan-European decline in beekeeping and also to ensure the next generation of beekeepers had been accepted for presentation to the Ministers. If there is a next time, why not come and show at least that there is beekeeping in England.

Terry Clare, Kent

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Show Us How to Do It!

The Publicity and Promotions Committee has undergone some changes for the year 2002, primarily the loss of its well known and hard-working chairman, Claire Waring, although thankfully, she remains on the committee. Mike Lambert (secretary), Sharon Blake, Sylvia Chamberlin and Mike Townsend make up the squad, with Tim Lovett taking on the chairman's role.

Promotion and publicity is a costly activity and given the BBKA's all too limited resources, the P and P Committee must be realistic as to what it has to spend and what can be achieved. The obvious (and very expensive!) public relations activity which we all know would help raise the profile of beekeeping has to be eschewed at the national level. But local associations and branches have, through their often very close relationships with the local press, a great opportunity to reach the public on a pretty regular basis. Spring, with the resumption of beekeeping activity brings an opportunity to invite new members to apiaries. Our summer events, open days and shows bring yet others. Then the piece de resistance, the honey harvest, gives us yet more chance to shout the odds. And never forget how 'PC' and 'green' beekeeping is! Many associations are well practised in the art of publicity and we all can learn and benefit from their skill. The local associations can also act as the BBKA's eyes and ears by gathering press cuttings (another service which we cannot afford!) Please send copies of any of your own articles that are published or items that you pick up in the press, on radio or TV to Mike Lambert. Together with your ideas on what works to attract those much needed new members into beekeeping, to the P and P Committee at Stoneleigh so that we can learn and share.

On the P and P 2002 agenda is our involvement in two national shows, Gardener's World (19-23 June) and Tatton Park (17-21 July) plus we will be at the Great Yorkshire Show through Michael Badger's good offices. Stewards are always needed for our stands, so don't be slow to volunteer! Whilst the highly successful Spring Convention is behind us we have the Royal Show (1-4 July) to look forward to. Other projects are a complete review and overhaul where necessary of the BBKA leaflets and the establishment of a system to lend exhibition materials to local associations so that they can put on a professional show. And finally, as you will see elsewhere in this issue, we are asking members views on aspects of membership, BBKA News and services.

Tim Lovett, P and P Committee Chairman

New Members, New Appointments

BBKA welcomes three new member associations, Barnet, Enfield and Oldham.

Chris Utting from Devon BKA has been appointed as the new BBKA Correspondence Course secretary. He will be taking over from Gerry Collins who has, over the past fourteen years helped many beekeepers study for their BBKA examinations.

Marian Davies has replaced Lyndsey Bryning as the BBKA Legal Adviser. She can be contacted via BBKA headquarters. She is not a beekeeper but has a wealth of legal experience to call on.

Rogues Gallery

No, not the latest list of NBU staff, but some of the potential problems that may be brought into the UK. The NBU is currently assessing the potential impact of major exotic pests and pathogens to UK beekeeping if introduced. This article is intended to inform you about some of these undesirable creatures.

Aethina tumida *(Small Hive Beetle)*

The small hive beetle is native to Southern Africa. Adult beetles are about 5 mm long and brown to black in colour. Larvae are similar to wax moth larvae and can grow to 11mm. Larvae leave the hive and pupate in soil, after which the adult beetles may live up to six months. There may be up to five generations per year, which may mean a lot of larvae; indeed, heavy infestations of 30,000 larvae per colony have been reported. Larvae tunnel through comb with stored honey or pollen, damaging or destroying cappings and comb. The larvae defecate in honey causing discoloration and sometimes fermentation. This sometimes leads to a distinctive odour of rotting oranges in infested colonies.

Tropilaelaps clareae

This mite is native to Asia, and its natural host is *Apis dorsata*. The mite is about 1 mm long and 0.5 mm wide. *Tropilaelaps clareae* has a higher reproductive rate than *Varroa destructor* due in part to its shorter phoretic period and shorter life cycle, consequently when both are present in the same colony *T. clareae* populations build up more rapidly. *T. clareae* moves freely on combs, and relies on brood for feeding; the mouth parts are not thought to be capable of piercing the membranes of adult bees. Although it is thought to be unable to survive in broodless colonies, there is evidence that the mite can survive without a host, and may therefore be able to overwinter in this country. A survey carried out by the NBU indicates that there is a small amount of brood present in colonies even in the middle of winter. This may mean that the mite is capable of reproduction over the winter period, despite the lack of phoretic survival. In colonies with high mite levels, *T. clareae* causes damage similar to varroa, resulting in irregular brood patterns and stunted adults with deformed wings and shrunken abdomens. Infestation may lead to absconding or colony loss. There is another related mite, *T. koenigerum*, which is smaller in size than *T. clareae*, but has a similar lifestyle.

Apis mellifera capensis *(The Cape honeybee)*

The Cape honeybee, as its name suggests, is native to Southern Africa. It has a very interesting characteristic in that workers can lay diploid eggs able to develop into workers and queens; most laying workers in other races produce drones. The problem with the Cape honeybee is it is a poor worker, almost a lazy bee. It enters colonies of *A. mellifera scutellata* (the 'native' bee in South Africa) and rapidly increases in numbers. Once the colony is dominated by the Cape honeybee workers, there is loss of foraging and housekeeping activities, brood abandonment, an increase in fighting and ultimately the death of the colony. The cape bees may also drift into nearby colonies and continue the cycle, until all local bee colonies eventually die out.

The NBU must be informed IMMEDIATELY if any of the above are found!

Dr Ruth Waite

'A swarm in June is worth a silver spoon' so the saying goes.
If your bees swarm this June will you have frames and foundation for them? If not we can certainly help you.

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Worker Beekeepers Gather Data

Much water has flowed under the bridge since the establishment of the Register of Members was announced in the December issue of BBKA News. In fact, the process of data gathering is now a reality for all those 'lucky' Association nominees who have received their data gathering kits and are beavering away on our behalf. Many thanks for your work!

There was extensive discussion at the ADM in January, following a presentation to delegates and the project was given a resounding vote of support. A great deal of work has gone into refining the specification, with particular emphasis on keeping it simple and only including information that will be useful in helping the BBKA provide better service and support to its members. The data being gathered is split into basic communication information, ie names and addresses, which is considered *'essential'* for the provision of services, and that which is entirely *'voluntary'*, namely e-mail addresses, telephone numbers, positions in local associations and any skills that they may have to offer. Each member is being allocated a membership number, which will reflect their county and district affiliation. In due course a membership card is planned, for proof of membership and to give access to membership benefits and privileges.

A lot of effort has been put into liaison with Associations and providing support, now that the project has gone live. At the Spring Convention, the 'Register Help Desk' was busy throughout the day dealing with technical issues, as witnessed by Mike Lambert's total loss of voice by 5pm! Many have looked for reassurance on the confidentiality aspect, which is a fundamental principle and written into the contract, which the BBKA has entered into with the data processing organisation. Other Associations have welcomed the chance to update their own records and are adopting the Excel-based spreadsheet for their own register of members. And as we all know, the insurance issue plays its part in the register, in that many associations want urgent reassurance that their members are recognised by name and thus 'covered', as witnessed by recent and very welcome recruits to the BBKA.

The project is well on its way and subject to the inevitable glitches we encounter whenever computer and mankind meet. Following much hard work, we shall at last, have a register which will enable the BBKA to serve its members better.

Tim Lovett

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Further Improvements at HQ

The PA system in the National Beekeeping Centre has proved to be a great success, both at the ADM, the recent training sessions and lectures. However, it has become clear that without a floor microphone this is not as effective as it could be. This further improvement is being investigated by Van Hinman.

Your Association Needs Your Help

In November 1999 the Chancellor, Gordon Brown announced dramatic changes in the way charities could receive more money from subscribers; changes which encourage people who pay income tax to donate that tax to their chosen charities.

On 6 April 2000, Gift Aid declarations were introduced. It is a very simple way of making a donation to a charity without the donor having to make any commitment to give a set amount over a period of time. Each donation is complete and as soon as it is made, the Income Tax, currently 22% can be claimed. This amounts to 28p for every £1 donated. Four and seven year Covenants although still valid, are being phased out.

So how can you help your Association financially without any cost to yourself? The simplest way is to sign a Gift Aid declaration for your subscription. Your Association Treasurer or Gift Aid Secretary, who should have the appropriate form, can then reclaim the tax on that subscription; ie; on a subscription of £25 this amounts to £7 per member. If the subscription is increased there is no need to sign a new declaration as the wording states 'all donations'. If you cease to pay tax or no longer wish your subscription to be Gift Aided, then just write to your treasurer and inform him/her. It is as simple as that.

Written declarations will have to contain:

- the donor's full name
- the donor's full address including post code
- a description of the donation to which the declaration relates
- a declaration that the donor wants his donation to be gift aided
- a note explaining that the donor must pay an amount of Income Tax or Capital Gains Tax equal or greater to the tax deducted, ie the donor must have paid at least £7 of tax during the past year. This means that as long as a person paying Income Tax at the lowest rate (10%) fulfils this criteria, he/she can also make Gift Aid declarations.
- the date of the declaration
- the donor's signature

The description of the donation to which a declaration relates could be something like:

'I wish the Association to treat my subscription as a donation'.

'all donations I have made since 6 April 2000 and all donations I make hereafter'.

Also the declaration that the donor wants his donations to be Gift Aided *'I want my donation to be Gift Aided'.*

It is very important that:

- the Gift Aid secretary keeps a clear audit trail of all monies gift aided. The Inland Revenue (Charities Division) plans to inspect charities books every six years.
- the donor does not receive any financial benefit from his/her donation. This means that only the basic element of BDI in the subscription can be gift aided.

If your Association is a registered charity and you fulfil the above tax requirements then you should seriously consider gift aiding your subscription. A financially strong association is in a better position to offer its members a better service and this is a very cost efficient way of helping it.

Put another way, if half the beekeepers gift aided their subscriptions then beekeeping associations would be roughly £35,000 better off.

Peter Spencer

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It's What Really Matters To Me!

Running an organisation like the BBKA depends on trying to give members as much of what they want within the realms of possibility and budgetary limits. Some aspects of membership are more tangible than others and we need to get the balance right. Below is a short survey which seeks your views on BBKA News itself, the Membership Package and BBKA activity. Please take a couple of minutes to complete it; your views are important. When complete, detach, fold as instructed and pop in the post (no stamp needed!) Outcomes to be reported in a subsequent issue of BBKA News.

BBKA News:

1) By placing a number from 1 (most important) to 12 (least important) in the box next to each item in the list below give your order of priority for articles in BBKA News.

Reports on BBKA Executive activities	❑	How to improve your beekeeping	❑
Letters	❑	Diary of Events	❑
Year Book Supplement	❑	Questions and Answers on beekeeping	❑
Technical Articles	❑	News on Disease and related issues	❑
Beekeeping Admin	❑	BBKA Committee Reports	❑
Government/EU News	❑	Advertisements	❑

2) How often should BBKA News be published (tick box)

Six times per year ❑ Twelve times per year ❑ Other (write-in) ❑

3) The Register of Members will make direct mailing of BBKA News possible. Would you opt for this service? (tick)
Yes ❑ No ❑

4) What else would you like to see in BBKA News? (Write-in) .....

.....

BBKA Membership Package

5) By placing a number from 1 (most important) to 12 (least important) in the box next to each item in the list below give your order of priority for elements of the membership package:

Information Leaflets	❑	Exam Programme	❑	BDI	❑
BBKA News	❑	Sales Items	❑	Third Party Insurance	❑
Product liability cover	❑	Technical Advice	❑	Conventions/Shows	❑
Education	❑	Government lobbying	❑	Beekeeping Promotion	❑

6) What does the BBKA Membership Package lack or should be expanded or improved? .....

.....

BBKA Articles for Sale

7) By placing a number from 1 (most saleable) to 12 (least saleable) in the box next to each item in the list below give your order of priority for articles in BBKA News.

Advisory Leaflets	❑	Booklets	❑	Bees in The Curriculum	❑
Neck Ties	❑	Pens/Pencils	❑	Brooches/badges	❑
Polo Shirts	❑	Sweatshirts	❑	Zip Fleeces	❑
Baseball Caps	❑	Honey Pots	❑	Head Scarves	❑

8) Are the current items of adequate quality? Yes ❑ No ❑

9) What items if not shown above would you like to see on offer? (Write-in) .....

.....

Thank you for your input. **Please detach, fold and mail.**

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An Invitation from HRH

On the 2 May 2002, a small group from the BBKA was invited to visit the gardens of Highgrove, the country home of the Prince of Wales.

It began with drizzle, but thankfully soon turned into a beautiful spring day as we walked for nearly an hour and a half led by our expert guide. We admired many of the themed gardens, but my favourites were the one acre walled kitchen garden with its warm micro climate, and the newly made forest garden containing artistically arranged petrified wood with under plantings of hostas and sarcococcas amongst other shade loving plants. This unusual garden was apparently popular during Victoria's day, and is only one of two examples to be seen in this country.

What struck all of us was that virtually all of the gardens are newly designed, constructed, and planted. From the original plot of just over 300 acres that the Prince acquired in 1980, he has made these gardens into something that you would believe had existed there for ages. It included fountains, statuary, stone walls and yew hedges looking as if they had been trimmed in their unique shapes for decades. His belief in organic gardening is well known, and much in evidence as we observed the gardeners, of which there are eight, even weeding the lawn by hand!

Apart from the enjoyment of the gardens, the highlight of the day for all of us had to be admiring the bee house given to the Prince by the President of Slovakia. Typical of a bee house from Eastern Europe, it had ornate painted pictures depicting people in local dress gracing the front of the house above the entrances for the bees. If only we were allowed to view those bees and that house more closely we would have been in total beekeeping bliss on the day. Still, we had a great time and would like to thank the Prince for allowing our visit along with Michael Badger and Ian Preece who organised such a wonderful day.

Van Hinman

Bush Budget Blasts Bees

Judging by the evisceration of honey bee research in the 2003 Bush budget, one might think this was revenge against the beekeeping industry because Osama bin Laden used the Middle East honey trade as a vehicle for his terror organisation.

The Bush budget is not just guns versus butter; it's also guns versus apples, blueberries, alfalfa, watermelons, almonds, and many more crops. And yes, even broccoli, George. In the name of homeland security, the Bush budget beggars food security. It calls for $453 million for food security, but then cuts $3.1 million from the USDA labs that insure that fruits and vegetables (food) are pollinated in the first place. For the price of three or four cruise missiles, this budget commits a bureaucratic form of ethnic cleansing on three of four Department of Agriculture labs studying honey bees. In addition, the budget eliminates two thirds of the scientists who worked on bees. As a final insult, it moves what little research capability is left to Weslaco, Texas, as far from the entire honey producing parts of the USA as you can get, but right in the middle of Africanised honey bee territory! By cutting protection, we fail to see how this budget is ensuring security.

Honey bees fill a distinctive role in American agriculture. Yes, the thousands of full and part-time beekeepers produce about $150,000,000 of honey and wax annually. Of far greater importance, bees pollinate more than 90 food, fibre and seed crops valued at $15 billion annually. Furthermore, bees provide an immense, if immeasurable, amount of pollination for backyard gardeners who produce many billions worth of home grown foods. In fact, the same US Department of Agriculture has estimated that one bite in three of what we eat comes from insect pollination with honey bees doing the heavy lifting. Moreover, none of this addresses the value of the food produced for our natural wild life in all parts of the country. Wildlife that absolutely depends on honey bee pollinated nuts, berries and seeds for survival.

Almost twenty years ago, honey bees were the butt of Washington humour. Representatives Sylvio Conte on the right and Barney Frank on the left glib pot-shots at the honey subsidies when rising foreign competition forced beekeepers to dump as much as half their crop on Uncle Sam's doorstep. In a flurry of rectitude, Congress then cut the honey subsidies, while leaving in place billions for politically protected crops like sugar.

Ironically, these attacks came just as globalisation brought to the USA two parasitic mites, which eliminated almost every wild honey bee in the USA, and cut the number of managed hives in half. The mites changed the beekeeping landscape forever. Today, honey bees do not stay alive without beekeepers, and beekeepers do not stay in business without the bees. Neither will survive without the research provided by these labs now on the block.

The USDA laboratories (as well as several university programs) have been the shock troops of fighting the mites as well as "Africanised honey bees" and the invasion of the South African small hive beetle. The latter was not even on the radar as a threatening species until it arrived in 1998 and wiped out 20,000 Florida hives the first year it was discovered. Furthermore, by helping to develop mite resistant bees and effective integrated pest management programmes, these labs have reduced the need for chemical mite controls, and kept beekeepers in business.

In this budget, $5.9 billion is ear marked to fight bio-terrorism, which includes protecting the food supply. By cutting bee research funds so drastically, the Bush budgeters ignore the other half of the equation, protecting the pollinators that contribute to our abundant food supply. Without food to protect, what will that $5.9 billion be used for?

Bill Mares and Kim Flottum

Here we still have the bee health services offered by the CSL National Bee Unit. Use, appreciate and value them.

2002 Spring Convention - Did You Miss this Great Beekeeping Day Out?

Were you part of the record crowd of 1,600 that attended the BBKA Spring Convention at Stoneleigh this year? If not you missed an extremely successful day, which included the new 'conservation and environmental' hall and the many and varied lectures, some of which are summarised here. Make a note in your diary: next year the Spring Convention will be on Saturday 26 April 2003.

Education and the Beekeeper - Paul Metcalf

Since the early books on beekeeping there has been an accumulation of knowledge and experience to pass on to new beekeepers. Many years ago the older beekeeper would pass on his information and techniques directly to his young successor. But over recent years there has been an enormous amount of radical change in our knowledge of things like the science of disease, the phenomena of pheromones and the behaviour of the honeybee. Society moves forward and progresses with its knowledge. We as beekeepers are interested in producing more honey and doing it better.

Between the two world wars beekeeping was at its zenith and the number of beekeepers was increasing at an amazing pace. William Herrod-Hempsall was the first appointed government adviser and he travelled the country extensively in the 1920s and 30s lecturing and demonstrating the craft of beekeeping. In 1946 the government placed the responsibility of beekeeping education with the local education authorities. This created the County Beekeeping Advisers and their activities included adult bee disease diagnosis, lectures, demonstrations, advice, etc. But they began to disappear in the 1960s due to government economic restraints. Now they are completely gone and unfortunately formal beekeeping education has become of much less significance in agricultural colleges.

Why take examinations and what is the relevance? They are a challenge and prove to the beekeeper and other people that some form of standard has been reached. If we are going to rely on everyday beekeepers to impart knowledge then we must know that the knowledge is at a certain level. The BBKA has produced an educational programme where the syllabus and examination levels are designed to ensure that the standards of knowledge and information are correct. The end product is the Master Beekeeper who replaces the County Bee Adviser.

Education in beekeeping has an important role. Exams validate the level of knowledge and can be both interesting and stimulating.

Chris Utting, Devon

Investigating How Far Honey Bees Fly to Oilseed Rape and the Consequences for Pollination - Dr Juliet Osborne

Dr Juliet Osborne is currently working on the behaviour and movement of bees at IACR Rothamsted and this was an expanded version of the talk she gave at Apimondia in South Africa (in recognition of the funding received from BBKA to attend that convention.)

Juliet explained that understanding the movements of bees between crops is important for both tracking the gene flow between crops via transferred pollen and also for learning how to conserve wild flower populations which were often in fragmented habitats but still require bees to pollinate them.

Herbicide tolerant oilseed rape, maize and sugar beet are the first genetically modified crops to be evaluated in the UK. Herbicide can be sprayed onto the growing crop, killing the weeds but not the GM crop. Public debate about this is focussed on the effects on biodiversity, whether there will be an effect on other plants and invertebrates in and around the GM crop.

The research is being done into the flight patterns of bees as they collect nectar and pollen from oilseed rape and is to discover the extent of the gene flow into neighbouring crops, into neighbouring weed species and into hive products.

Juliet described her experiments; placing hives at varying distances between one field trial of GM oilseed rape and two other fields of regular OSR. The bees in each hive had to exit beneath a pad which dabbed a non-toxic powdered dye onto their backs. The plots of OSR were surveyed twice a day and these different coloured bees were counted in order to see the direction and distance travelled from the hive.

Results are still being analysed but so far show that the bees displayed no preference for GM or non-GM OSR, they consistently went to the nearest source and only travelled further once the flowering was over. 90% of the bees foraged close to the hive and the mean distance flown was only 127 metres.

An interesting initial result with the pollen samples shows that although there was so much rape available, the pollen actually collected was less than 50% OSR.

Future research plans include investigation into how much pollen is transferred between bees within the hive and how the landscape affects flight patterns.

Lyn Sykes, Avon

Queen Rearing: The Quickest Way to Improve Your Bees - Jos Hillen

His first experience of improvements in bee temperament was within six weeks of replacing local queens with native queens, obtained from specialist breeders. Jos recommended this simple initial approach instead of persevering with ill-tempered bees. Jos demonstrated that the desirable characteristics could then be further improved by selective breeding. His children can safely handle their docile, high yield bees, without any need for protective clothing.

Jos's achievements were a result of his development of the queen breeding system described in the book 'Breeding Queens' written by Gilles Fert.

Jos organised an isolated mating station and later learned artificial insemination. The fundamentals of his system are grafting, temporarily orphaned starting colonies, compartmentalised finishing colonies, drone rearing and artificial insemination.

Jos grafted larvae using the Swiss tool and found that children could easily perform the simple process. The larvae were not as vulnerable as one might expect. Bees must be brushed from the comb of broodstock (not shaken), to prevent disturbing the orientation of the larvae in the cell. The tiniest ten to twelve hour old larvae had the highest acceptance rate. The brood frame could then be taken indoors for grafting. Jos found that the development of the larvae could be suspended for up to six hours if stored at temperatures between 20ºC and 30ºC, which reduced dependence on food and the risk of starvation.

Jos's starter hive system involved introducing three frames comprising 42 grafted queen cups into a temporarily orphaned hive for a period of 20 to 24 hours. Generally inner cells went on to the finisher hive because they tended to receive a better supply of royal jelly than the outer cells, which were discarded.

His finisher hive involved placing up to three frames of 14 queen cells within queen excluder enclosures, set against frames of open brood, inside a queen right colony. Jos identified specific critical precautions for each stage of queen development based upon his experiences. For example,

shaking queen cells on the sixth day after grafting could separate the larvae from the royal jelly and cooling on the ninth day after grafting could damage wings.

Roller queen cages were used to protect the new queens if they were allowed to hatch in the finisher. The cages also prevented brace comb building across the queen cells. Secure attachment of the cages was emphasised, to prevent the bees from disengaging the cages.

A supply of candy in the queen cage reduced the dependence of the hatched queens on the hive bees and alleviated the possibility of bees attacking the queens through the roller cage openings.

Jos suggested a method of calming shaken bees for packaging using a bucket and water mist sprayer.

His finishing hive was subdivided into four compartments, each with individual top tray feeders, populated with packaged bees and held queenless for up to two days prior to introducing queen cells. Each compartmentalised colony could support six queen cells on a single half-frame.

The lugs of the half width frames of each compartment incorporated halving joints, allowing the frames to be reassembled into full frames for introduction into a conventional hive. The collective brood pattern of the four colonies was central within the partitioned hive, allowing the partitioned colonies to winter successfully.

Hatched queens could be artificially inseminated or queen cells in cages capped with candy could be introduced into mini-nuclei (or three frame nucleus hives) with candy stores and then kept in a cellar for two days, before moving to the mating station.

This area around the mating station was saturated with breeder drones by establishing local drone colonies and provided local beekeepers with improved queens.

Jos's lecture and slides provided a very simple, understandable introduction to the theory and practice of queen rearing.

Jim O'Neill, Durham

Bees, Boards and Bright Ideas - Peter Hewitt

The 'Seminar Room' was packed, with doors closing a good five minutes before the scheduled start, as there was no room left! Peter set the scene, we were there to listen to the 'old geezer' who would be telling us nothing new; but perhaps remind us of things we had forgotten we knew.

His **Bees** were 'nothing special' he does not mind being chased (on the odd occasion), it 'wakes him up'. Although we later heard of his colony improvement by drone selection.

After years trying various floors, including sloping ones (but its easier to tilt the hive), twenty years ago he found Norwegian beekeepers used 'open mesh floors' which work well where he keeps bees at Howarth. He showed their construction and adaptations required following varroa.

Initially he tried greenhouse shading but it sagged in the middle and the bees chewed it. So he used stronger plastic windbreak mesh telling his bees 'you chew that' and they did!

He does not use top ventilation, a slight build up of carbon dioxide within a hive over winter period causes the bees no harm. They become comatose, not using so much stores.

There have been many **Boards** working well in their own way, but swarm control requires another brood chamber. Kept 'on the hive' as a double brood, they are not full of frames but have blocks at each end to narrow the hive so the brood is tall and thin as in nature. New comb inserted in the top box is completely drawn out, unlike that at the bottom where bees build comb with a natural curve. Pollen is not stored in the supers, resulting in 'refulgent' honey that will absorb light and glow!

Bright Ideas included varroa calculators; very few people use them but he does. We must be careful about chemicals and only use when necessary.

Starter top bars for comb honey, especially heather, are good as bees provide the mid rib.

A box to hold combs removed for brood inspection and his tribulations to stop it falling over.

Traffic cones, cut off the top and bottom to assist putting wax for melting into stockings.

All too soon 'time was up' but there was a buzz of contentment from the beekeeper audience, their expectations well fulfilled.

Space does not permit me recounting Peter's many anecdotes, if you get the opportunity to hear him, do so, you will enjoy it!

John B Hunt, West Sussex

A Humbling Experience

If you find yourself in the big city, with an evening to spare, why not get yourself a ticket for the highly acclaimed show Humble Boy, at the Gielgud Theatre, Shaftesbury Avenue.

Set in a garden, dominated by a massive hive, this black comedy revolves around a recently deceased beekeeper, his unfaithful wife, played by Felicity Kendal and her son, a Cambridge Don, played by Simon Russell Beale. You will not learn much about beekeeping, but you will laugh a lot. The story line develops well and there is perhaps a predictable sting in the tail, of course! Oh, and a couple of tips: Firstly, the interval is short, so get to the bar early to avoid hiccups in the second half! Secondly, don't bother about a £3 programme - just sit back and enjoy the show!

Tim Lovett

Also look out for another play on a beekeeping theme touring regional theatres, called 'Beemaster'.

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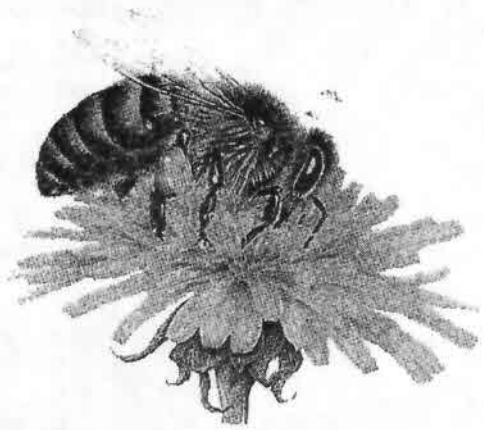

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New BBKA Slide Library Manager

I am sure that most members know of the very comprehensive 35mm slide library that has been well managed until fairly recently by John Rainey. However, John found that he had to relinquish the job he had done so well fo a number of years and passed all the slides back to BBKA HQ. I asked if I could take on the task of giving them a bit of tender loving care and so I now find myself 'Keeper of the Slide Library'.

There are over 140 sets with as many as 80 in some sets or as few as 7 in others, some of which are a little bit the worse for wear but all have a place in beekeeping history, one way or another. Some were old 9mm film strips that have each frame mounted in a slide holder with outer dimensions 35mm, but with smaller 'picture hole'. These are not protected with glass and some have heat damage from projector lamps. They were made with celluloid type material intended to pass the hot lamp in a movie projector at several frames per second, not to dwell in front of the hot lamp of a 35mm projector. I am looking through every set to ascertain the individual quality and how the damaged slides may be recovered

I am also in the process of writing up a new catalogue with as much detail as I can, including postage and packing details. The list is fast becoming a book, so circulation will eventually be restricted due to cost, but should be available through your area association secretary. Extra copies could be made available for a small charge. The complete new list is not ready yet as I am trying to take each set at a time, review and assess them for content and quality and reflect my findings in the catalogue.

The hiring of slides could not be easier. You should be a member of BBKA. You contact me to establish availability and I invoice you the cost of hiring the set, plus P&P, plus recorded delivery to ensure you get them in time for your meeting. You send me a cheque payable to BBKA and I send you the slides several days before you need them. You return them as soon after your showing as you can, in case someone else has booked them, and you pay the return postage.

Although there are forms available for booking there are easier ways; simply e-mail me, or write. The details I require, besides which slide set and when showing, is: your full name, address and postcode, plus telephone number. The postcode is essential for recorded delivery.

By the way, if you have a slide or slides you would like to donate I would be pleased to accept them, including single slides, which will be categorised to make up sets.

Happy viewing.

Ron Hoskins, 10 Larksfield, Swindon, Wilts. SN3 5AD
01793 525 364, e-mail: ron@honeybee.org.uk

The Latest from Rothamsted

Norman Carreck, a member of the BBKA Technical Committee has reported that the following work is currently being carried out at IACR Rothamsted.

- Radar Tracking of Insects is developing and progressing in collaboration with Freie Univeristat, Berlin.
- Distribution and foraging ranges of bumble bees.
- Bees and GM Crops. Dr Juliet Osborne spoke on this at the Spring Convention and Prof. Ingrid Williams will be speaking on this at the National Honey Show.
- Kashmir Bee Virus; risk evaluation of honeybee importation. Brenda Ball is working in collaboration with the New Zealand Ministry of Agriculture.
- Biological Control of Varroa. Work is entering a second phase and liaison with BBKA and Bee Farmers is planned. Brenda Ball spoke on this project at the Spring Convention.
- BBKA funded project on EFB diagnostics; good progress reported.
- Research for New Zealand Ministry of Agriculture into the thermal death point for *Melissococcus plutonius* in honey is completed and will be published shortly.
- An extensive site development is taking place at IACR Rothamsted with controlled environment facilities and new bee flight rooms now in use. A view is available at www.iacr.bbsrc.ac.uk/rescam/site.html

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There's No Business Like Show Business!

I wonder if you have ever given any thought to just exactly how best we can communicate our wonderful craft to the Great British public - our customers?

One of the most effective, yet underrated, methods must surely be the agricultural shows, town and country shows, church fetes and the like that hundreds of local association members attend each year. It is an opportunity for us, the actual beekeepers, to tell interested members of the public exactly what bees and beekeeping are all about and to correct some of the misapprehensions about beekeeping which the media seem able to establish.

If you have not been involved, you will probably not be aware of just how much effort goes into planning, arranging and staffing our presence at these events. And often, the few dedicated people who do this work have not even got the time to get their own honey bottled; they end up selling crop from other members!

But the effort can be great fun and is, to many, very rewarding, particularly if you have live bees at the show. The reaction to bees is often fascinating to watch. On occasions we have managed to get people who claim to be terrified of bees to put their hand on the glass of the observation hive. They feel the warmth of the brood nest and, somehow, they seem to warm to the bees as well. It is from reactions like that that we can recruit future beekeepers. Today's young people are also tomorrow's beekeepers. Not necessarily teenagers because many of them are too busy developing new attitudes to take on new ideas, but sub-teens can often show substantial knowledge as well as significant interest. Teachers, too, often stop by at the stand as they are always looking at new ways of teaching their charges. The BBKA publication 'Bees in the Curriculum' is invaluable in this respect as it offers a structured approach to introducing bees into various parts of the National Curriculum. It also provides an ideal vehicle for closer ongoing contact with schools if your association is able to support such a venture.

Honey tasting is a wonderful opportunity to convert attitudes from 'I don't like honey' to 'I didn't realise how different the flavours could be!' It also provides a basis for describing just exactly why various honies taste different. It is worth trying to link flavour to source crop (even if only at a seasonal level rather than specific flowers), possibly through a display of the flowers in question or, if out of season, some suitably chosen photographs. And this year we should also be emphasising the purity of our produce, untainted by antibiotics. The shortage of imported honey on the shelves of our supermarkets is yet another reason for **not underselling our product.** That same shortage does, of course, put even more focus on making certain that our own produce is at its very best.

Farmers' Markets are a relatively recent development in this country. Some may say that they do not fit into the category of shows; that they are solely commercial activities. But, increasingly, they are becoming a showcase for local produce, including honey, and that puts an even greater focus on quality, purity and presentation.

So, what are the key messages I am trying to convey this month?

Well, the first is that we need to take every opportunity to communicate with our public for they are our customers, our critics and our future.

Secondly, we need to interpret bees and beekeeping for our public, present the craft in attractive ways, emphasising the environmental benefits. Aim the way it is presented to the audience; fun things for children, food things for adults.

Thirdly, if you have never been involved in helping at a show, why not give some thought to doing so. You will almost certainly find it a rewarding experience and, because of the questions we are often asked, it can be a learning experience too. If you are unable to spare the time, why not thank the people who do. They are doing it on behalf of us all and are helping to keep our craft alive.

The Forager

More Biotechnical Methods for Varroa Control

Have you tried either of the two methods of biotechnical varroa controls that were described in the last issue of BBKA News? Below are two more which you may like to try. Once again these have been reproduced from the CSL leaflet 'Managing Varroa'. If you require clarification or further information about these methods, your RBI or SBI should be able to advise.

Comb Trapping

- Confine the queen to a worker comb 'A' using a purpose made comb cage, which is available commercially.
- After nine days confine her to a new, empty comb 'B' and leave comb 'A' in the brood chamber to become infested with mites.
- After a further nine days, remove comb 'A', which is now sealed. Confine the queen to a new comb 'C', leaving comb 'B' in the brood chamber.
- After nine more days, remove comb 'B'. Release or replace the queen, leaving comb 'C' in the brood chamber.
- After nine more days, remove comb 'C'.

Pros:

- Can be very effective
- More bees recruited to foraging

Cons:

- Time consuming
- Requires good beekeeping skills
- Can harm/weaken the colony if used without regard to the time of season eg late summer

Open Mesh Floors

- Fit a varroa monitoring floor, without a collection tray, on to the hive.
- Many mites falling from the colony are usually alive. The mesh floor allows these to drop out of the hive rather than returning to the colony.
- Used in conjunction with other control methods, this method helps to keep mite numbers down.

Pros:

- No debris on the floor to encourage wax moths
- Improves ventilation

Cons:

- Not sufficient if used alone

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Working With NFU Countryside

Plans are proceeding for a Saturday event here at the National Bee Centre on the 15 June this year.

In conjunction with the NFU Countryside magazine we are organising a visit by some twenty interested subscribers. They will have an introductory taste of beekeeping with a session of talks and demonstrations and weather permitting a hands-on experience with hives of bees.

Naturally we hope that some of them will consider taking up beekeeping as a hobby and joining our ranks. However, the main thrust of the event is to put across the importance of bees to agriculture in particular and life generally.

The life style of the honeybee is of considerable interest to a large proportion of the public and many are willing to learn more about bees even though there is a natural reluctance to approach an insect which has the ability to defend itself venomously.

The observation hive always attracts considerable interest and is an excellent way of allowing bees and public to inhabit the same confined space. It is even better if we can persuade people to don protective clothing and approach live bees being inspected at the hive.

The best situation is of course the ability to show people that even with the minimum of protection we can handle bees and it is up to us to breed better temper into our bees particularly for this purpose.

We are hoping that this is just the start of a series of such events not only here but at other centres and apiaries. It is important that we show to the public at large that bees are not dangerous and are vitally important.

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A Date for your Diary

The BBKA will be holding a second Training Trainers weekend for the Introduction to Beekeeping Course on 23rd/24th November. The last course was a great success and if you would like to assist in training others this is the course for you. For more information contact BBKA Headquarters

Margaret Johnson

Wax Chandlers

A donation of £500 has been received from the Wax Chandlers. It is intended that his donation should be put towards the purchase of electrically operated blinds for the main hall of the National Beekeeping Centre in Stoneleigh.

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YORK & DISTRICT BEEKEEPERS ASSOCIATION
GLOSSARY OF BEEKEEPING TERMS

ACARINE.....A parasitic mite infesting the trachea of the honey bees.
APIARY.....A site where bee hives are kept.
BEE SPACE.....A gap of 1/4" to 3/8" left by bees between frames etc. smaller gaps will be filled in, larger gaps will also be filled in.

BRACE COMB.....Used by bees to fill larger spaces under frames.
BROOD BOX or DEEP BOX. Where the queen is confined to lay eggs .
BROOD.....Eggs, larvae and larvae sealed in cells undergoing metamorphosis
CASTELLATED SPACERS. Strips of metal with slots to sit your frames in.
COLONY.....A hive of bees
CORBICULA OR POLLEN BASKETS Stiff hairs on a workers back legs for carrying pollen back to the hive.
CROWN OR CLEARER BOARD. Sits on the top of the uppermost box with screened hole to prevent bees getting into roof space. It also doubles as a clearer board when fitted with porter escapes
DRAWN COMB.....Foundation drawn out by the bees approximately half an inch either side of the mid rib. Bees use the cells thus formed to rear brood or store surplus honey and pollen.
DRONE.....The male of the species. He has no sting. His function in life is to mate with virgin queens, after which he dies. Those remaining in late summer are ejected from the hive to die.
ENTRANCE BLOCK...Comes with the floor board. It allows you to reduce the width of the entrance in the winter or on weak colonies.
FEEDER.....Comes in various guises. Use to give bees additional food in the autumn or when their supply of food is getting low.
FLOOR OR BOTTOM BOARD The very bottom of the hive where any debris collects. It also has the entrance through which the bees come and go.
FORAGERS.....Worker bees that fly out of the hive collecting nectar, pollen, water and propolis.
FOUL BROOD.....American and European. Both virulent diseases of sealed and unsealed brood. Early stages can be treated. Otherwise burning of bees and hives is only resort.
FOUNDATION.....A thin sheet of bees wax embossed with hexagons as a guide for bees to draw out. Comes in either drone or worker base.
FRAME.....Five pieces of wood in a rectangular shape into which foundation is fitted
GLASS QUILT.....Same as a crown board but with glass inserts
HIVE.....The stack of wooden boxes that a colony of bees live in.
HIVE STAND.....Used to raise the hive off the ground
HIVE STAPS.....Strapping used when moving bees. Secures floor board, brood box, supers and travelling screen together to prevent them parting company during transit.
HIVE TOOL.....A metal tool used to prize hives apart,lift frames out and scrape wax from top bars.
HOFFMAN FRAMES....These frames have wide shoulders making them self spacing. No need for plastic spacers.
HONEY.....Nectar collected by bees, ingested by other bees and enzymes added, excess water is then evaporated off to give the viscous liquid we know. It is the source of carohydrate in laval diet.
NECTAR..... A thin watery liquid collected by bees from the nectaries of flowers, which eventually becomes honey.
PHEROMONES.....A chemical substance given off by one insect ot attract other insects of the same species
POLLEN.....A granular substance collected in quantity by bees. It is the protien in larval diet. Comes in many colours. Its source is identifiable by size and shape.
PROPOLIS.....A resinous, very sticky substance secreted by trees. Collected by bees in late

summer and used to seal the hive against winter winds, and infuriate the beekeeper when he gets it on his fingers.

QUEEN.....The matriarch of the colony. An egg laying machine. Said to lay up to 2000eggs per day at her best. Her production of pheromones maintains colony cohesion.

QUEEN CELLS.....Long finger like cells hanging down on the face of a comb. Unmistakable.

QUEEN CUPS.....Preliminary queen cells

QUEEN EXCLUDER.....A perforated metalsheet or wood framed wires spaced s that the queen cannot pass through, yet allows slimmer workers to do so.

REFRACTOMETER.....An optical device for determining the water content of honey.

RIPENER.....This is a misnomer for a settling tank. Honey is poured into this tank prior to to bottling to allow air bubbles and debris to rise to the.top.

ROOF.....Metal covered Sits on the top of the hive to keep the rain out.

SKEP.....Astraw domed cylinder. The hive of bygone days. Nowadays sometimes used for show or catching swarms.

SMOKER.....A metal cylindrical furnace with a nozzle on top, with bellows at the side Used to produce smoke to subdue bees during manipulations.

SMOKER FUEL.....Rolled cardboard and hessian sacking are the two most common fuels used in smokers. You can also use dry rotten wood, dry grass or puff balls.

SOLAR WAX EXTRACTOR A wooden box. Double glazed with metal trays inside for rendering wax and old comb using solar heat.

SPACERS.....Used to keep frames at the requuisite distance apart. Usually made of plastic

SUPER OR SHALLOW BOX Saparated from the brood box by the queen excluder for storing surplus honey.

SUPERCEDURE.....This is when a queen is replace without swarming. Only one or two queen cells will be produced. Unless the queenis marked, then supercedure can take place unnoticed.

SWARM CONTROL.....Manipulations undertaken to prevent a colony swarming after queen cells have been observed.

SWARM.....Bees way of increasing colony numbers.

TRAVELLING SCREEN A wire mesh used in place of the crown board and roof to give ventilation when moving.

UNCAPPING KNIFE.....A hot knife-frequently electrically heated-used to remove the wax cappings of frames prior to extracting.

VEIL.....Black netting usually fitted to a hat and hanging down over your face to reduce the risk of being stung on the face.

VARROA.....A parasitic mit e originating in far east that spread slowly west over the last 25 years reaching Britain five years ago. As yet there are no means of eradication. It can be kept under control chemically. Every colony is infested to some degree.

WAX.....A secretion from the glands in the underside of the bees abdomen. They use it to make comb.

WORKER.....Does all the work. Cleans the hive, feeds the young, collects water, pollen nectar and propolis.

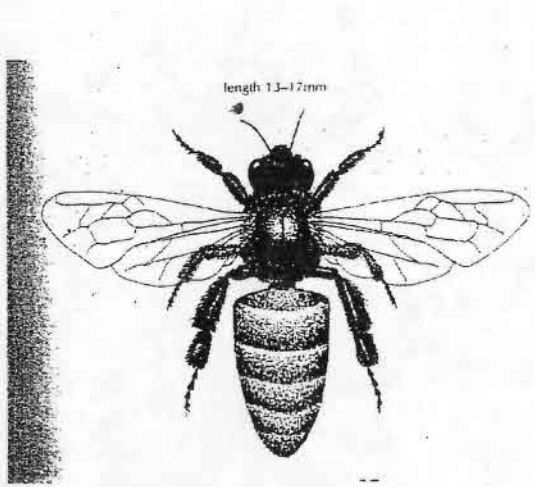
John Fuller, 4th June 2001

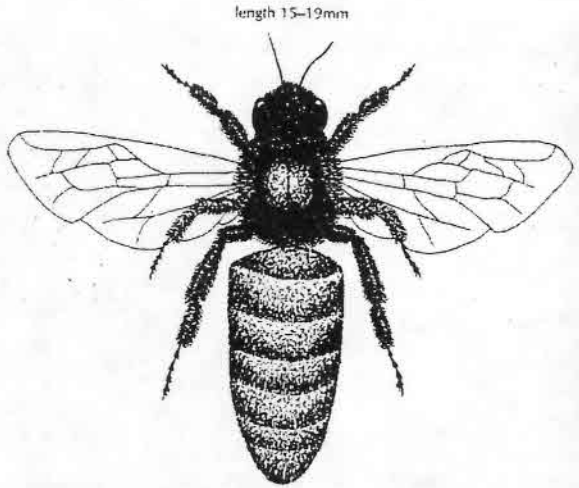
SETTING UP AN APIARY

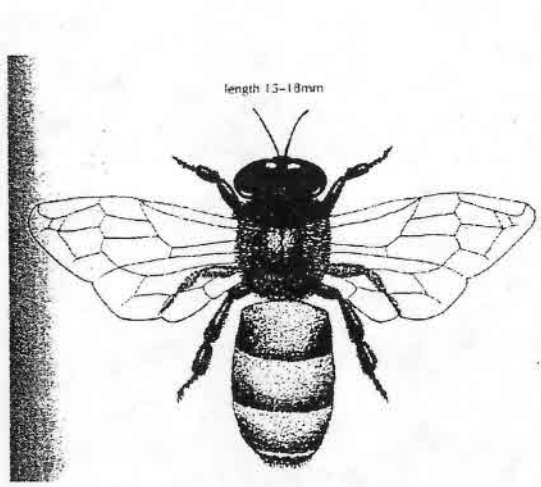
* Home or out apiary?
* Liase with your neighbours
* Easy access
* Away from another beekeeper's apiary
* Hidden from road, paths (& thieves)
* Level ground
* Early sun and possible shade at mid day
* Water nearby
* Plenty of room to work on the hive
* Hives not in a regular pattern
* Safe flight path

Rob Colcman 762532.

Number of bees in a colony







~60,000 workers | 1 queen | ~2000 drones

but in winter

~10,000 workers | 1 queen | 0 drones

Courtesy of Clive de Bruyn

AN UNDERSTANDING OF THE ANATOMY OF THE HONEY BEE AND ITS BENEFITS TO GOOD BEEKEEPING PRACTICE

Development of the worker honey bee

Natural History - worker

Hatches	3-4 days	
Diet changed	6 days	2 days old larva
Cell sealed	9 days	
Emerges	21-22 days	
Fly	30 days	
Mature	36 days	
Foraging	42 days	For 5-6 weeks average summer
Dies	12 weeks	Average summer

Social System

House duties of the young bees

Division of labour according to age-:

Worker bees	Indoor staff
1-3 days old	Clean and polish cell walls
3-6 " "	Feed older larvae
6-10 " "	Feed younger brood
8-12 " "	Feed and tend Queen
11-18 " "	House cleaners
12-18 " "	Make wax and build comb
18-20 " "	Guards

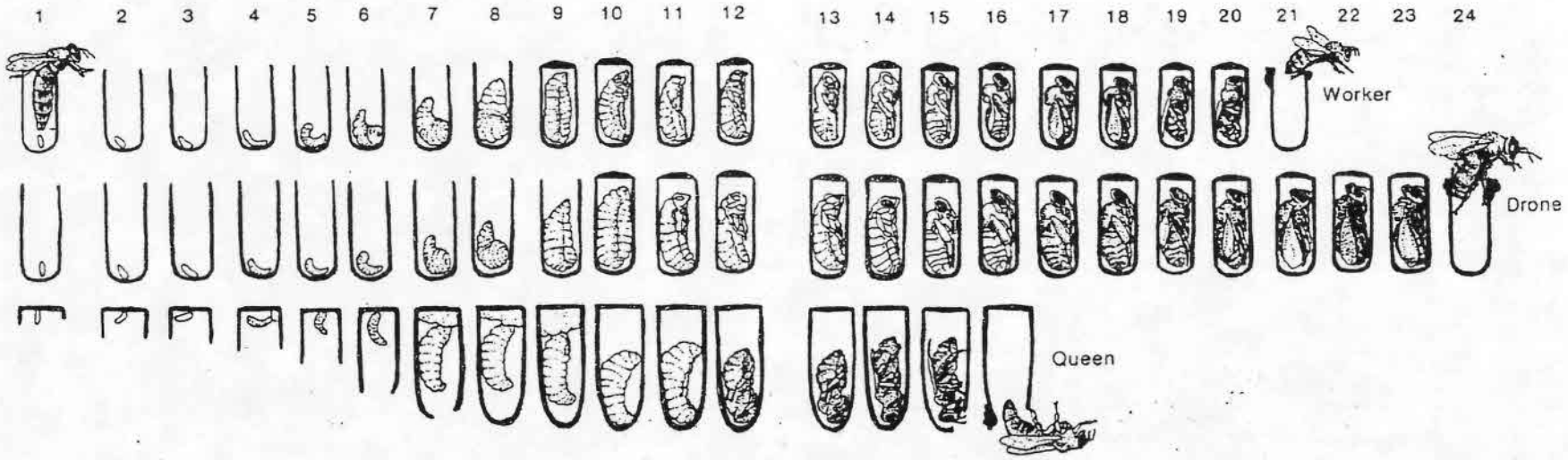
Outdoor staff

20 days onwards — Forage nectar, water, pollen and propolis

IMPORTANT NOTES

	Queen	Worker	Drone
Cells are sealed	9 days	9 days	10 days
Emerge from cell	16 days	21 days	24 days
Mature (approx)	10 days old	14 days old	14 days old
Preferred age	-	-	21 days old
Queen will mate	3-5 days old	-	-
Queen will commence laying	10-21 days after mating		
Natural life expectancy	4-5 years	12 weeks summer 6 months winter	

Larval Development



Ex: Biology of the Honeybee by Mark Winston

NB: Worker and drones are laid in cells that are approximately horizontal whereas queens are laid and developed in cells that hang downwards

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Website	Linda Carey	01759 371959

ASSOCIATION

Summer Programme 2005

Queen Marking Colour for 2005 is BLUE

Beginners Training Course

Meeting at Murton Tuesdays at 6.30pm unless otherwise advised

Date	Course Details	
3rd May	Introduction, Hives & Equipment -	Colin Hattee
10th May	Beekeepers calendar & colony structure-	David Aston
17th May	Spring Management	Alan Johnston
24th May	Handling & Manipulation & bee diseases-	Colin Hattee
31st May	Summer Management/Migratory Beekeeping	Ken Barran/John Acheson
7th June	*Apiary visit/Swarm control	Rob Coleman
14th June	Winter feeding & Care	John Fuller
21st June	Extracting & Marketing	Bob Hirst

Saturday 21st May - 6th Annual Auction.
Viewing from 11am
Auction commences 12.00 noon prompt

Tuesday 3rd May
First of 8 classes for beginners to be held in the Bee Pavilion Murton every Tuesday 6.30 –8.30pm
Unless advised otherwise

Saturday 9th July Annual Summer Barbeque
From 6.00pm at Jenny Smith's House
Bring your own meat ,sweets and drink.
All salads, disposable plates, cutlery & glasses will be provided by the Association
NB In case of inclement weather Tel 01904 706941
Please confirm attendance by 1st June by completing the enclosed form & sending it to:-
Jenny Smith,Lowrance House, Hagg Farm, Askham Bryan YO23 3QR

Wednesday 21st September
Bob Mould—Bee Inspector—'Winter Management'

Wednesday 19th October
YDBKA Annual General Meeting + Speaker

Tel:01430 860972
Greenside Lodge, Little End Holme Upon Spalding Moor York. Take Howden Road out of village, turn right at Cross Keys Pub, house at end of lane

Tuesday 27thJune 6.30pm Rob Coleman
Tel: 01904 7672532
Plainville Farm, Plainville Lane Wiggington
From North York ring road, 2 miles up B1363 signed Helmsley. 1st left, 1st right signed 'no through road'/Jacobean pub.White farmhouse just past pub on left

Saturday 25th June Ken Barran
Tel: 01757 708925
Time & Place to be advised

Wednesday 6th July William & Ann Johnson
Tel: 01904 738541
Orchard House, Marston Lane Moor Monkton
A59 from York to Harrogate. Left at crossroads into Marston Lane, Right before level crossing

Thursday 21st July 6.30pm Jenny Smith
Tel: 01904 706941
Meet at Nags Head Askham Bryan York

Saturday 6th August Tom Robinson
Time & Place to be advised

York and District Beekeeper's Association

Charity Number 507960

Would you like to keep bees?

Man has benefited from the honeybee for centuries. He has used honey as a sweetener and burnt beeswax candles for light.

As the honeybee collects nectar and pollen she pollinates flowers in our environment, including many essential food plants.

Beekeeping involves managing, controlling and learning about these fascinating insects.

Beekeeping impinges on many aspects of our lives. It brings together those interested in improved agricultural production and the well being of the countryside, gardening and education, food and cooking, and ancient craft skills as well as scientific work.

Some people, both men and women, become absorbed in the systematic and often hard physical work of securing good honey crops. Others find satisfaction in some special aspect of the natural history of the honeybee. There are devotees of each of the different aspects of beekeeping technology, honey and beeswax processing, exhibiting and marketing.

Beekeeping Associations bring people from all walks of life concerned to further and share their own knowledge and love of the honeybee.

The York and District Beekeeper's Association meets monthly at the Murton Museum of Farming, usually on a Wednesday evening. The date of its next meeting is Wednesday 15 September 2004 starting at 7.30 pm.

First steps in beekeeping

Before committing yourself or spending any money it is well worth finding out a little about honeybees and their management. Then if you are still interested make contact with other beekeepers such as your local beekeeper's association. Most associations run introduction to beekeeping classes and these are an excellent way to find out how you feel when opening up and looking inside a colony. Once you have seen inside a colony and been introduced to bees in the colony you will want to see and know more. There are details to be mastered in keeping bees which cannot be learned from reading books and attending classes but only come from experience in working with the bees. Experienced beekeepers are always willing to share their knowledge and experience with you.

One of the best ways to gain access to this expertise is by joining your local beekeeping association.

York and District Beekeeper's Association has more than 95 members and is one of the largest associations within the Yorkshire County Association. Yorkshire BKA is a member of the British Beekeeper's Association the headquarters of which are at the National Agriculture Centre in Stoneleigh.

Being a member of a beekeeping association is not only a way to access expertise and meet other beekeepers but you are also covered for public liability insurance for your beekeeping activities.

For further information contact:-
Colin Hattee YDBKA Secretary
Tel:01430 860972
Email:-hattee@holmeapiary@fsnet.co.uk

YDBKA Website:-ydbka.org.uk

July 2004

COMBINGS.

THE MAGAZINE OF THE YORK AND DISTRICT BEEKEEPERS ASSOCIATION.

Number 10. JUNE 2004.

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York BKA web site address is www. ydbka. org. uk

Magazine Editor. John Fuller. "Summerfield", High Street, Barmby on the Marsh, Goole. DN14 7HU. 'phone 01 757 638 388.

I wish to open by congratulating our Chairman David Aston on being appointed Chairman of the National Diploma in Beekeeping Board on the retirement of Geoff Hopkinson.

There was a short article in the February 04 edition of BBKA News where the BBKA had been approached by the National Trust. They want to sell more home produced goods in their shops and ask if the BBKA would set up a joint scheme with them to identify local beekeepers that produce quality honey, and would be prepared to supply local National Trust shops.

A similar article appears in the National Trust's spring magazine, although honey is not specifically mentioned, they are looking for more home produced specialities.

This could be a good opportunity for a few York members to sell honey at the prestigious outlets that the National Trust operates. They have a shop in Goodramgate and every one of their premises has a shop that you are forced pass through before you leave.

On the evening of Sunday 22nd February snow fell and laid overnight. On Monday in the early after noon I saw a bumble bee working the last of a winter flowering honey suckle with snow still on the ground. If you were out of the cold northerly wind it was a lovely warm sunny day. I walked down to the end of my garden to see what my bees were doing and found only the odd ones flying. The warmth on the ground must have brought her out of hibernation; sadly I'm sure she must perish in the cold.

At the Committee meeting held on the evening of Wednesday 3rd March it was decided that, due to lack of support, your Association will not run a bus trip to the BBKA Spring Convention at Stoneleigh. It was also decided that the Association should not subsidise the trip.

At the regular monthly meeting held at Murton on Wednesday 21st April a change to our Constitution was passed. You had all received a letter proposing the amendment to the Constitution, where by the period of grace for paying your annual subscription be reduced from six months to three months. Chairman David Aston and Treasurer William Johnson addressed the meeting out lining the reasons for the change before being put to a vote. The proposition was passed with out any dissention.

Treasurer William Johnson also told the meeting of an award that the Association had been granted by the National Lottery that he had been pursuing for some time. There is a copy of his announcement else where in this edition of "Combings"

This years "Introduction to Beekeeping" course got off to a good start with thirteen attending the first session given by Margaret Langstaff . Being the first lesson I went along to give a hand. Jenny Smith was also present to lend a hand. This year's course is organised by Sue Hesp. The evening went off without a hitch. I got home in time to catch a glimpse of the lunar eclipse as high cloud started obscuring it.

I noticed in a short article in the February edition of Beecraft written by Gill Smith from Thorne's (Beehives) stating that under the new honey labeling regulations we must have a "best before" date on the jar.

I read through the new regulations and found only vague references to "best before", so I contacted Alan Johnson who wrote the article in December 2003 "Combings". He in turn wrote to York Trading Standards for clarification.

Their reply signed by Mrs Penny Coupland is given below and is un ambiguous.

Dear Mr Johnston, 10 February 2004

The Honey (England) Regulations 2003 Best Before Dates

Thank you for your letter of 9 February 2004 enquiring whether jars of honey are required to be labelled with "Best Before" or "Sell By" dates.

Jars of honey are now required to be labelled with a "Best Before" date. (The term "sell by" is no longer a recognised term in food labelling legislation). This requirement was brought about by the introduction of the new Regulations you mention in your letter, The Honey (England) Regulations 2003. I am unable to provide you with a copy of the Regulations but you can view a copy at the HMSO website www.hmso.gov.uk or obtain a copy from any HMSO bookshop.

The new Regulations, which came into force on 25 September 2003, revoke Regulation 4(2) (c) of the Food Labelling Regulations 1996 which previously made honey exempt from the Food Labelling Regulations. This results in the requirement to now label the honey with a Best Before date. Unfortunately there are no set time limits for how long a Best Before date should be applied to any products, including honey – it is matter for a food manufacturer or packer to determine themselves e.g. by the use of shelf life testing. If The York and District Beekeepers are members of a larger, nationwide organisation, they may be able to provide you with guidance on this matter. End of letter.

This poses the next question "What period do we use for our best before"? The BBKA in its Newsletter for February 2004 does not shed any light on the subject and states "the best before date can be anything we choose it to be as long as the honey is in a fit state at the end of this period". Thorne's in their new catalogue says two to five years.

Editor's note. It is my opinion that honey should be given a shelf life of no more than two years. What are your thoughts on the matter?

An anomaly with these new regulations is the HMF content of honey; this has been reduced from 80 mg/kg to 40 mg/kg EXCEPT honey from tropical climates. No definition is given regarding tropical climates, but I would think that southern Spain and Greece would fall into this category. Is this one law for us and one law for them?

Alf Race's "History of York + DBKA" Part 3.

These were very lean times and I remember meetings at the Bay Horse hotel in Gillygate and later at St William's College when the attendance at the meetings as low as five or six including Messrs Leafe, Cass. Graham, Boatfield and myself when apologies had to be made to the lecturer and when perhaps the first three mentioned attenders knew more about beekeeping than the lecturer.

It was in the late 1940's that our membership declined rapidly and in 1952 it was down to 27 with a cash balance of £9. With an annual subscription of three shillings and six pence and a capitation fee paid to the Yorkshire Beekeepers Association of two shillings, it will be seen that the balance left for the York Association of one shilling and six pence (equivalent to seven and a half pence in present day money) did not give much scope for adventurous programmes.

All our lecturers were obtained free through the Education Authorities and films where these could be hired free of charge. We also got a cheap rate for postage on circular's in those days (less than half a penny in present day money) but with only 27 members our annual income after paying capitation fee was about £2 and things were really tight. I remember quite a lot of time being spent on wondering what we got from the County Association for our two shillings per member capitation fee and whether we should cease being members of the Yorkshire Beekeepers Association. This continued to be a very sore point right through the 1950's. We did however arrange some interesting demonstrations and lectures but it was essential that no cost be incurred.

All typing and duplicate work was done free to the Association but I'm afraid at British Railways cost. Such people as Mr G.Potter of Wilberfoss and Mr C.Etherington also of Wilberfoss, Mr J.L.Graham of Bishopthorpe, Miss A.Thornton of Bide-a-Wee cafe and Mr W.Hamilton and Mr W. Slinger of Alne being persons I remember who were very generous in their hospitality at demonstrations and lectures. Mr W.Hamilton, writer of the well known book on beekeeping, took his aunts bees to the moors as a boy, loading four hives on the back of a donkey. On one occasion one became loose and the four hives dropped off the donkeys back. The bees stung the donkey which bolted and caused Hamilton quite a lot of trouble. I attended a demonstration by Hamilton at Lady Starmer's apiary at Washington in 1939 when he dealt with a hive about to swarm. Later it was found his efforts had not been successful and I remember Lady Starmer saying "Never let that man come near my bees again". All the same he was a very successful beekeeper, held in high esteem. He consulted Mr Cass of Bishopthorpe in writing his chapter on "Queen Rearing".

At this time New Earswick members were being invited to our functions which eventually led to our taking over that Association in 1959.

John Whittaker who is Secretary of Barkston Ash BKA gives his thoughts on how much space a colony really needs. This article was circulated to members of the Barkston Ash Beekeepers last summer and was printed in the Yorkshire BKA Newsletter. It is worthy of printing again as it fly's in the face of current thinking and gives us food for thought.

A QUESTION OF SIZE.

After keeping bees for several years I have started to question the assumptions upon which my beekeeping methods are based. The first of these is the relative merits of using different sizes of brood. As all my equipment conforms to British National standards I have the choice of

a) using a single National brood box
b) using a national brood box plus a super (brood and a half)
c) using a 14 x 12 brood box

When I started beekeeping I was taught that a thriving colony would require a brood and a half. In addition this arrangement gave a quick method of checking for queen cells as these would be built hanging below the upper box, and so could be spotted by simply lifting the upper box at an angle.

Unfortunately my bees have never filled a brood and a half with brood and would appear to not to have been concentrating when taught about where queen cells should be built. And finding a queen, whether marked or not, is at least twice as time consuming as in a single brood box.

For years I have been willing to accept that my unsatisfactory experience with this arrangement was due to my own shortcomings as a beekeeper, but now, while retaining the above explanation as an option I am now willing to question the method.

For a while I have considered introducing deep brood boxes. It is the cost that I find a discouragement. Frames, boxes and foundation are at least 50% more expensive than for normal national brood boxes. Maintaining both deep brood and normal brood boxes adds to the complications of managing my hives.

So now for some mathematics. The different brood box systems are primarily designed to provide the appropriate number of cells in the brood area. So how many cells are there? I calculated that the area of a worker cell is 23.9 sq mm.

The formula for the area of a hexagon is

Area = 6 x 0.5 x 0.866 x d x d where d is the length of the side.

By measuring over twenty cells of foundation I was able to determine, with a little trigonometry, that the length of a side of a cell is 3.032mm. No doubt there is an accepted value for this tucked away in a text book somewhere.

	Width mm	Depth mm	Area sq mm	No. of cells per surface	No. of cells on 22 surfaces	Percentage of Cells available used for 40,000cells
Super	335	113	37855	1583	34826	
Brood	335	190	63650	2663	58586	68%
Brood and a half.			101505	4246	93412	43%
14×12 brood	335	280	93800	3925	86350	46%

The books I have available to me suggest that in a good colony of honey bees, the number of brood cells peaks at about 40,000 in June. I'm sure there will be colonies that perform better than this, but I hope this would be accepted as the basis of discussion. A peak of 40,000 brood would result in a colony of between 70,000 and 80,000 bees.

From the table above it can be seen that even with just a single National brood box less than 70% of the available cells are required for brood. Certainly some of the available cells must be used for pollen, and some will empty, being cleaned for the next batch of eggs.

But we do not need, in mid season, combs of granulated honey, damaged comb and two wasted surfaces of frames positioned right up against the sides of the box.

So I am led to the conclusion that hive management would be simpler and cheaper if a single brood box were used, and there would be no loss of production provided 2/3 of the available cells were used for brood. So is this possible?

After a lecture given by Ian Molyneux at the Bishop Burton conference I was encouraged to use the Shook Swarm Technique. The technique is well documented. I decided that in my situation the best time to do it was immediately after the rape flow ceased and the rape honey had been removed. This technique was originally developed as a method of disease control (EFB) in which case all the old frames need to be destroyed. Where the technique is used as a part of yearly colony management, such ruthlessness is not necessary.

Supers can be given to other colonies, drone brood and damaged frames go straight in the solar extractor, and worker brood frames given to weaker colonies. If there are queen cells present these can be used to make up a nucleus.

So the result is equivalent to a very strong swarm at the beginning of May. In a normal swarm there are just flying bees; in a shook swarm there are also nurse bees. All instincts to swarm are laid aside. In my limited experience this technique results in an exceptionally vital colony. The queens are soon laying a tight brood pattern across the full brood chamber.

The honey crop has exceeded, by far, what I have achieved from a single colony in the past. Maybe I was lucky and I know this year has been exceptional.

The technique has a number of other benefits:

a) many of the viruses and pests are removed with the old frames, so the colony is healthy

b) the relentless increase in the number of varroa mites is halted by the break in production of brood.

c) The brood cells are full size, resulting in stronger new bees.

d) The new foundation encourages the queen to lay in a tight pattern across the full frame

e) The procedure gives an ideal opportunity to change your hive set up, or introduce a new queen

Of course there is a cost:

11 sheets of BS deep foundation £7.50 plus 4 Kg of sugar £2.40 = £9.90 = 5 jars of honey - not too bad

For more definitive information on the shook swarm method you can contact Ian Molyneux at his e-mail address i.molyneux@csl.gov.uk.

Ian Molyneux also demonstrated it the Yorkshire BKA Conference and Colin Hattee has supplied these notes on the method.

Shook Swarm Method of Swarm Control.

Shook Swarm method of Swarm Control as demonstrated by Ian Molyneux at the Yorkshire Beekeepers Conference on Saturday 13th March 2004
Ian explained this did not guarantee the colony would not swarm but could help prevent it
It is also a very useful tool to:-
Transfer a colony of bees from one type of frame to another

1. Effective in removing E F B
2. Effective in reducing other brood diseases (e.g. chalk brood, sac brood etc)
3. Enables replacement of old comb

Process.
A sterilised hive with new frames and foundation is placed at the side of the colony to be manipulate
The Queen is then located, and placed in a cage in the new hive and a Queen Excluder is placed above the floor – this prevents her from absconding. It is possible that she may do so after the bees have released her from her cage, hours or possibly a couple of days later.
The sterilised hive, with new frame and foundation, is then placed on the site of the original hive and the bees shaken from the old comb to the new hive.
The existing brood, if infected, should be placed in black plastic bags and destroyed, or, if in good health, can be used to support and improve a weaker colony

The Queen should be released after 24 hours if she has not already escaped from the cage
The colony needs to be fed with syrup and left alone for several days, during which time the new foundation will be drawn out and the Queen should be laying prolifically
Recommendation
This should be undertaken every 4 – 5 years with all your colonies.
Ian also advocates the use of ventilated floors and sealed cover boards
There is a lot to discuss here – why not try it yourself and see if the colonyis better after this manipulation than your other colonies
I hope the Association can arrange for a demonstration to take placethis summer for the benefit of th Membership

YORK & DISTRICT BEEEEPERS ASSOCIATION

Awards for All Grant - April 2004

As you will know we have been awarded a grant of £3000 which we will be able to spend after the 21st April. The areas in which we wish to spend the money were required to be specific and we are expected within reason to stay within these limits. Any variation of any significance has to be advised to the awards committee for their approval. We may spend within the specified amounts only for the benefit of the Association and its members and not for any third party.

The list is as follows;

1. £300 Information packs for new members
2. £100 Duplicating and printing of information
3. £50 Membership details
4. £750 Protective clothing
5. £150 Posters and diagrams
6. £500 Bee equipment and hives for demonstration
7. £250 Garden shed-storage garden equipment
8. £100 Warning signs
9. £ 200 Grass cutter
10. £100 Uncapping knife
11. £500 Stainless steel Honey extractor

This list will be circulated to members authorised to procure the items and all invoices and receipts must be forwarded to the Treasurer for payment or reimbursement as appropriate.

William Johnson Honorary Treasurer

WHO'S WHO

Frank Arnold - a long standing member of our Association tells us of how he got started keeping bees and some of the people he has met over the years . Frank currently runs 20+ colonies.

My Dad bought two hives of bees just after the war. Father had quite a lot of apple trees and soft fruit bushes so he needed bees for pollination.

During the war, beekeepers were allowed 10lbs of sugar per hive. This was Winston Churchill's idea and what a good one it was. Food rationing didn't finish until 1954. Father hadn't all the beekeeping equipment, so he left the honey for the bees and we had the sugar.

1954 was my first trip to the North Yorkshire Moors. I went to help my good friend and beekeeper Peter Popplewell to take bees to the heather. Peter's lorry an ex WD Ford 2 tonner, bought for £20. 0s 0d from Byrom Park. I have gone to the moors each year ever since apart from the foot and mouth year.

In 1958 after three years in the army with the Royal Engineers, mainly in Germany, I took over Fathers two hives. I was doing some building work at Wilberfoss next to Cecil Etherington and he got me to do some work for him. Cecil a good friend and beekeeper ,got me to join York and District Beekeepers – this would be in 1960 or 1961. Meetings then where held at St Williams College with eight to ten members attending meetings.

Norman Boatfield was Chairman. Alf Race was Secretary and Treasurer, (who only missed three meetings in 25 years). Alf was first at meetings and last to leave – he was a wonderful person. Bill Lockwood, Arthur Minney, Bernard Leafe, Mr Cass, Mr Graham (whose wife died through a bee sting) John Rowbottom and Cecil Etherington. All were good attender's at meetings.

Mr Minney – a good friend and beekeeper had a Morris 1000 Traveller which took four hives of bees, he had this vehicle for 25 years and did 298,000 miles on one engine. He worked for Rowntree's as an engineer and set up factories in Canada, Ireland and up North.

York + DBKA moved to a room in Purey Cust Chambers. This was achieved through John Acheson who worked there. Membership grew and we had to move to larger premises. We then had a chance to go to Askham Bryan –where we stayed for quite a number of years and had many good meetings there. Barry Potter got us there. Our last move took us to Murton Park.

This has been our H.Q for many years. We have our bee hut and hives of bees, an observation hive and extracting equipment for our Members and a large room for our winter monthly meetings. Summer beekeeping classes are also held there and our Spring Beekeeping Auction, which I have had the pleasure and privilege of being the Auctioneer these last three years.

Membership peaked at about 100 before varroa struck, it was a sad day when this happened, but with bees coming from down south to the heather and bees going from north to south to apple orchards it was only a matter of time for us to get it. Treatment now is just over half the price it was when varroa first arrived, and with treating each year we are better beekeepers.

This last ten years we have had some wonderful summers and last year 2003 I would rate it as the sunniest and the best in living memory.

With oil seed rape, borage and heather there's a lot of travelling, taking the bees to these crops. Nobody needs to fear oil seed rape providing you take your honey off just before it finishes flowering.

Bill Bell has done a very good job with spring training classes and it's good to see new members each year. John Acheson has also worked hard over the years. Others who have given many hours to the Association are Ken Barran, Rob Coleman, Dick Gardner, Terry Nundy, David Aston, Tom Robinson, John Rowbottom and Bob Hirst.

Here are some of Frank's to make beekeeping easier.

I use 9" × 3" alloy sliding vents situated in the brood box, these prevent mice getting into the hive and also make it easy to fasten the hive up.

Put your queen excluder on top of your crown board in the autumn and take it off at spring.

Every school should have an observation hive.

Swarms – be prepared. You need a deep lift with combs, place this on top of a crown board on one of your hives and place another crown board on top and use the lid from the hive, this saves you a floor and a roof. Either have hole in the deep brood box or pack up with ⅜" piece of wood.

Bees collect 3lbs of nectar and have to drive off 2lbs of moisture to finish with 1lb of honey.

Madam Debbie continues with your horror scope:-

GEMINI. 22 MAY - 22 JUNE.
You are a chatterbox!
Communicative, witty and sociable. Intellectual and quick minded. With a youthful outlook and a lively personality you demand constant change and variety in your life.
At worst you are a terrible flirt and an awful gossip
The sunny yellow colour of French Sunflower honey suits your bright disposition. A strong flavoured, set honey it will get your day off to a cheerful start.

CANCER. 23 JUNE - 23 JULY.
You love your hone and family!
A caring, kind and sympathetic person and sometimes a little shy. Ruled by your emotions you have a tendency to worry. You are however tenacious and shrewd in business.
Moodiness and hypersensitivity are your worst faults.
The sweet mild flavour of acacia honey matches your delicate emotions. However a spoonful of this will soon lay your worries to rest

LEO. 24 JULY - 23 AUGUST
Love to party and have lots of fun!
Warm hearted, magnanimous and generous. You're a born organiser who is creative and enthusiastic. You like a sense of drama in your life and like to look good.
At your worst you are bossy and like showing off
Rich & dark, wild thyme honey is dramatically delicious. Of medium consistency and amber in the colour the strong herb flower reflects your warm and generous character.

VIRGO. 24 AUGUST - 23 SEPTEMBER
You analyse everything!
You love facts and know all sorts of rubbish about everything. Practical, reliable and organised - a true perfectionist. You can be quite modest and shy
At your worst you can be over critical, fussy and a worrier. Don't be too hard on yourself
The 'not quite clear' heather honey is how people sometimes see you. However as with this golden amber rich, chewy honey, any effort proves worthwhile.

WHAT YOU ALL WANTED TO KNOW ! The collective noun for a group of magpies is a tiding and a group of swans is a herd.

PAST EVENTS.

Wednesday 18th February.

This was our regular monthly meeting at Murton. There was a good turn out to hear Selwyn Wilkins from the Central Science Laboratory at Sand Hutton speak on "Integrated Pest Management".

It is 10 years since varroa was first found in the U.K and predictably it is now becoming resistant to pyrethroids. We now have to look to other methods to combat the pest with chemical treatments being the last resort. Every thing Selwyn mentioned revolved round knowing how many mites are present in the colony. Open mesh floors seemed to be the best way of counting how many mites have fallen over a given period.

Open mesh floors in use allow any live mites that fall off bees to drop to the ground and die. With a solid floor they will be able to attach them selves to a passing bee and continue as before.

The easiest way to keep a check on your varroa population is to insert a shallow frame at one end of your brood box. The bees will draw drone comb from the bottom bar which the queen soon lays eggs. Varroa mites enter the cells just before the cells are sealed. If you leave the comb another week until the drone larvae reach the purple eye stage, it will then be easier to uncap. Any varroa mites will then be readily visible on the white bodies of the larvae.

Another method recommended by Selwyn to rid the colony of excess mites is to dust them with un perfumed talcum powder or icing sugar. The theory is the power makes the mites loose their foot hold.

Pyrethroid resistant mites have not been found in our area yet, so Apistan / Bayvarol can still be used effectively.

Editors note. I use a shallow frame in a deep box to trap drones. It works well and does not require any extra equipment or extra visits to your bees.

The cost of a National Varroa floor from Thorne's is £40 (2003 prices) For new comers to the craft it would be a good idea to purchase these as you go along.

Tuesday 24th February.

Bill Bell organised a trip round Sam Smith's Brewery at Tadcaster. Twenty three of us met in the Angel and White Horse public house which is part of the brewery complex. We were split into two parties to be shown how they still brew beer in the old traditional way, the five grey Shire horses used for delivering beer round Tadcaster and for show, the Coopers shop where an apprenticeship is four years, and, very much a mans thing – a refrigeration compressor built in 1920 and acquired by Sam Smith's when Hull Brewery closed down. It was a massive piece of machinery driven by a large D.C. motor, belt and a flywheel that must have been 10 feet in diameter.

Finally we sampled their produce in the bar. When I left it was snowing hard with buildings and cars covered in snow. It was an evening with a difference – nice not to have a bee related topic.

Wednesday 3rd March.

There was a Committee meeting held at the Murton Farming Museum. Where it was decided that because of lack of support we would not run the bus trip to Stoneleigh. Russell Carey reported that our web site has had 567 hits. Sue Hesp reported that she had sent out 24 letters to people who had shown an interest in keeping bees, inviting them to this years "Introduction to Beekeeping" classes.

Other topics discussed were, the make up of the panel for April's Open Forum, the purchase of coloured vest to identify Stewards at our auction in May. Rob Coleman and Bob Hirst were charged with putting together the summer programme. The week end manning of the pavilion at Murton.

Wednesday 17th March. (St. Patricks Day).

We had a good turnout this evening for our "Open Forum" meeting. The panel was made up of John Acheson, Ken Barran, Bill Bell, and Tom Robinson with Rob Coleman in the chair.

Many topics were touched upon including:- when is the earliest that queens are ready – how to requeen a bad tempered colony - home reared queens versus bought in queens – when removing honey, bees can detect the smell of honey if ventilated floors are used, thus setting off robbing – through ventilation as opposed to no ventilation – the reluctance of bees to use stored heather honey during the winter.

Wednesday 21st April.

Our regular monthly meeting saw an above average attendance to listen to Vera Rider talk to us on "Cosmetics and Bees". The first thing Vera stressed when making polish of any sort was to use only genuine turpentine. To use white spirit (usually as an economy measure) gave you a product with an awful smell.

Here is her formula for furniture cream;-

1 pint genuine turpentine,
5 ounces beeswax,
½ pint boiling water,
1 ounce pure soap powder,

Method :- Dissolve the bees wax in the turpentine in a water bath . Mix the soap powder with the water and heat until it is the same temperature as the wax / turpentine mixture, then blend the two together. Allow to cool a little before pouring into containers.

Vera produces a wide range of cosmetics and stresses all the time to use only the best quality ingredients including your cleanest wax.

She produces moulded candles which she sells by weight – a little honey bear for £2 and a small owl for £3. Rolled foundation candles made from a single sheet of shallow foundation she sells for £1 and two sheets rolled together for £2.40. The appeal of rolled candles can be improved by wrapping them in cellophane with the wick end tied with a bow made from florist's ribbon.

Tuesday 4th May.

Margaret Langstaff gave the introductory talk at this years "Introduction to Beekeeping" course at Murton, followed by making frames and lighting a smoker.

Heather Aston of Hutton Wandesby, Richard Blades of South Duffield, Heather Burkit of Osbaldwick. Ray Childs of Wilberfoss, Polly Kirk of Barton on Humber, Charles Lamb of Heslington, Rachel McBride of Eskrick, Danielle Palmour of York, Chris Robinson of Barton le Willows, Chris Simpson of Thirsk, Norman Thompson of Seaton Ross, and Kate Wallace of Bishopthorpe attended this first lesson. Edmund Downs and Geoff Norton attended the second lesson.

Saturday 15th May.

York + DBKA's 5th annual auction was held at Murton on a fine warm day. Lots for sale were down on last year, but non the less, there was a good selection. Four honey extractors were for sale, two of which where small hand powered table top models, both in good condition. One fetched £20 and the other £50. Another interesting extractor was an early model Thorne's Mk II, this was knocked down for £42. Also of interest was a Mountain Grey heather press in first class condition went for £32. Three vertical sided WBC type hives with all the innards in good condition apart from some easily rectifiable rot on the legs only fetched £5 each. Hives such as these usually command a price ten times this as a garden feature.

The rest of the lots where the usual floors, brood boxes, frames, and queen excluders.

FOR SALE.

1lb squat honey jars with screw lids. £28.00 per gross. Lids are available at £6.60 per gross. Your order can be brought to meetings or collected by prior arrangement. Contact Colin Hattee on 01 430 860 972.

FORTHCOMMING EVENTS.

Saturday 5th June.

Yorkshire BKA Field Day. Hosted this year by Richmond BKA will be held at Foxglove Covert Local Nature Reserve. This is former Ministry of Defence land and is situated behind Cambrai Barracks in Catterick Garrison. Apart from beekeeping activities, there will be scheduled guided walks in the Reserve. Pond dipping and moth trapping will also feature. There will be a book stall and two equipment suppliers present.

Admission is by free ticket obtainable from Donna Parker, Dale Farm House, Worton, LEYBURN. DL8 3ET. Telephone 01 969 650 550.

Wednesday 9th June. 19.00.

The second of this years apiary visits will be at the home apiary of Colin and Debbie Hattee, "Greenside Lodge", Little End, Holme upon Spalding Moor. Take the A614 Howden road out of the village, turn right at the Cross Keys pub. Their house is at the end of the lane.

Wednesday 23rd June. 19.00.

Visit one of Margaret Langstaff's apiaries. Site not yet known. Contact Margaret on 01 759 380 546 nearer the time.

Saturday 3rd July. 17.30 onwards.

Our Annual Summer Barbeque will be held at the home of Colin and Debbie Hattee.

Bring your own meat, sweets and drink. All salads, disposable plates, cutlery and glasses will be provided by the Association.

In case of inclement weather, contact Colin and Debbie on 01 430 860 972. Please confirm your attendance no later than Friday 25th June,

Wednesday 7th July. 19.00.

Rob Coleman's apiary visit. "Plainville Farm", Plainville Lane, Wiggington. From the North York ring road, two miles up the B 1363 sign posted to Helmsley. First left then first right signed "No through Road / Jacobean pub". White farm house just past the pub on the left. Rob's 'phone number is 01 904 762 532.

Saturday 10th July.

Thorne's Open Day at their show room at Wragby, 09.00 start with workshops starting at 11.00.

Wednesday 21st July. 19.00.

Visit Jenny Smith's apiary. Meet at the Nags Head public house in Askham Bryan. Jenny's 'phone number is 01 904 706 941.

Wednesday 21st July.

Driffield Show at the Driffield Show Ground.

Wednesday 4th August. 19.00.

The last of this years apiary visits will be at William and Anne Johnson's apiary at their home – "Orchard House", Marston Lane,Moor, Monkton. Take the A59 Harrogate road out of York. Turn left at the cross roads and then right immediately before the level crossings. Their telephone number is 01 904 738 541.

Wednesday 4th August.

Yorkshire BKA Honey Show in association with the Egton Horse and Agricultural Society. Exhibits can be left prior to the show at Mr Jefferson's Apiary, 'phone 01 947 840 723, or with Mr Ivor Flatman, 'phone 01 924 257 089. Judging to start at 09.30 prompt.

Thursday 5th, Friday 6th and Saturday 7th August.

Pickering Traction Engine Rally. For more information ring Ray Hurdus on 01 929 257 196. This will be a good day out for steam fans.

Saturday 7th and Sunday 8th August.

Leeds BKA Honey Show will be held in conjunction with the Leeds Flower Show at Leeds Boys Grammar School, Harrogate Road, Leeds. All the usual classes plus photographs and one class voted by members of the public. More information from Terry Beddows on 0113 268 8231. Members of other districts are always welcome to visit Leeds BKA apiary at Temple Newsam House.

Wednesday 15th September. 19.30. Murton.

Lester Quayle of Beverley BKA will tell us about "Beekeeping my Way".

Wednesday 20th October. Murton.

York Beekeepers Annual General Meeting and Honey Show. Exhibits for the Honey show will be accepted from 19.00.

Thursday 21st, Friday 22nd and Saturday 23rd October.

The National Honey Show is being held at it's new venue – the RAF Museum , Hendon, which is close to junction 2 of the M1 motor way. For us coming from the north, probably a little easier to get to than previous venues in central London.

For more information, contact: - Reverend Francis Capener, 1 Baldric Road, Folkestone, CT20 2NR. Telephone 01 303 254 579 or e.mail :- nathon @ zbee.com

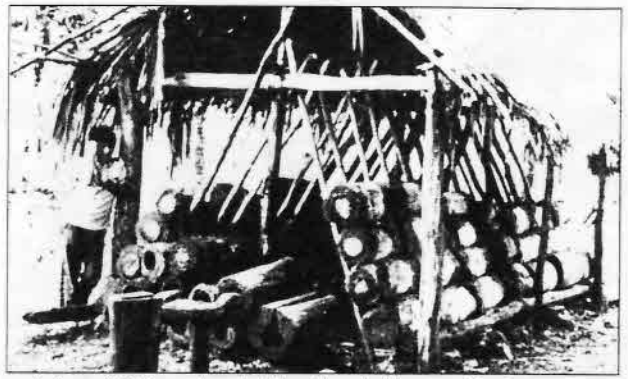
One of the major obstacles to exhibiting at the National is getting your exhibits to and from the show. This year, Thorne's will take your exhibit to the show from their head office in Wragby and hand it over to a steward for staging. After the show they will bring it back to Wragby. This is free of charge, all you have to do is get it to Wragby by Monday 15th October and pick it up afterwards.

I think this is a generous offer by Thorne's, for it could entail a lot of work for them.

APICULTURE AND SOCIAL INSECT LABORATORY
UNIVERSITY OF SHEFFIELD

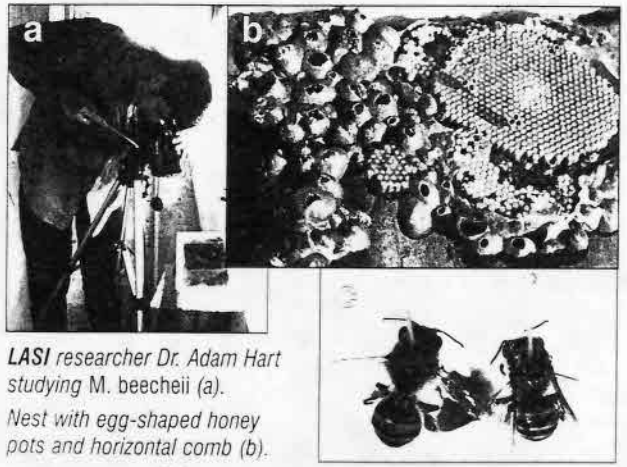
WORK ORGANIZATION: Honey bee foragers collect nectar, which is transferred to receiver bees to store. For efficient nectar collection the work capacities of foragers and receivers must balance. If not, time is wasted waiting, similar to a supermarket with few check outs open. **LASI** is investigating how a colony maintains this balance.

RESEARCH: Stingless Bees, Ants, Wasps



Apiary of Melipona beecheii *log hives in Yucatan, Mexico, owned by Mayan Indian beekeepers. Each has c. 1000-2000 bees.*

LASI studies similar questions in other species: worker policing in wasps and dinosaur ants; work organization and hygienic behaviour in leafcutter ants; foraging in leafcutter ants, wood ants and Pharaoh's ants. **LASI** also studies stingless bees, which are tropical and live in large colonies. They have many similarities to honey bees, but also interesting differences. The research is carried out in Mexico (University of Yucatan) and Brazil (University of São Paulo).



***LASI** researcher Dr. Adam Hart studying* M. beecheii *(a).*

Nest with egg-shaped honey pots and horizontal comb (b).

African honey bee (left) and M. beecheii *workers (c).*

Finding LASI Research Articles

Many **LASI** research articles can be downloaded from ***www.shef.ac.uk/uni/projects/taplab/flwrpub.html***

Talks by LASI Researchers

LASI researchers frequently give talks at beekeeper meetings. For further information contact us.

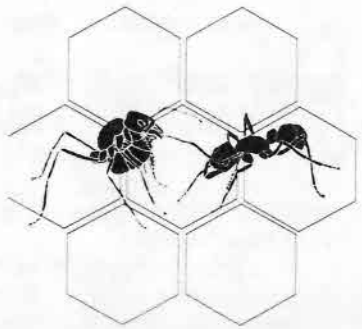
How Beekeepers & Groups Can Help

For many years UK beekeepers have promoted the idea of a new bee research institute. **LASI** is such an institute. A university-based lab can complement existing research groups such as Rothamsted and the National Bee Unit, as a university is an ideal location for getting students – the next generation of bee biologists – started in bee research, and for investigating a broad range of basic and applied questions. Beekeepers and groups can help in two main ways: first, by providing encouragement to the university and organizations that fund honey bee research to support **LASI**; second, by direct support. Small amounts can help. For example, £130 pays one week of a summer bursary to allow an undergraduate to do honey bee research. If you can help or would like to make suggestions please contact us.

Contacts & Further Information

Visit our website: ***www.shef.ac.uk/uni/projects/taplab*** or contact:

Prof. Francis Ratnieks,
Department of Animal & Plant Sciences,
University of Sheffield, S10 2TN, UK
tel: 0114 2220070 • fax: 2220002
e-mail: *F.Ratnieks@Sheffield.ac.uk*

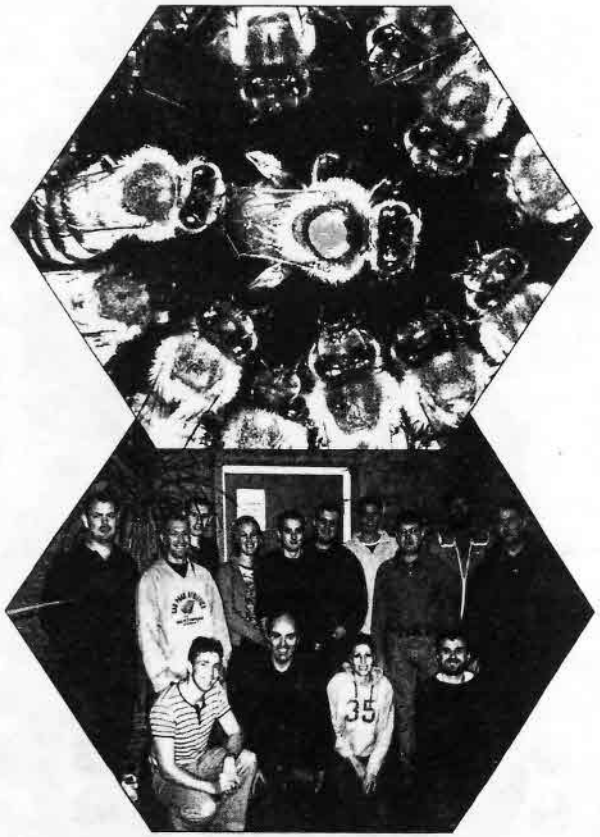


HONEY BEE RESEARCH

LASI: Laboratory of Apiculture & Social Insects

University of Sheffield

Queen honey bee laying an egg while surrounded by a court of workers. She can choose the sex of the eggs she lays and never makes a mistake!

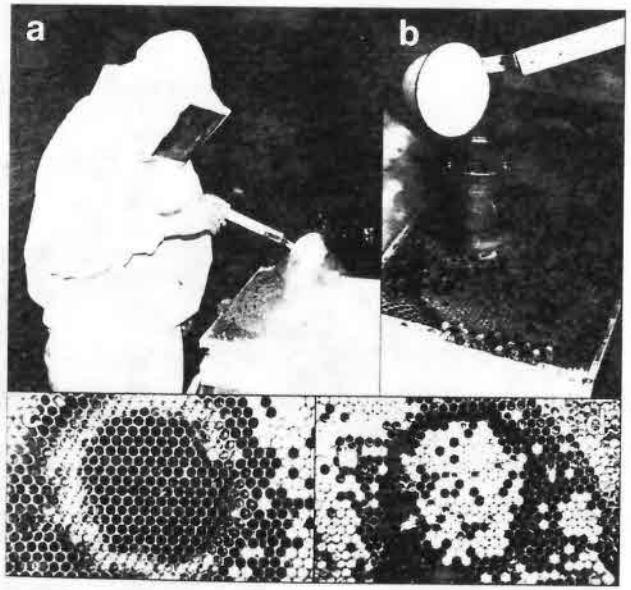


***LASI** researchers standing outside the lab building in Sheffield: undergraduate students, PhD students, post-doctoral researchers, and Professor Francis Ratnieks.*

LASI: Background Information

LASI was founded in 1996 by Dr. Francis Ratnieks who has MS and PhD degrees in honey bee biology from Cornell University, a centre for honey bee research. He is an experienced beekeeper and queen-rearer, has studied bees in five continents and is author of c.170 scientific articles on bees and social insects. He is Professor of Apiculture (the only one in the UK) in the Department of Animal and Plant Sciences, University of Sheffield. Currently (autumn 2002), there are five other scientists with PhDs, four PhD students, plus undergraduates and visitors, making **LASI** the largest UK centre for bee research. **LASI** is equipped with apiaries, beehives, observation hives, microscopes, video, queen insemination apparatus, tropical ant room, computers, and workshop. **LASI** also works with the Sheffield Molecular Genetics Facility (SMGF), UK beekeepers, and scientists in 15 countries. Research investigates bee biology, apiculture, and social insects and is largely funded by the Natural Environment Research Council (NERC, the EU and BIBBA (Bee Improvement and Bee Breeders Association). **LASI**'s mission is to be an international centre of research excellence, to train the next generation of bee scientists, and to be a resource for UK beekeepers.

RESEARCH: Apiculture & Beekeeping



***LASI** PhD student Luis Medina screens a beehive for hygienic behaviour by killing a patch of the capped brood with liquid nitrogen (a, b). Hygienic hives remove freeze-killed brood within two days (c) whereas non-hygienic hives do not (d).*

DISEASES: Hygienic bees uncap and remove dying brood from cells. **LASI** is screening British black bees for hygienic behaviour to use in queen rearing. **LASI** is also using mathematical techniques to model disease transmission and improved bee-breeding methods.

IMPROVED QUEEN-REARING: **LASI** is investigating whether artificial queen pheromone, in the form of commercial Bee Boost strips, can aid mating nuc establishment. Results indicate treated nucs abscond less on set-up.

Queen-rearing apiary in the Derbyshire Peak District

OVERWINTERING: **LASI** research has shown that a 5-frame medium-depth Langstroth hive is suitable for both queen rearing and overwintering. It is small enough for a queen rearing nuc but can overwinter.

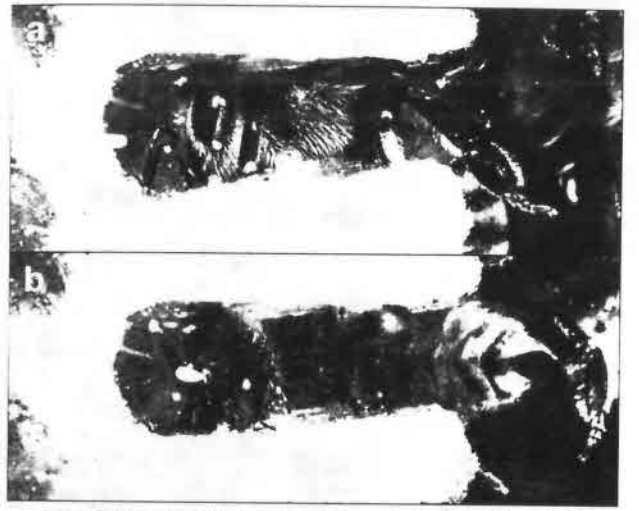
MATING ISOLATION: With the SMGF and the University of Copenhagen, **LASI** uses genetic methods (DNA micro-satellites) to quantify queen-mating isolation in several Peak District valleys for potential use in bee breeding.

CONSERVATION: **LASI** is carrying out practical conservation measures on the British black bee, *Apis mellifera mellifera* using DNA techniques to quantify mating isolation, gene flow, and genetic characteristics.

*Research on apiculture is funded by BIBBA and through a grant from the EU to **LASI** and five other European bee honey bee labs for the research network "BABE: Beekeeping and Apis Biodiversity in Europe".*
www.biologie.uni-halle.de/zool/mol_ecol/babe/index.html.

RESEARCH: Basic Honey Bee Biology

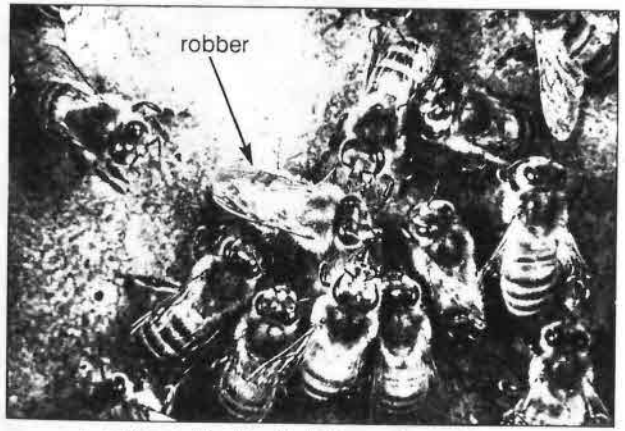
WORKER POLICING: The honey bee colony is a model of cooperation but there is also conflict. Workers have ovaries and lay unfertilized, male, eggs. However, if one worker lays an egg another normally eats it. This is known as "worker policing". **LASI** is investigating how workers can tell which eggs are queen-laid and how some workers lay eggs that escape policing. **LASI** is also investigating parasitic and "anarchistic" workers which evade policing. Such bees are a major beekeeping problem in South Africa.



Police worker checks a worker-laid egg (a) before killing it (b)

FORAGING: By keeping a colony in an observation hive, the waggle dances made by foragers can be videotaped and decoded. Foragers dance to tell recruit bees where the flowers are. Research at **LASI** is comparing the dancing, and hence the foraging, in large- and small-population colonies. Other **LASI** research has shown that workers fly a long way, up to 13km (average 6km) to heather moors from **LASI**.

NESTMATE RECOGNITION: Entrance guards normally exclude non-nestmates. Where does the odour used in recognizing nestmates come from? **LASI** research shows that it is not from flowers or the genetics of individual bees. **LASI** is also investigating "acceptance threshold" changes. During a nectar flow the number of guards decreases and those remaining are more permissive, letting in non-nestmates.



Guard bees defending their hive against a robber bee

BEE IMPORVEMENT AND BEE BREEDERS' ASSOCIATION

Local Heritage initiative
Heritage Lottery Fund
Nationwide
The Countryside Agency

OUR NATIVE HONEYBEE LIVES!

THE wildlife TRUSTS

By Dr Dorian Pritchard, Dip Gen, PhD

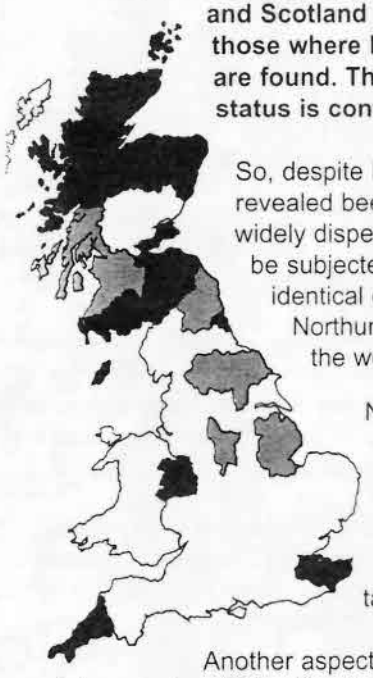


Fig 3 **Present known distribution of native honeybees in England and Scotland (excluding Wales). Regions coloured blue are those where honeybees with native morphometric characters are found. Those coloured red are where native status is confirmed by DNA analysis.**

So, despite IOWD the native bee lives on. A Scottish survey revealed bees with native morphometric characters in 8 of the 10 widely dispersed apiaries investigated. The only Scottish bees to be subjected to molecular examination have mitochondrial DNA identical only to that in a Northumbrian strain, while a second Northumbrian strain has mitochondria apparently unique in the world.

Native status is confirmed by DNA analysis of bees from North Yorkshire, Derbyshire and Lincolnshire and strongly suspected on morphometric grounds in several other counties (Fig 3). However, all these stocks are threatened by genetic contamination from imported bees, to say nothing of the devastating ravages of the parasitic mite, *Varroa destructor*.

Another aspect of the DNA studies is directed at assessment of introgression of *A.m.ligustica* (Italian) genetic material into basically *mellifera* populations and results are disturbing. Areas where native bees still predominate are nevertheless contaminated by foreign alleles and hybridisation between *mellifera* and the other races generally produces unnaturally aggressive bees.

Now that survival of native British bees is irrefutable, the time has perhaps come to establish protected areas for their conservation, before another British subspecies is lost forever. Exclusion of foreign bees from such areas would be essential for planned breeding of well adapted, gentle bees of high productivity.

This article was written by Dr Dorian Pritchard on behalf of
Northumberland *Wildlife Trust*
Garden House, St Nicholas Park, Gosforth, Newcastle upon Tyne NE3 3XT
Tel: (0191) 284 6884 www.wildlifetrust.org.uk/northumberland Charity no. 221819

Fig 1
A native British honeybee, *Apis mellifera mellifera*, on pear blossom. Note the uniformly dark abdomen with narrow bands of paler hair (narrow tomenta) characteristic of this subspecies. Photo: courtesy John Dews

Acknowledgements.
Dr Bo Vest Pedersen, Dr Annette Jensen, Dr Kellie Palmer, Morna Stoakley, John Dews, Albert Knight, Bill Tindal and Dr James Kilty.

A terrible epidemic devastated British honeybees at the beginning of the last century. Isle of Wight Disease (IOWD), as it became known, was widely reported to have spread throughout the country and such was its impact that the belief arose that our native honeybee had been exterminated. It is on record that some apiaries were never actually visited by IOWD and ancient strains of bees have survived there. The official view nevertheless, is that all British strains of *Apis mellifera mellifera*, the so-called "British black bee", are now extinct and, to his death, Brother Adam of Buckfast Abbey, the world's best-known beekeeper, insisted this was the case. However, amateur researchers such as those within BIBBA (the Bee Improvement and Bee Breeders' Association) have long believed he was mistaken and recently DNA-based research at the University of Copenhagen conclusively confirms this belief.

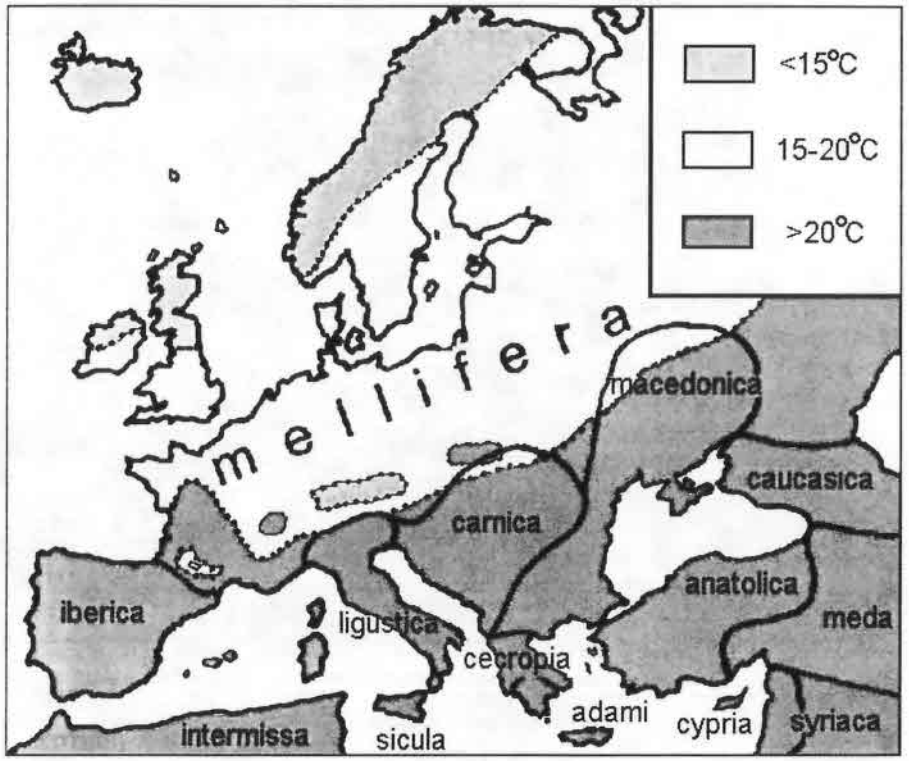


Fig 2 Natural home ranges of subspecies of *Apis mellifera* in Europe in relation to July average temperatures. The *mellifera* subspecies was originally confined to an area where average temperatures rarely exceed 20°C. All other subspecies are adapted to warmer climates.

The native bee is dark brown, almost black, large and powerful, well furnished with body hair and well adapted to survival in a cold, wet environment (Fig 1). A glance at the natural distribution of the *Apis mellifera* subspecies shows that only *A.m.m* is likely to exist unaided in Northern Britain. The July average temperature in these regions is at or below 15°C, whereas that in the home ranges of all other subspecies is 20°C or above (Fig 2).

Adaptation of *A.m.m.* to survival in Northern Britain includes extreme frugality with stores and its adoption of "winter physiology". Bees born in August fatten themselves on pollen, so have little need to consume food in winter or to leave the hive for cleansing flights. Furthermore, these "winter bees" remain " physiologically juvenile", ensuring they can still produce brood food from their head glands to feed the larvae in early spring. Such colonies enjoy an extended brood-less phase, discouraging build-up of disease. They also form a characteristic "winter cluster", like a hedgehog with venomous spines, protective even when they are torpid with cold.

The different honeybee subspecies can be distinguished by measurement of certain body features, including wing veins and the angular relations of vein junctions. We know what those measurements should be for native bees because ancient specimens are preserved in our museums and were salvaged by archaeologists from the Viking settlement of Jorvik.

One DNA-based test is an adaptation of a technique used in forensic DNA fingerprinting and involves counting the number of repeats of short sequences in so-called "microsatellite DNA". Repeat sequences of different lengths are equivalent to variant alleles and a specific assembly of such alleles is apparently unique to Scottish bees.

A second approach involves mitochondrial DNA. Mitochondria are microscopic organelles in the cytoplasm of all multicellular animals, passed on to offspring by mothers, but not fathers. Over time, the mitochondria accumulate mutations that are retained in descendants, so that analysis of their DNA provides a record of the female ancestry of a colony stretching back perhaps a million years. Family trees can be drawn that show the relationships of all honeybee queens.

British *mellifera* bees are seen to be closely related to Irish, French and Scandinavian, but are themselves unique to these islands. The honeybees of Tasmania are derived from colonies from North Yorkshire, taken there by early British settlers, and their relationship to present day Northern British bees is easily seen.

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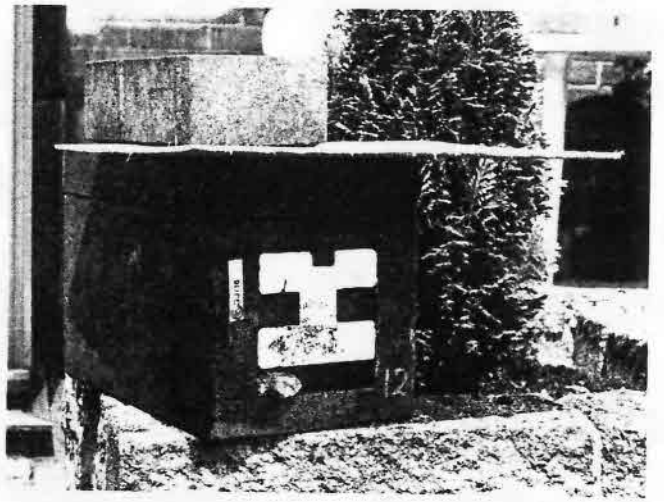
Guide to

Managing Apidea Mini-nucs



Shade, ventilation and a natural marker are important points in managing mini-nucs

A BIBBA Publication
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Compiled and edited by

Albert Knight
BIBBA Groups Secretary

Management of Apidea Mini-nucs

Small nucs such as the Apideas are difficult to manage successfully; with such small units of bees everything must be right for them to successfully produce mated queens. As the equipment gets older, more problems occur that need measures taken to overcome them. These notes are written with older equipment in mind, so some of the measures advocated may seem unnecessary to those with new mini-nucs.

Preparation of the nucs

Nucs must be thoroughly cleaned to prevent disease. Dismantling the nucs, removing old comb and washing and brushing in soapy water, then rinsing and setting out to dry will ensure they are fit for re-use. At this stage the feeders should be tested for leaks by filling with clean water. Wax moths can drill holes in them making them unsuitable for using syrup. Many beekeepers will use candy rather than syrup, but the use of syrup is an option that will not be available if the feeders leak.

In assembling the nucs, frames should be fitted with a strip of foundation. It is worthwhile drilling the side bars and fitting two horizontal wires to strengthen the comb when drawn out. So often, comb heavy with stores will break off when being handled. Another option is to fit plastic comb in the top half of the frames; gluing this in will add to the rigidity of the frames and also makes cleaning easier.

After assembly, the next steps should be to ensure security of the nucs; by this I mean ensuring bees will not be lost by the door opening inadvertently or the coverboard being

pushed up by the bees. Taping the coverboard and both the entrance door and bottom door in position will keep these securely in place. Although with new Apideas the doors are often very tight, as they become older they become very slack. The doors may be tightened by inserting 4 drawing pins on the front (outer) surface on the 'slide' areas

Taping the coverboard down should of course be done after the frames are in position and the candy put in the feeder. The frames should be placed so that they have the cut-out for the queen cell lined up with the hole in the coverboard.

The security measures are only to prevent loss of bees over the first few days; once the bees have been liberated the only precaution needed will be to make sure the door stays open as it can drop down shutting the entrance to the nuc. It should be noted that the door should be lifted only high enough to allow bees access. Lifting the door to its upper limit shuts off the ventilation grid and this could result in over-heating in warm weather.

Stocking nucs

It is important to stock the nucs with the right volume of bees; this means measuring the quantity by a scoop of the right size, or having a mark to denote the 300 ml level, the correct volume of bees to stock an Apidea mini-nuc. Too many or not enough bees can result in the nuc not functioning. A large proportion of the bees should be nurse bees; which means collecting bees from brood frames of strong colonies. Obviously the queens in such colonies must be found before brushing bees into the collecting box. A simple wooden box with a mesh bottom will suffice unless

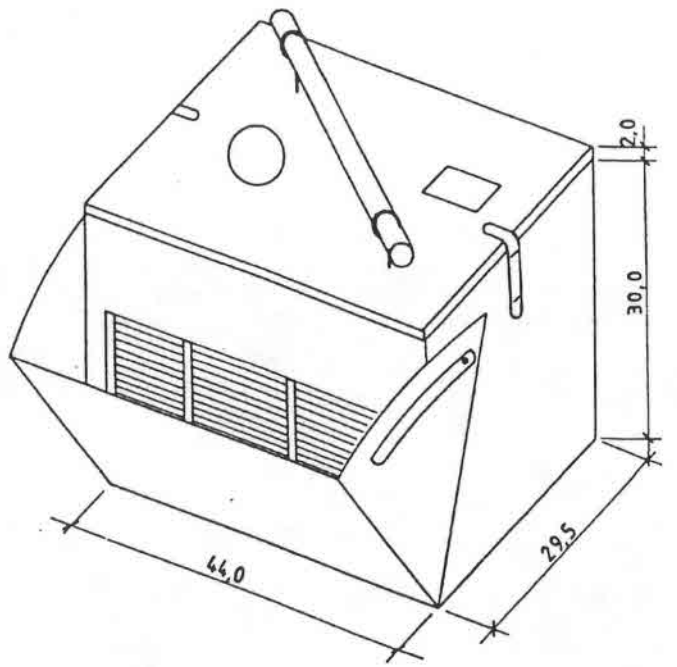

Fig. 1. Marburg swarm box

drones are to be filtered out, which is necessary if a mating site is to be used where control over the drones taken there is desired. A Marburg Swarm box or similar device would then be used as described in fig. 1.

If a small quantity of nucs are to be made up free of drones, then a Marburg swarm box will suffice to collect the bees. Another way is to move some frames of open brood above a queen excluder for a few hours, having brushed off all the bees

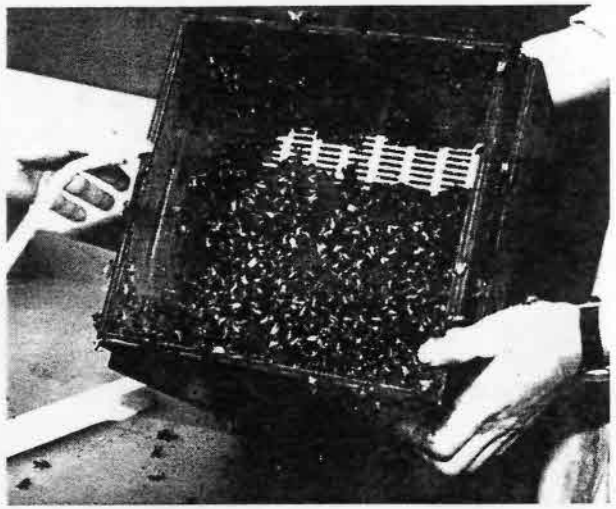

Fig. 2 Collecting box to filter out drones

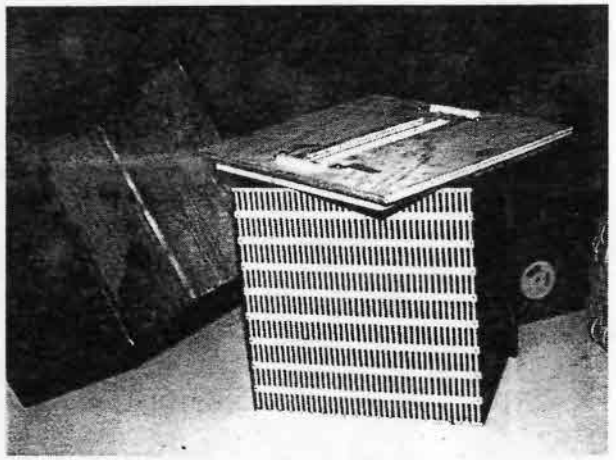

Fig 3. View of the parts of the drone filter

beforehand. Nurse bees will quickly move up through the excluder and attend to the brood; the bees from these frames can then be brushed off into the collecting box.
For a large number of nucs, the use of a specially designed collection unit is worthwhile. Such a unit is shown in Figs. 2 and 3. This consists of two boxes, one telescoping inside the other. The lower box has a mesh floor; the upper box a

queen excluder floor.
First the lower box is used for the collection of bees. A hopper is fitted onto this into which the bees are shaken or brushed off the brood combs. A pressure spray is used to spray a fine mist of water on the bees to prevent flying. From time to time the box is bumped on the ground to shake the bees that are climbing up the sides in the box down to the bottom.

When a depth of 4 inches of bees has been collected the hopper is removed and the upper box is gently lowered onto the mass of bees, and pegs are inserted to prevent the weight of the box bearing down and crushing bees. A Perspex lid ensures worker bees will be attracted to the light and move up into the upper box, leaving drones below the queen excluder. After 15 minutes the unit can be bumped on the ground and the lid removed and bees scooped out in measured amounts to fill the nucs.

The nucs are turned upside down, the bottom doors are opened and the nucs set out in rows ready to receive the bees. If the nucs are to have a live freshly hatched queen, then these must be ready in cages. Each cage is sprayed with water and opened and the queen shaken out into the hand; then as the scoop of bees is dumped in the nuc, the queen is dropped among them and the bottom door is closed.

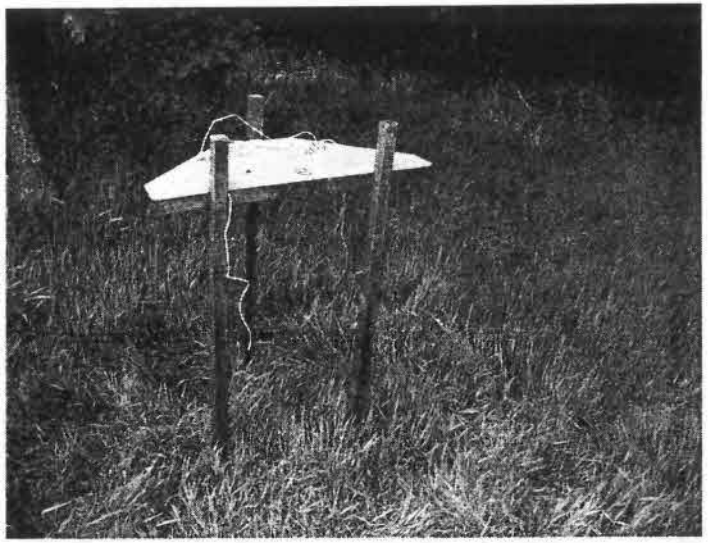

Fig. 3. Platform holding three Apidea mini-nucs

If a ripe queen cell is to be used, this should be introduced several hours after the nuc is made up, thereby ensuring that the bees are dried out. A two inch square of cooking foil with a hole cut out of the middle should be used as a cell protector, and the queen cell lowered in gently though the hole in the coverboard.

Storage of nucs and siting at the mating site

The prepared nucs should be stored in a cool dark place for three or four days. A little spray of water at each ventilation grid will help the bees to work the candy and start comb building.

Siting and the release of the nucs is important. The nucs are best off the floor to prevent slugs entering. They should be

Consideration should be given to some shade, but the nuc should have an open aspect and not be hemmed in by foliage. Strapping nucs to trees can be a good way to site them, as is making platforms to hold three nucs facing in different directions. (Fig. 3.)

Release should be at dusk. This will avoid the area becoming filled with flying bees taking orienting flights and resulting in bees being attracted to the nucs that have the most fanning bees at the entrance, thus causing some nucs to be overstocked and others depleted of bees. Care should be taken to ensure the ventilation grid is not shut off by pushing the door to its upper limit, and a small stone should be wedged under the door to keep open if loose.

The nucs should be examined weekly, checking for the presence of stores, a queen and eggs. Once a queen starts to produce eggs she quickly runs out of room to lay and should be removed and used. The nuc should then be left queenless for twenty-four hours and then given a ripe queen cell due to hatch the next day. At the same time one or two of the frames should have the bottom half of the comb cut away. This will allow the bees to build new comb and give the new queen room to lay once she has mated.

A virgin queen should not be given to a nuc that has had a laying queen removed; otherwise a high percentage will be killed even using an introduction cage, making it better to give a ripe queen cell.

Should a nuc become low on bees and queenless, it should be cleared of bees and re-stocked with fresh bees and a queen or ripe queen cell. If it is low on bees and queen-

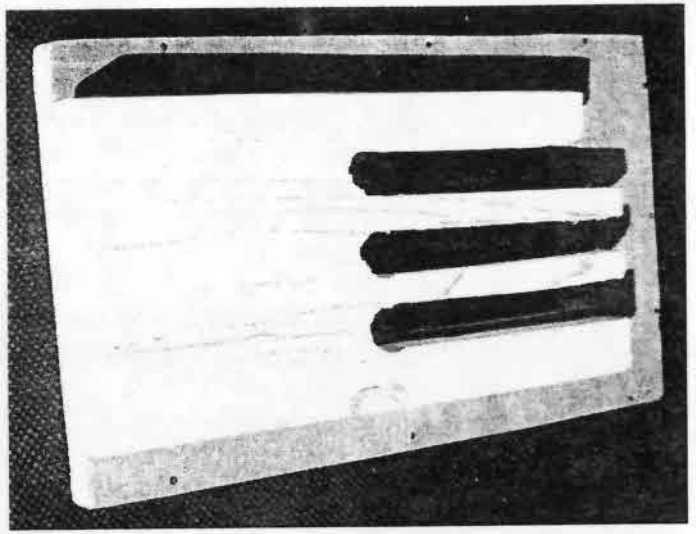

Fig. 5b. View of the upper side of the connecting piece, note the block of wood that replaces the floor of the upper nuc. The slots allow bees access from nuc to nuc.

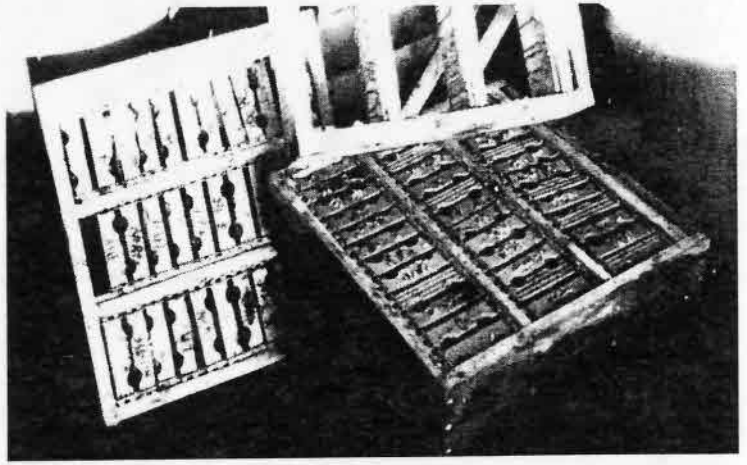

Fig. 6 Super fitted to take Apidea frames
Photo by Michael Mac Giolla Coda

special connecting piece fitted instead (figs. 5a and 5b); the bottom two nucs have coverboards and lids removed. The doors on the top two nucs are set in the upper position, that is the ventilation grids are shut off. A block of wood cut to size is fitted under the door to shut off the entrance in each of the two nucs.

Making use of frames from Apideas

At the end of the queen rearing season, the frames from Apideas can be fitted into empty supers and put on full colonies to make use of them. (Fig. 7)

The same system can be used to get Apidea frames drawn out and filled with stores on a strong colony early in the season by placing the unit shown in Fig. 7 on a strong colony. This helps the small units to progress more quickly. Do not be tempted to provide a nuc with more than one comb of stores and one frame of drawn comb. The small colony needs to engage in making comb to make use of the comb builders, and providing the brood nest for the queen to lay once she has mated.

Problems with Apideas

Apideas are such small units, they demand exacting procedures from the bee breeder. So many things can go wrong, such as either too many bees or not enough. The bees should be measured using a plastic container with a 300 ml mark on it. A plastic bottle such as those containing water that can be bought from supermarkets can be cut down to size for the purpose. The square shaped corrugated ones are better than the round ones, as these can get into corners better.

Loss of bees because a door comes open, or the cover board becomes displaced, can be avoided by taping these to prevent accidental opening.

Candy that is too soft or too hard can cause absconding. Syrup can be used with caution; only put an inch depth in the feeder until the nucs are at the mating site and then top up. The use of some means to prevent drowning should be provided. Comb is drawn out more quickly with syrup than candy.

Another cause of absconding is bad siting. Nucs should be spaced at least 10 metres apart and not in regimented rows. Siting each nuc near a natural marker such as a tree, bush or large stone helps in orientation.
Liberating the nucs for the first time at the mating site should be carried out at dusk or in rain; this will prevent a mass of bees all carrying out orientation flights at the same time. During mass orientation flights, the nucs that have the most workers fanning at the entrance are liable to attract bees from other nucs. This depletes some nucs and over-stocks others; and both these factors can lead to absconding.

Another problem is the limited amount of comb available for the queen to lay in. Once a queen starts to lay, it is imperative she is moved quickly; otherwise she will go off-lay and be difficult to introduce to another colony. If a second queen cell is given to that nuc, it should be ready to hatch within 24 hours. Some new drawn comb must be provided for the second queen to lay in, which can be done by cutting out the bottom half of the existing combs thereby prompting the bees to draw out new comb.

Nucs should be carefully cleaned at the end of the season; all brood combs should be cut out and the nucs sterilised with acetic acid 80% concentration. Storage of nucs in large bin liners that are sealed up with tape will prevent damage from wax moth. Wax moth larvae will drill holes in the polystyrene that the nucs are made of; and the feeders will not then hold syrup.

Introducing a second queen cell

The nuc should be left queenless for at least 24 hours before inserting a second queen cell. If the mating site is a considerable distance away such that visits to the site are only made weekly, then removing the nucs with laying queens to the home apiary is worthwhile. There the queen can be removed and a cell added 24 hours later; this enables a check to be made that the queen has hatched successfully before taking the nuc back to the mating site several days later. It is important to place the nucs back on the exact spots they occupied previously; otherwise the bees will find their old flight paths and go to the nuc occupying their old site.

Conclusions

Apidea mini-nucs are difficult to manage, but with care and attention to the points made in this booklet, they can be successfully used. One should expect some losses, but this is a small price to pay for being able to get large numbers of queens mated at the cost of just a small number of bees.

Contact for queries relating to the use of Apidea mini-nucs:

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APIMONDIA 2005

ABSTRACTS

IRELAND 2005

"Five Millennia of Beekeeping on your Doorstep"

August 21st-26th 20

39th Apimondia International Apicultural Congress
Dublin, Ireland

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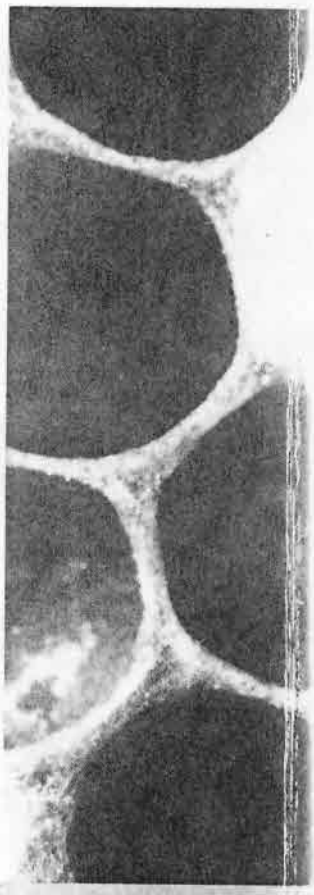

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SCIENTIFIC PROGRAMME APIMONDIA IRELAND 2005

DAILY PROGRAMME

Monday 22nd August, 2005

ORAL PRESENTATIONS (AM)

Beekeeping for Rural Development
President: Dr Nicola Bradbear
Plenary Session Name: Beekeeping for Rural Development
Room: Concert Hall

Chair: Nicola Bradbear

08:45 -09.00 **ROLE OF BEEKEEPING IN POVERTY ALLEVIATION: MARKETS AND MARKETING OF BEE PRODUCTS IN TANZANIA (26)**
A MWAKATOBE

09:00 - 09:15 **PARTICIPATORY ACTION RESEARCH AS A BEEKEEPING DEVELOPMENT STRATEGY (27)**
T CARROLL

09:15 - 09:30 **BEEKEEPING IN TANZANIA: WHEN THE BEES GET OUT OF THE WOODS (28)**
P M MPUYA

09:30 - 09:45 **HONEY QUALITY AS AFFECTED BY HANDLING, PROCESSING, CHANNELS OF MARKETING AND OTHER CONSTRAINTS TO BEEKEEPING (29)**
D.R. KUGONZA

09:45 - 10:00 **DEVELOPMENT OF APIS CERANA BEEKEEPING WITH ETHNIC MINORITIES AND SMALL FARMERS IN VIETNAM (30)**
DR N NGUYEN VAN

10:00-10:15 **BEEKEEPING AN ALTERNATIVE LIVELIHOOD OPTION IN THE WESTERN GHATS REGION OF KARNATAKA, INDIA (31)**
DR M S REDDY

10:15 -10:30 **FOREST BEEKEEPING SYSTEMS: KNOWLEDGE AND CHALLENGES TO INDIGENOUS COMMUNITIES IN NILGIRIS (WESTERN GHATS) INDIA (32)**
R LEO

10:30 - 10:45 **RAFTER BEEKEEPING IN CAMBODIA WITH APIS DORSATA (33)**
D JUMP AND C WARING

Break

11:00-11:15 **FAO'S ACTIVITIES FOR PROMOTION OF BEEKEEPING FOR RURAL DEVELOPMENT (34)**
H LEA

11:15-11:30 **GOOD AND BAD EXPERIENCES FROM BEEKEEPING PROJECTS (35)**
O HERTZ

11:30-11:45 **SUSTAINABLE RURAL DEVELOPMENT THROUGH APICULTURE (36)**
M CALALB

11:45-12:00 **A RURAL DEVELOPMENT PROJECT IN A MOUNTAINOUS AREA OF TURKEY (37)**
A INCI AND M SOMUNCU

12:00 – 12:15 **CURRENT STAGE AND PROSPECTS OF BEEKEEPING INDUSTRY OF ARMENIA (38)**
R TSARUKYAN AND N HAKOBYAN

12:15-12:30 **TRADITIONAL HIVES IN IRAN (39)**
M FORSI

12:30 - 12:45 **STUDY ON STEADY STATE OF BEE KEEPER IN IRAN WITH RESPECT TO ALL CAPABILITIES AND INHIBITIONS (40)**
H JOMEHZADEH

12:45 – 13:00 **BEEKEEPING IN THE ANDES: A PROPOSAL FOR QUEEN BEES REARING (41)**
J LLAXACONDOR

Apitherapy
President: Dr Theodore Cherbuliez
Symposium 1: Science and Apitherapy
Room: Clyde 1

Chair: Cristina Mateescu

09:00-09:20 **IMMUNOTHERAPY EFFECT OF APIS MELLIFERA L. VENOM ON GOUTY ARTHRITIS PATIENT IN CENTRAL TAWAIN (1)**
S W IP

09:20-09:40 **ANTIVIRAL & ANTIOXIDANT PROPOLIS (2)**
A HEGAZI

09:40-10:00 **ANTICARCINOGENECITY OF PROPOLIS ANTICARCINOGENICITY OF ARTEPILLIN C IN BRAZILIAN PROPOLIS THROUGH UP-REGULATION OF CIP1/P21 EXPRESSION IN COLON CANCER (3)**
K KANAZAWA

10:00-10:20 **WATER SOLUBLE PROPOLIS: EFFECTS (4)**
N ORSOLIC

Break

10:50-11:10 **COLOMBIA ANALYSIS OF FLAVONOIDS IN PROPOLIS (5)**
G SALAMANCA GROSSO

11:10-11:30 **COMPARISON OF ACTIVITIES OF PROPOLIS** (6)
ACHF SAWAYA

11:30-11:50 **RUSSIA "CLAY" IN THE THERAPIST'S HANDS (7)**
TV RUZANKINA

11:50-12:20 **EVALUATION OF SYNERGISM AND ANTAGONISTIC ANTIBACTERIAL EFFECTS OF HONEY, PROPOLIS AND ROYAL JELLY ON PATHOGENIC BACTERIA (8)**
MR DASTOURI

1220-12:50 **RUSSIA THE "APITOX" PROGRAM FOR NARCOMANIA (9)**
I KRIVOPALOV-MOSKVIN

Biacore Workshop
Room: Clyde 2

11.30 -13.00

RAPID AND RELIABLE DRUG RESIDUE SCREENING IN HONEY USING BIOSENSOR TECHNOLOGY:
- AN INTRODUCTION INTO BIACORE AND THE AND BASIC PRINCIPLES OF THE TECHNOLOGY.
- A CUSTOMER REPORTING ON HIS EXPERIENCES OF USING BIACORE IN HONEY QC
- A PRESENTATION OF NEW PRODUCTS FOR DRUG RESIDUE SCREENING IN HONEY
- A LIVE DEMONSTRATION OF THE BIACORE Q SYSTEM DETECTING DRUG RESIDUES IN HONEY SAMPLES

POSTER PRESENTATIONS

12.30 – 13.30

Bee Biology (Abstract No 203 - 261)
Beekeeping for Rural Development (262 – 277)

ORAL PRESENTATIONS (PM)

Apitherapy
President: Dr Theodore Cherbuliez
Symposium 1: Science and Apitherapy
Room: Dodder 1

Chair: Adolfo Perez-Piñeiro

13:30-13:55 **COMPOSITION/ACTIVITY OF ALGERIAN PROPOLIS (10)**
A EL HADI

13:55-14:20 **THE PSYCHONEUROECOLOGICAL BASIS OF BEE VENOM THERAPY: EVOLUTIONARY CLUES OF PROTEIN-DOPAMINE LANGUAGE FOR CONSCIOUS LEARNING IN HOMO SAPIENS**
J G RODRÌGUEZ PINTO

14:20-14:40 **EAR CONE-CANDLING (12)**
A VAN ALTEN

14:40-15:10 **MANAGEMENT OF ALGETIC SYNDROME DURING BEE VENOM INJECTIONS (13)**
I KRIVOPALOV-MOSKVIN

Break

15:40-16:00 **TREATMENT OF DEAFNESS**
I KHISMATULLINA

16:00-16:20 **HOW TO BUILT AN APITHERAPY SOCIETY (15)**
S STANGACIU

16:20 -16:40 **A PRACTICAL EXPERIMENT USING BEE PRODUCTS ON OPEN LEG WOUNDS TO PROMOTE THE HEALING PROCESS (16)**
BV DALBY

16:40 -17:00 **NEW APITHERAPEUTICS IN ROMANIA (17)**
C MATEESCU

17:00 -17:20 **APITHERAPY IN THE TREATMENT OF INFANTILE CEREBRAL PARALYSIS (18)**
I KRIVOPALOV-MOSKVIN

Bee Pathology
President: Dr Wolfgang Ritter
Plenary Session Name: Bee Pathology
Room: Concert Hall

Chair: Dr Wolfgang Ritter

13:30 – 13:40 **INTRODUCTION**
DR W RITTER

13:40 – 14:10 **WORLD WIDE TRADE: BEES, BEEPRODUCTS AND BEE HEALTH (42)**
M BROWN

14:10-14:30 **SENSE AND NECESSITY OF HARMONISATION OF DIAGNOSTIC METHODS (44)**
T SCHNEIDER

14:30-14:50 **RISK OF INTRODUCTION OF DISEASES IN HONEY BEE PRODUCTS IMPORTED INTO NEW ZEALAND (46)**
HJ PHARO

14:50 - 15:10 **POTENTIAL IMPACT OF DIRECTIVE 2004/28EC ON HONEYBEE DISEASES MANAGEMENT (47)**
F MUTINELLI

Break

15:40-16:00 **DEVELOPING NEW ZEALANDS´S IMPORT CONDITIONS FOR HONEY BEE GENERIC MATERIAL AND HONEY BEE PRODUCTS (48)**
LR BASHER

16:00-16:20 **THE IMPACT OF THE BEEKEEPING INDUSTRY OF A SUSPECT INCURSION OF VARROA DESTRUCTOR IN THE SOUTH ISLAND (49)**
LR BASHER

16:20 – 16:40 **THE SMALL HIVE BEETLE (AETHINA TUMIDA MURRAY): DIAGNOSIS, PREVENTION AND CONTROL OF A NEW HONEYBEE PEST (50)**
P NEUMANN

16:40 – 17:00 **AN ECOLOGICAL EXAMINATION OF THE SMALL HIVE BEETLE(COLEOPTERA: NITIDULIDAE, AETHINA TUMIDA) (51)**
JD ELLIS

17:00 – 17:20 **THE EPIDEMIOLOGY OF SLOW PARALYSIS VIRUS IN HONEY BEE COLONIES INFESTED BY VARROA DESTRUCTOR IN THE UK. (52)**
NL CARRECK

Beekeeping Technology and Equipment
President: Mr Gilles Ratia
Symposium 1: Analysis of Bee Products
Room: Clyde 2

Chair:

13:30-13:50 **VITAMIN E CONTENT IN BRAZILIAN POLLEN PELLETS – PRELIMINARY STUDY (53)**
KCLS OLIVEIRA

13:50-14:10 **10-HDA AS A CHEMICAL MARKER FOR PURE ROYAL JELLY AND ROYAL JELLY PRODUCTS (54)**
LB ALMEIDA-MURADIAN

14:10-14:30 **BELGIUM PROFICIENCY TESTING OF CHARM II TESTS FOR RESIDUE CONTROL OF HONEY (55)**
P BEAUNE

14:30-14:50 **BELGIUM VALIDATION OF THE TETRASENSOR HONEY FOR THE SCREENING OF TETRACYCLINES IN HONEY (56)**
W REYBROECK

14:50-15:10 **PRELIMINARY RESULTS OF CHEMICAL COMPOSITION IN HONEY BY NEAR-INFRARED SPECTROSCOPY (57)**
DR. J.A. RUIZ MARTÍNEZ

Break

15:40-16:00 **PERFIL ANALITICO PARA EL CONTENIDO DE AZUCARES MAYORITARIOS EN MIELES TROPICALES COLOMBIANAS(58)**
G SALAMANCA GROSSO

16:00-16:20 **IMPROVING MASS SPECTROGRAPHIC CONFIRMATION OF ANTIBIOTIC CONTAMINATION IN HONEY USING CHARM HPLC RECEPTORGRAM (59)**
R SALTER

16:20-16:40 **COUPLING OF LIQUID CHROMATOGRAPHY WITH CARBON STABLE ISOTOPE RATIO MASS SPECTROMETRY (LC-IRMS) – A PROMISING NEW TECHNIQUE FOR DETECTION OF SUGAR ADULTERATION OF HONEY (60)**
L ELFLEIN

16:40-17:00 **IDENTIFICATION AND DETERMINATION OF TYLOSIN AND ERYTHROMYCIN AND THEIR METABOLITES IN HONEY USING IONTRAP LC-MS/MS (61)**
KP RAEZKE

17:00-17:20 **MAIN SUGAR COMPOSITION OF BRAZILIAN MELIPONINEA HONEY ; PRELIMINARY STUDY (62)**
AH MATSUDA

Tuesday 23rd August

ORAL PRESENTATIONS (AM)

Bee Biology
President: Dr R Crewe
Plenary Session:The Honeybee Genome: Revolution in Honeybee Genetics
Room: Concert Hall

Chair: Prof Dr Octaaf Van Laere

08:40-09:00 **BEHAVIOR DIVERSITY OF APIS FLOREA AND APIS ANDRENIFORMIS: TEMPERATURE CONTROLS BY FANNING AND RAIN PROOFS BEHAVIOUR (63)**
S WONGSIRI

09:00-09:20 **PIN CHINA BIODIVERSITY OF HONEY BEES (APIS CERANA) IN CHINA (64)**
SHI WEI, ZHANG XIU-LIN, LIU LI

09:20-09:40 **GENETIC STATUS OF HONEYBEES (APIS MELLIFERA L.) IN COLOMBIA TODAY (65)**
C PRADA QUIROGA

09:40-10:00 **ALGERIA ANALYSE DES RÉSULTATS DE RECHERCHE SUR LES CARACTÈRES BIOMÉTRIQUES DE L'ABEILLE TELLIENNE « APIS MELLIFICA INTERMISSA » PEUPLANT LE NORD DE L'ALGÉRIE. (66)**
ML BERKANI

10:00-10:20 **THE INFLUENCE OF SMALL-CELL BROOD COMBS ON THE MORPHOMETRY OF HONEYBEES (APIS MELLIFERA L.) (67)**
JB MCMULLAN AND MJF BROWN

Break

10:50-11:10 **COMPARATIVE STUDIES BETWEEN MORPHOMETRICAL CHARACTERS OF SOME RACES AND HYBRIDS OF HONEYBEE COMIN ASSIUT REGION, UPPER EGYPT (68)**
MH HUSSEIN

11:10-11.30 **BIOMETRICAL STUDIES ON SOME RACES AND HYBRIDS OF HONEYBEE IN ASSIUT REGION, UPPER EGYPT (69)**
MH HUSSEIN

11:30-11.50 **HONEYBEE (APIS MELLIFERA) RACES, ECOYYPES AND THEIR GENERAL CHARECTERISTICS OF TURKEY (70)**
E AKYOL

11:50-12.10 **A STUDY OF COMPARISON OF DIFFRENT BEE GENOTYPES IN THE HATAY REGION WITH RESPECT TO THEIR PHYSIOLOGICAL CHARACTERISTICS (71)**
N SAHINLER

12:10 – 12:30 **COMPARISON OF THE PERFORMANCES OF IMPORTANT HONEY BEE (APIS MELLIFERA L.)RACES AND ECOTYPES IN DIFFERENT REGIONS OF TURKEY (72)**
B YUCEL

12:30 – 12.50 **IMPACT OF TRANSGENE PRODUCTS ON HONEY BEE LARVAE (73)**
D BABENDREIER

Beekeeping Economy
President: Dr Dinh Quyet Tam
Symposium 1
Room: Clyde 2
Chair: Dr Dinh Quyet Tam

09:00-09:20 **BEE BREEDING AND SELECTION IN UKRAINE (74)**
S BUGERA

09:20-09:40 **BEEKEEPING IN URUGUAY: OPPORTUNITES FOR FUTURE DEV. IN THE INTER HONEY MARKET (75)**
Y MANCEBO

09:40-10:00 **BEE PRODUCT QUALITY SAFETY & PRODUCING STANDADIZATION MODE IN CHINA**
C LIHONG (76)

10:00-10:20 **A RESEARCH ON DETERMINATION OF THE TECHNICAL AND STRUCTURAL CHARACTERISTICS OF BEEKEEPING IN TURKEY (77)**
DA CEYLAN

Break

10:50-11:10 **HOW TO INCREASE THE PRODUCTION OF PROPOLIS USING THE TOPBAR HIVES (78)**
M HLUNGWANI

11:10-11.30 **BEEKEEPING IN NORTHEAST OF BRAZIL AND ITS DEVELOPMENT: THE BIG CHALLENGE REPRESENTED BY EXPLOITATION OF THE AMERICAN HONEY BEES (AHB) (79)**
LS GONCLAVES

11.30 - 11.50 **SECOND ATTEMPT FOR A BEE GARDEN MUSEUM IN VENEZUELA (85)**
P VIT

11.50 - 12.10 **POSTER DISCUSSION**

12.10-12.30 **THE STANDARDIZATION BUILDING OF BEEKEEPING INDUSTRY IN CHINA (81)**
Z JING

12:30-12.50 **HONEY BEE PRODUCTS-PRODUCTION, MARKETING, PERSPECTIVE IN REPUBLIC OF MACEDONIA (82)**
I DZIMREVSKA

Beekeeping for Rural Development
President: Dr Nicola Bradbear
Beekeeping for Rural Development Workshop 1
Room: Lansdowne Room

09.00-09.30 **USING TOP BAR HIVES 1**
G SOLOMON (TRINIDAD & TOBAGO)

09.40-10.10 **MAKING TOP-BAR HIVES 1**
J DONAGHUE (IRELAND)

10.20-10.50 **MAKING PINS (FOR BARK HIVES)**
B MALICHI (ZAMBIA)

11.00-11.30 **HOW TO LIGHT A SMOKER**
R RUDD (IRELAND)

11.40-12.10 POLLINATION O HERTZ (DENMARK)

12.20-12.50 **HARVESTING POLLEN**
E MICHAELIS (NETHERLANDS)

Apitherapy
President: Dr Theodore Cherbuliez
Symposium 3
Room: Clyde 2
Chair: Dr Theodore Cherbuliez

09:00-09:20 **COMPARISON ON QUALITY OF PROPOLIS**
I AFROUZAN

09:20-09:40 **COMPARISON OF ACTIVITIES OF PROPOLIS (19)**
ACHF SAWAYA

09:40-10:00 **METHODS TO ANALYSE PROPOLIS (20)**
S SILICI

10:00-10:20 **"APITOX" FOR NORMALIZATION OF ALCOHOL (21)**
I KRIVOPALOV-MOSKVIN

Break

10:50-11:20 **CLASSIFICATION AND STANDARDIZATION OF PROPOLIS (22)**
MC MARCUCCI

11:20-11.50 **NEW NEEDED QUALITY REGULATIONS FOR THE PRODUCTION OF APITHERAPICS (23)**
S STANGACIU

11:50-12:20 **NEW APITHERAPY IN ROMANIA (24)**
C MATEESCU

12:20-12.50 **STANDARDIZATION OF PRODUCTS OF THE HIVE (25)**
R DOMERGO

Bee Pathology
President: Dr Wolfgang Ritter
Symposium 1
Room: Clyde 1

Chair: Brenda Ball

09:00-09:40 **REVIEWING THE DIAGNOSIS OF P.LARVAE ARVAE IN LIGHT OF THE DEVELOPMENT OF NEW TECHNIQUES AND NEW INFORMATION. (86)**
E GENERSCH

09:40-10:00 **OXYTETRACYCLINE SENSITIVITY AND PULSED FIELD GEL ELECTROPHORESIS TYPING OF AFB (87)**
M HORNITZKY

10:00-10:20 **PHENOTYPIC AND GENOTYPIC FEATURES OF P. LARVAE STRAINS (88)**
EM FORSGREN

Break

10:50-11:10 **MONITORING FOR AMERICAN FOULBROOD SPORES FROM HONEY AND BEE SAMPLES IN CANADA (89)**
SF PERNAL

11:10-11.30 **THE DETERMINATION OF TRACHEAL MITE ACARAPIS WOOD; INCIDENCE IN THE REPUBLIC OF TURKEY (90)**
A OZKIRIM

11:30-11.50 **SEARCHING FOR DEFORMED WING VIRUS IN NEW ZEALAND HONEY BEES (91)**
B BALL

11:50-12.10 **INCIDENCE OF THAI SACBROOD VIRUS DISEASE TO ASIAN HONEYBEE APIS CERANA INDICA FAB, IN KERALA, INDIA (92)**
S DEVANESAN

12.10-12.30 **BIOLOGICAL AND MOLECULAR CHARACTERISATION OF DEFORMED WING VIRUS AND KASHMIR BEE VIRUS (93)**
JR DE MIRANDA

12:30-12.50 **GENERIC TECHNOLOGIES FOR THE DETECTION OF BEE PESTS AND DISEASES IN THE FIELD AND THE LABORATORY (94)**
N BOONHAM

POSTER PRESENTATIONS

12.30 – 13.30

Apitherapy (Abstract No 278 - 323)
Beekeeping Economy (329 - 330)

ORAL PRESENTATIONS (PM)

Beekeeping Economy
President: Dr Dinh Quyet Tam
Symposium 1
Room: Clyde 2

Chair: Dr Dinh Quyet Tam

13:30-13:50 **THE HONEY PRODUCTION IN CHINA FROM 2000 TO 2003 (83)**
QY DIAO

13:50-14:10 **SLOVENIA QUALITY OF SLOVENIA HONEY (84)**
V KMECL

Beekeeping for Rural Development
President: Dr Nicola Bradbear
Beekeeping for Rural Development Workshop 1
Room: Lansdowne Room

14.00-14.30 **CANDLE MAKING 1**
D RYAN (IRELAND)

14.40-15.10 **MAKING COSMETICS 1**
J RYAN (IRELAND)

15.20-15.50 **CAPTURING OF APIS CERANA COLONIES BY NILGIRI HILL TRIBES**
R LEO (INDIA)

6.00-16.30 **HONEY LABELLING FOR EU MARKET**
R RUDD IRELAND

6.40-17.10 **ORGANISING A BEEKEEPERS' ASSOCIATION**
A JORGENSEN (DENMARK)

Beekeeping Technology and Equipment
President: Mr Gilles Ratia
Sympoisum 2: Quality of bee products
Room: Clyde 1

Chair: Dr Banu Yucel

13:30-13:50 **THE ANALYSIS OF FLAVANOID COMPONENTS FOR THE PROPOLIS FROM RUSSIA (95)**
KI.ELLER

13:50-14:10 **EFFECTS OF ARTIFICIAL SUGAR FEEDING ON SUGAR COMPOSITION OF ROYAL JELLY (96)**
P ODDO

14:10-14:30 **MICROSCOPIC CHARACTERISTICS OF ROYAL JELLY (97)**
ML PIANA

14:30-14:50 **HUNGARY ORGANIC BEEKEEPING AND PROSPECTS IN HUNGARY (98)**
S SZALA

14:50-15:10 **AN ATTEMPT TO ESTABLISH RELIABLE "BEST BEFORE" DATES FOR HONEYS ORIGINATING IN BOTH CONTINENTAL AND OCEANIC CLIMATES (99)**
M.T. SANCHO

Break

15:40-16:00 **GERMANY IDENTIFICATION OF HONEY ASSOCIATED YEASTS (100)**
G BECHK

16:00-16:20 **HONEY QUALITY PARAMETERS FROM APIS MELLIFERA AND MELIPÓNINAE BEES IN PORTUGUESA STATE, VENEZUELA (101)**
R THIMANN

16:20-16:40 **PHYSICOCHEMICAL PROPERTIES OF TURKISH HONEYDEW HONEY (102)**
B YUCEL

16:40-17:00 **IDENTIFICATION AND MANAGEMENT OF HAZARDS IN THE APIARY'S ACTIVITIES TO GUARANTEE HONEY SAFETY (103)**
G FORMATO

17:00-17:20 **USING BEES AND HIVE PRODUCTS TO ASSESS METAL POLLUTION IN FINLAND (104)**
K FAKHIMZADEH

Pollination and Bee Flora
President: Marinus J. Sommeijer

Plenary Session: Pollinator Diversity, Competition and Conservation
Room: Concert Hall

Chair: Chris O'Toole

13:30-14.10 **A REVIEW OF OSMIA SPP. AS MANAGED POLLINATORS - BASIC NESTING BIOLOGY; ANATOMICAL AND BEHAVIOURAL REASONS FOR THEIR SUPERIORITY OVER APIS IN THE POLLINATION OF CERTAIN SELECTED CROPS. (105)**
C O' TOOLE

14:10-14:50 **POLLINATION OF INVASIVE PLANTS BY BUMBLE BEES AND BUMBLE BEE CONSERVATION IN IRELAND (106)**
J STOUT

14:50-15:10 **EXAMINING PATTERNS OF BEE MOVEMENT WITH HARMONIC RADAR (107)**
J OSBORNE

Break

15:40-16:00 **HABITAT PREFERENCES AND FOOD PLANTS OF BUMBLE BEE QUEENS IN AN AGRICULTURAL LANDSCAPE (108)**
E ALANEN FINLAND

16:00-16:20 **THE RELATIONSHIPS AMONG VARIOUS BEE GENERA (APIS MELLIFERA L., BOMBUS SPP., MEGACHILE ROTUNDATA F. AND RHOPHITOIDES CANUS EV.) AS OBSERVED ON FLOWERING ALFALFA (MVETCH CORONILLA VARIA (109)**
V PTACEK

16:20-16:40 **ENHANCING BEE POPULATIONS ON UK FARMLAND USING FORAGE MIXTURES (110)**
N CARRECK

16:40-17:00 **POLLINATOR DECLINE - ASSESSING THE RISKS: ALARM & EPI (111)**
S ROBERTS

17:00-17:20 **DECLINING FLORAL RESOURCES AND PUBLIC LAND POLICY RESTRICTIONS FOR BEEKEEPING IN AUSTRALIA AND PROSPECTS OF PLANTATION FORESTRY (112)**
D SOMERVILLE & M MONCUR

17:20-17:40 **COMPETITION BETWEEN HONEY BEES AND BOMBUS IMPATIENS IN THE US**
E EVANS & M SPIVAK

Wednesday 24th August

ORAL PRESENTATIONS (AM)

Beekeeping Technology and Equipment
President: Mr Gilles Ratia
Plenary: Beekeeping technologies around the world
Room: Concert Hall

Chair: Mr. Gilles Ratia

09:00-09:20 **BENEFITS OF THE FRECUENCY ANALISYS OF THE HUM OF AN APIS MELLIFERA SWARM, APPLIED TO THE HIVE INSPECTION (124)**
A MEZQUIDA

09:20-09:40 **PRODUCTIVITY OF BEEKEEPING DEPENDS ON THE SUNSPOTS ACTIVITY (125)**
I NICOLADZE

09:40-10:00 **METHOD OF PRODUCING OF THE PURE BEE VENOM (126)**
I NICOLADZE

10:00-10:20 **BEEHIVE DRAGOSLAVKA (127)**
DRAGOSLAV ILIC SES

Break

10:50-11:10 **GEOGRAPHIC INFORMATION SYSTEM FOR APIARIES MANAGEMENT (128)**
K SIMÕES

11:10-11.30 **NEW SOFTWARE FOR BEEKEEPING ADMINISTRATION ON TROPICAL COUNTRIES (129)**
G SALAMANCA

11:30-11.50 **INTENSIFICATION OF UTILIZATION OF SPRING HONEY FLOW (130)**
J G RACYS

11:50-12.10 **THE BEEKEEPER'S SOLUTION IN ARCHITECTURE (131)**
RL BRUNS

12.10-12.30 **PRODUCTION OF TOP-BAR HIVE AND FRAMES FROM CHEAP AND LOCALLY AVAILABLE MATERIALS (132)**
N ADGABA

12:30-12.50 **APICULTURE RESEARCH IN UPPER EGYPT AND OMAN (133)**
M HASSAN HUSSEI

Bee Pathology
President: Dr Wolfgang Ritter
Symposium 2
Room: Clyde 1

Chair: P. Martin, W. von der Ohe, W. Ritter

09:00-09:20 **HONEY QUALITY: THE RESIDUE ISSUE (114)**
W VON DER OHE

09.00 - 09.20 **RESIDUES IN HONEY - THE CURRENT SITUATION WORLD-WIDE (114B)**
DR. KURT-PETER RAEZKE (114B)

09:20-09:40 **CONTROL OF BEE DISEASES WITHOUT RESIDUES IN HONEY - PACKER AND CONSUMER NEEDS AND GOVERNMENT POLICY (115)**
P MARTIN

09:40-10:00 **THE RESIDUE FREE CONTROL OF BEE DISEASES (116)**
W RITTER

10:00-10:20 **RESIDUE FREE HONEY IN IRAN AND CANADA (117)**
H YEGANEHRAD

Break

10:50-11:10 **DETECTION METHODS OF PAENIBACILLUS LARVAE SUBSP.LARVAE INFECTIONS BY SAMPLES HONEY AND ADULT HONEY BEE ANALYSIS (118)**
K POHORECKA

11:10-11.30 **IN VITRO INHIBITORY EFFECT OF HEN EGG WHITE LYSOZYME AGAINST PAENIBACILLUS LARVAE SSP. LARVAE (119)**
G ZHANG

11:30-11.50 **SHAKING CAN CURE AMERICAN FOULBROOD (120)**
A. LINDSTRÖM

11:50-12.10 **DISSEMINATION AND PERSISTENCE OF FUNGI TO CONTROL VARROA DESTRUCTOR (121)**
B BALL

12.10-12.30 **A COMPARISON BETWEEN DIFFERENT OXALIC ACID TREATMENTS IN OVERWINTERING HONEY BEE COLONIES AFFECTED BY VARROA DESTRUCTOR ANDERSON & TRUEMAN (122)**
A NANETTI

12:30-12.50 **BEE DISEASES ORIGINATE NOT ONLY FROM PATHOGENS - DISEASE PREVENTION IS BETTER THAN CURE (123)**
O BOEKING GERMANY

Beekeeping for Rural Development
President: Dr Nicola Bradbear
Beekeeping for Rural Development Workshop 2
Room: Lansdowne Room

9.00-09.30 **USING TOP BAR HIVES 2**
GLADSTONE SOLOMON (TRINIDAD & TOBAGO)

09.40-10.10 **MAKING TOP-BAR HIVES 2**
JOHN DONAGHUE (IRELAND)

10.20-10.50 **HOW TO GET HIVES OCCUPIED**
TOM CARROLL (KENYA)

11.00-11.30 **HIVES FOR STINGLESS BEES**
MARINUS SOMMEIJER (NETHERLANDS)

11.40-12.10 **MAKING WALL HIVES FOR FORESTED HILLY HABITATS**
ROBERT LEO (INDIA

12.20-12.50 **SOLAR WAX EXTRACTORS EXPLAINED**
JOHN DONAGHUE (IRELAND)

POSTER PRESENTATIONS

12.30 – 13.30

Beekeeping Technology and Equipment (Abstract No331 - 357)
Pollination and Bee Flora (358 - 391)

ORAL PRESENTATIONS (PM)

Beekeeping for Rural Development
President: Dr Nicola Bradbear
Beekeeping for Rural Development Workshop 2
Room: Lansdowne Room

14.00-14.30 **WAX RENDERING**
BEN HARDEN (IRELAND)

14.40-15.10 **RECOVERING WAX FROM OLD BROOD COMBS**
BOB MALICHI & OTHERS (ZAMBIA)

15.20-15.50 **CANDLE MAKING 2**
DENNIS RYAN (IRELAND)

16.00-16.30 **MAKING COSMETICS 2**
JIM RYAN (IRELAND)

16.40 – 17.10 **MAKING AFRICAN HONEY BEER**
BOB MALICHI & OTHERS (ZAMBIA

Beekeeping Economy
President: Mr Dinh Quyet Tam
Plenary Session
Room: Concert Hall
Chair: Mr Dinh Quyet Tam

13:30-13:50 **ALTERNATIVE MARKETING STRATEGIES FOR HONEY AND OTHER BEE PRODUCTS IN TURKEY (134)**
G SANER

13:50-14:10 **NEW EDUCATIONAL MATERIALS FROM THE DANISH BEEKEEPEERS ASSOCIATION (135)**
RT THEUERKAUF

14:10-14:30 **BEEKEEPING IN UKRAINE (136)**
S BUGERA

14:30-14:50 **ECONOMICS OF HONEY PRODUCTION-THE HIDDEN BACKBONE OF NATIONAL ECONOMY (137)**
HB THOMPSON

14:50-15:10 **BKEEPING" A COMPUTER PROGRAM (138)**
K H MCLLVRIDE

Break

15:40-16:00 **FACILITIES TO IMPROVE ORGANIC BEEKEEPING IN TURKEY: PROBLEMS & SOLUTIONS (139)**
B YUCEL

16:00-16:20 **CURRENT SITUATION OF THE MACEDONIAN APICULTURE-FACTS & FIGURES (140)**
A UZUNOV

16:20-16:40 **HONEY QUALITY AS AFFECTED BY HANDLING, PROCESSING, CHANNELS OF MARKETING & OTHER CONSTRAINTS TO BEEKEEPING (141)**
DR KUGONZA

Pollination and Bee Flora
President: Marinus J. Sommeijer
Symposium 2: Greenhouse Pollination
Room: Conference Room 1

Chair: Bernard Vaissierre

13:30-14.10 **THE IMPORTANCE OF BEES AS GREENHOUSE POLLINATORS (142)**
BE VAISSIERRE

14:10-14:30 **THE EFFECT OF ENVIRONMENTAL CONDITIONS ON BEE POLLINATION ACTIVITY IN GREENHOUSES (143)**
A DAG

14:30-14:50 **BEEKEEPING FOR SEED AND VEGETABLE PRODUCTION IN GLASSHOUSES (144)**
W BOOT

14:50-15:10 **POLLINATION BY BUMBLEBEES IN PEPPER AND ZUCCHINI CULTURES IN GREENHOUSES IN ALMERIA (145)**
JM GUERRA

Break

15:40-16:00 **KEEPING ORCHIDS (CYMBIDIUM SP.) FREE FROM EXTRA-FLORAL NECTAR USING HONEY BEES (146)**
J CALIS

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E MAC GIOLLA CODA

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Chair: Th. Cherbuliez

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R DOMEREGO

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V KUMAR KENYA

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D SAMMATARO USA

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Bee Pathology (Abstract No392 - 470)

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Beekeeping for Rural Development Workshop 3
Room: Lansdowne

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D RYAN IRELAND

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J RYAN IRELAND

15.20-15.50 **HARVESTING PROPOLIS**
E MICHAELIS NETHERLANDS

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C CHAVASSE IRELAND

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President: Mr Gilles Ratia
Symposium 3: Queen Rearing
Room: Clyde 1

Chair: Gilles Fert

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TIAGO MAURICIO FRANCOY

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DG NAIK

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S AGHILI

ABSTRACTS

IMMUNOTHERAPY EFFECT OF APIS MELLIFERA L. VENOM ON GOUTY ARTHRITIS PATIENT IN CENTRAL TAWAIN.

No 1

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INTRODUCTION: Apis Mellifera L.(AML) venom is commonly used in Taiwan to decrease the inflammatory response of joints and joint pain in Gouty Arthritis(GA) patients. However,we have found that the allergic reaction during AML venom treatment was the major side effect of this treatment.

METHODS: Ten G.A. patients were selected in this study, patient received AML venom therapy three times weekly for 10 months. Patient's serum IgG and IgE were examined every two weeks to monitor for the appropriate dosing for AML venom therapy.

RESULTS: Patient's serum IgG had increased 24 hours after AML venom therapy and became stable after 3 weeks of treatment. Patient's serum IgE had increased 24 hours after AML venom therapy then decreased after 2-3 weeks of therapy. After received 10 months of AML venom therapy, patients found that the inflammatory response and painful sensations of the joints were greatly improved.

DISCUSSION: The Mellitin in AML venom was a welcome trans-membrane peptide working against inflammatory response in human immune disorders. However, the allergic reactions caused by bee venom were the major side effects in bee venom therapy. Human serum IgE and IgG might act as the indicators to monitor the appropriate dosing during bee venom therapy.

EGYPTIAN PROPOLIS: 8- ANTIVIRAL AND ANTIOXIDANT ACTIVITIES IN RELATION TO FLAVONOID CONTENT

No 2

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Eight Egyptian propolis samples from different localities were investigated for their antiviral activity against NDV and IBDV. All samples showed antiviral activity. The activity was varied according to the propolis origin.
The antioxidative potential and capacity of these samples were calculated from their kinetics of the decrease of DPPH ESR signal. Samples Assiut (As), Fayoum (F), Ismailia (Is) and Dakahlia (D) showed the highest antioxidative capacity and potential respectively, while the samples Souhag (So), Sharkia (Sh), reclaimed lands from Ismailia (IsR) and El-Saff (El) have moderate antioxidative capacity and potential.
The flavonoids present in eight Egyptian propolis samples were identified by HPLC. 23 flavonoids could be identified as well as the caffeic acid esters (dimethylallyl caffeate and phenylethyl caffeate). Biochanin A and 7-hydroxy-4'-methoxyflavone were identified for the first time in propolis. Myriceten, luteolin, luteolin-3'-methylether, pinocembrin, and acacetin were present with the highly significant concentrations in Assiut sample (As). Also it has the highest concentrations of quercetin-3-methylether, apigenin quercetin-7-methylether and chrysin. While Sharkia sample (Sh) has the highest concentration of quercetin, hesperetin, quercetin-3,3'-dimethylether and biochanin A. El-Saff sample (El) showed the highest concentration of dimethylallylcaffeate, pinostrobin and galangin-7-methylether. Fayoum samples (F) have the highest concentration of pinobankasin.
The assessment of flavonoids by HPLC and antioxidant activity by ESR was done for the first time to Egyptian propolis.

ANTICARCINOGENICITY OF ARTEPILLIN C IN BRAZILIAN PROPOLIS THROUGH UP-REGULATION OF CIP1/P21 EXPRESSION IN COLON CANCER

No 3

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Colon cancer is a major cause of cancer related mortality and morbidity in the world, and the incidence has been increasing. The potential chemopreventive agents against colon cancer have been searching in food, because dietary factors positively related with reduction of the risk. Various food polyphenols have been found to be preventive in cell line experiments. However, most of them fail to express the activity when used to cancer model animals. The dietary polyphenols are usually

conjugated with glucuronidate and/or sulfate at the intestinal absorption step, and the active forms are aglycone but not are conjugates. Artepillin C in Brazilian propolis passed through intestinal Caco-2 cells and incorporated in hepatic Hep G2 cells in the active form without any conjugations, and suppressed strongly oxidative damage of DNA. Then, artepillin C was examined in cancer preventing activity with colonic cancer model mice and in preventing mechanisms with human colon cancer WiDr cells. In azoxymethane treated mice, oral doses of 80 mg/kg and 160 mg/kg body weight propolis and 10 mg/kg artepillin C reduced significantly the frequency of colonic aberrant crypt foci by 39.2%, 43.7% and 43.4%, respectively. In WiDr cells, artepillin C inhibited cell growth dose-dependently, inducing G0/G1 arrest in the cell cycle. This event included decreasing levels of phosphorylated retinoblastoma protein and cyclin D1-cyclin dependent kinase 4 complex, and increasing level of Cip1/p21. On the other hand, artepillin C did not induce the arrest in Cip/p21-deleted cells, HCT116 p21(-/-). Thus, artepillin C induced the cell cycle arrest through stimulating expression of p21 and clearly suppressed colonic cancer. Propolis including artepillin C is one of useful chemopreventive materials against colonic cancer.

EFFECTS OF WATER SOLUBLE DERIVATIVE OF PROPOLIS AND ITS POLYPHENOLIC COMPOUNDS ON FUNCTIONAL ACTIVITY OF MACROPHAGES AGAINST TUMOR CELLS

No 4

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Effect of two preparations (Croatian and Brazilian) of water-soluble derivative of propolis (WSDP), caffeic acid, quercetin, chrysin, naringenin (components present in WSDP) on the development of Ehrlich ascites tumour (EAT) was evaluated. Test components (50 mg/kg) were given by gastric intubations (po) or intraperitoneally 2 hour prior the intraperitonel injection of EAT (2 x106) cells. It was observed that WSDP and its compounds effectively inhibited tumour growth and the proliferation of EAT. The volume of ascitic fluid induced by EAT cells and total number of cells present in the peritoneal cavity was markedly reduced in EAT-bearing mice treated with test components. Treatment with test components increased the number of polymorphonuclear (PMN) cells and decreased the number of macrophages in the peritoneal cavity of treated animals. The macrophage spreading revealed that WSDP and all test compounds affected the functional state of macrophages increasing their tumorcidal activity. The results indicate that the WSDP and its polyphenolic compounds significantly reduced the tumour growth and proliferation of EAT cells; the antitumour effect of test components might be due to an increase of peritoneal macrophage activity and not to an increase in macrophage number.

ANALSIS ESPECTROFOTOMETRICO DE FLAVONOIDES EN MUESTRAS DE PROPOLEOS COLOMBIANO

No 5

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La importancia y posición que ha ganado el propóleo obedece a su actividad biológica, la cual reside en la presencia de polifenoles, particularmente de flavonoides isoflavonoides y acido Canféico entre otros, otorgándole al producto propiedades antioxidantes y anticonservantes, en este sentido se ha demostrado su acción como inhibidores de la peroxidación de los lípidos de la lecitina, como bacteriostático y bactericida, se conoce de su acción frente a Staphylococcus aureus, Streptococus faecaelis, Corynebacterium, E. Coli, Krebsiella, Salmonella Cholerae, Salmonella Enteridis, Tiphosa, Dublin, Shigella, Proteus vulgaris, Mycobacterium tuberculosis y Bacillus subtilis entre otros. Sus propiedades biológicas residen en la presencia de ácidos fenólicos, esteres grasos, terpenos, aminoácidos y flavonoides. En este trabajo se presentan los resultados analíticos correspondientes a la caracterización de unidades estructurales del tipo polifenol activas a los reactivos 2,4 dinitrofenilhidrazina (2,4D) y tricloruro de aluminio. Se recolectaron 10 muestras de propóleos de la zona biogeográfica de bosque seco montano bajo (bs-MB), de las localidades de Belén, Cerinza, Cucaita, Nobsa, Paipa y Tutasá, en el departamento de Boyacá. Las muestras fueron colectadas utilizando la técnica de raspado de las partes internas de las colmenas de abejas de Apis mellifera en el periodo comprendido entre Octubre de 2003 a Enero de 2004. Las muestras se acondicionaron convenientemente en recipientes herméticos de vidrio limpios y en condiciones de esterilidad, los recipientes usados fueron de color ámbar, que se mantuvieron de manera individual en refrigerador a 5 °C, contendiendo cada una de las muestras. Con fines comparativos se analizaron dos muestras de propóleos de Argentina de las localidades de Mendoza. El contenido de flavonoides en las ocho muestras analizadas siguiendo el método espectrofotométrico del cloruro de aluminio, en general fue mas bajo respecto de los observados en la determinación de la 2,4 Dinitrofenilhidrazina, tal como se muestra en la tabla 1. El rango para el primer estuvo entre 0.52 ± 0.03% (Santa Rosa de Viterbo) y 3.26 ± 0.26% (Cucaita); en el segundo caso el rango vario entre 4.83 ± 0.50% (Santa Rosa de Viterbo) y 18.4 ± 0.80% (Tame). El total de flavonoides por los dos métodos osciló entre 5.30 ± 0.51% (Combita) a 22.3 ± 5.41% (Cucaita). Los resultados indican que hay un mayor contenido de flavonoides expresados como equivalentes de quercetina en la muestra de Cucaita, condición que se

mantiene en el caso del equivalente de naringenina. Las dos muestras adicionales de Argentina (Mendoza y Lulunta), presentaron equivalentes de quercetina entre 2.60 ± 0.01 a 3.94 ± 1.17% y de 11.4 ± 1.40 a 17.5 ± 0.70% en equivalentes de naringenina. Los valores observados en las muestras de propóleo colombiano, son significativamente menores en relación a los equivalentes de quercetina observados en muestras de Brasil, China y Taiwán.

ANTIOXIDANT ACTIVITY OF SAMPLES OF PROPOLIS FROM THE STATE OF BAHIA IN BRAZIL.

No 6

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Among its many therapeutic activities, propolis is studied for its antioxidant properties. Propolis from the northeast of Brazil has only recently begun to be studied and not much is known about its composition and activity, which is determined by the geographic and plant origins of its resin. Methods that determine the antioxidant activity of natural products often use expensive and / or toxic reagents. The purpose of this study was to test simple and safe methods for this determination and to identify components with antioxidant activity.
Samples of propolis from hives placed in the same area in Cruz das Almas, Bahia, Brazil, and collected in different months during 2003, were compared with samples from other regions. The antioxidant activity was measured by two different methods: a) discoloration of potassium permanganate solution and b) potentiometric titration using cerium sulphate. Triplicates of all samples were analysed by both methods and the results compared. Thin Layer Chromatographic plates of the samples were sprayed with the potassium permanganate solution to observe the areas where discoloration occurred; compounds from these areas were later isolated by preparative TLC and identified by negative mode Electrospray Ionization - Mass Spectrometry (ESI-MS). The areas of discoloration on the TLC plate were mainly in the area were less polar compounds are found. This result was different from green propolis from the southeast of Brazil and red propolis from other regions of the northeast. Compounds of m/z 373, 401 and 469 were isolated from these areas. Tandem MS studies of compounds of m/z 373 and 401 show their structures are similar and possibly come from the same plant source. The results of both methods showed a direct, but not linear correlation. The samples that took the longest time to discolour the potassium permanganate used the lowest volumes of cerium sulphate, and vice-versa. The lack of linearity was probably due to the inherent imprecision of the potassium permanganate method, which depends on a person with a stopwatch to measure the time of discoloration (a subjective parameter). The titration was more precise.

'CLAY IN APITHERAPIST'S HANDS'

No 7

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Purpose: Making a new preparation – product: apiproducts + clay for increasing possibilities of patients' sanitation.
Methods: Effect of clay:
a) The possibility of giving microelements through skin and mucous coats (microelements contained in clay define its colour: blue, white, red, pink, yellow and their lack in the organism results in sicknesses.)
b) The possibility of adsorbing toxins, and metabolic products including radio-active substances through skin, mucous coats and lymphatic system that is an effect of enterosorbent. Wax plays the similar part in apitherapy. It gives its healing substances through skin and mucous coats and adsorbs that is takes away all that is necessary to eliminate from an organism having antitumoral effect. As an apitherapist I make individually ointments, creams and other apiproducts for patients.
I began to make Ruzankincreamproduct according to needs of those patients who can't be treated with bee stinging for different reasons. (This cream is prepared on the principle of making antihomotoxic preparations.) This complex preparation is applied in case of all kinds of inflammation. It can be applied locally, per os as it is a product and also per rectum. The mechanism of its action is determined by combined effect of all its ingredients.
Results: The preparation is obtained. The main effects of Ruzankincream: anti-inflammatory, regenerative, antiexudative, antispasmodic, analgetic, metabolic, antitoxic and immunostimulating.
Conclusion: The suggested preparation Ruzankincreamproduct is an optimal corticosteroid substitute. This is a nonsteroid anti-inflammatory agent with a mechanism of action which is similar to that of allopathic ones. However, it doesn't cause side effects in contrast to allopathic nonsteroid anti-inflammatory agents. It can be applied in case of different inflammatory reactions including sport traumatism, bronchitis, gastritis and colitis.

EVALUATION OF SYNERGISTIC AND ANTAGONISTIC ANTIBACTERIAL EFFECTS OF HONEY, PROPOLIS AND ROYAL JELLY ON PATHOGENIC BACTERIA

No 8

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Some Honey, Propolis and Royal jelly samples were gathered in E. Azerbaijan province in the northern Iran and were taken in to the lab. All the samples were prepared separately. Propolis samples were taken with EEP through Soxhlet's method and EEP through the method excluding heat and the antibacterial effects of all pathogenic bacteria were evaluated.
After getting conclusion, all the three substances were blended with one another in different degrees and all the synergistic and antagonistic effects of them on the same bacteria were verified. In the first step, gel diffusion and Disk diffusion were considered in order to evaluate the antibacterial subsequences. MIC experiment was done on the registered ones. Antagonistic and synergistic subsequences of each combination were compared with other combinations. The resulted subsequences were outstanding.
Key words: Antagonist, synergism, Honey, Propolis, Royal Jelly antibacterial, MIC method

THE APITOX PROGRAM FOR NARCOMANIA TREATMENT

No 9

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The treatment of narcological addiction according to the "APITOX" programme is based on the bee venom use. The treatment consists of 2 stages: during the period of abstinent syndrome and during remission period.
During the period of abstinent syndrome application of apitoxinotherapy is possible due to:
- powerful analgetic effect of MSD-peptide and adolapin, which stimulate production of the endogenous opioid peptide and slow down the synthesis of prostaglandin E;
- sedative effect - melittine inhibits the incitement of the reflexogenous zones, prevents the nerve impulses conduction through the spinal cord;
- normalization of patients' physical condition (somato-vegetative stabilization), normalization of the metabolic processes, tissue microcirculation increase, blood reology improvement;

During the remission period apitoxinotherapy allows achieving:
- reduction of compulsion to the drug (the biogenic amine system and hypophisis epinophros system activation with the help of bee venom; apipsychotherapy);
- normalization of the mood and sleep (sedative effect of secapine and tertiapine; apipsychotherapy),
- reduction of asthenia, anxiety and stress.

For 3 years we've been studying the influence of apitoxins while having provided treatment for narcomania. Clinical observation have been carried out at 2 stages:
- in-patient observation (anamnestic data; clinical examination of the psychical, neurological and somatic states; the dynamics estimation);
- clinical observation during 1 year afterwards.

61 patients of the initial and middle stages of opiate addiction have been treated under medical observation. The data shows that the use of apitoxins along with existed method of abstinent syndrome treatment is more effective: reduction of the main symptoms of abstinent syndrome (somatic) has been observed with 75,4% of patients in 2-3 days. The psychic component of abstinence has lasted up to 10 days with 47,5 %, up to 3 weeks – with 37,3 %, up to 4 weeks – with 9,8 %. That improves the existing figures to some great extend.
The apipsychotherapeutic influence has been used as well at the stage of psychological dependence to have obtained remission with 44,3 % of patients up to 6 months, with 24,7 % of patients from 6 months up to 1 year.
The scrupulous clinical data analysis of the apitoxonitherapy use in treatment and rehabilitation of opium narcomania shows that:
- the use of apitoxins allows achieving quicker inhibition of the abstinent symptomatology during the drugs addiction and makes early psychocorrrective actions possible. It allows as well diminishing the doses of psychotropic remedy and lowering the chemical pressure on the Central Nervous System and liver, which is really important for concomitant hepatitis;
- psychical component of the abstinent syndrome (depression, dysphoria, asthenia, sleep disorder) during the treatment has been less evident; its dynamics have been more favorable than during the treatment exclusively with the adopted methods;
- the combination of psychotherapeutical and apitherapeutical influence has helped achieving more constant remission of the narcological illness

CHEMICAL COMPOSITION, ANTIVIRAL AND ANTIMICROBIAL ACTIVITIES OF ALGERIAN PROPOLIS

No 10

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Four Algerian propolis samples were investigated by GC/MS, 95 compounds were identified, 19 being new for propolis. Propolis (1) was characterized by the presence of 5% of caffeate esters; one of them is new to propolis. Propolis (2) was characterized by the presence 13.24% of sterols. Sample (3) contained 35% of benzoic acid. Sample (4) characterized by the presence of 32.44% fatty acid esters mainly for hexadecanoic and oleic acids, 11 of them are new to propolis. It was also characterized by the presence 13.24% of sterols, 4 of them are new to propolis. No flavonoids were detected, except 2 chalcones in Sample (3). That is the first time to investigate Algerian propolis from different localities.

The antiviral activity of Algerian propolis samples against avian reo virus (ARV), bovine ephemeral fever virus (BEFV) and infectious bursal disease virus (IBDV) was evaluated. All propolis samples reduced the viral infectivity in variable degree according to the propolis origin. Propolis sample 3 showed the highest activity against BEFV.
The antimicrobial activity against Staphylococcus aureus, Escherichia coli and Candida albican was also investigated. The propolis samples showed inhibition in the growth of the examined pathogens but the inhibition varied according to the propolis origin.

MANAGEMENT OF ALGETIC SYNDROME DURING BEE VENOM INJECTIONS

No 13

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Apitherapy has won the leading position in the treatment for too many different diseases, bee venom (especially bee venom injections followed by the apparent algetic syndrome) being undoubtedly of prime importance. This fact appears an obstruction while treating patients with low threshold of algetic sensitivity, and as a matter of fact it becomes an obstacle in treatment of children. Nevertheless sometimes it becomes necessary to increase effectiveness in order to achieve faster result, no matter how strong the activity of bee venom during injections is. Consequently we've worked out ways, which would allow managing the bee venom activity power and algetic syndrome.
The aims in view are as follows:
a) Influence on velocity of bee venom admission into the body during injections in order to manage algetic syndrome;
b) Distractive therapy
The methods are as follows:
1. Reduction of bee's activity with:
a) Thermal influence;
b) Reduction of dietary habits
2. Influential application of Krivopalov-Moskvin's Apparatus or other devices.
3. Multiuse of the bee sting:
a) During injections into the body;
b) In non-injective ways
4. Taking bee's age into account.
5. One-time bee venom injections into two or more body spots to increase algetic, reflexive and stress process.
This way of algetic syndrome management allows to:
1. Increase a coverage of:
a) Patients with pain fright;
b) Children
2. Alleviate pain, especially during critical situations connected with spinal and joints problems.
3. Adapt the human organism to bee venom under heightened allergy.

COMPLEX TREATMENT OF SENSORINEURAL HEARING LOSS BY BEESTING TO BIOLOGICALLY ACTIVE POINTS AND BEEKEEPING PRODUCTS

No 14

N. Khismatullina, Tentorium Apicompany

New method of sensorineural hearing loss treatment is still to be to found because up-to-date medical treatment of this progressive disease is ineffective and seen as a problem to be solved.
Apitherapy includes the use of different forms of honey, pollen, propolis, chitosan, ambrosia, royal jelly, and bee venom. The main principle of apitherapy is an influence of every beekeeping product upon the certain cause of sensorineural hearing loss. Due to some useful properties of bee venom to stimulate host defenses of human organism, to influence positively upon cerebral circulation and facilitate impulses transmission through nerve fibers, this apiproduct is applied in creams and in form of bee stinging to the biologically active points. Royal Jelly contains acetylcholine – a transmitter of nerve impulses, essential element of nerve system performance.
Clinical research carried out in a group of six patients, has given the following results: improvement of whispered speech perception from 1.5 to 4 meters, regular speech from 2 to 4,5 meters. Bone conduction increased by 8-13%. Before the treatment there were descending lines in audiograms of all the patients that is lesion of sound perception with bone-air interval 5-10 decibel. After the treatment cochlea reserve increased up to 15-30 decibel, all the patients performed improvements, such that ear noise reduced or disappeared, better sleep, appetite and general condition. The result was obtained in1,5-2 months after the first course of apitherapy.

HOW TO BUILD AN APITHERAPY SOCIETY?

No 15

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There are many advantages of being enrolled in an Apitherapy Society in comparison with staying in your own more or less isolated "tower":
- Better exchange of information through more frequent events like: Courses, Conferences, Symposiums, Workshops, meetings, etc.;
- Better "image", extremely important to start new projects at national scale (like building an Apitherapy Centre or convincing your National Health Department to start officially accepted Apitherapy Courses for

medical doctors and therapists;
- Better legal protection;
- Better communication with other similar Societies located in other countries/continents.

To create and build an Apitherapy Society, among the first and most important steps to do are:
- Increase the awareness of the general population on the importance for health of a constant use of bee products through as many as possible Mass Media presentations;
- Contact the best specialists in bee products you have in your own country to form a first "nucleus" of your future Society;
- Contact the best medical doctors and therapists you have in your own country and ask for their support and help;
- Write a draft of the future status (by-laws) of your Society using similar documents from other Societies;
- Do your best to get the best people on the Executive Board: a medical doctor (for the president position); a dentist, a veterinarian, a pharmacist and a beekeeper specialised in Apitherapy for the vice-presidents positions; an expert in editing medical journals + an expert in Internet (for your future website);
- Obtain the harmony among all these people by focusing on the main goals of the Society;
- Announce the first meeting of your future Society...!

A PRACTICAL EXPERIMENT USING BEE PRODUCTS ON OPEN LEG WOUNDS TO PROMOTE THE HEALING PROCESS

No 16

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Introduction: To demonstrate the use of bee products to promote healing in open infected wounds.
Method: Patient presented with two open wounds on the left leg following a road traffic accident. These started as deep grazes on the leg amongst extensive bruising throughout the leg. A couple of weeks post accident the wounds became infected and weeping, deepening into the soft tissue. It was decided at this point to use honey as a wound dressing to cleanse the infection and promote rebuilding of the subcutaneous tissue.
Results: Honey was placed in the wound and covered with an adhesive, Meopore (non-stick) gauze dressing. The dressings were changed daily with daily re-applications of honey. The infection was drawn out and within two weeks the infection had abated. Daily dressings with honey continued until a healing plateau was reached approximately two months from the original injury. At this point 0.05% alcoholic propolis tincture was added to the honey to stimulate healing. Honey and Propolis cream was also used on the surrounding skin to reduce soreness from the prolonged use of adhesive dressings. The upper wound healed after a month of this treatment but the surrounding skin of lower shin wound was very sore and had small open surface wounds. The use of Propolis was discontinued and the area only treated with honey and gauze dressings with minimum use of adhesive tape. The surface wounds healed after two weeks and it was then decided to use bee stings in the centre of the wound itself to stimulate blood supply and also the healing process. Propolis was also gradually re-introduced in cream form and the wound has continued to heal. Photographs were taken to record progress.
Conclusion: The conclusion that I have made is that the combined use of bee products stimulates open wound healing on all areas including those with minimum depth and blood supply. Experiments continue of other open wound situations.

APITHERAPY IN ROMANIA – A REVIEW

No 17

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At the beginning of the sixties, what we call now the Romanian Apitherapy or the Romanian School of Apitherapy, had as a starting point the ideas of prof.dr.V.Harnaj- president of Apimondia between 1965 and 1985 – and the enthusiasm of a group of specialists in chemistry, pharmacology and medicine who succeeded to define the bee products for both their chemical composition and pharmacological actions and to put thus the basis of a new medical branch.
The actions of each of the collected or secretion products in the bee hive that were defined and supported by laboratory clinical and paraclinical data, made it possible to create formulas with specific actions in the treatment of some human diseases. More than 40 formulas of apitherapeutical products were prepared in the production department of the Institute for Beekeeping Research and Development in Bucharest. All these products were accepted and appointed as medicines by the Ministry of Health. Thus, a new a prospective was open and the first Medical Centre of Apitherapy in the world was founded. This Centre functioned and still functions as a polyclinic with all the medical specializations. Under the management of the institute, the specialists of centre carried out several research projects at the level of the Academy of Medical Sciences. The encouraging results had also open the gate to a new approach – the preparation of more than 30 specific formulas of nutritional supplements used in complex treatment protocols. The new exigencies related to the adhesion of the country to the E.U., led to the implementation of a modernization programme consisting in the introduction of the GMP regulations and the accreditation of the laboratory for the quality analysis of the bee products, two important objectives that will be completed by the end of this year.

APITHERAPY IN THE TREATMENT OF INFANTILE CEREBRAL PARALYSIS (ICP)

No 18

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ICP might be characterized by absence of any treatment for it up till now, some methods for rehabilitation being known just as a part of the general physical rehabilitation, which corrects locomotive abnormalities only.
Some years ago we developed a new approach for solving the problem within the framework of the program "APITOX" based on the application of bee venom fractions; it allows applying therapy and rehabilitation simultaneously during the reasonable period of hospitalization.
We'd like to introduce an absolutely new approach for the treatment of ICP based on applying of apitoxinotherapy in combination with apikinesitherapy, including medicines prepared on the basis of pollen, honey, herbs, propolis and royal jelly along with a special rehabilitation complex.
Aims of the treatment are physical and psychic medical rehabilitation of ICP patients.
Physical rehabilitation allows improving of locomotive abilities of the patient due to:
- Rehabilitation of normal muscle tone of limbs;
- Correction of contracture and deformity of limbs;
- Destruction of old and habitual motor skills;
- Formation of new range of motions;
- Fastening motor skills acquired during the period of treatment.

Psychic rehabilitation improves mental power of the patient due to:
- Improvement of enunciation;
- Improvement of memory;
- Normalization of cerebral blood flow and metabolism.

Other aims of the treatment:
- Reduction of spasmodic attacks frequency;
- Removal of hyper excitability;
- Increase of protective strength of organism;
- Normalization of metabolism.

An integral part of the treatment, which allows achieving significant results, is apikinesitherapy (that is combination of apitoxinotherapy and exercise therapy along with mechanical and reflector actions). Physical power extends due to: muscle hyper tonus reduction under influence of melittine; owing to adolapine's analgesic effect; fastening of new skills owing to central stimulating action of apamin; improvement of metabolism in the muscular tissue.
The effectiveness of the therapy was estimated with clinical observation (psychomotor development including locomotive activity, muscular tonus and somatic status). During 4 years 23 ICP patients have been provided with the treatment by means of this method; 18 children of 1 to 14 years old and 5 grown-ups over 18 are among them. There were 14 patients with spastic form, 3 – with dyskinetic, 6 – with mixed form. We got the following results:
- 21 patients improved their motor abilities
- 2 of them have got somatic status improved with no progress in movements.

Clinical observation showed that spastic form of ICP responses to the treatment better than others.
The "APITOX" program of ICP treatment allows:
- first, providing treatment and rehabilitation simultaneously,
- second, providing psychic rehabilitation and improving the quantity of psychic development.

ANTIOXIDANT ACTIVITY OF SAMPLES OF PROPOLIS FROM THE STATE OF BAHIA IN BRAZIL.

No 19

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Among its many therapeutic activities, propolis is studied for its antioxidant properties. Propolis from the northeast of Brazil has only recently begun to be studied and not much is known about its composition and activity, which is determined by the geographic and plant origins of its resin. Methods that determine the antioxidant activity of natural products often use expensive and / or toxic reagents. The purpose of this study was to test simple and safe methods for this determination and to identify components with antioxidant activity.
Samples of propolis from hives placed in the same area in Cruz das Almas, Bahia, Brazil, and collected in different months during 2003, were compared with samples from other regions. The antioxidant activity was measured by two different methods: a) discoloration of potassium permanganate solution and b) potentiometric titration using cerium sulphate. Triplicates of all samples were analysed by both methods and the results compared. Thin Layer Chromatographic plates of the samples were sprayed with the potassium permanganate solution to observe the areas where discoloration occurred; compounds from these areas were later isolated by preparative TLC and identified by negative mode Electrospray Ionization - Mass Spectrometry (ESI-MS). The areas of discoloration on the TLC plate were mainly in the area were less polar compounds are found. This result was different from green propolis from the southeast of Brazil and red propolis from other regions of the northeast. Compounds of m/z 373, 401 and 469 were isolated from these areas. Tandem MS studies of compounds of m/z 373 and 401 show their structures are similar and possibly come from the same plant source. The results of both methods showed a direct, but not linear correlation. The samples that took the longest time to discolour the potassium permanganate

used the lowest volumes of cerium sulphate, and vice-versa. The lack of linearity was probably due to the inherent imprecision of the potassium permanganate method, which depends on a person with a stopwatch to measure the time of discoloration (a subjective parameter). The titration was more precise.

COMPARATIVE STUDY OF IN VITRO METHODS USED TO ANALYSE THE ANTIFUNGAL ACTIVITY OF ETHANOLIC EXTRACT OF PROPOLIS AGAINST TRICHOPHYTON RUBRUM AND T.MENTAGROPHYTES

No 20

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A broth microdilution method following the recommendations established by the National Committee for Clinical Laboratory Standards (NCCLS) and agar dilution method were used to compare the in vitro activity of propolis with that of itraconaole (ITC) against 29 clinical isolates the dermatophytes belonging to two different species of Trichophyton. In terms of MICs, ITC showed greater activity than propolis. MICs of propolis at which 50% (MIC50) and 90 % (MIC90) of the isolates were inhibited were 0.1 mg/ml and 0.2 mg/ml, respectively. Propolis merits further investigations as a potentially useful agent for treatment of dermatophytosis and the broth microdilution and the agar dilution methods were good agreement for propolis against dermatophytes. Moreover, the study suggests the potential value of the broth microdilution as a convenient alternative method for testing the susceptibilities of dermatophytes to propolis.

Key words: Propolis, dermatophytes, Trichophyton spp., itraconazole

POSSIBLE USE OF APITOXINS IN NORMALIZATION OF ALCOHOL DRINKING

No 21

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In 1995 a program was worked out to let people with the alcohol abuse and alcoholism not to give up drinking alcohol completely but to rehabilitate destroyed functions. As a complete compensation of the alcohol for the organism we offer apitoxins (components of bee venom), that influence the main mechanism of addiction development – catecholamines exchange by means of hypophysis-epinephros system activation. Besides by managing the opioid peptides production apitoxins remove primary and secondary inclination to alcohol, normalize alcoholdehydrogenase exchange and improve trophic process. A new conditioned reflex for taking control of alcohol use is being built up.
The objectives are: changing of organism's needs of alcohol; creating new psychological attitude towards alcohol; molding of the self control.
The effectiveness of the treatment has been estimated by the absence of alcohol excesses during 6 months, 1 year and 3 years periods after of the program was finished.
4300 patients have been treated during 10 years, and 679 of them have been observed. They were divided into 2 groups: 412 men with alcohol abuse, 267 men with alcoholism.
The effectiveness of the programme of the dosed usage of alcohol

Groups	Remission 6 months (%)	Remission 1 year (%)	Remission 3 years (%)
Alcohol abuse	84,9	77,9	69,9
Alcoholism at 1st and 2nd stages	79,9	69,8	55,1

As a conclusion we can say that:
Either at the stage of the alcohol abuse or at the stage of developed alcoholism the normalization of the alcohol use is possible.
Use of apitoxins increases the possibility of the normalization process.
At the first stages of alcoholism normalization without apitoxins would be rather difficult because of absence of any compensation.
At the stage of the alcohol abuse normalization is the most effective preventive measures of alcoholism.

CHEMICAL CLASSIFICATION OF BRAZILIAN PROPOLIS: A WAY TO OBTAIN STANDARDIZED NATURAL MEDICINES USING THIS BEE PRODUCT

No 22

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This work is about a process to classify different kinds of chemical compounds in Brazilian propolis from different regions, using HPLC and GC-MS. It was possible to establish chromatographic methods to identify and quantify different chemical compounds in Brazilian propolis. After analyzing more than two thousand samples, and using the multivariate analysis, we found three majority groups. Group 1, named BRP (Brazilian prenylated compounds) with a lot of prenylated compounds (p-coumaric acid derivatives, including

Artepillin C) including caffeoylquinnic acids. The sub-groups were stablish based on differences between the concentration of chemical markers, such as: high content (BRP-X), intermediate 1 (BRP1), intermediate 2 (BRP-2) and low content (BRP-3). This group includes another sub-type named BRP-PR. Group 2, named BRG with vanillin, aldehydes and coumaranes. Group 3, called BRPG is a mix between the first and second group, with chemical compounds from group 1 and group 2. This classification was comproved by mass spectra technique. With this classification it is possible to establish quality control of all products elaborated with Brazilian propolis. Now, we are including propolis from other regions in Brazil inside the classification. This research was supported from FAPESP: 95/09606-5 and 00/10031-0.

NEW NEEDED QUALITY REGULATIONS FOR THE PRODUCTION OF APITHERAPICS

No 23

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In a world increasingly polluted physically, chemically and biologically the stringent need for new quality regulations in the production of bee products for Apitherapy/medicinal use is obvious.
There are still too many beekeepers that use in an excessive or inappropriate manner various chemicals to treat or prevent various bee diseases...
So, we can say that we have an external, environmental, pollution and an "internal" one, made by some of our own beekeepers...
Many beekeepers and/or processing companies still do not know very well how to protect the active/useful ingredients from their raw bee products, preparations or final products, by exposing them for example to light, selling the final products in transparent jars or packages. Such products can be used for their still good nutritive qualities, for healthy customers, but they have smaller chances to heal or prevent diseases in humans and/or animals.
A list with the most important rules and principles to be applied in Apitherapy related Apiaries, but also by the processing companies will be presented, for analysis and discussion, during the Congress.
If a general consent will be achieved, we will propose that our new German quality related regulations to be used in the future not only by the members of the German Apitherapy Society but by all interested people in getting better results from a modern Beekeeping and a more effective Apitherapy.

NEW APITHERAPEUTICS IN ROMANIA

No 24

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Whether pure secretion products (royal jelly) or collected products (pollen, propolis, honey), bee products offer to the human body, some of the richest spectra of biochemical compounds with nutritive, functional and therapeutic actions.
Based on the biochemical and pharmaceutical studies carried out within the Apitherapy Centre in Bucharest, belonging to the Institute for Beekeeping Research and Development and on several clinical trials that have already proved their action, some formulas of balanced nutritive-functional supplements as well as medicines were developed during the last years. Thus, beside bee products (royal jelly, pollen or pollen extracts, propolis - as soft (spiss) extract and honey) plant lecithine, mineral salts (calcium, phosphorous, kalium) and an extra supply of vitamins, were used to potentiate their actions. These food supplements (Apivital, Vi-fort, Meltonic) are especially designated to regulate the metabolic processes in both healthy organisms and those affected by several deficiencies generated by pathological processes or suffering the effects of special environmental and working conditions. In their turn, medicines have their special destination and new formulas were developed or old formulas were improved according to the new technologies and demands from EU regulations.

STANDARDIZATION OF PRODUCTS OF THE HIVE

No 25

R Domergo. Standing Commission for Apitherapy, Apimondia Executive Council

Standardisation des produits de la ruche

Dans pratiquement tous les produits de la ruche aucune standardisation n'a été mise en place. Seul, le miel, par le Codex alimentarius a une grille bien définie pour sa commercialisation et sa consommation. Tous les autres produits n'ont que des criteres toujours succints d'habitudes mises en place par le marché. Aucune grille de standardisation n'impose une qualité que ce soit pour la propolis, la gelée royale, la cire, le venin ou le pollen.

Nous mettons en place, dans cette publication, une approche de raisonnement qui permette de rationaliser la standardisation nécessaire des produits de la ruche qu'ils soient à destination alimentaire et encore plus pour leur utilisation thérapeutique. Dans cette partie, les travaux de la Commission d'Apith_rapie, en particulier à Cuba, ont montré la nécessité °© lors de l'écriture de protocoles de traitement °© la nécessité de la

standardisation à des fins de quantification, de stabilité et de reproductibilité.

Dans ce monde presque 40% des miels sont testés positifs aux antibiotiques et/ou aux pesticides. La nécessité d'une grille de standardisation est encore plus éloquente.

Mots-clé : standardisation, produits de la ruche, tous les produits, apithérapie, protocoles,

Liste des publications et références sur demande

ROLE OF BEEKEEPING IN POVERTY ALLEVIATION: MARKETS AND MARKETING OF BEE PRODUCTS IN TANZANIA

No 26

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During October 2003 to June 2004 a study was carried out in ten urban centers to determine marketing of bee products, honey in particular, in Tanzania. The study was conducted using semi-structured questionnaires and direct observations. Although awareness of honey was generally high throughout the study area, honey availability was generally low, ranging from 5.3% to only 53% of all market sources namely hotels/ restaurants, supermarkets, retails shops etc. Honey as food and medicine were the main uses recorded, with Tabora Region being the main source of honey available in the market in Tanzania. There are no public announcements on honey in all except two urban centers surveyed. The results are discussed in the context of a need for beekeeping playing a role in poverty alleviation in Tanzania.

PARTICIPATORY ACTION RESEARCH AS A BEEKEEPING DEVELOPMENT STRATEGY

No 27

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Introduction: The paper explores the importance of a Participatory Action Research approach to beekeeping development in Africa
Methods: The paper discusses the author's experience and observations of beekeeping development in Eastern Africa over the past 12 years.
Results: New ideas and knowledge generated, documented and shared.
Develop the confidence of target groups.
Innovation promoted.
Empowerment, self-reliance and sustainability promoted
Discussion: We as beekeeping development workers, frequently set out to 'train' in beekeeping/beekeepers. However we must recognise the importance of already existing knowledge and skills amongst communities in beekeeping. Frequently development workers ignore th good in front of them in the rush to introduce 'modern' beekeeping methods. So much is not know about beekeeping in Africa – we cannot wait for researchers t assist us. We, as beekeeping development workers, in close collaboration with rural communities, must becom our own researchers to tap into this existing wealth of knowledge. We must also facilitate the generation of new knowledge and ideas. This old and new knowledge/experience must be documented and shared with others so that we can all learn from each other. Participatory Action Research is an appropriate beekeeping development strategy in Africa.

BEEKEEPING IN TANZANIA: WHEN THE BEES GET OUT OF THE WOODS. AN INNOVATIVE CROSS SECTORAL APPROACH TO COMMUNITY BASED MANAGEMENT OF NATURAL RESOURCES.

No 28

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The present trend in Community Based Natural Resources Management (CBNRM) had lead to a focus on research of alternative economic activities to the destructive and environmental detrimental practices of slash and burn agriculture, forest clearing and poaching that occurs in most of the rural areas in Africa.
The development of activities linked to the so called non timber forest products (NTFP) has received considerably more attention and support than previously from financing organizations, cooperation agencies and national public agencies in charge of natural resources management. The promotion of those environmental friendly but productive activities are now widely recognized as being among the good practices that occur in this field. Nevertheless, little has been finally done.
While focusing on the subject, it appears that beekeeping is often quoted as being one of those particular activities. A lot of Integrated Conservation and Development Projects (ICDP) Initiatives include it in a number of other "alternatives activities" that should be supported and promoted in the course of the project life. But few examples relate more than an experimental or demonstrative experience that have generally fallen short within expectation regarding the socio-cultural (appropriation of new techniques) and economical sides (profitability) of the issue.
We will present the first lessons of an initiative supported by NORAD in central and western Tanzania that shows interesting findings regarding both conservation and development issues and links.

We will first make an assessment of the current situation of beekeeping in Tanzania, its opportunities and constraints, then, through the case study of MNRP/NORAD project, we will try to identify the key elements of a successive approach to cross-sectoral beekeeping.

HONEY QUALITY AS AFFECTED BY HANDLING, PROCESSING, CHANNELS OF MARKETING AND OTHER CONSTRAINTS TO BEEKEEPING

No 29

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We report the factors that affect honey quality in a pioneer study representing the national outlook. A total of 120 beekeeping households were randomly sampled in four districts, one representing each of the four geographical regions of the country, and a questionnaire was administered to each. Processed honey in both branded and unbranded forms was sampled across supermarkets, hawkers and stall markets along four transects across the capital city. Honey quality parameters assessed were moisture content (MC), free acidity (FA), diastase number (DN), hydroxymethylfurfural (HMF), and water insoluble solids (WIS), using recommended methods. Over half of beekeepers were 40 years and above, and across ages, males were predominant (77%). Honey was the major hive product (93%) and was mainly for sale. Majority of beekeepers kept traditional hives. Pressing of combs, boiling and straining were the predominant honey processing methods. Beekeepers reported that honey quality was mainly compromised by harvesting immature honey, poor extraction and storage methods and contamination by extraneous materials. The main constraints to beekeeping were lack of appropriate equipment (52%), lack of transport and poor rural infrastructure, inadequacy in skills due to weak extension service, bad weather and vermin. Significant differences ($P < 0.05$) in HMF and DN were observed among the five honey brands. All brands met National and Codex Alimentarrius MC and WIS standards while most failed in HMF and DN. For the European Union market, 40% of the brands would qualify in HMF and 20% in DN. Strong correlations were observed between HMF vs. DN ($r = 0.94$) and MC vs. FA ($r = 0.56$). Supermarket honey was more superior ($P < 0.05$) in DN (5.07) and WIS (0.1%) than stall markets and hawkers. Honey from all the retail groups qualified for all standards only in MC while DN and WIS were major tailbacks to quality. Diastase, HMF and WIS levels are all management related hence, farmer training and extension in proper honey harvesting, handling and processing should be strengthened. Quality monitoring at all levels especially processing, should be emphasized.

DEVELOPMENT OF APIS CERANA BEEKEEPING WITH ETHNIC MINORITIES AND SMALL FARMERS IN VIETNAM

No 30

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The project was carried out from 2004 to 2005, in the provinces of Thai Nguyen, Hoa Binh, Thuathien-Hue and Cat Ba Island. Main objective of the project was to increase income opportunities among ethnic minorities and small farmers through intervention in the technical, economic and ecological aspects of beekeeping. In 2004, the project had successfully conducted an advanced training workshop for 15 local key technicians and the staff of BRDC, four technical training courses in beekeeping for 90 local farmers, supported 260 beehives to beekeepers and training apiaries, beekeeping tools, technical consultancies and training apiaries in four project sites. Trainees learnt beekeeping techniques three times per month from local key technicians and learnt each other by seeing and doing in the apiaries. Thanks to these supports, the beekeepers of the project have got good opportunities to learn and improve their basic advanced beekeeping techniques in the village and commune scales. They also took a field investigation on floral resources for bees in their areas and made a floral calendar for their beekeeping through the year Therefore, by the end of 2004, almost beekeepers maintained well their beehives and collected much honey. Total number of beehives and bee combs were increased 19% and 8% respectively, compared to those at the beginning of the project. They also collected 1,328 kg of honey and their income was 276,442 VND (=18 USD) per hive. This confirms that the project is on well progress and has got some fruitful achievements. However, the knowledge and skills of the beekeepers are not sustainable. Therefore, it is necessary to have follow-up supportive activities to upgrade their experiences and skills, so that they can run their beekeeping better and get more income for their family life.
Key words: Ethnic minorities, small farmers, Apis cerana beekeeping.

BEEKEEPING AN ALTERNATIVE LIVELIHOOD OPTION IN THE WESTERN GHAT REGION OF KARNATAKA, INDIA

No 31

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Beekeeping with Apis cerana indica, wild honey harvesting from Apis dorsata, some efforts of introduction of Apis mellifera and its problems, beekeeping extension, alternative income generating and outreach activities have been analysed during 2003-04. Information pertaining to the role of beekeeping cooperative societies in bee management practices, training, procurement of honey, its marketing and income generation have been analysed and discussed. In addition to beekeeping a traditional rural employment generating activity, people were also involved many crafts including collecting minor forest produce for which market support was provided by Large and Multipurpose forest produce cooperative societies and its federation. The number of beekeepers, type of beekeeping activity, methods of honey collection, harvesting, processing, value added products has been obtained and the results are also being discussed.

FOREST BEEKEEPING SYSTEMS: KNOWLEDGE AND CHALLENGES TO INDIGENOUS COMMUNITIES IN NILGIRIS (WESTERN GHATS) INDIA

No 32

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The indigenous community collects honey from Apis cerana bee colonies – this has been a long time traditional / seasonal activity. This activity has a strong cultural, economic and ecological linkage for centuries together in the mountain ecosystem. The natural cavity beekeeping - collecting system supports their livelihood for three to four months by selling honey to other mountain communities. The activity starts by November by cleaning all traditional cavities and fixing the cap stones for the safety of nesting structures. These special nesting sites will be recognized and occupied by Apis cerana bees in late November. The honey collector visits tree cavities during mid-February and begins honey collection by drawing out few honey combs, again visits two weeks later for the next round of collection. Bees migrate during monsoon, the honey gatherer exactly track on which side of the hill slopes the bees fly and next November again the activity continues. This forest-beekeeping practice has been going on from generation to generation. Structures are treated as family properties and livelihood sources and passed on from father to son. Cultural linkages and practices in forest-beekeeping are being tried to pass on to younger generations. This binds the community socially. The first harvest is always offered to forest deities – praying for profuse yield, supplies to other mountain living communities as medicine, offering, food and rituals. The people earn three to four months by selling honey – this takes care of six months livelihood needs.

Protection of ecology is a tradition: bee plants are protected; forest patches are protected where cavities are located. Songs and stories are passed on the younger generations about bee flowers, seasons, bee pollination on forest flowers & indicators of natural eco-systems.

The threats and challenges to the Indigenous Forest-Beekeeping Systems:

- Changes in forest policies: declaring wildlife reserves, a sanctuary prevents the community to access honey resources and losing ancestral domain.
- The raiding of cavities by Non tribal community who do not understand the ecological and social linkages.
- Introduction of exotic bees, Apis mellifera, by Government agencies, who are not familiar with tribal economics and technology.
- Hive beekeeping systems require larger extent of management which is lacking.
- Constant reduction of forest areas affects natural bee habitats and foraging.
- The extensive usage of chemical inputs, change in crop patterns by agrarian community's limits foraging and danger to bee forage.
- The lack of an organized marketing structure & unfair price for honey by co-operatives.

Due to these issues – which are often beyond the control of Indigenous Communities – the younger generations do not continue as forest-beekeepers or honey gatherers and migrate to other areas for non-traditional occupations. This trend is an intrinsic threat to the sustainability of the forest-community – losing their traditional livelihoods and losing their linkages to ecology and local society. They become wage-gatherers and ecological refugees in an urban world.

RAFTER BEEKEEPING IN CAMBODIA WITH APIS DORSATA

No 33

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Western beekeepers are familiar with honeybees, bumblebees and solitary bees. However, Asia adds a whole new dimension with its own particular species of honey bees, several of which build a single comb in the open air and protect it with a curtain of workers.

One such, Apis dorsata, the giant honeybee, suspends its large combs from a tree branch. Colonies migrate to take advantage of the nectar flows, returning to the same bee tree season after season. However, in various areas in the region, notably the Mekong delta in Vietnam, deforestation has removed the large trees, leaving the colonies with nowhere suitable to build their nests.

Rafter beekeeping has been reported in Vietnam, Malaysia, West Kalimantan in Indonesia, Little Andaman in India, and Myanmar. A long pole is supported on uprights at each end, 2-2.5 m from the ground. The rafter is set at an angle of 30-40°, inducing Apis dorsata

colonies to take up residence. Honey collectors then harvest brood and honey.
In October 2003, rafter beekeeping was recorded for the very first time in Cambodia. The tradition here goes back many generations and appears to have developed completely independently of other beekeeping traditions. Many families of subsistence farmers in the area are involved. Rafters are set out in the low shrub. Each is protected on all but one side which serves as the bees' flight path at the upper end of the rafter. Colonies build comb, rear brood, and collect and store honey and pollen.
The harvest was recorded for the very first time in March 2004. A crude torch is made from green foliage to smoke bees off the comb. The honey and brood are removed separately. Honey is squeezed at home by hand, bottled and sold by the litre to middlemen for re-sale in the urban areas. Brood is cooked and shared among family and friends or sold to others in the village. Wax is rendered and sold by the kilo to middlemen.
We report the first record of rafter beekeeping in Cambodia. Sustainable honey-harvesting methods are now being encouraged allowing several harvests per year; the first taking place on 29 January 2005.
Further progress of sustainable rafter harvesting will be reported.

FAO'S ACTIVITIES FOR PROMOTION OF BEEKEEPING FOR RURAL DEVELOPMENT

No 34

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Technical and development activities in apiculture are handled by the Food and Agricultural Engineering Technologies Service (AGST) in the FAO. The work of FAO for apicultural industries for rural development aims to serve FAO member countries through assistance in formulation and execution of field projects, information and technology transfer, and promotion of beekeeping as additional income and employment opportunities in order to enhance livelihoods of rural population. AGST has been involved in executing 59 projects in 46 countries (2000 ~2005), in three funding categories, namely Tele-Food Programme (TFD), Technical Cooperation Programme (TCP), and Trust Funds (TF). FAO's work under the regular programme and field projects will be introduced, in addition to presentation of guidelines for preparation of TFD and TCP proposals.

GOOD AND BAD EXPERIENCES FORM BEEKEEPING PROJECTS – A SLIDE LECTURE

No 35

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During the last 14 years Danish beekeeping projects have taken place in both the tropics as well as in the arctic.
All projects have had the purpose either to support local industrial development or to secure a better pollination of tropical crops. All projects have taken the local conditions in consideration, been using local materials if possible and drawn on local beekeeping knowledge. In spite of this, the results of the projects have been quite different. The lecture deals with some of the reasons for success as well as reasons for failure.

SUSTAINABLE RURAL DEVELOPMENT THROUGH APICULTURE

No 36

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ORDSE is implementing apiculture as optional school subject in Moldovan orphanages with gymnasium level teaching. At the moment apiculture is taught in 10 rural orphanages. 400 children benefit by the apiculture project. During 3 academic years the students follow 500 hours of apiculture sessions: theoretical sessions, practical courses and laboratories. The theoretical sessions and laboratories take place in Apiculture Learning Classrooms supplied with teaching aids, demonstrative equipment and tools. The practical sessions take place at school apiaries organized for this reason. Biology professors, who are beekeepers in the same time, conduct the lessons according to specially elaborated curriculum. Apiculture textbooks, notebooks and visual aids are elaborated for boarding schools. Produced honey is used for children food.
In the frame of the second apiculture project ORDSE sustains Moldavian beekeepers to rehabilitate their bee yards in order to market honey and other produces of the hive. This financial support benefits 100 beekeepers from 10 rural districts. Mostly young associated beekeepers are involved. Along with increasing honey production the main aim is to advise rural beekeeping farmers in sustainable modern bee farming techniques and management. We pay a considerable attention to instructing hivers in the diversification of bee products. There is an important unexploited potential to produce nutritional supplements and medicines. The beekeepers and the consumers have to know most of the bee products show important antioxidant properties due to a large series of natural non – enzymatic compounds. In this way ORDSE promotes the beekeeping business as a sustainable income source in rural localities of Moldova.

A RURAL DEVELOPMENT PROJECT IN A MOUNTAINOUS AREA OF TURKEY

No 37

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The Eastern Black Sea Region of Turkey is a mountainous area. The Camili (Macahel) basin is in the province of Artvin borders the state of Georgia on the eastern edge of the Black Sea Region. The Camili area is socially and economically underdeveloped. To overcome this conditions, a rural development project was geared towards improving the local economy by creating new resources, providing basic social services, and increasing awareness among the local people about protecting biodiversity. Initiated in 1998, the project was implemented by the TEMA Foundation, a non-profit NGO in Turkey. Queen bee production and ecotourism were promoted as new sources of income for the region. Caucasian bee (Apis mellifera caucasica) species lives only in the Camili region of Turkey and genetically pure. The TEMA Foundation considered this an important factor in the success of Project. On initiation of the Project in 1998, volunteers among locals in the basin were trained in queen bee production for 3 months. These producers then received subsidies to set up queen bee production enterprises. Artificial insemination laboratories were established. This management has been continued by the TEMA Foundation since initial of the Project. As a result of successful management of queen bee production in 2004, 23 families earned an income of $105.000 from the production of 7000 queen bees. Income per family, $700-1.000 annually prior to Rural Development Project, increased by a factor of 5 or 6 for individuals involved in queen bee productions. The people of the area appreciate the benefits of the project, since the Rural Development Project has brought economic vitality to 6 villages. The project has also being supported by Central Finance and Contracts Unit (CFCU), EU with 130.000 Euros due to queen bee production education of additional 60 young villagers. With this 60 new producers total number of queen bee producers reached to 83. In 2005, a production goal of 20.000 queen bees is expected with an income of $300.000.

CURRENT STAGE AND PROSPECTS OF BEEKEEPING INDUSTRY OF ARMENIA

No 38

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The Armenian beekeeping sector produces high quality honey, which is a traditional agricultural activity for many Armenians in the rural regions. Natural nectar, honeydew and pollen sources are mostly gathered from chemical-free Alpine poly-flora, which provides the specific taste and flavor to Armenian honey. However, beekeepers have been isolated from many improvements that occurred in the beekeeping industry in recent years, resulting disease problems in the bees, lack of a diversified genetic base, and lack of queen production capabilities.
To address these issues "Multi Agro" Ltd, one of the biggest apiary farms in the country, conducts couple of research projects in Armenia on genetic improvements, hive management, bee disease control systems through IPM, economic analyses of beekeeping, etc.
The "Train-the-Trainer" program was designed to train Armenian beekeepers in appropriate beekeeping technology and techniques to be disseminated to the general beekeeping community in Armenia. The program is being successfully implemented in Armenia now.
The leaders of beekeeping industry are re-instituting a national queen-breeding center in Armenia to speed up the enhancement of the genetic pool with more productive traits, where quality breeder queens can be produced and sent to production queen breeders in local areas. In turn, the local production queen breeders will distribute production queens to the beekeepers in their areas and will also return the best of their production to the national center where they will be evaluated for continual up-grading of the breeder queen genetic pool
In October 2004, regional Armenian beekeeping associations established the "Armenian National Federation of Beekeepers". "Multi Agro" is a proud member of the Federation and works together with them to realize the prioritized objectives mentioned above.

TRADITIONAL HIVES IN IRAN

No 39

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Introduction: Iran with a long history in beekeeping has about three million colonies which 370,000 of them are traditional hives. Most of traditional hives are in north, north-west and west of Iran. The climate in north is moderate, the humidity is high, and the weather in west and north-west is cold and mountainous.
Methods:
We researched in six provinces of Iran and we found different types of traditional hives and prepared digital photos.
Results:
The traditional hives have different shapes and most of them are trunk hives, the other shape of hives is ceramic hives, In addition, basket forms of hives, and wooden hives.

Basket Hive

Ceramic Hive

The average production of honey in these hives is 6 kg per year.
This hives have some advantages and disadvantages, which will be explained.
There are different pictures, which will be sent in future.

STUDY ON STEADY STATE OF BEE KEEPER IN IRAN WITH RESPECT TO ALL CAPABILITIES AND INHIBITIONS

No 40

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Iran with 164,000 km2 areas has different potential such as 1.3X108 hectares forest and 14 x 106 hectares farm. In Iran near 50,000 beekeepers and more than 2X106 beehives are estimated and near 20,000 tones of honey per year are produced by these number of bee keepers. This much honey production between our neighbor countries is acceptable but if we look at to the development countries this much production is very less. In this study we have focused on all problems which caused less production of honey in Korasan as a biggest province of Iran. We analyzed some important cases such as management, government policy for honey production and all related rules. The study was preformed in two stages. In the first stage 23 beekeeper cooperations were selected and asked them to fill a questionnaire. After analyzing the filled forms we have found that the most important difficulties for cooperations and the beekeepers are marketing, education, continuous drought and office problems. In the second stage we focused on all rules regarding to production and marketing, duties of each related office and operation of different government offices related to this industry. The results showed that all beekeeper difficulties in this area are because of unstable policy, some times wrong legislation, old rules and operation of the rules. Finally we suggested that a solution for these all problems is right revenue of the rules by government and non-government offices related to honey production.

BEEKEEPING IN THE ANDES: A PROPOSAL FOR QUEEN BEES REARING.

No 41

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Among the 3,000 and 3,500 meters above the sea level, in the Mountain Range of the Andes, among Peru, Ecuador and Bolivia (South America), a very particular beekeeping is developed. It is conditioned by climatic and geographic factors. The Production Season takes place in heavy-raining months, short spring, and long drought periods, in which temperature drops up to 0° C. Likewise, the difficult terrain and the few asphalted ways make the work more difficult.
The Andean settler has incorporated beekeeping as a complementary activity to his daily labors; among them we can mention agriculture, livestock, etc.
He takes the advantages of flora resources (in many cases, native) for the honey and pollen production and in less quantity for the royal jelly, propolis and wax production.
After a diffusion process of the beekeeping activity, we consider that the improvement of productivity is an objective of priority. For that purpose, we have adapted the modern beekeeping exploitation techniques to our conditions.
Some considerations that have been taken:
The European and American traditional techniques are not fully successful in the particular conditions of the Andes. For instance; in the Inter-Andean valleys, the temperature outside the hive endangers the colony when traditional methods, as the "swarm box", are applied.
Beekeepers have limited access to printed material about Queen Rearing.
There is a necessity of developing the beekeeping techniques in the Andes for being in better competitive conditions.
Canalize the ingenuity and creativity of beekeepers (most of them self-taught) in order to revaluate their ancestral knowledge of nature
We have adapted a method for the intensive queen rearing having as a starting point the "swarm box" technique. This new method is taught to the Andean beekeepers because it is simple and beekeepers can afford to it.
The objective is to create queen bee lines with the desired characteristics: hygienic behavior, mite resistance, adaptation capacity to specific climatic conditions, productivity, among others.
These technical adaptations are part of what we want to understand as sustainable development.

IMPORT RISK ANALYSIS AND THE HARMONISATION OF SURVEILLANCE AND DIAGNOSTIC METHODS

No 42/43

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Global activity has intensified in recent years, and we now live in a global economy with trade and international exchange increasing all the time, both in terms of means

of transport and its speed. Trade in honeybees and hive products are governed by the Sanitary and Phytosanitary (SPS) under WTO. Under this agreement the OIE (Office International des Epizooties) is recognised as the relevant international organisation for developing standards, guidelines and recommendations relating to animal health. The aim of this agreement is to ensure that SPS measures are applied only to the extent necessary to protect human, animal or plant life or health, i.e. they do not constitute a disguised restriction to international trade. Trade is therefore based on managed or acceptable risk, rather than zero risk, and these agreements should permit commerce to be done more safely by reducing the risks. The trade is permitted unless there are valid scientific based grounds for restricting it. Risk Analysis is a systematic aid to decision making in support of this process and is used to examine the risks associated with import and export of commodities such as honey bees, inform import policy and pest and disease control strategies. The robustness of the risk analysis depends on the available data both in the exporting and importing country. The accuracy of these data will depend on the level of and standards and systems of surveillance employed, the sensitivity of the diagnostic methods used by the appropriate authorities responsible for bee health policy and disease control. Furthermore, any bee or bee product import policies, which may include prohibition recommendations on honeybee imports, based on the apparent absence of a pest or pathogen needs be supported up by robust surveillance data. An important element of this is a standardized approach to both disease diagnosis and surveillance for pests and diseases. A diagnostic tool that CSL routinely uses for disease identification and surveillance is TaqMan real time PCR. This approach allows delivery of very rapid, comprehensive and large scale testing services for beekeepers or and in the case of survey work to regulatory bodies.

SENSE AND NECESSITY OF HARMONISATION OF DIAGNOSTIC METHODS

No 44

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In Germany, a federal state, the organisation of veterinary services is decentralised. The great advantage of the non centralised structure is, that a competent local authority involves veterinarians in diagnose and control of infectious diseases, directly. Especially, in cases of bee diseases or questions on bee keeping a bee specialist is assisting. To ensure correct diagnostics within a federal system, a high level of standardisation and harmonisation is quiet necessary. The National Reference Laboratories in the central national institute for animal health, Friedrich-Loeffler-Institut (FLI), ensure this level within Germany, especially in cases of notifiable diseases controlled on the basis of the German Animal Infectious Disease Law and special control programs. The National Reference Laboratories are setting diagnostic standards and prove their implementation regularly by ring tests. In Germany diagnostics (commercial diagnostic test kits) for the detection of animal infectious diseases have to be licensed by the national competent authority, the FLI.

Similarly, the harmonisation of national veterinary services has to be designed for the opportunities of the community trade in the European Union (EU) as well as for open international trade. There are established Community Reference Laboratories (CRL's) on the level of the EU and World Reference Laboratories (WRL's) on the level of the World Organisation for Animal Health (OIE). These laboratories ensure the implementation of harmonised test methods, the basis for animal health certificates and infectious disease control measures, to save the open trade with live animals and their products

RISK OF INTRODUCTION OF DISEASES IN HONEY BEE PRODUCTS IMPORTED INTO NEW ZEALAND

No 46

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Introduction: In 2004, New Zealand's Ministry of Agriculture and Forestry completed an import risk analysis on honey bee products - honey, propolis, pollen, royal jelly, beeswax, bee venom.
Methods: The standard WTO risk analysis methodology, as agreed internationally by member countries of the OIE, was used. A broad range of viruses, bacteria, protozoa, fungi and parasitic insects was considered in the hazard identification process. For each disease agent, the epidemiology and the nature of the organism were considered in detail to assess the risk of introduction and the possibility of management of that risk through the application of safeguards. The draft risk analysis and the recommended safeguards were subjected to international expert peer review.
Results: The risk analysis concluded that the risk was non-negligible, and that safeguards were justified, for

- Paenibacillus larvae subsp. larvae, the cause of American foulbrood
- Melissococcus pluton, the cause of European foulbrood
- Braula coeca, the bee louse
- Aethina tumida, the small hive beetle
- Parasitic mites of the family Varroidae

Discussion: Application of the OIE risk analysis framework to devise science-based measures for trade is complicated by the lack critical data regarding individual organisms - in particular the level of contamination of products, the infectious dose, and the rate of inactivation by various processes. There is a strong need for further research.

POTENTIAL IMPACT OF DIRECTIVE 2004/28/EC ON HONEYBEE DISEASES MANAGEMENT

No 47

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The Review of the European legislation on veterinary medicinal products concluded on 30 April 2004 with the publication of Directive 2004/28/EC of the European Parliament and of the Council of 31 March 2004 amending Directive 2001/82/EC on the Community code relating to veterinary medicinal products, and Regulation (EC) No 726/2004 of the European Parliament and of the Council of 31 March 2004 laying down Community procedures for the authorisation and supervision of medicinal products for human and veterinary use and establishing a European Medicines Agency. The requirement that a veterinary medicinal product may only be dispensed after a veterinary prescription has been made out should, as a general principle, be extended to all medicinal products for food-producing animals. However, it should be possible to grant exemptions, where appropriate. Beekeepers have been so alarmed at the new legislation that lobbying for an exemption for honeybees has begun since this legislation could be disastrous for beekeeping, honey production and agricultural pollination in Europe. It will lead to an increase in treatment costs, encourage the use of unapproved products and result in the loss of bee colonies across Europe. Why Directive 2004/28/EC is bad for beekeeping? Veterinarians in most European countries have little knowledge or experience of honeybees. Will beekeepers take hives to veterinarians to obtain prescriptions, or call veterinarians to attend their apiaries? The involvement of any other agency in dispensing bee treatments will increase costs of treatment which in turn will encourage the use of unapproved and cheap alternatives that can be unreliable and even dangerous. Furthermore, existing approved honeybee treatments have been shown to offer no significant risk to humans. The need for prescriptions is therefore totally irrelevant. Anything that interferes with or inhibits honeybee treatment will be disastrous for the survival of bees, honey production and the pollination of agricultural crops and native flora. Comments on relevant aspects of Directive 2004/28/EC and veterinary medicinal products intended for honeybee diseases are given.

DEVELOPING NEW ZEALAND'S IMPORT CONDITIONS FOR HONEYBEE GENETIC MATERIAL AND HONEYBEE PRODUCTS

No 48

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From the 1950's until 2003, New Zealand's borders have been almost closed to honey bees, bee genetic material and bee products. The only form of genetic material allowed entry has been bee semen. Most of the honeybee products allowed entry have been highly processed, shelf-stable and sealed. There have been robust border controls to prevent unintentional and illegal importation of live honeybees, products and used beekeeping equipment. New Zealand is also fortunate that it is an island nation surrounded by the Pacific Ocean.
Because of tight import controls and geographical isolation, many of the diseases affecting honeybees in other countries have not yet been detected in New Zealand. As New Zealand honeybees play a major part in pollinating pasture and horticultural crops and the economy relies mainly on primary production, it is imperative that these honeybees maintain their high health status.
This paper discusses the process by which MAF modified New Zealand's import conditions to make decisions more transparent and risk-based in accordance with the OIE code and SPS Agreement. It highlights some of the dilemmas that arose as part of this process and some of the challenges which still exist if New Zealand wants to maintain freedom from many honeybee diseases.

THE IMPACT ON THE BEEKEEPING INDUSTRY OF A SUSPECT INCURSION OF VARROA DESTRUCTOR IN THE SOUTH ISLAND OF NEW ZEALAND

No 49

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Varroa destructor was first detected in the North Island of New Zealand on 11 April 2000. Over the subsequent four years, the infestation became widespread in the North Island. During this time, movement controls were maintained between the North Island and South Island of New Zealand and the South Island remained free of varroa.
In June 2004, the Ministry of Agriculture and Forestry (MAF) national reference laboratory detected two varroa mites on sticky board samples submitted from two areas of the South Island.
MAF instigated a full exotic disease incursion response for ten weeks, which involved extensive surveillance of over 15,500 hives in the two areas. During this period, no infestation was found and the investigation was closed. MAF concluded the varroa finds at Oxford and Murchison were the result of cross contamination, either from North Island surveillance samples or from equipment used in the testing process.
As no evidence of varroa infestation was found, the South Island continues to be regarded as varroa-free. The

movement controls between the North Island and South Island of New Zealand that have been maintained since the North Island outbreak of V. destructor in 2000 will be continued.
This paper considers the challenges that have arisen from the detection of the two mites and the subsequent impact on New Zealand's beekeeping industry.

THE SMALL HIVE BEETLE (AETHINA TUMIDA MURRAY): DIAGNOSIS, PREVENTION AND CONTROL OF A NEW HONEYBEE PEST

No 50

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The small hive beetle [SHB] is an African honeybee parasite, which recently became an invasive pest species in populations of European honeybee subspecies. In contrast to its native range, SHB can be harmful parasites of European bees, where they can reproduce even in strong colonies. Indirect diagnosis of SHB can be achieved via the characteristic smell of infested colonies and signs of SHB damage to colonies. Direct diagnosis is possible using eggs, larvae, pupae and adult SHB. A post mortem diagnosis of colonies is feasible via the traces of wandering larvae inside and outside of the hive, the remainders of destroyed colonies on the bottom board and screening of surrounding soil for SHB wandering larvae and pupae. Prevention of SHB includes sanitation in the honey house and in the apiary to prevent reproduction outside of colonies and keeping of strong colonies. Control approaches focus so far on acaricides and insectizides, bearing the potential risks of residues in the bee products and of pest resistance. A number of alternative control approaches using traps, modified hives or biological control agents will be discussed.

AN ECOLOGICAL EXAMINATION OF THE SMALL HIVE BEETLE (COLEOPTERA: NITIDULIDAE, AETHINA TUMIDA)

No 51

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Small hive beetles (Aethina tumida; Coleoptera, Nitidulidae) are native to sub-Saharan Africa where they exist as both scavengers and symbionts in colonies of African subspecies of western honeybees (Apis mellifera). The beetle is a scavenger in its native range, feeding on pollen, honey, and bee brood. In extreme circumstances, the beetle may act as a superorganism parasite that destroys weakened or diseased hives, bu this scenario is the exception rather than the rule. In Africa, beetle reproduction is maximized in bee colonie that abscond. In this instance, the beetle confers a positive benefit, disposing of weakened/diseased hives or abandoned nests that can harbor disease organisms Having never been found outside sub-Saharan Africa, t beetle was recently discovered in the southeastern United States and in pockets of eastern Australia wher it has proven deleterious to colonies of European subspecies of honeybee.
Honeybee colonies provide a wealth of resources for would-be symbionts but their behavioral repertoire (including a complicated confinement scheme, tightly guarded colonies, etc.) has proven insurmountable to most insects. Indeed, these factors make the occurren of would-be symbionts comparatively rare in honeybee colonies. Among insect taxa, the sap beetle family Nitidulidae is predisposed to overcome the obstacles presented by a social bee group. As nitidulids, small hiv beetles fill an ecological niche that other potential symbionts in honeybee colonies have been unable to exploit. The reason the beetle has penetrated this niche lies in its behavioral convergence with its host and suite of adaptations. An exploration of beetle ecology allows one to illuminate the unique symbiotic relationship it and its host share and understand how this relationship is fostered, place this relationship in context with that of other social insect symbionts, understand its natural reliance on honeybee colonies, and predict its spread an effect on other potential hosts outside its native range.

THE EPIDEMIOLOGY OF SLOW PARALYSIS VIRUS IN HONEYBEE COLONIES INFESTED BY VARROA DESTRUCTOR IN THE UK.

No 52

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Varroa destructor was first detected in the UK in early 1992. Studies of pathogen incidence in infested colonies showed that virus prevalence differed significantly from the results of previous long-term studies in uninfested colonies. In particular, in severely infested colonies, adult bees and brood were killed by slow paralysis virus (SPV), an infection which had never previously been known to cause mortality in the field.
In the subsequent studies reported here, detailed observations were made on a small number of infested colonies during a complete year. Adult bee and brood populations were assessed every 21 days, and 1% of the adult bees, 1% of the sealed brood, and fallen mites were sampled and analysed individually for SPV by ELISA. Thus, estimates of the proportion of adult bees and brood infested with mites and infected with virus could be made throughout the season. The results showed that SPV first appeared in those colonies with

the largest mite populations, and virus infection was most prevalent late in the season when multiple infestation of brood cells frequently occurred. Colony death often followed, although where virus infection declined, colonies could recover and overwinter successfully.
Laboratory studies have shown that adult bees die approximately 12 days after injection with SPV, whilst semi-field longevity studies have demonstrated that overwintering adult bees infected with SPV have their lives significantly shortened. Thus, since infected individuals are rapidly lost from the population, large numbers of mites are necessary to sustain virus transmission sufficient to cause a colony scale infection. SPV normally persists in the bee population as an inapparent infection, but overt infection may potentially reappear in any infested colonies left untreated.

VITAMIN E CONTENT IN BRAZILIAN POLLEN PELLETS – PRELIMINARY STUDY

No 53

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Pollen grains are the male reproductive cells, formed in the anthers of flowering plants for pollination purposes. Besides, pollen is collected by honeybees and it is the most important product of the hive, as it supplies all nutrients, such as proteins, lipids and minerals for the bee survival. Bee pollen is usually mixed with nectar or regurgitated honey so that it can be stuck together and adhered to the bees' hind legs. The nutritional value of the pollen collected by beekeepers depends on the drying process, temperature, storage and its botanical origin. It is usually used as a Health Food supplement for humans, as it is composed of proteins of highly biological value, carbohydrates, lipids, minerals, anti-oxidant vitamins (provitamin A, vitamin C and E), B complex vitamins and D vitamin. The present work has two main objectives. Firstly, to determine the value of vitamin E in fresh pollen pellets samples and secondly to evaluate the possible loss of this vitamin by the conventional drying process (40 – 42 ºC). Samples were collected in the city of Pindamonhangaba, Brazil (Agência Paulista de Tecnologia dos Agronegócios) in 2004. In order to quantify vitamin E (alpha-tocoferol), the HPLC method described by PRESOTO et al. (2000), which uses silica column and fluorescence detection, was applied. The vitamin E values varied from 22.05 mg/kg to 33.09 mg/kg. The results showed that the conventional drying process does not decrease the vitamin E value.

*PRESOTO, A.E.F., et al. **Bolletino del Chimici Igienisti**. n.7, p.111-114, 2000
Thanks to Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for scholarship

10-HDA AS A CHEMICAL MARKER FOR PURE ROYAL JELLY AND ROYAL JELLY PRODUCTS

No 54

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The aim of this paper is to determine the 10-HDA (10-hydroxy-2-decenoic acid), in pure royal jelly samples and bee products containing royal jelly, using HPLC methodology. Royal jelly is the unique material product that has the 10-HDA, and this acid can be used as a chemical marker giving the authenticity and purity of royal jelly and also of the products that contain it. As material it was used pure royal jelly samples and honey added with royal jelly. The method used was based on the GARCIA-AMOEDO and ALMEIDA MURADIAN procedure (2003)* with the following chromatographic conditions: isocratic system, C18-H column, auto sampler, diode array UV/VIS detector (225 nm), methanol/water (45:55) as mobile phase, pH = 2.5 and alpha-naphtol as internal standard. The results obtained varied from 0% for pure honey to 2.37% for pure royal jelly.

*GARCIA-AMOEDO,L.H, ALMEIDA-MURADIAN,L.B. **Cienc. Tecnol. Aliment**. v.23, Supl., p. 62 - 65, 2003.
Thanks ara due to the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for scholarships

PROFICIENCY TESTING OF CHARM II TESTS FOR RESIDUE CONTROL OF HONEY

No 55

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An interlaboratory study was set up among 15 users of Charm II tests in order to validate the tests for the determination of sulphonamides (25 samples), (dihydro)streptomycin (17 samples), tetracyclines (19 samples) and chloramphenicol (13 samples) in honey. With the Charm II Sulfa Drug Test for Honey 2 positive samples (5.2 µg/kg sulfamethazine and 26 µg/kg sulfathiazole) were tested negative in one lab. A high percentage of false positive results (resp. 76.4% and 47.2%) were obtained for 2 samples and their duplicates.

With the Charm II Streptomycin Test for Honey 4 positive honeys (24.9 µg/kg, 27.9 µg/kg, 33.9 µg/kg and 34.7 µg/kg (dihydro)streptomycin)) were once reported as negative. The problem of false positive screening results was solved by reanalysing suspect positive samples using a C-8 extraction column.
Using the Charm II Tetracycline Test for Honey, 2 positive samples were tested negative: 3 resp. 38 µg/kg tetracycline was missed by 5 resp 1 lab(s). The number of false-positive results was very high (85 results out of 150 or 56.7%). Some labs even reported all negative honey samples as positive.
All labs using Charm II Amphenicols Test for honey reported the positive honey sample (153 ppb chloramphenicol or CAP) as positive. However due to this very high concentration, there was no real test for false negative results. The number of false-positive results was very high (66 results out of 132 or 50.0%).
When screening tetracyclines or CAP in honey with Charm II tests, the number of false positive results is unacceptable high. This problem is smaller for the Charm II Sulfa Drug Test (18.6% false positive results).
The authors would like to thank all ring trial participants.

VALIDATION OF THE TETRASENSOR HONEY FOR THE SCREENING OF TETRACYCLINES IN HONEY

No 56

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Regarding the European legislation, the use of antibiotics is not allowed in apiculture: no MRLs are fixed in honey. Discussions are going on in order to set action limits on European level. In Belgium action limits for residues of some antibiotics (e.g. tetracyclines) are fixed at 20 µg/kg.
The Tetrasensor Honey (Unisensor, Liège, BE) is a receptor-based assay using dipsticks for a rapid screening (30 minutes) of honey on the presence of tetracyclines. The intensity of the colour formation on the dipstick can be read visually or instrumentally. Since no special equipment is needed, even beekeepers or honey packers can easily perform the test.
The test was validated at DVK-CLO according to Commission Decision 2002/657/EC. The test detects in a specific and sensitive way tetracycline, oxytetracycline, chlortetracycline and doxycycline in honey. Depending on the type of tetracycline, a detection capability between 6 µg/kg and 12 µg/kg was obtained. When the dipstick becomes dry, the detection capability improves. When reading dry dipsticks, detection capabilities between 4 µg/kg and 7 µg/kg were obtained.
The test is rugged: no influence on the test capability was noticed by the geographical or botanical origin or by physical parameters (solid versus liquid) of the honey. Only limited matrix effects were encountered for a Spanish honeydew honey in which 9 ppb tetracycline was only detected when the dipstick was read dry. Small differences in test capability between 2 different batches of the test kit were also observed. Participation with the test in an international ring trial gave no false negative and no false positive results.
The Tetrasensor Honey is a simple and reliable screening test.

PRELIMINARY RESULTS OF CHEMICAL COMPOSITION IN HONEY BY NEAR-INFRARED SPECTROSCOPY

No 57

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Our Beekeeping Center researchs alternative treatments and genetic selection of tolerant bees for the control of varroa.
In 2003 a new research topic started to prove the feasibility in the use of near-infrared spectroscopy (NIRS) on the performance of calibration equations useful for determine honey quality, according to principal physical-chemical parameters.
The calibration equations were made up with 65 samples collected during 2003 and cross validation with 65 samples. All samples collected during 2003. The statistical results (R2 and SECV) are presented.
NIRS technique could be very important to the professional beekeeping sector because it´s an easy, fast and cheap technique that employs minimun chemical reactives and produces minimum residues.

PERFIL ANALITICO PARA EL CONTENIDO DE AZUCARES MAYORITARIOS EN MIELES TROPICALES COLOMBIANAS

No 58

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La miel es un alimento, elaborado por Apis mellifera y subespecies, a partir del néctar de las flores y de otras secreciones extraflorales de las plantas. Estos insectos liban, transportan, transforman y adicionan enzimas para finalmente deshidratar, concentran y almacenar en panales. La fracción de azúcares por lo general representan niveles que oscilan entre 95 al 99% de los sólidos totales, otorgándole a cada tipo de miel propiedades físicas entre las que vale mencionar el índice de refracción, actividad de agua (aw) e higrospicidad, su tendencia a la granulación y el poder rotatorio. Los azúcares mayoritarios corresponden a la

BEHAVIOR DIVERSITY OF *APIS FLOREA* AND *APIS ANDRENIFORMIS:* TEMPERATURE CONTROLS BY FANNING AND RAIN PROOFS BEHAVIOR

No 247

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Apis florea and Apis andreniformis construct a single comb in on a twig exposed to sun in summer and rain in rainy seasons. In this study, temperature controls and rain proofs behaviors of A. florea; and A. andreniformis were observed in northern parts of Thailand. When the nest directly exposed to the sunlight, curtain formation bees of A. florea were fanned, deformed and took a short flight to reduce brood temperature. Subsequently, A. andreniformis, fanned but did not deform, formed a tail like structure from the bottom of the nest. During the rainy time, all the curtain formation bees of A. florea came up on the dancing floor and formed an umbrella shaped by spread wings up on wings and formed a roof of waterproof jacket to protect the nest from rain. In case of A. andreniformis, curtain formation bees oriented their heads upwards and rest compactly against the brood cells and spread the wing in_ _-shaped, so that one wing can overlay another wing of curtain formation bees. In both species, the honey cells sizes are double than the brood cells serve as a roof of nest.
This research was financially supported by Thailand Research Fund, grant # RTA4580012.

BIODIVERSITY OF HONEYBEES (APIS CERANA) IN CHINA

No 64

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There is a profound lack of information on many aspects necessary to improve beekeeping and breeding of honeybees (Apis cerana) in China. This paper contributes aspect on genetic structure of honeybees (Apis cerana) populations.
Honeybees (Apis cerana) were collected from seventy-nine sites in China with an altitudinal range from 7m to 3300m, a geography rang of E92° to E134°, N18° to N52°. Both mtDNA variations and morphological characteristics were studied.
Polymorphisms in the mitochondrial DNA COI-COII intergenic region were determined by PCR. 3 haplotype length variants were found and 30 haplotype patterns were documented by sequencing. In general the COI-COII intergenic region of Chinese Apis cerana are longer than philippine's. All these haplotypes are not previously described.
40 morphological characteristics were analysed and data is under analysis.

GENETIC STATUS OF HONEYBEES (APIS MELLIFERAL.) IN COLOMBIA TODAY

No 65

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Allozyme and mitochondrial DNA analyses were conducted on adult workers of thirty-one Apis mellifera colonies from five different Colombian localities. A high frequency of the Mdh-1 F variant was observed in the analyzed samples (85 to 96%), with the exception of Boyacá, where a marked increase in the variant M frequency was found (68%). The Cytochrome b mtDNA analysis revealed that Apis mellifera populations of Colombia are constituted mostly of the African pattern (97%). Three COI-COII intergenic region haplotypes were found, corresponding to A1, A4 and C1 patterns previously reported; a fourth haplotype possibly corresponds to an as yet undescribed pattern. Our results indicate a strong introgression of the "African" genes into the Colombian populations, very similar to what is seen in northern Brazilian honeybees.

ANALYSE DES RESULTATS DE RECHERCHE SUR LES CARACTERES BIOMETRIQUES DE L'ABEILLE TELLIENNE APIS MELLIFICA INTERMISSA PEUPLANT LE NORD DE L'ALGERIE.

No 66

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Suite à l'introduction de races d'abeilles originaires d'Europe surtout de France et d'Italie afin d'augmenter les rendements des produits de la ruche Le but escompté par les apiculteurs n'a pas été atteint car ces races introduites n'ont pu survivre aux conditions du milieu du nord de l'Algérie .En même temps ,les spécialistes on constaté un autre problème qui a surgi lors de ces importations de races d'abeilles ;c'est la pollution du bagage génétique de l'abeille locale Apis mellifica intermissa par les croisements des hybrides étrangers. La Tellienne ,connue par ses grandes qualités (Rusticité, productivité ,grande pollinisatrice etc.) a tendance à ne plus répondre aux critères économiques .L'étude des caractères biométriques de l'abeille locale qui peuple le Maghreb en général et l'Algérie en particulier, appelée communément "la Tellienne" ont infirmé ces constatations sur terrain et confirmé que quelque soit l'intensité des introductions frauduleuses de reines étrangères l'abeille locale a toujours gardé ses caractères originaux. L'étude a été réalisée sur su plus de 5,000 abeilles récoltées au niveau de tous les écosystèmes du nord algérien.

THE INFLUENCE OF SMALL-CELL BROOD COMBS ON THE MORPHOMETRY OF HONEYBEES (APIS MELLIFERA L.)

No 67

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The advent of moveable hive frames and artificial comb foundation in the second half of the nineteenth century enabled changes to be made in the size of the brood cells in which honeybees were raised. The trend in agriculture in this period was towards breeding larger livestock and a similar trend in apiculture resulted in a general increase in the cell diameter of colonies of Apis mellifera mellifera bees from circa 5.0 mm to circa 5.5 mm by the 1920s. This period also coincided with the outbreak of the condition in Britain and Ireland known as the 'Isle of Wight' or acarine disease that devastated honeybee colonies.
We investigated the ability of Apis m. m. colonies to draw out foundation and raise brood in the comb sizes (5.0 mm) of the mid nineteenth century and evaluated the resulting changes in honeybee morphometry. Thre colonies of honeybees were raised in hives where the brood nests were made up of both standard and small sized brood cells. The changes in key physical dimensions of the bees due to the reduced cell sizes were analysed.
The paper describes how the bees, that were predominately of the strain Apis mellifera mellifera, ha no apparent difficulty in drawing out the small-cell com and details the small, but significant reductions in the resulting physical dimensions of the bees. Proportional did not exist, with the change in the physical dimensio of the bees being much less (~ 20%) than the change cell size. The possible implications for honeybee mite infestation, honey production and the use of old brood combs are considered.

COMPARATIVE STUDIES BETWEEN MORPHOMETRICAL CHARACTERS OF SOME RACE AND HYBRIDS OF HONEYBEE COMIN ASSIUT REGION, UPPER EGYPT"

No 68

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The Carniolan race characteristics of workers were better. The Carniolan workers had significantly the longest organs in all morphometrical characters measurements except for in case of dry body weight (mg) where, Italian hybrid was the highest weight; body water content (%) where, Carniolan hybrid was the highest value and proboscis length (mm) where, Caucasian hybrid was the longest. The maximum distance between the two first wax mirrors (mm) was found in Egyptian race, and maximum sting shaft length (mm) was noticed in Italian hybrid. On the other hand, the Egyptian workers were with significantly the shortes measurements, in general. The Egyptian queens had significantly the shortest morphometrical characters measurements, except in case of: cubital index, and number of hamuli. Insignificant differences were noticed between the other tested hybrids and races. The Carniolan hybrid queens, the Carniolan race, the Caucasian hybrid and the Italian hybrid followed descendingly in the measurements of most organs. The Egyptian drones had significantly the shortest organs in all morphometrical characters measurements except for in case of number of hamuli where, insignificant differences was noticed between the tested hybrids and races. The Carniolan race drones, the Carniolan hybrid, the Italian hybrid and the Caucasian hybrid followed descendingly in the measurements of most organs. For workers egg length (mm), the Carniolan race was the longest. On the other hand, Egyptian race was the shortest. While in case of egg width (mm), the Egyptian and the Carniolan races were the highest values. In

contrast, Italian hybrid was the lowest value. Fifty four morphological characters were used for evaluation, or scoring method for tested hybrids and races. Total scores and (ranking order) of morphometrical characters were: 86 (1), 140 (2), 151 (3), 180 (4) and 247 (5), in Carniolan race, Carniolan hybrid, Caucasian hybrid, Italian hybrid and Egyptian race, respectively.

BIOMETRICAL STUDIES ON SOME RACES AND HYBRIDS OF HONEYBEE IN ASSIUT REGION, UPPER EGYPT

No 69

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The descending order of the tested races and hybrids of honeybee, during 2000-2003, in Assiut region according to the mean workers sealed brood area (in sq. inch/colony) was as follows: Italian hybrid, Carniolan race, Caucasian hybrid, Carniolan hybrid and Egyptian race; the mean drones sealed brood area (in sq. inch/colony) was as follows: Carniolan race, Carniolan hybrid, Egyptian race, Caucasian hybrid and Italian hybrid; he mean colony population was as follows: Italian hybrid, Carniolan race, Caucasian hybrid, Carniolan hybrid and Egyptian race, the mean number of unsealed and sealed queen cells and drawing out wax foundation (sq. inch/colony) were as follows: Egyptian race, Carniolan race, Carniolan hybrid, Caucasian hybrid and Italian hybrid; he mean surplus honey (in sq. inch/colony) and honey yield (kg/colony) were as follows: Carniolan hybrid, Caucasian hybrid, Carniolan race, Italian hybrid and Egyptian race; he mean pollen stored (in sq. inch/colony) was as follows: Italian hybrid, Carniolan hybrid, Caucasian hybrid, Carniolan race and Egyptian race; the mean honey-sac weight (mg/bee) was as follows: Carniolan race, Italian hybrid, Carniolan hybrid, Caucasian hybrid and Egyptian race; the mean T.S.S. (%) of honey-sac contents was as follows: Egyptian race, Italian hybrid, Caucasian hybrid, Carniolan hybrid and Carniolan race; the mean pollen loads weight (mg/bee) weighted all over the different seasons was as follows: Caucasian hybrid, Carniolan hybrid, Carniolan race, Italian hybrid and Egyptian race. The descending order for tested races and hybrids was: Carniolan race, Carniolan hybrid, Italian hybrid = Caucasian hybrid and finally, Egyptian race.

HONEYBEE (APIS MELLIFERA) RACES, ECOYYPES AND THEIR GENERAL CHARECTERISCTISC OF TURKEY

No 70

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Turkey with its broad geography, topography, rich flora and different ecological characteristics is one of the most suitable regions and is highly rich country with its gen resource for honeybees (Adam, 1983). Archaeological studies showed that honeybees culture in Anatolia have practised since 7000 BC (Crane, 1983).
The present honeybees population show a great genetic variation and this variation provides some advantages to improve the present and future honeybee culture in Turkey. The studies carried out before the development of migratory beekeeping on the identification of the Anatolian honeybee population showed that the honeybee population could be a valuable genetic potential for breeding and also preservation (Bodenheimer, 1941). Since these initial studies, many research have been carried out to identify races, ecotypes, morphological, physiological and behavioural characteristics of honeybees inhabited in Turkey (Do_aro_lu, 1981; Ruttner, 1988; Kaftano_lu et al., 1993; Güler, 1995; Gençer, 1996; Dülger, 1997 and Akyol, 1998).
According to the behavioural and ecological data of Ruttner (1988), there are three different honeybee races in Turkey; Apis mellifera anatoliaca is spread around Thrace, Aegean, Mid Anatolia and seashore of Mediterranean regions, Apis mellifera caucasica is colonised around Northeast Anatolia and seashore of east Blacksea, while Apis mellifera meda is mostly distributed around the Southeast Anatolia. Additionally, ecotypes of Apis mellifera antoliaca, East Aegean Island Bees (Apis mellifera adami) spread, mainly in different Aegean Islands Gökçeada, Mu_la Bee is distributed around the West Mediterranean and Aegean Regions of Turkey and Thrace Bee is located around the European side of Anatolia.

A STUDY OF COMPARISON OF DIFFERENT BEE GENOTYPES IN THE HATAY REGION WITH RESPECT TO THEIR PHYSIOLOGICAL CHARACTERISTICS

No 71

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This research conducted to compare physiological characteristics of different honeybee genotypes as Mu_la (Apis mellifera anatoliaca), Italian (Apis mellifera ligustica) and Carniolan (Apis mellifera carnica) in Hatay region. Total of 36 cell builders were used during the experiment. Survival rates were determined according to, Akyol, 1998; Gençer, 1996; Gözenler, 2000; Güler, 1995; Dülger, 1997. Numbers of frame with covered bee, brood area, and weight change in the experimental colonies were determined as described by Akyol, 1998; Genç, 1990;Dodolo_lu, 2000; Fresnaye and Lensky, 1961. Samples were taken for measurement once every

two weeks. Brood areas were established by Puchta methods (Fresnaye and Lensky, 1961). SPSS 9.05 windows of version statistical software analyzed all data and the DUNCAN multiple comparison tests were used the comparison of the means (Bek and Efe, 1988).
With respect to survival rates and the number of frame covered with bees, Carniolan (Apis mellifera carnica) and Italian (Apis mellifera ligustica) bee genotypes were better than Mu_la (Apis mellifera anatolica) bees. It was found out that three was no difference between genotypes in respect to the colony weights and brood areas (P>0.05). Survival rates in Carniolan and Italian bee genotypes at the present study were similar to previous findings (Do_aro_lu, 1981; Kaftano_lu et al, 1993; Güler, 1995; Akyol, 1998) also Mu_la bee genotype was lower than previous studies (Akyol, 1998; Do_aro_lu, 1981;Güler, 1995;Budak, 1992). Average brood areas in Mu_la bee genotype in our study were higher than previous findings (Do_aro_lu et al, 1992; Budak, 1992; Güler, 1995). Wintering abilities in all genotypes did not differ from former study (Akyol, 1998).

COMPARISON OF THE PERFORMANCES OF IMPORTANT HONEYBEE (*APIS MELLIFERA* L.) RACES AND ECOTYPES IN DIFFERENT REGIONS OF TURKEY

No 72

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In this research, peformance tests of important honeybee races and ecotypes between North (Thrace) and South (Cukurova) regions of Turkey have been compared. Colony livability, adult bee population, brood production, swarming tendency, flying activity, aggresiveness and honey production have been evaluated.
In Thrace region, the differences among the Anatolian, Caucasian, Thrace and Mugla races and ecotypes have not been found significant (P>0,05) according to the livability where as the same groups have exhibited significant differences (P<0,01 in Cukurova Region. In Thrace, races and ecotypes have indicated higher performance (P<0,01) for adult bee population and brood production fllowed by Mugla, Thrace, Caucasian and Anatolian, respectively. In Cukurova conditions, the differences among groups according to adult bee population have been found important (P<0,01). Mugla ecotype has indicated higher performance (P<0,01) than all the groups in brood production whereas Anatolian was higher than Thrace (P<0,05) and Caucasian (P<0,01). Thrace was higher (P<0,05) than Caucasian.
In terms of swarm tendency, no significant difference (P>0,05) has been observed between the races and ecotypes in the conditions of Thrace and Cukurova. According to flying activity and aggresiveness the difference between races and ecotypes were not significant (P>0,05) in Thrace conditions where as differences were important (P<0,01) in Cukurova conditions. In Thrace Region conditions, average honey production of Caucasian, Anatolian, Mugla and Thrace races and ecotypes were 29,971 ± 7,797; 24,857± 8,545; 23,171 ± 7,721 and 19,529 ± 4,067, respectively. On the other hand, in Cukurova conditions, average honey productions of groups were 20,544 ± 1,386; 24,670 ± 3,353; 34,862 ± 3,576 and 17,381 ± 2,852, respectively. Caucasian ecotype in Thrace conditions and Mugla ecotypes in Cukurova conditions have yielded the highest honey production.

IMPACT OF TRANSGENE PRODUCTS ON HONEYBEE LARVAE

No 73

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In order to assess the impact that transgenic plants pose on larvae of the honeybee, Apis mellifera, several aspects of bee life history are important: (a) information on pollen consumption is needed as this is the only direct route of exposure of toxins expressed by transgenic plants, (b) the effects of transgene products on development of the hypopharyngeal gland of adult worker bees have to be assessed because they are producing the jelly necessary for rearing of the brood and (c) this jelly has to be checked for the presence of transgene products which may be passed on to the larvae.
We conducted experiments in which small queenright colonies of about 1,000 bees were kept in field cages (8m x 14m) containing only flowering maize plants. Fully grown worker larvae that were fed no other than maize pollen were dissected and the number of maize pollen grains counted. We could show that honeybee larvae ingested only about 2mg of maize pollen, indicating that protein provided directly to the larvae via pollen contributes less than 5% of the protein required for larval development.
The effects on the hypopharyngeal gland experiments were tested in small cages in a climate cabinet. Freshly emerged worker bees were added to small experimental hives, containing about 200 workers and a queen. Bees were exposed to Bt-maize pollen (event MON 810), Bt-toxin (Cry1Ab, 0.0015%) and to a Protease inhibitor (Soybean Kunitz trypsin inhibitor, SBTI) at 0.1% and 1% concentration. While the Bt treatments had no effect, the SBTI treatments significantly reduced the size of the hypopharyngeal gland of adult worker bees. ELISA tests did not detect any Cry1Ab Bt-toxin in the hypopharyngeal glands in the Bt pollen treatment while traces (close to the quantification level) were found in the Bt toxin

treatment. These results are of high significance to conduct realistic bioassays especially for honeybee larvae.

BEE BREEDING AND SELECTION IN UKRAINE

No 74

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Ukraine breeding and selection of three bee breeds – Ukrainian Steppe, Carpathian and Poliska. Ukrainian steppe bee breed was formed in Steppe and Forest-Steppe zones of Ukraine. They are characterized by high winter hardiness and are able to endure long-term period without flight. They effectively use the food stores during the winter period. The prolificacy of queens in the period of the most intensive development is 1,100-1,800 and sometimes even to 2,500 eggs per day. The selective work is directed at reproduction, use and extending of thoroughbred and high-quality material. The result of this work will allow to develop selective bee stock work with Ukrainian steppe bees, to raise genetically new types, to organize bee stock beehives-reproducers in different regions of Ukraine. The Department of Selection and Reproduction of Carpathian bees (P.I.Prokopovich Beekeeping Institute) is situated in the town of Mukachevo, Zakarpatska oblast. In conditions of high Carpathian Mountains bee breeding of local ecotype is being finished. Their morphological qualities are different from the known lines. The Department works on creation of thoroughbred, high-productive Carpathian bees. Mountainous relief allows to create isolated areas for complex of programs on selection and reproduction of thorough-bred half-stud types of Carpathian bees in closed micropopulation. The problem of breeding of Poliska stocks in an area divided into is investigated.

BEEKEEPING IN URUGUAY, OPPORTUNITIES FOR FUTURE DEVELOPMENT IN THE INTERNATIONAL HONEY MARKET.

No 75

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The objective of the present work is to determine, characterise and evaluate the present situation, opportunities for future developments of beekeeping in Uruguay, and how to improve the position of the country in the international honey market.
This study is based on data from government publications and the results from researches published in the last years in Uruguay and in the world.

Uruguay is located between the 30th and 35th parallels, and has subtropical weather with natural conditions for the development of beekeeping. Uruguay borders on the Northwest with Brazil, and on the west with Argentina. Beekeeping was first introduced in 1834 but it was only in the second half of the 20th century that it has developed significantly.
Eventhough Uruguay has only 3,440,205 people and an area of 173,215 km2, it was in the top 15 countries of honey exporters in the world as shown in the statistics published by FAOSTAT in 2003. In 2004 the total exports of honey were 13,600 ton with a value of U$ 29.7 million dollars, 77 % to the European Union and 23 % to the EEUU.
This work analyses the main factors and characteristics of beekeeping in Uruguay that made the country reach a position in the international honey market either in quantity but also in quality.
The strengths, weakness and opportunities for the Uruguayan beekeeping and its position in the international trade of honey are studied.
Finally different proposals to increase the beekeeping economy and consolidate the position of Uruguay in the international honey market are presented.

ADVANCING CHINESE APICULTURE

No 76

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China, an ancient and civilized nation, boasts a long history and valuable experience in apiculture. Nowadays, china has become the largest country in apiculture in the world. It has already held approximately 7 million colonies of domestic bees. And the output of honey is 200,000 tons, royal jelly is 2,500 tons, bees pollen 3,000 tons, and 400 tons propolis per year. The 7 million colonies of bees have devoted the indelible contribution to increasing output and improving product quality of the major farm crops, trees of an economic value and grasses by pollination.
Nevertheless, due to tie the tradition small skill agriculture economy and some other reasons, there is some disparity in apiculture between China and the developed country in the world. Specially in 2002, European Union ban to import Chinese honey because of the traces of chloramphenicol in honey, it is projected that beekeeping do has the certain problem in the developing process, especially in the bee products quality security. Therefore, Chinese government pay more attention to it and held "the national apicultural development symposium", and formulated and promulgates beekeeping production regulation, bee products production standard, the criterion of using drug, the remnant medicine monitoring in order to healthily develop Chinese apiculture. At the same time,

Apicultural Science Association of China(ASAC) takes "the small scale, the big community" as the strategy guiding ideology, makes the "main enterprise + beekeepers households (Union of beekeeper/federation of communes/Cooperative society)" as the way to sets up" Bee Products Security and the Standardization Production Base ". and carries on training according to the international standard request. Recently, the trained beekeepers are aware that: first of all, beekeeping must have a good production environment without pollution; Secondly, not to use the bee drug or reasonably uses the bee drug in regulation; furthermore, a good faith production record should be written so as to trace the source; finally, beekeeper must have good training frequently. In brief, beekeeper must aware that bee products should be "original ecotype" that means pure nature.
With the joint efforts of everyone of all apiculture, it is possible that china shout not only be a large country but also a powerful country in the world apiculture. We believe that the honey industry will be more "honey"!

A RESEARCH ON DETERMINATION OF THE TECHNICAL AND STRUCTURAL CHARACTERISTICS OF BEEKEPING IN TURKEY

No 77

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Turkey has enormous beekeeping potential with over four million bee colonies and diverse floral ecotypes (Sahinler et al., 2003). In terms of honey production, Turkey has been ranked fourth in the world, with 60 190 t produced in 2002 (Anonymous, 2002).
In this study, the structural situations of beekeeping were investigated by surveying to migratory and stationary 320 beekeepers (200 stationary + 120 migratory) that have15,698 hives in 10 district and 68 villages of Konya province where has the largest geographic place of Turkey.
At the end of study, it was determined in average that the age of beekeepers involved in survey was 46.18 years, their experience in beekeeping was 14.40 years, the number of the old type hive was 3.75 per beekeeper, the number of the new type was 45.30 per beekeeper, and honey yield per hive was found as 21.08 kg per colony.
It was determined that migratory beekeepers were professional ones who see beekeeping as the main job and major income provider. The migratory beekeepers were more educated, careful and experienced than stationary beekeepers in usage of high quality queen bee, queen bee production with Doolittle (larvae transfer) method, the time of queen bee usage in breeding, evaluation of nectar flow period, being aware of bee diseases and parasites, medication methods and wintering. All beekeepers' applications of spring feeding in their colonies were also determined.

Key Words: The Beekeeping in Province the Konya, Bee Diseases And Parasites, beekeeping applications.

HOW TO INCREASE THE YIELDS OF PROPOLIS PRODUCTION USING TOP-BAR HIVES

No 78

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Propolis is a natural resin produced by bees and used widely in folk medicines. Bees use it is sealing cracks of unnecessary openings in the hive, covering of any foreign object as well as an antiseptic.
In 2004 I therefore decided to carry out an experiment to find out how beekeepers can increase the production of this valuable product propolis using the top-bar hives.
The hives were put into two categories. In the first category were hives that had small entrance holes, no cracks, no space within the top-bars and propolis harvesting was not frequently done.
The second category contained top-bar hives that had cracks and large entrance holes, a lot of space within the top-bars, no lids and harvesting of propolis was frequently done.

Observation

In the first category very little propolis was harvested as compared to the second. The lids on the hives did not encourage the bees to produce propolis because it was already sheltered from weather. Very little of the product was formed between the bars and the entrance holes due to limited space.
However, it was observed that in the second category more propolis was harvested than in the first group of hives and spaces within the top-bars were sealed with propolis. This shows that bees have a tendency of sealing the cracks and gaps within the hive with propolis once spaces have been opened. This enables the beekeeper to harvest the product as many times as possible because the bees continuously keep on closing the opened spaces as well reducing the size of the entrance hole with this product.
The knowledge of trees that are known to be used by bees in making propolis is vitally important, this will assist the farmer to plant as many trees as possible around the apiary in an effort to reduce the time taken by bees in visiting similar trees very far away from the hive.

Conclusion

To increase the yields of propolis in beekeeping systems that employ top–bar hives it is very important to have hives that have enough openings.
That is large entrance holes, cracks and reasonable space between the top-bars. Once these empty spaces have been sealed with propolis harvesting should be frequently done because this stimulates bees to produce more of this product. The knowledge of trees known to be used by bees also plays a vital role in the production propolis as was observed.

BEEKEEPING IN NORTHEAST OF BRAZIL AND ITS DEVELOPMENT:THE BIG CHALLENGE REPRESENTED BY EXPLOITATION OF THE AFRICANIZED HONEYBEES (AHB).

No 79

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The introduction of the African honeybee Apis mellifera scutellata into Brazil in 1956 is considered today the most important event responsible for the expressive development of the beekeeping activities and huge increase in honey production in this country since its beginnings in 1839. At the beginning the African bee caused a serious concern due to several accidents and the complete absence of information about its biology and methods of control. This bee crossed with the European ones (ligustica, mellifera etc) previously introduced into the country and gave rise to the Africanized honey bees (AHB). The several accidents in the sixties greatly concerned and alarmed the public for many years. Today the AHB is the only bee found in the nature in Brazil and today beekeeping has changed considerably. Thanks to the scientific and technical support of researchers, technicians and beekeepers the biology of this bee is now better understood and the technologies to handle the AHB was improved a lot of. Today there is no need to import beekeeping equipment. The Brazilian honey production before 1956 was about 5.000 tons/year and today is more than 50.000 tons/year. The AHB became resistant to the mite parasite Varroa destructor. The most important honey producer region of Brazil was the South. In 2001 Brazil exported about 2,5 thousand tons of honey and the South region of Brazil (Rio Grande do Sul, Santa Catarina and Paraná states) was responsible for about 78% of the honey exported. The Northeast region was responsible for less than 10%). In 2004 Brazil exported more than 24 thousand tons of honey, specially organic honey, and the Northeast region of Brazil (with native vegetation: Caatinga, Cerrado etc.) was responsible for more than 30% of the honey exported (produced mainly by Piaui and Ceara states).However, beekeeping in that region is still disorganized and the beekeepers need technical support .They lose yearly about 40% of their AHB colonies due to swarming and absconding behavior. Undoubtedly, the investment in beekeeping in northeast of Brazil is a very important challenge which can transform that region in the most important honey producing region of the world.

THE STANDARDIZATION BUILDING OF BEEKEEPING INDUSTRY IN CHINA

No 81

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China is the greatest country in the world in apiculture and production of bee products, which plays an important role in international beekeeping industry. For the sake of furthermore developing beekeeping industry in China and promoting exchange in international apiculture technical, the strengthening the standardization building of beekeeping industry is very important.
In near decades the standardization work of national beekeeping industry set highly store by China government, which is strengthened in the management of the standardization work studying and fund. Many standards have being issued, including the standards of apiculture technical, bee products and testing methods and so on, which are bringing into active play in driving the modernization of beekeeping industry in China .
The standard system on apiculture as other agriculture products in China is made of the standards of four kinds, called nationality-standard, ministry(trade)-standard, region-standard and corporation-standard. The pioneer technical criterion on apiculture in China was issued in 1930s. After time comes into 1990s, new serious standards on apiculture have being continuously issued along with the strengthening of work of standardization in China. Up to now, early and late, there have been about 60 nationality or ministry (trade) standards on apiculture issued, including the standards of beekeeping technical, the standards of bee products such as honey, royal jelly, bee pollen and propolis, the standards of sanitation and the standards of testing methods such as medication remain in honey and royal jelly, otherwise there still are some region-standards issued. These standards make of a framework of the standards system on beekeeping industry in China.
But making the standardization work of beekeeping industry perfect there still is a long way to go. Many work must be made, such as perfecting the standards of all kinds of bee products, strengthening the study of standardization and international information communion, optimizing the construction of standards and so on.
The standardization of beekeeping industry is an important part in food safety to government. In China the establishing nationality or ministry (trade) standards are brought into national finance plan, the found used as establishing standards is supported by the government. In organization management generally each standard is put forward and organized by correspond technical department. Recently a standardization technical committee of the agriculture products are going to come into existence by the leader of national standardization committee in China, which will play an important role in putting forward standards plan, examining and approving standards, making communion with international standardization organization. The standardization committee of the apiculture will be a embranchment which belongs to livestock product one, its secretariat would be set up in National Animal Husbandry &

Veterinary Service Ministry of Agriculture.
Along with the developing of modernization, our antiquity beekeeping industry is coruscating new energy. To be a advantage agriculture traditional apiculture pattern in China must be replaced by the modernization and standardization one The setting up and perfecting standardization system in apiculture as soon as possible will lead beekeeping industry in China from tradition.

HONEY BEE PRODUCTS – PRODUCTION, MARKETING, PERSPECTIVES IN REPUBLIC OF MACEDONIA

No 82

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Republic of Macedonia has favourable conditions for beekeeping.
This paper presents current situation in the Macedonian beekeeping sector according to the production of bee products, average production per honey bee colony, market of honeybee products, its marketing, packaging and labelling, average prices per product, average consumption, recommendations for its development. The data presented in the paper are result of the conducted Analysis of the beekeeping sector in the Republic Macedonia.

THE HONEY PRODUCTION IN CHINA FROM 2000 TO 2003

No 83

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The honeybee management is a traditional breeding in China. Since the founding of the People's Republic of China in 1949, the drastic changes of apiculture took place in China.
The beehives and honey production in 2004.
The largest colony was obtained in China from 2000 to 2004. In 2004, China obtained 7,001,500 beehives. The ten major countries produced 55.1% honey in the world.
Honey production in different district of China.
Honey productions made some progress in China. China is divided to seven districts: north, north-east, east, middle, south, south-west and north-west of China.The largest honey producing district in China is east of China, and the second is middle of China, the third is south-east of China.
The ten major honey provinces of China
The amount of ten major honey provinces added and the percent dropped. The ten major provinces are losing their importance slowly, the other province are developing more quickly than the ten provinces.
No change was observed at the rank of six major hone production provinces.
The characteristic of honey production in China
There are 28 records of provinces and cities for honey production. The honey production of China has two characters in geographical district: Firstly, there is unbalance between south and north district. Secondly, there is unbalance between east and west of China.
Change characterstic of China
There are four types of honey production change in China from 2000 to 2002. Firstly, the change is constantly raised. Secondly, the change is constantly dropped. Thirdly, the change curve like "_". Fourthly, t change curve is like "_". The developing district is sout west. The developing speed of honey production is different among seven districts. The speed of developi in north is faster than south.

QUALITY OF SLOVENIAN HONEY

No 84

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In cooperation with the Slovene Beekeepers Associatio the monitoring of quality of 600 honey samples was performed at the Agricultural Institute of Slovenia* in 2004. The essential quality parameters for honey were analysed according to the French standard methods "Méthodes Officielles d'Analyses des Miels": moisture content, electrical conductivity, free acids, hydroxymethylfurfural (HMF), diastase activity, water-insoluble content, fructose, glucose and sucrose conten Different types of honey were analysed, which were declared as honey from acacia, fir, chestnut and lime tree, blossom honey, honeydew honey and blends of honeydew honey with blossom honey. Analysed parameters were compared to composition criteria described in "Council directive 2001/110/EC. Among 60 samples, 554 samples corresponded to the European regulations and 46 samples deviated in certain chemical parameters such as: diastase activity, HMF, sucrose, the sum of fructose and glucose and electrical conductivity. The diastase activity and HMF are indicators of honey freshness and overheating. In three analysed samples the HMF exceeded the maximal tolerance value which is 40mg HMF/kg. The diastase activity was too low in two analysed samples (DN<8). The specific sugars' content detects the difference between blossom and honeydew honey and also yields information about authenticity and adulteration of honey. Seven samples did not correspond to European regulations regarding the sum of fructose and glucose content and one sample of honey exceeded the value of 15g /100g which is the maximal tolerance value for sucrose in all types of honey. Deviations in electrical conductivity that indicate wrong characterization of botanical origin of honey were recognised in 33 analysed samples. The parameters such as moisture content, free acids, water-insoluble content

were within tolerance limits in all samples.
The results of monitoring indicate that 92,3% of analysed honey samples are appropriate for selling on the market.
* The authorized laboratory for honey analyses in Slovenia is a part of the Agricultural Institute of Slovenia and has been accredited by French and Slovenian accreditation authorities (COFRAC – Comité Francais d'Accreditation and SA – Slovenian Accreditation) since 2003.

SECOND ATTEMPT FOR A BEE GARDEN MUSEUM IN VENEZUELA

No 85

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The National Museum of Apiculture "Ignacio Herrera" (MUNAPIH) operated in the city of Mérida, Venezuela, in the period 1988-1999. It was coordinated by representatives of the University of The Andes, the Corporation of The Andes, and The Beekeepers Association of Mérida State. We received local, regional, national and international donations. The exhibition operated ad honorem during weekends and holidays. We held communitary course on beekeeping, honey quality control and apitherapy. Three honey competitions were organized, and the honey samples were exhibited in the collection, displaying the quality standards of genuine Venezuelan honey.
The idea to create this museum of apiculture in Venezuela was suggested during the plenary session of the First National Meeting of Apiculture held in Mérida, in 1986. The unexpected closure and vandalism occurred in 1999 still demands investigation. However, a new plan is taking place to open a consolidated museum with administrative support to fulfill a matured set of objectives. The opportunity to present our project in the Apimondia Congress 2005 is providing feedback to improve our ideas, and also motivation for attempts to create bee museums in other countries. Honeybees are inspiring creatures for mankind evolution and healing. Additionally to the technical, scientific and artistic issues covered by the study of bees, their products and the environment, a Bee Garden Museum is also a spatial structure to rejoice the spirit. Our multidisciplinary team is working towards the insertion of such museum in the Health Science complex of the university, aiming to achieve educational impact by therapies to improve the quality of lyfestyle.
In Venezuela, an important section for a Bee Garden Museum is the stingless bee culture, because Meliponini were native Indian traditions and are still kept in rural communities.
Our acknowledgement to all the donations received for Museo Nacional de Apicultura "Ignacio Herrera", that we hope to retrieve with a media campaign in the city of Mérida.

PAENIBACILLUS LARVAE SUBSP. *LARVAE* – CLASSICAL AND MOLECULAR ASPECTS

No 86

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Paenibacillus larvae subsp. larvae (P. l. larvae), a spore-forming Gram positive bacterium, is the etiological agent of American foulbrood disease of honeybees. American foulbrood (AFB) is the most virulent bacterial disease of honeybee brood not only killing infected larvae but also leading to colony collapse. AFB is highly contagious and has spread around the world causing considerable economic loss to beekeepers. In many countries, AFB is a notifiable disease and, hence, control measures are often regulated by disease control orders. Diagnostic of AFB by molecular methods was hampered by the fact that no specific PCR protocols were available to differentiate between P. l. larvae and his close relative Paenibacillus larvae subsp. pulvifaciens (P. l. pulvifaciens), thought to be the causative agent of the rare powdery scale disease of honeybee larvae. Most recently, a subspecies-specific PCR as well as a diagnostic kit based on the detection of bacterial proteins were developed for the diagnosis of AFB. We evaluated both methods for the detection and identification of P. l. larvae strains causing disease outbreaks in Germany. The strains used for this study as well as reference strains of P. larvae were genotyped using rep-PCR and analyzed biochemically and genetically. In addition, pathogenicity and virulence of these strains was determined via exposure bioassays. Genotyping of P. larvae resulted in the identification of four major types which showed differences in their metabolic fingerprint. 16S rRNA sequencing revealed only minor heterogeneity as expected from the literature. All strains analyzed were pathogenic but revealed clear differences in their virulence. We propose to consider these new results in the classification of P. l. pulvifaciens and in the description and diagnosis of AFB.

OXYTETRACYCLINE SENSITIVITY AND PULSED-FIELD GEL ELECTROPHORESIS TYPING OF PAENIBACILLUS LARVAE SUBSP. LARVAE ISOLATES OF AUSTRALIAN ORIGIN AND THOSE RECOVERED FROM HONEY IMPORTED FROM ARGENTINA

No 87

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The aims of this study were to determine the oxytetracycline (OTC) sensitivity and type Paenibacillus larvae subsp. larvae isolates obtained from Australian and Argentinean sources. P. l. larvae minimum inhibitory concentrations (MICs) to OTC were determined using an agar dilution method and isolates were typed using pulsed-field gel electrophoresis (PFGE). PFGE fingerprints of P. l. larvae DNA generated by the restriction endonuclease XbaI produced 12 distinct PFGE types. Types I, II and VIII comprised the majority of strains (28/44; 63.6%). Type I (9/44: 20.5%) consisted only of isolates cultured from Argentinean honey and Argentinean honey blended with Australian honey and all these isolates had a MIC to OTC of 0.6 µg/ml. Type II consisted of 10 (22.7%) isolates from New South Wales (3), Queensland (6) and one isolate originating from honey containing a mixture of Argentinean honey blended with Australian honey. All these isolates had MICs to OTC of 0.04 µg/ml or 0.05 µg/ml. Type VIII consisted of 9 (20.5%) isolates all of New South Wales origin with MICs to OTC of 0.04 µg/ml or 0.05 µg/ml. The other PFGE types consisted of 3 or less isolates (Type XI, 3 isolates; Types III, V, VI, VII and IX, 2 isolates each; Types IV, X and XII, 1 isolate each). P. l. larvae isolates of Australian origin and Argentinean origin were all very sensitive to OTC. However, the isolates of Argentinean origin and Argentinean/Australian honey blend origin were less sensitive to OTC (MIC of 0.6 µg/ml) than isolates of Australian origin (MICs of 0.04 µg/ml or 0.05 µg/ml). Collectively these data indicate that PFGE is an affective means of discriminating between P. l. larvae strains and could be used to determine whether OTC resistant strains are from local or imported P. l. larvae strains.

PHENOTYPIC AND GENOTYPIC FEATURES OF PAENIBACILLUS LARVAE STRAINS FROM FINLAND AND SWEDEN

No 88

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A phenotypic and genotypic characterization of 45 isolates of Paenibacillus larvae from honey and diseased brood of Swedish and Finnish origin were made. The characterizations were based on determination of the metabolism of carbohydrates (API), detection of specific enzymes (APIZYM), sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) of whole-cell proteins and pulsed-field gel electrophoresis (PFGE) of bacterial DNA. The last method is a high-resolution DNA fingerprinting method proven to be superior to most other methods for biochemical and molecular typing, not earlier described for identification of P. larvae subspecies. The results indicate biochemical and genetic variance at the subspecies level. Four strains showing all the characteristics of Paenibacillus larvae ssp. pulvifaciens, formerly associated only with a rare disease called Powdery scale disease were isolated from brood with clinical signs of American foulbrood.

MONITORING FOR AMERICAN FOULBROOD SPORES FROM HONEY AND BEE SAMPLES IN CANADA

No 89

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In Canada, the recent advent of oxytetracycline-resistant American foulbrood (rAFB) is leading to a major change in the management of AFB for beekeepers that have relied on prophylactic applications of antibiotics. In order to more effectively manage AFB in large commercial beekeeping operations where inspection of colonies does not occur regularly, more efficient techniques are needed to alert producers of their risk of disease. We examined whether the relationship between Paenibacillus larvae subsp. larvae spore levels from honey or from adult bees could be used as a sensitive indicator of AFB risk. Multiple samples of extracted honey were collected from 14 beekeepers in the Province of Alberta and 19 beekeepers in the Province of Manitoba over three years. In addition to honey, adult workers were collected from brood nests during provincially–regulated inspections in Manitoba and were stored in 70% ethanol. The number spores in each honey and adult bee sample was determined microbiologically. Honey samples were prepared for analysis by combining 300 mg of honey with 1 ml of phosphate buffered saline (PBS), pasteurising this solution and then pipetting eight 20 ml drops onto a plate containing a modified PLA agar. Adult bee samples were prepared by rinsing approximately 40 workers, macerating them in 30 ml of PBS, and then plating the supernatant. Inoculated plates were incubated at 34∞C + 5% CO2 and scored for P. l. larvae growth after 4 and 7d. Following the enumeration of P. l. larvae spores, the susceptibility of the P. l. larvae cultures to tetracycline and tylosin was determined using a standardised disc diffusion assay. The density of CFUs per g honey or adult bee was found to be a more reliable predictor of AFB history in a beekeeping operation than the number of samples positive for any detectable P. l. larvae growth. Initial results suggest that 500-1,000 CFUs /g of honey are indicative of beekeeping operations with >2% of their colonies exhibiting clinical symptoms of AFB. Nevertheless, adult bees appear to be a much more sensitive predictor of AFB infections. These techniques may eventually serve as new extension tools to pinpoint operations with high AFB risk.

THE DETERMINATION OF TRACHEAL MITE *ACARAPIS WOODI* INCIDINCE IN THE REPUBLIC OF TURKEY

No 90

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Introduction: Acarapis woodi, which lives in the trachea of honeybees and feed on honey bee hemolymph, causes an important honeybee disease. Turkey presents an indispensable environment for bees in terms of its floral diversity and favourable climate conditions. Turkey plays an important role in honey production depending on the fact that it has a rich floral diversity and is acting, in its integrity, as a transit line, being located between Asia and Europe. Migratory beekeeping is a common activity in Turkey, however there exist no control mechanisms to prevent the spread of honeybee diseases. In addition, there is no supervision over bee entry and exit, particularly in areas near the borders! For this reason, bee diseases, which are common in neighbouring countries, are highly likely to develop in Turkey, too. Especially feral and smuggled colonies regularly cross the country without regulatory inspection, coming from Greece and Bulgaria in the west and north-west; and from Azerbaijan, Armenia and Republic of Georgia in the north-east. Concerns about the existence of this disease in Turkey are increasing day by day due to migratory beekeeping activity and bee movements in the borders. For the last two years in particular, beekeepers have been continuously reporting some complaints, which are overlapping with the symptoms of the disease.

For the aim of scanning the existence of this disease, honeybee sample collected from 281 apiaries on border zone of Turkey are examined by direct (dissection method) and indirect (guanine visualization) methods and it was taken comparative results from both direct and indirect methods and evaluated. Several methods have been proposed and implemented for positive tracheal mite identification (Shimanuki and Knox, 1991). These methods roughly fall into either direct or indirect categories. The former includes bee dissection and homogenisation and staining of tracheae, by which mites are actually seen. In the indirect method, such as ELISA or Guanine visualization, infestation is determined by a colorimetric reaction of some molecules (Koch and Gerson, 1997; Grant et al, 1993; Fichter, 1988; Ragsdale and Furgala, 1987).

Methods: In this study, we applied both direct and indirect methods in a way to control one another. In direct method, honeybees are dissected in the classical manner; as for the indirect method, a purine compound, guanine, is used to determine the presence of A. woodi. A total number of 10290 samples from 281 apiaries were collected randomly in winter and early spring, when honeybee tracheal mite populations are at a high level. All bees were kept at -200C until assayed. We took about 50 live adult bees out of each colony. They were divided into two subsets. The thoraces of the first 25 bees were dissected and thoracic discs were cleared in 8% KOH (Delfinado-Baker, 1985; Shimanuki and Knox, 1991), then stained with lactic acid and observed microscopically. A preliminary evaluation of the method was conducted by dissecting the insects in one of the 25-bee samples from group 1. Their tracheae were ranked according to four categories of infestation (0: uninfested, meaning both tracheae were quite silvery; 1: incipient, one trachea with vague dark blemishes; 2: medium, one trachea clearly dark; 3: high, trachea brown to black). Other 25 bees were examined by Guanine visualization method. For this purpose, they were placed in 0.1M NaOH basic solution. All thoraces were separately homogenized by Ultra-Turrax tissue homogeniser and ultrasonic cell disruption and finally centrifugation. The supernatant was collected for guanine determination via TLC. Guanine was loaded as a standard. An eluent of 5% w/v ammonium sulphate/ 13M ammonia/ 1-propanol (60:30:10) was used for samples that extracted in a basic solution. Guanine spots were visualized by a UV lamp and were compared with the spots obtained by the above-mentioned standards. Results: The results demonstrated that 12.8% A. woodi positive according to the dissection method, 16.3% A. woodi positive according to the Guanine visualization method. A good concordance between the two methods was obtained in categories 0,1,2,3, ($P< 0.05$; _2 tests), suggesting that the guanine method provided results comparable with and more sensitive than the dissection methods.

Discussion: A. woodi was discovered, for the fist time, in Turkey by this study. So many reasons have been thought, up to now on, to justify the fact that in Turkey, there exist only two studies in this filed (Özkırım and Keskin, 2003; Çakmak et al, 2003), the results of which were negative. However, this study revealed the fact that the choice of method plays a very important role in identification. Before all, the way and time of collecting the samples may directly affect the result. That is, A.woodi infestation is at its highest level during winter and early spring. Collecting honeybee samples any time other than winter or early spring makes it more difficult to detect Acarapis woodi. Samples should not be put in any solution, especially alcohol. Contrary to what has been done in the study, conducted in Turkey by _. Çakmak et al.; fresh or frozen samples were preferred for the experiment rather than any material preserved in alcohol for our study; as alcohol darkens the tissues, making visualization of mites difficult. Furthermore, alcohol clears the trachea and causes the loss of mites (Tomasko et al, 1993; Shimanuki et al, 1994). For this reason, starting from the very early stage of the experiment, samples should be collected during the right season, that is, winter or early spring, and should be stocked at -200C until the beginning of experiment, without being placed in any kind of solution (Peng and Nasr, 1985). Taking into account the distribution of A. woodi infestation incidence in percentages in some provinces in Turkey, it is found that the infestation level is higher in border regions. It is normal to get positive

results in these regions because of high rate of bee entry-exit and existence of A. woodi in neighbouring countries. To conclude, in the last years, A. woodi is very quick to spread in our country especially starting from border regions. It is still pleasing to have a very low level of infestation. However, all the necessary steps shall be taken soon against this disease. Thus, spread of this disease will be prevented at a very early stage in Turkey, which is an important country in beekeeping industry. Bee Diseases Laboratory of Hacettepe University is continuing its studies hereon.

SEARCHING FOR DEFORMED WING VIRUS IN NEW ZEALAND HONEYBEES

No 91

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Studies in many countries on the prevalence and pathology of honeybee viruses associated with the parasitic mite Varroa destructor have identified deformed wing virus (DWV) as an almost ubiquitous infection in infested colonies of Apis mellifera. Investigations to determine the primary viruses responsible for the death of varroa-infested honeybee colonies in New Zealand were begun in 2001. The analysis of samples of live and dead bees from infested, untreated colonies comprised AGID and ELISA tests, which included a specific antiserum to DWV. These tests did not detect DWV in any of the samples. Further analysis of purified bee extracts using SDS-Page protein analysis of both the 2001 samples and additional samples, collected from different NZ colonies in 2002, also failed to detect any established DWV infections. The sequencing of the DWV genome has permitted the development of reverse transcriptase PCR-based testing for this virus. Analysis of NZ honeybee samples for DWV using this much more sensitive means of detection has still so far failed to detect the virus.

INCIDENCE OF THAI SACBROOD VIRUS DISEASE TO ASIAN HONEYBEE *APIS CERANA INDICA* FAB., IN KERALA, INDIA

No 92

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Asian honeybee Apis cerana indica Fab has been infected with Thai Sacbrood Virus (TSBV) and 95 per cent of the colonies were destroyed. Studies were made on the larval susceptibility, symptomatology and sequence of changes observed in the affected colony. Ten larvae were ground in 10 ml of distilled water (1 larva / ml) using a mortar and pestle kept in an ice bath. Resulting suspension was filtered through muslin cloth and the filtrate was centrifuged at 8000 g for 10 minutes. The clean supernatant fluid mixed with 50 per cent (w/v) sugar syrup in the ratio 1:10 was used for inoculation. 1, 2, 3 and 4 day old larvae were selected for inoculation. One day old larvae were highly susceptible, recording 100 per cent mortality closely followed by two and three day old larvae showing 84 to 92 and 82 to 96 per cent mortality respectively. Four day old larvae were comparatively less susceptible recording 72 to 74 per cent mortality only. Affected larvae appeared slightly plumby compared to healthy ones when examined by taking out of the infected cells. Infected larvae were seen stretched on their back in the cells with the head directed outwards and turned upwards like the prow of a boat. The dead larvae looked like a sac filled with milky white fluid when lifted up and it ruptured easily releasing the milky fluid. Cadavers changed their colour from white to pale yellow and sank down on the floor of the cell and dried up in 10 to 15 days as brownish black boat like cells. Sequence of visible symptoms were the presence of unsealed cells in brood area with the head of the larvae directed outwards like the prow of a boat. Dead larvae lying stretched out on their back, appearing like sacs filled with milky white fluid when lifted up. Dead and dying larvae seen strewn on the floor board, hive entrance or on the floor near the hive. Mottled appearance of brood combs with uncapped cells interspersed with capped cells with perforated cappings. Scales like remnants of dead larvae seen within the cells. Decreased foraging activity, egg laying and irregular placement of eggs. Dwindling of bee population of the colony and desertion of the infected hive by the bees.

BIOLOGICAL AND MOLECULAR CHARACTERISATION OF DEFORMED WING VIRUS AND KASHMIR BEE VIRUS

No 93

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Deformed wing virus (DWV) and Kashmir bee virus (KBV) are two of the most damaging virus diseases of honeybees. In combination with the parasitic mite Varroa destructor, which is a vector of both viruses, they can precipitate the collapse of an entire colony, usually during the fall and winter. Larvae and pupae infected by either virus are removed at a high rate by the bees. Both viruses can be detected in all life stages as well as in adult glandular secretions and larval brood-food, which is the natural form of transmission and persistence of the viruses in the colony. Virus titres in pupae increase

drastically when infested with viruliferous mites and this constitutes the engine of the epidemic that finally kills the colony. DWV is an Iflavirus and has a single open reading frame (ORF) with the structural proteins N-terminal to the nonstructural proteins, a long 5' nontranslated region and a poly-A tail. It is distantly related to several other insect viruses including sacbrood and slow paralysis virus. KBV is a cripavirus characterized by a poly-A tail and a highly conserved intergenic region separating the 5' nonstructural polyprotein ORF from the 3' structural polyprotein ORF. It is closely related to acute bee paralysis virus (ABPV) and more distantly to black queen cell virus and other insect dicistroviruses. KBV is considerably more variable than the other honeybee viruses, including its close relative ABPV, with an especially high proportion of non-synonymous nucleotide changes among different isolates, possibly pointing to a recent acquisition by A. mellifera. Co-variate analysis of the KBV-ABPV internal IRES, responsible for the translation of the structural proteins, showed it to be structurally similar to the cricket paralysis virus IRES and different by one major stem-loop from the IRES' of other dicistroviruses. For both viruses, the processing sites for the viral proteases were deduced by comparative analyses. The open reading frames of both viruses were expressed in bacteria for the production of monoclonal antibodies for use in immunomicroscopy, genome mapping and expression studies, surveillance and field studies.

GENERIC TECHNOLOGIES FOR THE DETECTION OF BEE PESTS AND DISEASES IN THE FIELD AND THE LABORATORY

No 94

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Honeybees can be affected by a large range of diseases, pests and parasites that are of importance for the health of colonies and also from the point of view of regulation and the movement of bees in trade around the world. In order to provide a complete health status test for beehives, it is necessary to develop generic techniques that facilitate testing for a full range of pests and pathogens using a single type of assay in a centralised facility. This approach allows the delivery of very rapid, comprehensive and large scale testing services both direct to beekeepers, and in the case of survey work, to regulatory bodies. In order to facilitate the routine usage of PCR at CSL in a high-throughput environment, work has focused on real-time PCR (TaqMan®) systems permitting quantitative gel-free detection of PCR products. The development of these techniques has made a significant impact in these areas for Plant Health, and is now being developed to fulfil the needs of the National Bee Unit and bee inspection services. Another aspect of diagnostics of particular interest to inspections services and beekeepers is that of 'field tests' or 'point of care tests' where the assays is carried out by non-specialists at the point of inspection. These need to be simple and rapid but speed up the decision making process. To allow detection of pathogens in the field, a 3 minute, single step, lateral flow test incorporating antibody coated latex particles has been developed. Examples will be presented of both aspects of testing from the UK survey for the detection of Kashmir bee virus (KBV) and other bee viruses using real-time PCR, and for the detection of European and American foul brood using lateral flow devices. In addition, a forward look to technologies on the horizon that are likely to make an impact in the field of bee disease detection will be discussed.

EFFECTS OF ARTIFICIAL SUGAR FEEDING ON SUGAR COMPOSITION OF ROYAL JELLY

No 96

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European Regulation on organic agriculture contains a specific section for organic beekeeping (section C). Here a number of breeding conditions are indicated that are suitable for honey production, but do not consider other bee products. In particular, supplement with artificial nutrition is not allowed, except in case of danger for bee colony life, while for the production of royal jelly it is often necessary to provide the colony with both glucydic and proteic nourishment.
A research was carried out in order to contribute to a better knowledge of the royal jelly (RJ) composition and to ascertain the effect of the glucydic nutrition. Four groups of three bee colonies, equipped for RJ production, were fed with 4 different sugar nutrition (honey, sugar syrup, and 2 commercial products with different sugar composition). Another group was kept without artificial nutrition. Altogether 90 RJ samples were collected and the main sugars (fructose, glucose and sucrose) were determined, according to a HPLC-RID method previously developed and validated.
The results show that the types of nutrition tested have no or little effect on RJ sugar composition. The ranges of values found for the 3 main sugars are (g/100 g of fresh product): 2.4 – 6.9 for fructose; 3.7 – 8.2 for glucose and 0 – 2.1 for sucrose.

MICROSCOPIC CHARACTERISTICS OF ROYAL JELLY

No 97

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Royal jelly (RJ) contains pollen grains, derived from the foraging activity of the honeybees that reflect the environment where beehives are located. Microscopic analysis of RJ can be used to determine its geographical origin. In this work a new simple method for quantitative (total amount of pollen grains) and qualitative (relative frequencies) pollen analysis is described and precision data are given.
An experiment was organized to study the influence of pollen or protein feeding supplements on microscopic characteristics of RJ.
Finally, microscopic characteristics of 30 samples of commercial RJ (imported and national) were studied and results are presented.

ORGANIC BEEKEEPING AND PROSPECTS IN HUNGARY

No 98

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Since the demand for safe agricultural products has grown in the last decade Europe-wide the number of organic beekeepers in Hungary has increased.
Depending on the nectar-source (bee-pasture) there were significant difference between organic and conventional beekeeping for a long time. After the appearance of the Varroa mite the beekeeping practice changed and divided into organic and so-called conventional. Hungary is an important – mainly acacia – honey producer and there is no doubt that high quality honey gives the greatest reputation. Though the number of organic beekeepers is still – relatively – low compared to the conventional ones their achievements and technology are often used by the "non-certified" beekeepers as well.
Different treatment methods were studied and efficiency survey was carried out. The effect of oxalic acid and formic acid was assessed during the season. Organic beekeepers – certified according to European Union Regulation 2092/91 – were selected and surveyed. The database of the studied beekeepers consists of 5164 colonies. The natural bee pasture has also a great effect on the possibility of being certified. Result shows a representative picture of the practical treatments, the preferred hives, visited bee pastures, the number of migrations during the season and the willingness to follow sustainable practices.
The effect of organic acid treatment on Varroa mite mortality was studied during the period of 2002-2004. Moreover the effects of the different treatments were studied on the development of the colonies during the season.

AN ATTEMPT TO ESTABLISH RELIABLE "BEST BEFORE" DATES FOR HONEYS ORIGINATING IN BOTH CONTINENTAL AND OCEANIC CLIMATES

No 99

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Honey is increasingly appreciated as a sweetening by European consumers. Nowadays, it is of particular importance to know how long honeys will last before they lose their quality. The purpose of this work was to research into "best before" dates for honeys originating continental ("C" samples) and oceanic ("O" samples) climates. Evolution, throughout thirty months, of severa quality control parameters was determined. The study was carried out on 60 high quality unheated Spaniard honeys (35 "C" samples and 25 "O" samples). All honey: were kept at room temperature, as they are usually stored both at home and at the supermarket. All parameters were analysed each five months by applyin(either official methods or equivalent procedures. Result are discussed with regard to average values. Electrical conductivity was not modified. Moisture kept constant during twenty months in both "C" and "O" samples, and then it decreased. Fructose and glucose decreased whereas HMF increased in all samples, but more markedly after 20 months. pH of both "C" and "O" samples kept constant during 15 months and then steadily decreased. In general, free acid showed a simil behaviour in both "C" and "O" samples with similar increases and decreases until 20 months and then, this parameter increased in all samples. Diastase activity decreased steadily in all samples. Acid phosphatase decreased steadily until 15 months in "C" samples and until 20 months in "O" samples then, it increased and decreased again in both group of samples, showing unpredictable evolutions. In conclusion, changes of honey composition regarding several parameters included in the composition criteria for this foodstuff are marked after 20 months. Thus, 20 months could be proposed as a "Best before" date for honeys originating in both continental and oceanic climates.
NOTE: The Spaniard INIA (Ministerio de Ciencia y Tecnología) and Junta de Castilla y León have supported this work under the projects API98-007 and BU17/99.

IDENTIFICATION OF HONEY ASSOCIATED YEASTS

No 100

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The matrix honey is nearly unperishable because of prevailing living conditions for microorganisms. Due to that fact only a few yeast species are able to survive in this matrix – osmophilic or osmotolerant species – and cause the one known spoilage. To discuss the matter "yeast cell limits" or "parameter to detect fermentation" correctly it is imperative to have knowledge of the species which cause the observed fermentation.
Yeasts were isolated and identified from the matrix honey (Accumulation: 90%ic Glucose-Bouillon; Isolation: Wort-, Sabouraud- or Maltextract-Agar; Identification: biochemical) The following genera were identified during a two years project period: Zygosaccharomyces, Schizosaccharomyces, Debaryomyces, Pichia, Torulaspora, Cryptococcus, Rhodotorula and Candida. From the first genus – if it was possible to name the species – one found Z. rouxii resp. mellis. Candida showed six, Cryptoccocus two and the other genera one species each.
Occurrence and statistical distribution of theses species will be explained in detail, the species will be comprehensively described.
According to the mentioned studies the genera/species Zygosaccharomyces spec., rouxii and mellis, Candida magnoliae and parapsilosis, Schizosaccharomyces octosporus as well as Debaryomyces hansenii (appearance >70%) seem to be the main causes of fermentation.

HONEY QUALITY PARAMETERS FROM THREE DIFFERENT SPECIES OF APIDAE:MELIPONINAE IN GUANARE, VENEZUELA

No 101

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Honey samples from seven colonies of Trigona (tetragonisca) angustula, four from Melipona compressipes and three from Melipona favosa were harvested directly from the sealed honey pots of each nest located in Las Panelas sector, Portuguesa State, Venezuela and processed using the methodology for Apis mellifera L. honeys at the Biochemistry and Bromathology Laboratories (UNELLEZ-Guanare) in order to study some quality physical and chemical parameters. Average yields did not show much difference within the honeys. The analysis of variance applied to average values of the studied fractions did not show differences (P<0,05) except for Reductive Sugars (%) and Brix (%) for M. favosa honeys; what suggests a particular flora foraged and special manage for ripening the nectar in the honey pots. Samples of honeys studied did not fulfil all the quality requirements parameters stipulated for Venezuelan honey normative (COVENIN) and foreign regulations (CODEX Alimentarius).

Key words: stingless bees, honey, quality parameters, sucrose

PHYSICOCHEMICAL PROPERTIES OF TURKISH HONEYDEW HONEY

No 102

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Turkey is the biggest honeydew honey (mediation of Marchalina hellenica insect) producer and exporter in the world. As the quality of honeydew honey is quite high here in Turkey, it plays a very significant role in the economy of the country. The aim of this research was to study the physicochemical properties of Turkish honeydew honey harvested from different locations in the provinces of Izmir and Mugla where the most of the world pine honey production (approximately 92%) is realized.
Sixty honeydew honey samples have been collected from individual apiaries for this purpose in autumn 2003. Ash, moisture, hydroxymethylfurfural (HMF), diastase activity, reducing sugar, apparent sucrose, total acidity and pH value have been analysed to determine physicochemical properties. Reducing sugar (>60 %) and pH (> 4.2) values were found higher, HMF content (< 40 mg/kg) was lower than the limits of National and European Regulations. Other parameters were appropriate with the regulations.
The low HMF contents indicate that the studied samples were not heated and were stored in good conditions. These results also state the high quality of the honeydew honey analysed with regard to the parameters studied.

IDENTIFICATION AND MANAGEMENT OF HAZARDS IN THE APIARY'S ACTIVITIES TO GUARANTEE HONEY SAFETY

No 103

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Farmers and food operators have the primary responsibility to ensure food safety. For this reason, all the sectors of the food chain must be considered, including primary production. This concept is well explicated in the EU legislation (White Paper on Food Safety and Regulation 178/2002). At the present time, it is not mandatory in Europe for HACCP principles to be applied to primary production, but the Regulation (EC)

852/2004 "on the hygiene of foodstuffs", states the development, dissemination and use of guides to good hygiene practice for the control of hazards in primary production and associated operations. Nevertheless, the same Regulation requires Member States to encourage operators at the level of primary production to apply the HACCP principles, as far as possible.
Our efforts are directed to give a tool for beekeepers – European and non-European - to facilitate their identification, prevention and elimination/reduction to acceptable levels of those hazards for honey safety that could appear during their beekeeping practices in the apiary.
Through a flow chart, we describe the different phases of beekeeping, from the harvesting/purchasing of the swarm to the removal of the supers for their delivery to the honey workrooms.
The flow chart's analysis shows that two phases could be considered critical for chemical hazards as a consequence of inappropriate therapeutic treatments on the hives: the breeding of the honeybee families before the supers' position; and the breeding of the families with the supers posed. About microbiological hazards, only the honeycombs contamination with spores of Clostridium botulinum could be considered relevant during the phase of the supers' removal, but the difficulties related to the monitoring of this hazard makes this phase manageable with the proper training of the beekeepers and with their proper application of good practices.

USING BEES AND HIVE PRODUCTS TO ASSESS METAL POLLUTION IN FINLAND

No 104

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The main objective of this study was to determine the degree of selected heavy metal (Cd, Pb, Cu, Fe, Mn, and Zn) pollution in Finnish pollen, honey and bees, and to evaluate their use as biological indicators of environmental pollution. The study sites (four in each category) represented the three categories: industrial, urban and control areas around Finland. The metal concentrations in honey were very low at all study sites. No significant differences were found in metal pollution in honey or in pollen between these categories. The level of Cd, Cu, Zn and Fe in bees were significantly different between these categories. It was concluded that under Finnish conditions honey and pollen are not good bio-indicators of heavy metal pollution, but bees can be used for bio-monitoring purposes at least for these metals. The average level of Cd, Cu, Zn and Fe that bees posses in industrial sites were 0.423:g g^{-1}, 19 :g g^{-1}, 76.25 :g g^{-1} and 172.5 :g g^{-1} , respectively.

A REVIEW OF OSMIA SPP. (MEGACHILIDAE) AS MANAGED POLLINATORS: BASIC NESTING BIOLOGY AND ANATOMICAL AND BEHAVIOURAL REASONS FOR THEIR SUPERIORITY OVER APIS AS POLLINATORS OF CERTAIN CROPS.

No 105

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At least five species of the mason bee genus Osmia (Family: Megachilidae) have been shown by various researchers to be superior to the honeybee as managed pollinators of a range of crops, including apples, almonds, strawberries, blueberries, raspberries, tomatoes, peppers, alfalfa and sainfoins.
The anatomical and behavioural reasons for this will be outlined and the potential of these as mass-reared managed pollinators will be discussed.

POLLINATION OF INVASIVE PLANTS BY BUMBLEBEES AND BUMBLEBEE CONSERVATION IN IRELAND

No 106

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Non-native (alien) plants have become established in many habitats worldwide, causing a wide range of impacts and often disrupting key ecosystem processes. Since many exotic plants require animals to transfer pollen between flowers, they have the potential to disrupt native plant-pollinator interactions. In addition, native pollinators have the potential to control the demographic processes of invasive plant populations. In this presentation, I will discuss the pollination of an ecologically and economically damaging invasive plant in Ireland, Rhododendron ponticum. This species, native to Southern Spain, relies on insect mediated pollination in order to set seed. In Ireland, its primary pollinators are bumblebees.
Populations of many native bumblebees in Ireland are thought to be under threat from changes in agricultural practices which have caused a reduction in wild flowers and nesting sites. Invasive alien plants with large floral displays which produce substantial volumes of nectar may therefore provide an alternative forage resource for native bumblebees. In the second part of my presentation, I will examine the role invasive plants may play in supporting native bumblebee populations and discuss bumble bee conservation in Ireland.

EXAMINING PATTERNS OF BEE MOVEMENT WITH HARMONIC RADAR

No 107

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A harmonic radar system for tracking individual flying insects at low altitude has now been used successfully on bumblebees, honeybees, butterflies and moths. It has provided a novel insight into how individuals search for resources and how they exploit these resources in a complex landscape. The radar has also enabled us to answer questions about the navigational abilities of these insects whilst in flight.
The harmonic radar is a 3.2 cm wavelength, 25 kW peak power, azimuthially scanning, dual frequency system. A transponder, weighing approximately 10mg and measuring 16mm long, is carefully attached to the dorsal surface of the insect. The transponder can be detected within a circle of radius 900m centred on the radar, in unobstructed flat terrain. Experiments in a flight room suggest the insects are not unduly hindered by the presence of the transponder, and continue to fly and feed as frequently as they do without the transponder in place.
To illustrate the power of this technique, examples will be given of how honeybees and bumblebees explore the landscape during their first flights, and how these flights develop into experienced forager flights. Radar tracking has enabled scientists to examine bees' searching strategies in detail, both when naïve bees are looking for food and also when bees are displaced into unfamiliar surrounding and are motivated to find their way home.

HABITAT PREFERENCES AND FOOD PLANTS OF BUMBLEBEE QUEENS IN AN AGRICULTURAL LANDSCAPE

No 108

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Introduction: There are only a few studies dealing with the occurrence of bumblebee queens in agricultural landscapes. However, the weather conditions and resource availability in the spring determine the performance of queens and therefore the whole bumblebee community later in the summer.
Methods: The data was collected in spring 2000. The study area consists of ten large patches of farmland. Bumblebees were counted using the line-transect method. Each line-transect was of a specific habitat type. Some other qualities of the habitats (for example ditch type and width of field margin) were also recorded and food plants were mapped.
Results: 13 bumblebee and cuckoo bumblebee species were recorded in this study. The total of individuals observed was 3,711. At the first and second counts the highest densities of food-collecting queens were in stream sides and at the third and fourth counts on leys. In stream sides the mean area (m2) covered by willows was at its highest and on leys the mean coverage (%) of dandelions was at its highest. Habitats used by different ecological species groups were somewhat different.
Discussion: There are differences in habitat selection by different bumblebee species according to previous studies as well. Habitats used by bumblebees change during the spring as food plants have different flowering periods. Willows are very important at the beginning of the spring and later dandelions become important.

THE RELATIONSHIPS AMONG VARIOUS BEE GENERA (*APIS MELLIFERA* L., *BOMBUS* SPP., *MEGACHILE ROTUNDATA* F. AND *RHOPHITOIDES CANUS* EV.) AS OBSERVED ON FLOWERING ALFALFA (*MEDICAGO SATIVA* L) AND CROWN VETCH *CORONILLA VARIA* L.

No 109

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As a side product of the research carried out in Czech Republic on insect pollination effectiveness in alfalfa and crown vetch interesting data illustrating relationships among various insect genera were obtained.
1. Generally – where several bee species occurred together, negative correlations were found between the abundance of both, the solitary bees and honeybees in various field situations.
2. Where abundance of M. rotundata increased in the time as a result of their emergence from cocoons brought to the field, the numbers of honeybees declined concurrently. Similar dependence occurred in the area: if M. rotundata bees' abundance decreased with the distance from their nests, the abundance of honeybees increased on the field parts less visited by the leaf cutting bees.
3. If abundance of both, M. rotundata and Rhophitoides canus females increased at the same time, the two species of wild bees divided with the field. The larger the distance from the nest, the lower the abundance of M. rotundata, and, consequently, the higher the numbers of R. canus was found on the field parts concerned.
4. On the flowering C. varia the negative correlation was found between the abundance honeybees and bumblebees (the group of B. terrestris, and B. lapidaries) during the cause of the days. Honeybees were most frequented at the warm noon hours, whereas bumblebees' numbers were highest in the morning and afternoon.
In the relations observed on alfalfa, the solitary bees seem to be the determinative factor. They trip flowers effectively what causes the cease of nectar secretion

and consequently the decline of attractiveness for honeybees. Then, honeybees concentrate on the field parts less covered by wild bees where the degree of pollination is lower. Paradoxically, in such cases even negative (naturally false) correlations between the abundance of honeybees and the seed yield were found.

The presentation was possible thanks to the project of NAZV IR44014

ENHANCING BEE POPULATIONS ON UK FARMLAND USING FORAGE MIXTURES.

No 110

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Populations of many species of bee in the UK have declined since the Second World War. Many species of solitary bee are now scarce or endangered, most arable areas now have only six of the twenty or so species of bumble bee, and managed honeybee populations are threatened by the parasitic mite Varroa destructor. This reduction in pollinators may threaten both the yield of arable crops that require insect pollination, and the survival of rare wild plant species. Reasons for the decline in bee populations are complex, but essentially habitat loss through arable intensification has led to a reduction in the supply of nectar and pollen for food, and suitable places for nest sites. Studies of suitable food plants for enhancing bee populations have been carried out by both Rothamsted and Monks Wood since the late 1980s, and have included various mixtures of both annual and perennial plants. The work has usually involved the use of small plots, which inevitably have limitations. One can, for example, easily demonstrate that such mixtures attract insect visitors, but it is difficult to prove that such plots are actually leading to long-term increases in populations, rather than simply diverting bees from other food sources. In order to answer some of these questions for bumblebees, a new five-year project (funded by defra and English Nature) has recently begun. Plots of different sizes have been sown with a mixture of plant species specified in the UK Countryside Stewardship Scheme "WM2 pollen and nectar mixture" at eight sites across England. These sites vary in farming intensity and landscape complexity from more intensive arable production in the east to more extensive, mixed farming further west. Regular observations of the bee species foraging on both the sown plots and the surrounding landscape are being undertaken, and non-destructive sampling techniques will allow genetic analysis of bees collected from the sites at the beginning of the project in order to estimate the size of existing bee populations, for comparison with samples collected four years after the establishment of the experimental plots. In addition, artificially reared bumblebee colonies will be placed adjacent to the experimental plots and their growth rates compared. The results of this project should help to identify the scale of habitat restoration required to sustain or enhance bumblebee populations and to better understand the influence of the surrounding landscape on the response by bees to such newly created habitats.

POLLINATOR DECLINE – ASSESSING THE RISKS: ALARM & EPI

No 111

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Europe, along with several other regions of the world, is experiencing marked declines in pollinators and the services they provide. Evidence for these changes is highly fragmented and it is difficult at this time to build a consistent picture at the continental level. Honeybees and some solitary bees have been shown to be important providers of pollination services, but the overall extent of their contribution remains largely unknown. As part of the ALARM project a consortium of researchers has embarked on a long-term programme to assess the large-scale environmental risks associated with the loss of pollinators. The primary objectives are to:
(1) Develop standardised methodologies to survey and monitor pollinators and the services they provide;
(2) Quantify the distribution shifts in key pollinating taxa throughout Europe;
(3) Determine the economic and biodiversity value of major pollinator groups;
(4) Identify the primary drivers of pollinator loss;
(5) Develop predictive models for pollinator risk assessment.
ALARM is aiming to achieve these goals and will allow the construction of a knowledge base to enable the EPI to underpin future programmes for the conservation, restoration and sustainable management of pollinators in agricultural and natural ecosystems across Europe. Only by quantifying the problem at the European level can we effectively target our resources to overcome the negative impacts of pollinator and pollination loss.

CAN PLANTATION FORESTRY REPLACE DECLINING FLORAL RESOURCES FOR APICULTURE IN AUSTRALIA?

No 112

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There are approximately 1000 commercial beekeepers in Australia managing over 500,000 hives. The primary floral resources are diverse and strongly influenced by climate. The dominant gena for honey production is Eucalyptus spp. and its close relations accounting for 70% of the Australian honey harvest.
The Australian industry is suffering a decline in floral resources due to a range of factors including public land policy restricting access, continued land clearing, urban development, prolong drought periods, fire wood harvesting, soil salination, logging of older reliable nectar yielding trees, reduced flooding, dieback of mature trees and the biological control programs for agricultural weeds of importance to honey bees. In recent years the national forest plantation estate has dramatically increased, offering some optimism that this may provide beekeepers with alternative melliferous flora.
The total area of forest plantations up to Dec. 2003 was 1,665,693 ha, 41% hardwood and 59% softwood. The softwood component is dominated by pinnus spp. which offers very little in the way of floral rewards to honeybees. The percentage area planted to hardwood plantations has increased at a greater rate than that of softwood spp. Eucalyptus globulus represents over 60% of the hardwood plantings with other Eucalypts accounting for 19%. The current harvesting rotation for eucalypts on high rainfall sites is 8 to 12 years. At this age flowering and nectar secretion is unreliable thus this floral resource is of limited value to commercial beekeepers.
Species selected for dryer sites for purposes other than pulp wood production hold better prospects for beekeeping although the area devoted to such species is small compared to the total national plantation estate. Plantation forests in Australia are not in the foreseeable future going to replace the existing floral resource focus of the commercial beekeeping industry.

HONEY QUALITY: THE RESIDUE ISSUE

No 114

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In the traditional opinion of consumers honey is a natural and healthy product. This is taken into account by high standards of honey quality and control in the European Community. The original quality concerns mainly ripeness, natural state and no adulteration. But since some years residues are the main problem. In some cases MRL are fixed for some pesticides which may occur in honey. There are also discussions about GMO pollen in honey. But the main problem is still residues of medical treatments against bee diseases especially antibiotics. There is an improvement, but there are still problems. The problem areas are to lead beekeepers to best apicultural practice without the use of antibiotics, progress in new methods of analyses and dealing with zero tolerance for antibiotic residues in honey.

RESIDUES IN HONEY – THE CURRENT SITUATION WORLD-WIDE

NO 114B

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Honey, as a genuine natural product, has to fulfil the EU directive 2001/110/EC: "Honey must, as far as possible, be free from organic or inorganic matters foreign to its composition".

Given that this claim is only deficiently being met, the residue problem nowadays is more current than ever. In the past, it was mainly analyses for antibiotics, such as sulfonamides, tetracyclines and streptomycin, that were processed. The "Chloramphenicol-scandal" in 2002 can be seen as the starting point for a significant extension of the range of analyses. The positive findings of nitrofurane metabolites, and later also of tylosin, in honey show that this caution was justified. The unclear legal background, a lack of analysis methods and the evaluation of the results caused the sensitiveness of all parties involved, and has effected a growth in the range of analyses, even without strong suspicion. Although regional and national focal points regarding the residue occurrence can be seen, they cannot be precisely limited because of the world-wide honey market.

On the basis of statistical data from the last 3 years, the current situation of the residue problem will be shown and questions such as, "In which countries do these problems occur? How has the situation changed or improved? What needs to be kept in mind in the future? What measures can be taken in order to deal with unforeseen problems?" will be answered.

CONTROL OF BEE DISEASES WITHOUT RESIDUES IN HONEY – PACKER AND CONSUMER NEEDS AND GOVERNMENT POLICY

No 115

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Honey packers and importers have suffered greatly in recent years from antibiotic and other residues in honey. Beekeepers will be under a strong compulsion to use some sort of veterinary medicine if they see diseased colonies. Antibiotics have been found beneficial to help colonies build up quickly in the spring in temperate

climates. On the other hand governments have been slow to put in place adequate legislation and inspection services. In many countries it is easy to obtain unapproved drugs. On the other hand consumers expect honey to be pure and natural. It is very difficult to get any significant movement on this issue. The ideal solution would be disease control measures that are cheaper than drugs but much more research is needed to investigate such measures.

THE RESIDUE FREE CONTROL OF BEE DISEASES

No 116

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Avoiding residues in the sense of preventive consumer protection must start from the beekeepers and the control of bee diseases. The best way is to avoid using medicaments as far as possible. But not all diseases allow this. Concerning varoosis it is often neglected that not all medicaments are suitable for colonies with brood. At the same time, medicaments should be used alternatively to avoid resistances and consecutive overdosing. Moreover, medicaments with substances of the group of organic acids and ethereal oils are available reducing the danger of residues significantly. In case of the American foulbrood, antibiotics are often used though they only mask this infectious disease. In consequence, the spores of the pathogen agent of this pest agglomerate in the colony and require treatment in smaller and smaller intervals. On the other hand, the alternative treatment of taking sanitary measures using artificial swarm methods, practised in some countries, is absolutely residue free. The success can only guaranteed on a long run if there is a simultaneous profound sanitation and disinfection of the hives and combs contaminated with the spores of the pathogen agent. There are similar correlations for other bee diseases.

RESIDUE FREE HONEY IN IRAN AND CANADA

No 117

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Iran: For many years the authors have combined the benefits of a pristine, mountain environment and the application of a nutritional and disease control supplement called Caspian Solution to produce a unique, residue free honey. The Damavand Mountain honey production region is located at elevations above 5,000 meters. Selection has created bees that are suited for life at high altitudes and the region offers many opportunities for isolated queen rearing. The bees are resistant to digestive and Chalkbrood diseases and they exhibit strong hygienic behaviour. The isolation and high mountain environment eliminates the risk of varroa mites. All of the nectar is from wild flowers and there are no herbicides, pesticides, fungicides or chemicals of any type applied in the region. Damavand Honey makes all of its own wax foundation to ensure the purity of the wax and honey. Damavand Honey uses Caspian Solution in nutritional supplement and disease control programs. Caspian Solution is a blend of royal jelly, pheromones and other natural ingredients. The quality and purity of the honey is supported by sampling, analyses and documentation.
Canada: Caspian Apiaries is pursuing the same residue free protocols in Canada. There are few high altitude meadows to exploit, but there are many isolated regions in British Columbia and the northern regions of Alberta. There are many opportunities for isolated queen rearing programs. Canadian beekeepers struggle with many of the pests and diseases known throughout the world, but Caspian Apiaries has successfully dealt with many pathogens through the use of Caspian Solution. The most obvious benefit of these pest and disease control programs is the dramatic reduction in the amount of medication used. In most cases the amount of medication used is lowered to 10 percent of the quantity suggested by suppliers, and Government Apiculturalists, and in some instances diseases are eliminated without using medication. It is clear from experience in two very different environments, that beekeepers can produce residue free honey if they adopt progressive management and disease control techniques.

DETECTION METHODS OF *PAENIBACILLUS LARVAE* SUBSP. *LARVAE* INFECTIONS BY SAMPLES HONEY AND ADULT HONEYBEES ANALYSIS.

No 118

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The method of choice for diagnosis of American foulbrood depends on whether clinical symptoms of disease are present or not. In the laboratory material from honey combs (diseased larvae), honey and adult honeybees can be investigated for the presence of spores Paenibacillus larvae larvae.
The aim of study was comparative diagnosis of American foulbrood using samples of both adult bees and honey from diseased and visually healthy honeybee colonies from apiary were AFB has been detected and from apiary were all colonies were visually healthy.
Both samples of the live bees and honey samples were collected from the brood chamber, from 2 honeybee colonies with clinical signs of disease and from 32 visually healthy colonies (apiary I) and from 13 colonies were clinical signs AFB not detected (apiary II).
Both materials were tested for the presence P. l. larvae

spores using microbiological methods which involved centrifugation, heat treatment of the sediment and culture on the BHIT-agar and MYPGP-agar plates.
Results demonstrate that in honeybee colonies with clinical symptoms of AFB (n=2) all samples (honey and bees) were positive for P. l. larvae. In 32 apparently healthy colonies from this same apiary, P. l. larvae was cultured from 24 of honey samples and from 19 bees samples.
In samples from apiary were not detected AFB signs (n=13), presence of P. l. larvae spores were detected in 7 bees samples and 3 honey samples.
Bacterial colony counts were higher in bee samples compared to honey samples.

IN VITRO INHIBITORY EFFECT OF HEN EGG WHITE LYSOZYME ON *PAENIBACILLUS LARVAE* SSP. *LARVAE* STRAINS ASSOCIATED WITH AMERICAN FOULBROOD DISEASE IN HONEY BEES

No 119

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American foulbrood disease (AFB) is a severe brood disease caused by Paenibacillus larvae ssp. larvae and is considered the most destructive of the brood diseases. The disease is distributed world-wide and can cause substantial economic losses. Increasing problems with antibiotic resistance of P. l. larvae have brought research attention on non-antibiotic methods for the control of AFB. In this study the inhibitory effect of hen egg white lysozyme on a number of P. l. larvae strains isolated from diseased larvae was investigated. A micro-broth dilution assay was used to evaluate the minimal inhibitory concentrations (MIC) of lysozyme against eight P. l. larvae strains in 96-well microtitre plates. The plates were inoculated with 105 CFU/ml of P. l. larvae from a fresh culture in Luria broth supplemented with 1 _g/ml of thiamine and the bacteria were tested with a gradient of lysozyme concentrations ranging from 0 to 1,000 _g/ml. The plates were incubated aerobically at 35°C for 48 hrs and the bacterial growth was measured by a change in optical density. The MIC of lysozyme against P. l. larvae strains was found to be between 2.0 _g/ml and 125 _g/ml. Lysozyme was also found to inhibit the growth of Melisococcus pluton and Ascosphaera apis. Therefore, there is potential to use lysozyme as an alternative to control AFB and other brood diseases of honeybees.

SHAKING CAN CURE AMERICAN FOULBROOD

No 120

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We wanted to evaluate the shaking method to cure honeybees from American foulbrood and investigate possible differences between double and single shakings.
We followed 60 shaken honeybee colonies for up to three seasons and measured the spore load of American foulbrood spores in the colonies. All colonies had clinical symptoms of AFB when they were shaken and the number of clinically diseased cells was estimated. All hive parts including frames with foundation, used in the new 10 frame deep Langstroth hive was bought brand new. Of all the colonies 21 where shaken twice and 39 were shaken once. Colonies that were shaken twice were left in their first hive for two days before they were shaken the second time. Live adult honey bees were sampled during shaking and then once a week for 4 weeks. After that sampling was done once a month during season.
When the last samples where taken 23 colonies remained. Of them 9 were shaken twice and 14 shaken once. The main reasons for loss of colonies are absconding and winter mortality. The data is being analysed and results will be presented
All colonies reduced their spore load significantly, to a level where it no longer can be detected. We found no difference between treatments, the single and double shakings reduced their spore load equally fast.
Further, the number of clinically diseased cells in the original colony did not influence the rate of spore load decrease or the survival time.
It seems that shaking, if done properly, can cure a colony that is infected with AFB and that it is a disease that is maintained by the beekeepers. Data from other experiments support this theory and will be presented during the meeting.

DISSEMINATION AND PERSISTENCE OF FUNGI TO CONTROL *VARROA DESTRUCTOR*

No 121

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In most countries the management of Varroa destructor is based on the use of chemical acaricides but increasing problems with the establishment of resistant mite populations now makes more urgent the development of alternative sustainable control strategies. Isolates of entomopathogenic fungi identified as potential microbial control agents have been selected on the basis of virulence against V. destructor, efficacy under colony conditions and low impact on beneficial, non-target organisms, including bees.
The transfer of fungal inocula between bees and to mites and their efficacy is being evaluated at increasing spatial scales; laboratory populations, observation hives

and nucleus colonies. Some of the problems that had to be overcome in attempting to undertake and quantify these relationships are presented with some of the results. The high temperatures and low humidity within honeybee colonies present a considerable challenge to the survival of fungal conidia. Studies to determine the longevity of conidia of fungal isolates stored at a range of temperatures were designed to measure both germination and the formation of colony forming units (cfu's). Some isolates stored at 5oC remained viable for a year.
The results obtained so far indicate that a fungal biocontrol agent for V. destructor could provide a valuable, environmentally benign contribution to an integrated programme of mite management, especially with the onset of acaricide resistance.

A COMPARISON BETWEEN DIFFERENT OXALIC ACID TREATMENTS IN OVERWINTERING HONEYBEE COLONIES AFFECTED BY *VARROA DESTRUCTOR* ANDERSON & TRUEMAN

No 122

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Four oxalic acid (OA) administrations were compared under winter continental (Modena, Emilia-Romagna) and Mediterranean (Siena, Tuscany) conditions in Italy. Each of two apiaries of 50 broodless colonies was randomly split into 5 groups. Sucrose (S) was added to solutions intended for trickling and the Varrox device was used to sublimate OA within the hives. Groups A, B and C received respectively 4.2%OA/60%S, 3.2%OA/60%S and 4.4OA%/30%S solutions by trickling (5ml/comb) and group D was treated by sublimation (1,4g of OA). Group E was left untreated and served as a control.
The tolerability was assessed by comparing initial and final number of adults and brood cells. At the time of administration, the colonies sized 8,840 and 10,530 adults in Modena and Siena, respectively, and had an average decrease of 20-35% and 8-27% by the end of the winter. At this age, the brood averaged 1,454 and 10,391 cells, respectively. The above population parameters did not significantly differ between groups and no evidence for a lacking tolerability was attained. In Siena, a low mite load did not allow the evaluation of efficacy. This could be made in Modena, where the natural mite mortality reached 13.6% and the efficacy was 87.7, 87.1, 70.3 and 91.0% in groups A-D respectively. This was somewhat lower than previous recordings and may be due to the low environmental and internal RH. The significantly lower mortality in group C stresses the need of a high sugar concentration in solutions intended for trickling. No significant differences occurred between the other groups, whose treatments seemed alternative on the practical point of view. The sublimation was time expensive and required heavier protections than the trickling.
The statistical analysis pointed out that, under the examined conditions, the natural mite mortality does not allow a reliable estimate the overall colony infestation (Squared R=0,501). Similarly, the number of populated combs depends on the actual number of bees to a limited extent (Squared R=0.507), although this does not necessarily imply an influence on the treatment performances.

BEE DISEASES ORIGINATE NOT ONLY FROM PATHOGENS – DISEASE PREVENTION IS BETTER THAN CURE

No 123

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Most bee diseases are considered to be of socio-economic importance and are significant to the international trade.The moment clinical symptoms of diseases are visible in a bee colony the natural defence mechanisms of the bee colony failed to suppress the disease under the threshold. Bee diseases originate not only from the pathogens. Environmental condition can favour the outbreak of the bee diseases. But adaptations to these changing conditions are difficult to achieve. However, the responsibility of the beekeeper as an adding factor in the multifactor causal chain often is neglected. Principals of "Best beekeeping practice" will be discussed.

BENEFITS OF THE FRECUENCY ANALISYS OF THE HUM OF AN APIS MELLIFERA SWARM, APPLIED TO THE HIVE INSPECTION

No 124

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Rational beekeping requires continuous following of the beehive conditions, but exhaustive inspection, that demands its opening, is aggesive and in many cases can be harmful. In this document we explain some experimental results we have obtained, that can be the seed of a new technique for hive inspection. This technique will offer relevant information of hive state avoiding its opening. Moreover, It can be made in any weather and in a very short period of time.
In those experiments, we have recordered the sound

produced inside the beehives by the swarms. Then, whith the aid of computers, we have made the analysis of the signals and have compared its frequency spectrums. From the experiments we have deduced that the frecuency analysis of the swarm hum inside the hive, offers applicable information in order to know its state. This method has showed differences among several beehives in the same visit, and also, the changes on the same beehive inspected in different dates.

PRODUCTIVITY OF BEEKEEPING DEPENDS ON THE SUNSPOTS ACTIVITY

No 125

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As it is known, the spectrum of Sun electromagnetic emission is varied with regards of sunspots activity. The Sun radiates the electromagnetic waves with the wide interval of wavelength but to the Earth surface reaches only the narrow interval of spectrum with the lengths: 3,200 Å – 11,000 Å. Other waves are absorbed by the Earth atmosphere. For the human eye are sensitive more narrow interval between 3,800 Å – 7,600 Å, which is more stable interval and almost do not depends on the sunspots activity. The spectrum 3,200 Å – 3,800 Å is the nearest ultraviolet waves. They are not visible for a man but they are visible for bees. Besides, ultraviolet and visible spectra are radiated from outer electrons transitions in molecules or atoms. Other part of Suns spectra reached to the Earth surface has the following wavelengths 7,600 Å – 11,000 Å are infrared waves, radiated from molecular vibrations. Both these intervals of electromagnetic waves, especially the first one have the peculiar meaning for hurrying up of chemical reactions in the cells of living creatures. Very often we observe that bees have all conditions yielding of nectar but, in spite of, they are very passive and the honey crop is very pure. We have been observed this phenomenon and conclude that when the sunspots activity is minima then the productivity is maxima in case of ability of the mellifluous. Here we suggest tree conjectures: 1. Due to variation of sun spectra (especially ultraviolet part) varies the possibility of metabolism, mellifluous may not separate the nectar. 2. In case of maxima of sunspot bees cannot use the eyes sensitive for ultraviolet waves. 3. The first and second reasons act simultaneously. According the up to date biology this conclusion must be justified. But the quantitative investigation of this interesting problem needs the more ability of data from different point of the world. Apparently, the quantitative investigation of this problem would be useful for preliminary evaluation of the beekeeping economical effect. A beekeeper would be able to define replace his apiary on new mellifluous or not. The prediction, of seven days before, of sunspots activity he could be able to find in internet

METHOD OF PRODUCING OF THE PURE BEE VENOM

No 126

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Usually there are used different kinds of collectors for producing of bee venom but collecting of pure production is very important problem. We collected the bee venom from different kinds of devices comparing their cleanness and have been concluded that the advantage has the collector with horizontal glass plate. It had been compared to the venom collected by device with vertical glass plate. Apparently, when bees separate the venom on vertical glass plate, after irritating by current impulse, they simultaneously separate the excrements which are mixed up to the venom. When bees separate venom on horizontal plate from below to above then the gravity force separates the pure venom from the excrements and on the plate surface we get the pure product.
In our system of bee venom collector and the impulse generator are assembled together in the each cassette and fed by the rechargeable battery also attached on the same cassette. This autonomy system of device is very convenient than the cassettes with common battery and impulse generator, due to the inevitability to connect them by cables in night times.
The quality and quantity of producing bee venom are depended also on the date of season and the mellifluous consisting. The quality of bee venom is depended also on the bee breed. The bees of Georgian - bees Apis Mellifera Caucasica gives a best quality of venom.

BEEHIVE DRAGOSLAVKA

No 127

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This new type of a beehive provides the bee colony better living conditions than all other well-known types, even than a natural beehive in the tree stem. That is the reason the bee colony is being developed faster, getting fewer diseases and the yields are better. A beekeeper is enabled to work and apply all well-known methods of beekeeping in a faster and easier way. Manufacture of those beehives is faster, simpler and cheaper. The beehive consists of three equal bodies with equal frames. External frame dimensions are 358 x 255 mm. Internal dimensions of one body are 372 x 372 x 265 mm. The volume of one body is 36,77 l in comparison to DB having the volume of 63,33 l and LR with 41,77 l. The volume of the brood chamber is 73,54 in comparison to DB of 63,33 l and LR 83,54 l. The volume of the whole beehive is 110,3 l in comparison to DB of 126,5 l

and LR of 125,3 l. The volume according to the cm of the height is 1,383 l according to DB of 2,043l and LR of 1,726 l. Beside the ideal volume, this beehive has also the ideal base surface of 1383 cm2 and LR of 172,6 cm2.
All types of modern beehives have some disadvantages. In addition to it, some constructors of those beehives did not know about today's methods of beekeeping and therefore, those beehives became outdated. That is why it was necessary to invent the ideal beehive.

GEOGRAPHIC INFORMATION SYSTEM FOR APIARIES MANAGEMENT

No 128

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Geographic Information Systems (GIS) are computer systems used for storing, processing and analyzing spatial phenomena. Therefore, it is a powerful tool for managing apicultural activities. This work presents the designing of a GIS applied to apiaries logistics for beekeepers of a Brazilian municipality. This GIS for apicultural logistics aims to supply the needs of a beekeepers association called APICAMPO – Beekeepers Association), and it is implemented in a Brazilian freeware software for GIS, called SPRING, developed by INPE – National Institute for Space Research (www.inpe.br). The logistics for beekeepers activities is based on information about apiaries characteristics, including their geographic location, and geographic information such as terrain relief, roads, railroads, settlements, hidrography, municipality boundaries and land use. The efficient manipulation of apiaries characteristics demands for a cadastre including the essential information for apiaries logistics. The cadastre data are related to every apiary and their beehives. The stored data for the apiaries are, besides their geographic location, owner name and address, and the data for their beehives are: quantity (total number of), spatial arrangement, types, wind direction, shade, and honey production. After storing the cadastre and geographic data, the second step is to generate the thematic information about the potential of apiculture pasture using the GIS tools. The definition of the potential of apiculture pasture depends on the information about the potential of honey production and the level of bee population, which is obtained from the apiaries cadastre and land use information. Using these thematic information and the cadastre data, make the diagnosis of the current situation of the apiaries possible for APICAMPO associates. This is an important step of a strategic plan that intends to establish the apiaries location based on the most efficient honey production on the APICAMPO geographic region.

NEW SOFTWARE FOR BEEKEEPING ADMINISTRATION ON TROPICAL COUNTRIES

No 129

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Apicontrol 1.0 is a simple and potent computer system developed for users in tropical conditions that completes all the possible requirements for beekeeping activities: detailed information such as location on different biogeographical positions, hive count, breeds information about queens. User will be able to keep up special date records. Apicontrol 1.0 was develop at Universidad del Tolima (Colombia), according to demand of beekeepers. Its fundamental objective is the integral administration of production system under tropical conditions and consider Africanized honeybee habitat. The software uses eleven specific modules: Installations on the farm, hives and it places, Queens, global productions (Honey, propolis, wax, pollen and royal jelly) and polinization. The tool makes possible elaboration, presentation of final reports, so administrate warnings of the pending tasks in automated way. The tasks are completely programmable and transparent for final users, make possible print reports and forms for the taking of data in the apiary, stores and it conserves the historical files of the exploitation on productive system, complete statistics of the beehive, copy of automatic security of the data and the exploitation. Apicontrol 1.0 used for the development of the software the programming package Borland Delphi 6.0, which is qualified as an environment of visual programming of high level, the base of this program is the language Object Pascal, the software is compatible with the operating systems Microsoft Windows 95,98, Me, 2000, Xp. It's the first administrative software for tropical conditions in South America useful for development countries.

INTENSIFICATION OF UTILIZATION OF SPRING HONEY FLOW

No 130

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The aim of experiment was to examine some means for bee stimulating on utilization of spring honey flow An experiment involving 6 treatments and 6 replications was conducted in 1996-1999. Colonies of all treatments were kept in one section, bee queens sisters of the same age were given to the colonies and were replaced every second year. 16-frame Dadant bee hives were used in the experiment. In all treatments, except for (C), we used Caucasian x Carniolan bee hybrids of the first

generation. In (C) treatment we used Carniolan bees of "Vangerog" line.
Bee colonies consume much food in spring for brood rearing and support of their lives, therefore honey production in 1996 from April 16 to May 8, i.e. during 22 days was less than 3 kg per colony, and "double" colonies consumed even their reserves. The year of 1998 was more successful, honey production over the period of 24 days was from 3.6 kg to 5.7 kg per colony. Most of the colonies efficiently used the spring honey flow in 1999: Carniolan bee colonies gathered 14.2 kg, "double colonies" – 7.6 kg of honey.
Annual honey production per check colony was on average 16.2 kg. Carniolan bees produced significantly more honey, i.e. 30.2 kg per colony and "double colonies" 25.8 kg. The other means of stimulation also had a positive effect on bee efficiency. In the treatment involving electrical heating honey production was 22.7 kg, in the treatment involving early feeding in the autumn - 22.0 kg, and in the treatment involving spring stimulation – 20.8 kg. Compared with the check colony, the treatments with Carniolan bees gave 52,6 more income per colony, the treatment involving early autumn feeding – 22.9 , the treatments involving electrical heating in spring – 21.4 , the treatments involving extra feeding in spring – 14.5 , and the treatments with two colonies in a beehive – 13,9 .

THE BEEKEEPER'S SOLUTION IN ARCHITECTURE

No 131

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Did you ever realise which kind of building beekeepers work with? Started in the cellar of their houses, the beekeeping processes crawl out into workroom, garage and hovel. Barracks are randomly added to their houses, later overgrown by a hall for the professional sector, but always decentralised, inefficient and troubling the family. My exam-work tries to solve this problem. The work is an architectural concept. It consists of a modul-based structure in building, a detailed information by a worldwide website and a financial definition of the costs and earnings down to a monthly balance. The basis of the whole concept is the necessity of a cheap but neat architectural solution for proffessional beekeepers, which allows to grow alongside the amount of beehives you have. In constructive means this worked out to be a system of frames for the static structure, and prefabricated wall- and roof-elements for the mapping, which create a room of at least 5 x 10 meters (i.e. 550 square feet), defined as one module. Modules can be arranged in the number they are needed, they can be equipped with the working-area wanted and surfaces can be designed from a large catalogue of samples. This way architecture can become a tool for the beekeeper to work with. In several ways rooms can be added, rearranged, rebuild or filled with other usage. There are possible working areas for all the functions needed in beekeeping. Architecture helps to optimize industrial processes with forklift and pallettes. Furthermore housing modules can be added to suit the beekeeper. These modules are divided by another ceiling to provide even more space for a whole family. And if the children have grown up, just take one module apart and save money for energy costs and time for room-cleaning. And if the beekeeping grows, just order more modules at www.beekeepers-house.org. Including full transparency on costs, great individuality in design and highest efficiency in erecting process. This whole concept is on the way to be realised. I would appreciate if I could explain it to you and all interested beekeepers on the APIMONDIA 2005 in Dublin.

PRODUCTION OF TOP-BAR HIVE AND FRAMES FROM CHEAP AND LOCALLY AVAILABLE MATERIALS

No 132

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Top-bar hives have been considered as an intermediate and an appropriate hives for low-income groups with low skills of bee management. However, the construction of the top-bar frames requires precision to keep the bee's natural inter comb distance (bee space), which makes beekeepers to depend on machines that might not be available in their vicinity. As a result, the adoption of top-bar hives by farmers' has been remained very low. The objective of this study was to construct and test an alternative and low cost top-bar hive and frames from locally available materials using hand tools only. For this study widely found materials like, Arundinaria alpine (bamboo) splits, Arundinaria donax (shambeko), Oxytenathera abyssinica (shimel) and Eucalyptus globules (Eucalyptus) round sticks with diameter of 31mm – 33mm were used as top-bar frames. Along with these, a machine made timber top-bars were also used for comparison. Molten beeswax was smeared at the midribs of each top-bar to be used as starter and also to guide the bees to build straight combs. For the construction of hive bodies, the same materials as top-bar frames were used.
A total of 15 honeybee colonies with uniform strength were transferred to each hive type with three replications and kept under similar environmental conditions for three years and data on bee space, brood comb thickness, comb spacing and cell depth were measured and recorded. Moreover, the honey yield data were collected and compared for four seasons. The experiment revealed the absence of statistically significant difference ($P > 0.005$) in bee space, brood comb thickness, comb spacing and cell depth among the top-bars produced from different materials and also with that of machine made one. The average honey yield (11.93kg) harvested from these hives was twice as much as the annual average yield of traditional hives. There

was no also statistically significant variation ($P > 0.005$) in honey yield among the materials used to construct the top-bar hive and frames. The experiment indicated the possibilities of utilizing the locally available materials for production of top-bars using hand tools without affecting the honey yield. It has been also calculated that the estimated average material costs required to construct a complete hive with the different test materials were five and eight times cheaper than the timber top-bar and the movable frame hives respectively.

APICULTURE RESEARCH IN UPPER EGYPT AND OMAN

No 133

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About 400 kilometers south of Cairo, situated Assiut. My research work in Apiculture in this district is extended from 1966 till now and during my work in Oman as Apiculture Specialist from 1984 to 1987 and from 1993 to 1995. The material of this report concerning my work in Apiculture research, pollinators and bee botany was published in 75 articles in UK, India, Saudi Arabia, Germany, Russia, Belgium, Canada, South Africa, Slovenia, Yemen, Jordan and Egypt. These articles were published throughout 30 years, from 1973 to 2003.

ALTERNATIVE MARKETING STRATEGIES FOR HONEY AND THE OTHER BEE PRODUCTS IN TURKEY

No 134

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Turkey is the fourth important honey producer country after China, USA and Argentina. The State Institute of Statistics (SIS) figures showed that 69.540 tons of honey and 3.130 tons of beewax from 4.288.853 hives owned by 150,000 beekeepers in 2003.
One of the most crucial problems in Turkish beekeeping sector is marketing. Beekeepers can undertake by working together in their technical and commercial activities. This means to establish a marketing cooperative. But the amount of honey marketed by cooperatives is very low. One common notion about the marketing honey and the other bee products is that it is likely to become more like other agricultural commodities. Marketing cooperatives are organizations comprised of farmers that collectively market their products. Farmer have the collective bargaining to bid up the price of products by using the cooperative a tool besides providing many services at cost. Cooperatives assist the members on the accession process from conventional beekeeping to organic beekeeping. This is an alternative way to undertake the marketing problem. Economical development for beekeeping in Turkey can be reached by an effective marketing, however, generally animal products' market structure in Turkey has a confusing chain. Beekeepers have kinds of alternatives to market their honey in Turkey. They may sell their honey: directly to consumers (in local market or roadside stand), to a honey cooperative, to a wholesaler, to a honey packer or dealer, to the export market. The length of this chain causes great differences between the producer prices and the consumer prices. At this study, it is important to examine the honey and the other bee products marketing channels in detail and marketing margins and defective aspects of this marketing margin must be revealed by both producer and consumer. Due to that, problems and defects of the honey marketing from the point of view of the producer and the other actors in the market are brought into light and suggestions are given to remove them.

NEW EDUCATIONAL MATERIALS FROM THE DANISH BEEKEEPERS ASSOCIATION

No 135

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For several years there has been a decrease in the number of beekeepers in Denmark. A campaign with the aim to change this negative development was started - and we have succeeded!
Throughout the last two to three years we have had a small increase in the number of beekeepers.
On a yearly basis, approximately 400 (or 10%) of our members do not renew their membership, while at the same time 450 new members are joining us. This means that we have to produce educational material suitable for the education of beginners. Some of our materials are also used in public education.
The educational materials include: Special issues of our journal (Tidsskrift for Biavl), Posters, a cd-rom and a dvd. Examples will be presented at the presentation.

BEEKEEPING IN UKRAINE

No 136

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Ukraine is one of the oldest leading in the world on bee breeding. Accumulation of considerable experience in the field of apiculture as well as its importance for agriculture were the cause of establishing of Ukrainian research and

technological Apicultural Institute in Kiev in 1989. In honor of the great Ukrainian scientist, originator of scientific apiculture in the world practices the research Institute was given a new after P.I.Prokopovich. This Institute is a part of Ukrainian Academy of Agrarian Sciences. P.I.Prokopovich Beekeeping Institute the main institution of Ukraine to resolve problems of apiculture. It is a scientific and methodical authority and coordinator of research activities of organizations, institutions and scholastic institutions, enterprises of different forms of property when they resolve scientific and technological problems and tasks of apiculture. In the Institute there are the Ukrainian Beekeeping and Apitherapy Associations, the National Beekeepers Associations of Ukraine "Ukrbzholoprom", the Found of P.I.Prokopovich.. Apicultural Museum is qualified to keep historical past and propagandize modern technologies of production of apiproducts. The Institute has a scientific library with scientific woks of home and foreign authors, textbooks, journal and reference literature on apiculture. The Institute to publish interministerial thematic scientific digest-"Apiculture" is a cofounder of journal-"Ukrainian Beekeeper," to cooperate of journal-"Beehive". Ukraine is member of international organizations-"APIMONDIA" and "APISLAVIA".

ECONOMICS OF HONEY PRODUCTION - THE HIDDEN BACKBONE OF NATIONAL ECONOMY.

No 137

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The paper focuses on the economics of modern beekeeping with the aim of showing the profitability of the business which can guarantee diversified agricultural product, optimise land use and minimise environmental pollution.
Problem Statement:
To a common man, it is very difficult to understand the real value of honey, the national honey need is not met, lesser attention is given to non-timber forest products (honey) – this has led to under utilisation of resources. However, honey production using modern beekeeping method is yet to be widely known and practised in Nigeria and some parts of the world, because of the belief that bee keeping is generally hazardous and should not be taken as an enterprise. Thus the knowledge and economic usefulness of honey is not growing well, the crude way of harvesting honey is still the major practise e.g. honey hunting and traditional bee farming. Few beekeepers are not aware of modern beekeeping methods and practise for optimum production and efficiency. It is therefore noteworthy that before honey production could attain its potential of increasing farmers incomes, improving standard of living, marketing of honey and other bee hive products, enabling environments and government support need to be given adequate attention and priority. The national resources may be destroyed if the bee hunters and traditional beekeepers are allowed to continue with their crude practise – This calls for the urgent need for enlightenment campaign around the world: **the main reason for the presentation of this paper**
General Objectives Of The Paper:
-To study the economy of honey production around the world
-To describe the socio-economic characteristics of bee keepers
-To assess the profitability of honey enterprise
-To examine the factor that militate against honey production
-To proffer solutions to the many problems of the beekeepers

"BKEEPING" A COMPUTER PROGRAM

No 138

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Introduction: "BKeeping" a computer program developed by a beekeeper for beekeepers to keep better records. It will be presented as a PowerPoint presentation which will demonstrate from the actual program.
Methods: The computer program has been developed using Visual Studio C++ and will operate on a windows 98 through to XP operating system. As this program has been developed using C++ it is totally self contained and has a small memory footprint. For the database it uses Foxpro DBF type files which are very efficient in storing information.
Discussion: There are 9 main areas of information:-
Site Details
Hive & Load Details
Queens
Disease
Production
Supplements
Weather
Each of these areas is expanded in information gathering to present a representation of your beekeeping operation.
Most beekeepers keep a tremendous amount of information in their head. This is fine for a short period but permanent records enable better beekeeping decisions in the long term.
Quality assurance programs are being requested by consumer groups and in Australia some packers are paying a premium price to a beekeeper who is QA audited. "BKeeping" keeps the information and enables print outs for the auditor.
There are many other areas in today's beekeeping wheret records are important for better profitable beekeeping.
All computer programs benefit from user suggestions

and I have no doubt this will be the case with "BKeeping". It is available for download for a 60 day trial so give "BKeeping" a go.

FACILITIES TO IMPROVE ORGANIC BEEKEEPING IN TURKEY; PROBLEMS AND SOLUTIONS

No 139

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Turkey possesses a huge beekeeping potential of 4 million honey bee hives and 70.000 tons of honey harvest annually. Turkey is placed among the countries where the density of beehives is the highest in the world. In recent years, significant increase in the amount organic products including honey has come into being in Turkey to meet the demand for organic products. In terms of the variety of melliferous plants, Turkey offers such a unique geography. As GMO planting is forbidden in Turkey, the ecosystem has not been ruined yet and is still favorable for the honey bee ecotypes. The present situation attracts the attention of EU countries since it has got the potential of producing "clean" hive by-products as a significant item.
As a result of positive improvements in recent years, organic beekeeping plays an important role in Turkish beekeeping. According to the data obtained from Agricultural Ministry for the year 2003, 192 beekeepers produced 1.100 tons of organic honey from 37.653 bee hives, and 109 tons of organic honey were exported to Europenion Countries, most of which was sent to Germany (64 tons). However, organic beekeeping sector is still facing serious problems. Low honey production per hive, mix harvest of honey, lack of the production of residue-free organic comb foundation and limited-use of organic acids against varroa are some of the problems facing the sector. The price difference in conventional and organic honey is not more than 10 % or 20 %. It is also said that Turkish government will continue its efforts to control the quality of organic honey and the other bee products.
Turkish organic beekeeping sector will take a better place in the world market, provided that governmental financial support, high quality management techniques, emphasizing the "clean and healthy" honey production are granted and that the customers are trained to be conscious consumers, that is, they should be ready to appreciate the difference between the organic and conventional honey.

CURRENT SITUATION OF THE MACEDONIAN APICULTURE – FACTS & FIGURES

No 140

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In 2004 the whole country area was subject of analysis with main objective to find out the current situation of Macedonian apiculture. For this purpose local beekeeping associations were visited and questionnaires were provided for managers of the local beekeeping associations (27) and for their members (433).
The results of the statistical analysis of the questionnaires show that the Macedonian apiculture has an impulse of new young beekeepers (27, 6% of the whole beekeeping population are between 20 to 40). Most of the apiaries are managed on hobby and semi-commercial basis (79,8%) which shows that beekeeping in Macedonia is good resource of additional income. The analysis of the data shows that 57% of the beekeeping businesses in Macedonia are traditional family businesses. The rest 43% of the beekeeping businesses are new. Beekeepers, according their experiences, are divided in two general groups such as: 9,3% not experienced (with 1 - 3 years experience) and 90,7% experienced (with 3 - 20 years experience).

HONEY QUALITY AS AFFECTED BY HANDLING, PROCESSING, CHANNELS OF MARKETING AND OTHER CONSTRAINTS TO BEEKEEPING

No 141

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We report the factors that affect honey quality in a pioneer study representing the national outlook. A total of 120 beekeeping households were randomly sampled in four districts, one representing each of the four geographical regions of the country, and a questionnaire was administered to each. Processed honey in both branded and unbranded forms was sampled across supermarkets, hawkers and stall markets along four transects across the capital city. Honey quality parameters assessed were moisture content (MC), free acidity (FA), diastase number (DN), hydroxymethylfurfural (HMF), and water insoluble solids (WIS), using recommended methods. Over half of beekeepers were 40 years and above, and across ages, males were predominant (77%). Honey was the major hive product

(93%) and was mainly for sale. Majority of beekeepers kept traditional hives. Pressing of combs, boiling and straining were the predominant honey processing methods. Beekeepers reported that honey quality was mainly compromised by harvesting immature honey, poor extraction and storage methods and contamination by extraneous materials. The main constraints to beekeeping were lack of appropriate equipment (52%), lack of transport and poor rural infrastructure, inadequacy in skills due to weak extension service, bad weather and vermin. Significant differences ($P < 0.05$) in HMF and DN were observed among the five honey brands. All brands met National and Codex Alimentarrius MC and WIS standards while most failed in HMF and DN. For the European Union market, 40% of the brands would qualify in HMF and 20% in DN. Strong correlations were observed between HMF vs. DN ($r = 0.94$) and MC vs. FA ($r = 0.56$). Supermarket honey was more superior ($P < 0.05$) in DN (5.07) and WIS (0.1%) than stall markets and hawkers. Honey from all the retail groups qualified for all standards only in MC while DN and WIS were major tailbacks to quality. Diastase, HMF and WIS levels are all management related hence, farmer training and extension in proper honey harvesting, handling and processing should be strengthened. Quality monitoring at all levels especially processing, should be emphasized.

THE IMPORTANCE OF BEES AS GREENHOUSE POLLINATORS

No 142

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Greenhouse agriculture has spread considerably all over the world over the past decades, and the array of crops grown under enclosures is fast expanding as well. Whether it be to improve earliness, grow fruit and vegetables that simply cannot survive in the outside environment because of climate and/or pests and diseases, to isolate plants genetically for seed production, or provide the produce of superior esthetic quality that customers have gotten accustomed to, growing crops in greenhouses, taken here in their widest sense, is becoming a common practice everywhere. Many of these crops are strictly dependent on insects for their pollination. And though for others autonomous self-pollination and/or wind-borne pollen may provide adequate fruit and seed set in the open, the confined environment found in greenhouses with its reduced air movements and access for the outside fauna often highlights dramatically the essential role of bees as key greenhouse pollinators, as will be illustrated by a few examples such as tomato and strawberry.
Bees have thus become essential allies of man to pollinate greenhouse crops, though the need to introduce bees to assist pollination in enclosures is often still not fully appreciated. Indeed, the pollination of entomophilous crops in greenhouses remains more an art than a science as little scientific research has taken place to date to adress this area. Thus the use of bees to pollinate greenhouse crops can remain a challenge as the whole environment, both abiotic and biotic, is profoundly altered under greenhouses. Farmers usually think of their crops with little thought as to the requirements of the bees. And beekeepers are not always aware of the constraints that their colonies will face when placed in greenhouses and of their management options which could improve the pollinating activities of their colonies as well as their very survival. These constraints will be reviewed as will some essential points of honey bee colony management that have come to light recently to maximize the pollinating activity of bees in greenhouses.

THE EFFECT OF ENVIRONMENTAL CONDITIONS ON BEE POLLINATION ACTIVITY IN GREENHOUSES

No 143

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In modern agriculture many high cash crops formerly cultivated in open fields are now grown in greenhouses. This shift has occurred mainly to facilitate plant protection and to enable production out of season. Greenhouses have created a unique environment for bee activity, with the potential for detrimental or enhancing effects on pollination of these protected crops. We investigated flowers' rewards, bee pollination activity and the resulting fruit set in vegetables grown under greenhouse conditions. Carbon dioxide levels were found to affect the flowers rewards, and possibly bee activity in melons. Air-flow direction and level in respect to hive location affected bee pollination activity and fruit set in melon; this phenomenon is explained by the tendency of bees to fly up-wind. Enclosures limit the food resources of a colony to a specific area. This situation caused a rapid decline in colony strength mainly due to shortage of pollen as witnessed for sweet pepper and melon. The humidity in a greenhouse is easily controlled. Changes in humidity affected nectar composition of melon and hence, the flowers' attractiveness to pollinating bees. A new approach in greenhouses is to block UV radiation. In tomato greenhouses, reduced radiation interfered with the bees' navigational ability and thus reduced their activity. Overall conditions resulting from the assimilation of all the variables influencing the greenhouse environment must be considered in crop pollination management.

BEEKEEPING FOR SEED AND VEGETABLE PRODUCTION IN GLASSHOUSES

No 144

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For many crops, pollination is required to produce fruits or seeds. In the Netherlands, glasshouses are widely used to produce vegetables like sweet-pepper, egg-plant and courgette, and honey bees are placed inside to optimize pollination. Glasshouses are also used for seed production. Here 'male' and 'female' lines are often combined to produce hybrid seeds. Good pollination using honey bees is essential. Bees usually forage on the crop inside the glasshouse as long as pollen and/or nectar can be reached. Even when more attractive flowers are visited by flying through open windows, part of the bees stay foraging on the crop inside. Glasshouses are a relatively hostile environment for bees. The use of pesticides may harm the bees, although nowadays many pests are controlled using natural enemies. Bees may get trapped in corners or structures inside the greenhouse, especially since orientation inside the greenhouse is probably difficult. Bees flying outside the glasshouse may get lost or find the windows closed when returning from foraging. Healthy colonies are therefore the key to success because the bees will continue to forage on the crop although colony size is gradually reduced. We use colonies housed in 8 or 10 frame hives for pollination inside glasshouses, most of which has been set up in the year before from two frames with a young queen. A large brood nest guarantees replacement of old and lost bees for several weeks. Hygiene and disease control warrant relatively long-lived bees

POLLINATION IN EXTRA-EARLY HORTICULTURE CROPS OF ALMERÍA GREENHOUSES

No 145

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An overview of the main extra-early crops cultivated in greenhouses in Almeria (Spain) is described, pointing out the economical importance of the pollination on the revenues of each crop. The main characteristics of the floral biology of each crop species concerning to pollination will be signalled, together with nectar analysis, pollinator attractions such as volatiles and other important traits for pollination.
Here they will be shown some results obtained by us on the pollination of sweet pepper. Also an advance of results of aubergine pollination trial will be described. Nectar dynamics and sugar composition in several sweet pepper commercial cultivars of the 'bell' type were studied during two years. Nectar volume per day was always small, depending on the cultivar and the time of collection. Differences in nectar production and composition were found between varieties and times of collection. One of the studied varieties did not produce nectar until the third month after blooming. Nectar volume decreased with flower age, being greater on the first day of floral anthesis, declining until the third day when it almost disappeared. Nectar from all varieties was hexose-dominated (glucose and fructose), although sucrose was identified in most samples. The sucrose to hexoses ratio was very variable, not only between varieties, but also within the same variety. That ratio varied among samples of the same variety, depending on the time of collection. The importance of nectar volume and sugar composition of sweet pepper is discussed from the point of view of pollinators' commercial application.
Some aubergine flower important characteristics for pollinators are described, such as pollen dimorphism, and an advance of results of a pollination trial in greenhouse by bumblebees will be discussed.

KEEPING ORCHIDS (CYMBIDIUM SP.) FREE FROM EXTRA-FLORAL NECTAR USING HONEY BEES

No 146

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Many plants produce extra-floral nectar. In Cymbidium orchids, produced as cut-flowers in glasshouses, nectar production is very high, resulting in nectar droplets at the base of flowers and stems. The flowers get sticky, and black fungi grow on the nectar droplets. In serious cases the flowers have to be cleaned manually before they can be sold. Bees are essential for pollination of many of our crops, where they transfer pollen from flower to flower. Their ability to forage on nectar sources is used to produce honey, but this ability may also be used directly. By placing a honeybee colony inside a glasshouse with Cymbidium orchids, bees can be used to remove all visible nectar on the flowers and growth of fungi is prevented. The main problem for the use of honeybees in Cymbidium are residues of pesticides. In ornamentals many persistent pesticides are used. Several months after spraying, forage bees may still get in contact with the residue and foraging on the nectar droplets will stop

after the first flights. Because glasshouses with Cymbidium are kept relatively cold and shaded, breakdown of pesticides takes longer than usual. In addition, Cymbidium grows very slowly, so months before bees are needed small flower stems are already present. Therefore, bees walking on the stems to forage on the nectar droplets are easily contaminated with residues. Cymbidium pollen is transferred in packages to large insects like bumblebees, and the flower is spoiled. Fortunately, honey bees are too small to spoil the flowers but this implies that they cannot forage on Cymbidium pollen. If they cannot forage outside, brood rearing is stopped and colonies have to be strengthened regularly. We do not provide alternative protein sources to the bees as this will increase defecation of bees on the flowers.

THE POSSIBILITY OF THE PLANTS' DETERMINATION POLLINATED BY *BOMBUS TERRESTRIS* L. AND ECONOMICALLY IMPORTANT SOLITARY BEES - *MEGACHILE ROTUNDATA* F. AND *OSMIA RUFA* L. ON THE BASIS OF PALYNOLOGICAL ANALYSES THEIR FAECES.

No 147

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Till now practical methods of determination wild bees food plants on the basis of pollen analysis depended on taking away collected by insects pollen. It was always connected with killing them or destroying their nests. The aim of research was to check if the pollen analysis of faeces will let to know about food plants of chosen insects species without the interference in their life. This method limits only to taking of samples faeces in which are residues of pollen grains in form of undigested external layer of the exodermis - exine which structure is the most important also in the pollen analysis of alive pollen grains. The pollen analysis of faeces can be used in the research of food plants protected species of solitary bees and bumblebees, nesting in the ground, for example in the case when taking pollen samples for analysis is impossible (inaccessible nests) or when it would be connected with complete devastation of nest, especially in protected regions.

THE USE OF HONEYBEES AND BUMBLEBEES AS VECTORS FOR THE DISSEMINATION OF ANTAGONISTS AGAINST GREY MOULD IN STRAWBERRIES

No 148

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Antagonists can effectively be applied against Botrytis cinerea in strawberry. They can be administered by spraying, but since Botrytis enters the plant through the flowers, the use of pollinating insects, already present for their pollinating service, for the dissemination of antagonists seems promising. The research in 2004 showed that two different antagonists could be effectively distributed to the flowers by bumblebees and honeybees, although the number of spores recovered per flower was not yet sufficient. In 2004 cellulose and talcum were used as a carrier for the spores.
The research of 2005 focuses on improvement of the dispensers used on the hives of the bumblebees and honeybees, and on testing and comparing different carrier substances, for instance bentonite, cellulose, talcum, quartz. A good carrier has to adhere to the bees' body surface, but needs also to be transferred to the petals and adhere to them. The results will be presented and discussed.

BECHBRETHA: THE ANCIENT IRISH BEE JUDGEMENTS

No 150

James Ryan

Bees played an important part in life in Ancient Ireland. Ireland was traditionally known as the "Land of Milk and Honey. Our ancestors produced a body of law tracts called Bechbretha which means The Bee Judgements in Irish. The text that has come down to us dates from the middle of the 7th century but is obviously from an oral tradition many centuries older. The text deals with the ownership of bees and how the honey was to be divided up among adjoining landowners; Injuries done to people by bees and the penalties for such injury; and the penalties for the stealing of bees. The laws also give details of the vessels used to measure honey. As well as the actual text of the laws the manuscripts that have been preserved have interesting comments written on the margins and these give a flavour of what beekeeping was like over the centuries

THE ISLE OF WIGHT DISEASE IN IRELAND

No 151

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The impact of the Isle of Wight epidemic on Irish beekeeping and the Irish honeybee population in the first half of the 20th century was explored. Isle of Wight disease, which is associated with acarine, caused by the

mite Acarapis woodii, was first discovered in Ireland in 1912 and, according to anecdotal reports, had a catastrophic effect on honeybee colonies across the country over the next 15 years. To assess the short- and long-term consequences of the disease, the records of the apiary examinations conducted by the bee inspector T. B. O'Bryen, issues of the Irish Beekeeping Journal, and other archival material held in the library of the Federation of Irish Beekeepers' Associations for this period were reviewed. The findings provide insight into the spread of Isle of Wight disease across Ireland, the immediate effects of the disease on honeybee colonies, and the long-term economic and psychological impact of the disease on Irish beekeeping. Most importantly, the results are of particular relevance to assertions that the Isle of Wight disease eradicated the Irish strain of the native dark European honeybee (Apis mellifera mellifera).

COMPARATIVE DNA ANALYSIS OF IRISH AND OTHER DARK EUROPEAN HONEYBEE SAMPLES.

No 152

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Mitochondria are present in the cytoplasm of eggs, but not sperm and contain DNA that is passed on by female parents only, providing long-standing molecular details that characterise individual queen lines. Comparative studies of two features of mitochondrial DNA reveal affinities and minor distinctions between different lines that allow construction of pedigree diagrams showing the descent and relationships of all queen lines.
The bulk of genetic information is carried on chromosomes within the nuclei of both eggs and sperm and transmitted by both sexes at fertilisation. Chromosomal DNA can be characterised by details of a subfraction called "microsatellite DNA" which differs between individuals and is utilised in our own species for DNA fingerprinting. Study of microsatellite DNA in individual worker honeybees indicates the proportion produced by inbred matings and also reveals the extent of introgression of foreign DNA into that of native A.m.mellifera stocks, through mating of their queens with drones of exotic subspecies.
(This presentation is based on data developed in the laboratory of Prof. Bo Vest Pedersen at the University of Copenhagen.)

A NEW LOOK AT BEEWING MORPHOMETRY

No 153

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An Beachaire December 1993 published a study, by T.J. Carroll, on the racial identity and purity of Irish honeybees. He analysed bees from 110 colonies and found that 106 colonies were predominantly Apis m. mellifera. E.O'Sullivan, P.Lyne, and R.Mooney young scientists of 1996 presented their study "The Perfect Queen Bee". A large proportion of their project was a countrywide bee-wing-morphometric-survey, identifying strains of bees used by Irish beekeepers. They studied 684 colonies (an average of 30 right wings/colony were measured). Their overall conclusions confirm that most bees farmed in Ireland can be regarded as representative of A. m. mellifera strains. More recently (2002 – 2004) DNA of 50 Irish samples, studied by V.Pedersen (Denmark) confirmed that the Irish bees were in the main undiluted A.m.mellifera. The present study attempted to explore in greater depth relationships in wing venation. I used left and right wings of 30 worker bees from each of 40, out of the 50, Irish samples included in the above project. Computer software enabled the analyses of aspects of bee-wing morphometry which until now have been neglected. The following programme was used for measuring - Version 1.20.902.54 Beewings, designed and distributed by the Bee-Research-Institute in Dol (Czech Republic). For statistical analysis I used Genstat 5 Second Edition (for Windows) Copyright 1995 Lawes Agricultural Trust (Rothamsted Experimental Station). The importance of Normal-Distributions is emphasized.The distribution of means of the discoidal-shifts (DS) ranges from –5.076 to 1.531.The means of cubital indices (CI)range from 1.5 to 2.056 (i.e. A.m.mellifera). I found a positive correlation between the means of DS and CI. It emerged that in all the samples there is a negative correlation between the short and long arms of CI. A number of subgroups were found. I generated multiple-linear-regression-models for discoidal-shifts in 13 samples, using eight veins as exploratory variables. This again showed that DS and CI are not independent variables. Finally analysis of left and right wings was used to partition the phenotype into its genetic and non-genetic (e.g. environmental) components.

IMPROVING THE DARK EUROPEAN HONEYBEE

No 154

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Introduction: As members of the Galtee Bee Breeding Group we believe that Apis mellifera mellifera is best suited to Irish climatic conditions. Having first established purity of strain our next objective was to identify the more desirable behavioural characteristics and then propagate those.
Methodology: Over the past fifteen years Group members have based their selection procedure on monitoring five behavioural characteristics which were devised by our chairman Micheal MacGiollaCoda. These are Docility, Steadiness on the Comb, Brood Pattern,

Pollen Storage, Comb Building / Productivity – with priority being given to docility and brood pattern. Selected genetic material must attain a 75% rating on the above five characteristics
Breeder material is made available to members to increase the desirable gene pool and for on going evaluation. Proven satisfactory breeder material is returned for inclusion in our Instrumental Insemination programme.
Conclusion: The results to date show an outstanding improvement in the quality of our stock. Comparisons show an improved mean rating from 51% at the start of our project to 75% at present.

QUEEN SUPERSEDURE IN *APIS MELLIFERA*

No 155

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Supersedure is the act of queen replacement without the act of swarming taking place. Looked at in this way, there is no more merit in the act than the replacement of a failing queen.
The most efficient form of this act is the one where the old queen and her daughter continue to live together in the broodnest for a while. It is efficient because there is no period of queenlessness. In other forms, the old queen may die (a) before any queen cells are built, (b) while there are queen cells only, or (c) while there is a new virgin queen in the hive.
During supersedure, there are only very few queen cells built, normally one or two, usually but not exclusively on the face of the comb.
However, supersedure in the right context rises to a new high level of importance. The strain of bee becomes paramount in this instance. The oceanic climate of Ireland and the United Kingdom is capable of producing years where non-swarming favours survival and only the non-swarmers manage to live to better times. The Irish farmer, for example, would talk of 'saving' hay while the rest of us 'make' it.
In a strain of bee with low levels of swarming, long-lived workers and queens, and a strong love of pollen, supersedure is likely to be an important characteristic. Such a strain, if selectively bred, could pass on this valuable characteristic with a consequent reduction in the necessary work involved in swarm control.

HONEY YIELD PRODUCTION PATTERN TEAGASC, CLONROCHE, IRELAND 1966-1999

No 156

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Records from the production apiaries at Clonroche over this extended period show that it is possible to consistently produce good crops of honey. The average honey yield over the 34 year period was 23.5 kg per colony. In the climatic conditions that prevail in Ireland this would be considered good. The principal source of nectar was the blackberry (Rubus fruticosus) with white clover (Trifolium repens) and other plants contributing. Beekeepers in areas where oilseed rape (Brassica napus) is grown would have a considerable advantage.

The type of bee was the dark race that prevails in Ireland. To exploit fully the available floral sources the beekeeper has to ensure that the colonies are managed skilfully. This means that attention to feeding, swarm control, queen replacement and elimination of disease is paramount.

A STRATEGY FOR GROUP BEE BREEDING IN IRELAND

No 157

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The Galtee Bee Breeding Group (GBBG) in Ireland represents a model for local honeybee improvement and conservation initiatives. The GBBG was established on December 30th, 1991, by a group of 4 beekeepers from the Galtee/Vee Valley of South Tipperary. The objectives of the group were the conservation of the dark European honeybee (Apis mellifera mellifera), the study and restoration of local strains of this bee, and the elimination from the locality of bees with undesirable traits, such as aggressiveness and an increased swarming tendency. Potential breeder queens were identified, and an isolated breeding apiary was established on the slopes of the Galtee Mountains. Using the so-called Dún Aonghusa system, the purity of breeder queens was ensured by surrounding the breeding apiary with successive rings of apiaries containing desirable queens. Over the years, the area covered by the GBBG was expanded to include much of the east of the province of Munster. In addition, the group's bee improvement and conservation philosophy was disseminated to other parts of Ireland by inviting interested beekeepers to join and by encouraging the establishment of other local bee-breeding groups. The GBBG has also set up an instrumental insemination program, organized morphometry and queen-rearing workshops, founded a quarterly newsletter, and established a beekeeping study group. The efforts of the GBBG have led to the development of a honeybee that according to morphometric and DNA studies is a pure strain of A. m. mellifera. In addition, there have been continuous improvements in the desirable characteristics of these bees, including docility and swarming propensity, with no concomitant loss of honey productivity.

THE ROLE OF BIBBA

No 158

Albert Knight, BIBBA Groups Secretary

The Bee Improvement and Bee Breeders Association (BIBBA) have over the past 40 years tried to make beekeepers aware of the importance of preserving the native bees of Britain and Ireland, Apis mellifera mellifera, the Dark European honeybee. Through the publication of books and pamphlets, workshops, lectures and conferences, BIBBA has shown how to identify this sub-species from other sub-species and their hybrids; advocating the formation of groups and describing ways of selecting and improving the sub-species by breeding.

This has resulted in the formation of numerous breeding groups throughout Britain and Ireland. Ireland as played a very significant role in the development of breeding groups and the Galtee Bee Breeders Group (GBBG) has become a role model for breeding groups elsewhere. It is therefore particularly appropriate that the founder of the Galtee Bee Breeders Group (GBBG), Michael Mac Giolla Coda, should be the President of BIBBA.

The GBBG has become the largest BIBBA group anywhere, and it has spawned other groups in Ireland. Another significant event in Ireland was the honeybee survey carried out by the three Irish schoolgirls that won the Young Scientist of the Year Award in Ireland, then going on to win third place in the European Young Scientist of the Year award.

In this talk I will go on to give more details of BIBBA's role in beekeeping.

APITHERAPY, IMMUNOLOGICAL ASPECTS,

No 160

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Medicine, like all other fields, is subject to trends. In recent years, trends towards "alternative healing" have emerged on top. Medicine has advanced so much that attempts to create medicines that are less harmful than synthesized medicines have resulted in this natural trend. One type of "alternative healing" is called Apitherapy. Apitherapy is defined as "the healing use of the products of the honeybee hive". Much of apitherapy is based on the properties of bee venom, though there are other byproducts (propolis, royal jelly, wax, honey and pollen) which have claimed to be beneficial.
Bee venom is composed of 78 different components, many of which are peptides that should provide an anti-inflammatory affect, as well as other agents which stimulate the body's immune system. Pure bee venom (Apitox) has been tested and found to be safe in humans and animals by the International Pain Institute.
The byproducts of honeybees seem to have a lot of potential for effective treatment of many medical conditions. Propolis is a sticky resin-like substance that bees collect from tree buds and bark i. It s much better antibiotic than chemical antibiotics because it only kills the harmful bacteria in the body activate macrophages by producing cytokines, antitumor activity, antifungal, antiviral, immune stimulant Royal Jelly is another compound that is supposed to have beneficial effects and have boosting energy to treating kidney disease, even boosting sex drive.

WHY AND HOW TO BUILD AN APITHERAPY DATA BASE?

No 161

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Any serious scientist/researcher/practitioner before starting a new study/project makes first his/her "homework" by searching if his/her kind of study has been already made by other people from other countries/institutions. Indeed it may be frustrating to invest a lot of time, energy and money to just re-invent... the wheel.
Why is important to build an Apitherapy Data Base (A.D.B.)?
Because in an A.D.B. you can easy and fast find:

- Similar papers/works/books written by colleagues from other countries/institutions;
- The whole "picture" of Apitherapy, thus orienting your work towards the real needs of Apitherapy and its development;
- Contact addresses of people having similar passions with your ones (the so called Apitherapy "Yellow Pages").

The main needed steps to be done in building an A.D.B. are:

- Contact the best specialists in bee products and Apitherapy you know, then collect all Apitherapy related information you find;
- Organize in your computer and in your own library the collected information on the following at least 5 big chapters:
- BEE PRODUCTS (honey, propolis, beeswax, Royal jelly, Apilarnil, bee bread, bee pollen, bee venom) and their origin, characteristics, composition, properties, indications, contra-indications, administration, preparations & products, quality, photos, general and specific uses.
- Medicinal and nectaro-poleniferous herbs.
- Human and Animal Diseases that can be treated through Apitherapy; group the diseases on Specialities like blood diseases (Haematology), skin diseases (Dermatology, etc.).
- Apitherapy and Apipuncture specific methods and

techniques.
- The Apitherapy "Yellow Pages", structured on "Countries" but also on professions like "Biochemists", Pharmacists", "Practitioners", etc.

Once you built your Data Base start sharing it with all people that need it, thus being able, through feed-back, to continuously update it!

THE "APITOX" PROGRAM FOR MULTIPLE SCLEROSIS TREATMENT AND REHABILITATION

No 162

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We've worked out the complex program "APITOX" for Multiple Sclerosis (MS) treatment. It is based on the usage of apitoxins and other apimedicines.
The effectiveness of the treatment have been traced due to the data of clinical observation and instrumental inspection (magnetic resonance imaging therapy, blood analysis and liquor analysis) with the frequencies of 1 week, 1 month, 6 months and 1 year after the treatment.
During 3 years 60 MS patients have been provided with treatment and observed, 32 women and 28 men are among them.
We've got the following results:
- 85 % of all patients have had the halt of the demyelinization owing to MSD-peptide, melittine and phospholipase.
- 73 % of all patients have had the remyelinization owing to the direct action of "the nerves growth" factor and maintenance of 18 indispensable amino acids in bee venom.
- 92 % of all patients had had the realization of the new physics opportunities (co-ordination included) owing to the activation of the system "hypothalamus-hypophysis-cortex of epinephros"; action of apamine and melittine; influence through the biologically active points, improvement of functional bonds between Central Nervous System; apikinesitherapy.
- Improvement of the functions of the pelvic organs: 63 % of all patients have had their trophic processes and reflecting influence improved.
- Rehabilitation of sensitivity: 95 % of all patients have had the improvement of microcirculation of tissues and the improvement of the nervous impulse leading and of reflective influence.
- Improvement of the psychic status and in the spirit; removal of anxiety – 88 %.

Thus, "APITOX" is:
- A complex approach to MS treatment.
- A therapy without any severe side effects and aftereffects.
- A set of impressive clinical results.

Most of up-to-date types of treatment and methods have really a narrow range. They don't cover all the pathogenetic spectrum at once, underestimate psycho-emotional factors and sometimes are mistaken in choosing physic rehabilitation.
The above and some other drawbacks are avoided in the "APITOX" program that allows achieving a new HQ level in the treatment of MS.

RELEVANCY OF BEE POLLEN IN HUMAN DIET

No 163

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Bee pollen as used in human nutrition is the male germ cell of a flower blossom which has been gathered by the bees and to which some nectar or honeydew and digestive enzymes from the bees have been added.
The main ingredients of pollen are carbohydrates, proteins, fibre and lipids beside a wide spectrum of different substances such as vitamins, minerals and trace elements. The composition of pollen depends largely on its botanical origin. There is a broad range of variation with respect to composition and quality of the main constituents and specifically in the numerous phytochemicals and polyphenols.
Pollen is most commonly traded in a dried form with water content up to 8%. Despite of its nutrient density pollen is considered rather a neutraceutical than a food product and its primary market is dietary supplement. Beyond nourishing its focus is strongly on the functional properties based on the essential nutrients as well as on the minor constituents and their physiological effects. For example plant metabolites such as flavonoids and other phenolic compounds for which pollen is a rich source, have demonstrated antioxidant and anti-inflammatory properties. In order to produce the desired effects a certain availability of the nutrients which are encapsulated in the pollen grain is to achieve. Thus the development of products with enhanced and well preserved functional properties is still a challenge for the food technology.
Modern analytical methods step by step unveil the secrets of pollen composition. And a growing number of clinical studies is adding to the scientific knowledge about the respective effects on human well being and health. However due to the immense variety of the raw materials some mystery will remain.
This review will concentrate on nutrition and well being. It will not cover aspects of apitherapy

HONEY FOR NUTRITION AND HEALTH: A REVIEW

No 164

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The main ingredients of honey (H), are the carbohydrates besides a wide spectrum of different substances: traces of the minerals Al, B, Ba, Bi, Ca, Cd, Cl, Cs, Cr, Co, Cu, F, Fe, I, K, Li, Mg, Mo, Na, Ni, Rb, Se, Si, Sr, S, Zn, V and of the vitamins B1, B2, B5, B6 C and K; amino acids, proteins, enzymes; acids; numerous phytochemicals, polyphenols and volatiles. The composition of H. depends on its botanical origin. First of all, H is a highly effective fuel. The Glycemic Index (GI) of H, varying from 32 to 87 and depending on H's botanical origin, is important for the evaluation of the nutrition effects of honey. H with various GI's can be useful for different nutrition purposes. It is beneficial for athletes, enhancing their performance and H with different GI can be ingested in order to optimise specific athletic exploits. H has a cyto-protective activity and prevents gastric damage in experimental nutrition studies. Infants fed on H gain more weight and have a better intestine flora than ones fed on sugar. H contains many oligosaccharides which might explain its effect as functional food. The intake of H enhances the development of Bifidus bacteria. It possesses antimicrobial activity against many pathogenic bacteria and its ingestion has a positive effect on bacteria-induced diseases such as bacterial gastroenteritis and gastric ulcers. H promotes rehydration and shortens the duration of acute diarrhoea. It has antioxidant activity due to polyphenols, flavonoids and other compounds, depending on its botanical origin. This activity probably protects against oxidative stress, chronic diseases, like coronary heart diseases and atheroscleorsis. H has a gene protecting effect and also immuno-protective and immuno-modulatating activity in animal and cell experiments, and can thus promote anti-cancer effects. It is used in many food applications: in beverage clarification; for enhancement of Bifidus bacteria growth, of browning, of food flavour and of food shelf life; for preventing of drinks browning; for coloration of food and as food extrudable. It is a valuable additive to many different foods: different milk and baker products, cereals, spreads, marzipan, caramel, nougat, juices, syrups, fries, pasta, snacks, salsas etc.

TRAVAIL DE LA COMMISSION À CUBA DE 1997 À 2005

No 165

R Domergo

Durant ces dernière années, la Commission d'Apithérapie a mené à bien un travail de recherche pré clinique et clinique avec l'accord des autorités cubaines. Au vu des résultats, des applications dans différents hôpitaux et en milieu rural ont eu lieu entre 2003 et 2005. Les pathologies approchées concernaient principalement des infections (en particulier sphères ORL, broncho-pulmonaire, digestive et ostéomyélites) ainsi que des problèmes de cicatrisation. Plus de 2.600 cas ont été traités et le pourcentage de guérison se situait entre 84 et 87%.

L'apithérapie a non seulement montré son efficacité en milieu hospitalier, mais plus encore, qu'elle était une médecine d'avenir, ses résultats étant dans de nombreux cas supérieurs aux traitements de synthèse des cas de comparaison. Pour finaliser le projet, la Commission d'apithérapie, en relation avec des instances apicoles et le Ministère de la Santé de Cuba a permis de mener à bien l'entièreté des dossiers des enregistrements comme médicaments (aromiels et proparomiels, mélange standardisé de miel thérapeutique et d'huiles essentielles chémotypées et/ou propolis standardisée) des produits utilisés à Cuba. Nous montrerons, lors de cette publication, aussi bien les résultats pré cliniques que cliniques inhérents à ce projets.

Mots-clé : apithérapie, aromiel, huile essentielle, propolis, infections, ORL, broncho-pulmonaire

Liste des publications et références sur demande

FROM CUBA TO BURKINA FASO

No 166

T Cherbuliez, President of the Standing Commission on Apitherapy, Apimondia Executive Council

In the last twelve months, the Commission has significantly pursued its humanitarian mission. The work done in Cuba for the last seven years has yielded the following results: in the course of four symposia we have trained more than 600 health professionals, physicians, pharmacists and nurses. Our preclinical work has demonstrated the safety and efficacy of our antiviral and antibacterial formulations. In close cooperation with the University we developed the first green medicine protocol for the treatment and bacteria infections together with the treatment of 2600 patients. Finally we have developed the tools and the technique allowing the treatment of hospital acquired infections. Two of our formulations have been officially registered as medications. All our formulations can be created from sources that are indigenous to the country and they all can be registered. In brief, Apitherapy has obtained a legitimate place: our project was declared to be of National Development by the Ministry of Health.
Our next humanitarian mission concerns Burkina Faso for which we have developed an Apitherapy project. It includes four distinct components: Apiculture, Agro-forestry, Pharmacy and Medicine. Having successfully conducted a feasibility study, we were able to show de work done in Cuba to Burkinabé experts. From their reports the Minister of Health declared the program of Apitherapy to be of national interest and asked the United Nation Development Program for support . UNDP in turn pledged its support in finding funding. This development show that Apitherapy has been legitimized by both Burkina Faso and the United Nations.

THE BEHAVIOUR OF ADULT SMALL HIVE BEETLES TOWARDS HONEYBEE WORKERS AND DRONES

No 167

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Small hive beetles [SHB] are honeybee, Apis mellifera, parasites and show a series of behavioural interactions with their hosts, ranging from defence to offensive behaviour. Previous studies show a high degree of flexibility in the behaviour of adult SHB from defence posture to attack on adult bees. This indicates that SHB are able to adjust their behaviour. Here we test for the potential of behavioural shifts in SHB behaviour using groups of adult honeybees with different levels of defensiveness. Mature workers and drones (N=80 each) and callow workers and drones (N=80 each) were tested against SHB which were either caught in field colonies or reared in the laboratory. For each test group (N=4), the interactions between 20 honeybees and 10 SHB were observed for 50 minutes. The individually labelled SHB were observed for 5 minutes each and all behavioural interactions between the SHB and the bees were recorded. The results show that there are significant differences in the behaviour of the SHB towards the different groups. The data suggest that adult SHB are probably able to make tactical decisions according to the defensiveness of the host.

REVIEWING THE CONFINEMENT OF SMALL HIVE BEETLES (*AETHINA TUMIDA*) BY WESTERN HONEYBEES (*APIS MELLIFERA*): LIFE IN THE PENITENTIARY

No 168

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Although only scavengers in honeybee colonies in their native range of sub-Saharan Africa, small hive beetles (Aethina tumida) can cause considerable damage to colonies of European honey bees in Australia and the southeastern United States. Early research on the beetle focused mainly on its biology and control although there has recently been a shift towards studying its intra-colonial behavior. Researchers have demonstrated that when small hive beetles enter a bee colony, a cohort of guard bees confines them to the nest periphery (a bee response that limits beetle reproduction).
As bees pass through their normal sequence of age-dependent tasks, they begin guarding small hive beetles at 18 days of age. Behavior of guard bees at confinement sites includes biting (extending head and lunging towards beetle with open mandibles, or attacking beetle), antennal contact (touching beetle antennae), trophallactically feeding confined beetles, and biting the area around beetle prisons (chewing at prison walls with mandibles). Despite a myriad of bee defensive behaviors that culminate in beetle confinement, the beetles are able nevertheless to dupe their honeybee guards into feeding them. In addition to soliciting trophallaxis, beetle behavior at confinements sites includes resting (not moving), antennal contact with guard bees (touching prison guard bee antennae with their antennae), and mating.
The confinement behavior of African and European honeybees appears unique among social insects; if the behavior is present in other social insects, it has not yet been discovered. Indeed, confinement behavior may be one reason that nest inquilines are relatively rare in honeybee colonies. Small hive beetles (and other small nest intruders in honey bee colonies) may exert selection pressures on their hosts that are unique among social insect inquilines; hence, the confinement scheme may be unique to honey bees. In conclusion, we may consider confinement behavior a superorganismic immune response of honeybees to small nest intruders.

TRAPPING SMALL HIVE BEETLES, *AETHINA TUMIDA* MURRAY

No 169

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The small hive beetle, Aethina tumida Murray, is a newly introduced honeybee pest in the Western Hemisphere where it has become established in Australia and the United States. Various control measures have been developed, but other effective and safe methods are needed to control this pest without fear of hive product contamination. Various traps for small hive beetles have been investigated that seek to control this pest without the use of chemicals. Traps placed in the apiary outside of colonies have been inefficient primarily due to competition with hive odors making colonies more attractive to flying beetles. Other inside-hive traps have been developed that require modification of the hive (Hood 2004), but few have been field-tested.
Since 1998, we have been developing an inside hive trap for small hive beetles that can be placed in the bottom or top of an infested colony. The trap (152x80x25 mm) is manufactured of transparent plastic and can be attached by two screws to the bottom bar of a hive frame. The frame containing the trap can be placed in a hive body or a honey super in frame position one or ten. We have tested various modifications of the trap lid in an effort to develop a lid that deters beetle escape. The trap is made of durable plastic and should last for many seasons. We continue to test various food grade materials that are placed in the trap to attract beetles and result in reducing the pest population. One goal of the project is to produce a trap that can be placed in a beetle infested hive that will attract and kill over-wintering adults which is the predominant life stage present in winter.

SUB-LETHAL EFFECTS ON BEES OF SYNTHETIC VARROA ACARICIDES

No 170

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Applications of synthetic acaricides such as fluvalinate and coumaphos are routinely used to control Varroa destructor. Although these chemicals have low acute toxicity to bees, there is mounting evidence that they are not harmless to the insects they are designed to protect. So far, published reports of this troubling evidence have been limited to their effects on developing queens and drones. In conference we plan to report results of a 2005 experiment designed to detect sub-lethal effects of label rates of fluvalinate and coumaphos on brood and bees, including effects on bee population, brood production, honey production, colony foraging rates, brood survival, worker longevity, and age-related worker bee tasks. The work involves field observations, incubator lab tests, and observation hives. The work is scheduled to begin spring 2005. An apiary of thirty-six standard, 10-frame experimental colonies will be set up, each colony receiving one of three treatments (12 replicates): (1) two strips of CheckMite™ (coumaphos) inserted between frames 4/5 and 5/6 for 42 days (2) two strips of Apistan™ (fluvalinate) inserted between frames 4/5 and 5/6 for 42 days; (3) no treatment. This work has the potential to increase our understanding of the complicated cost-vs-benefit ratio of pesticide use in beekeeping.

THE REPRODUCTIVE BIOLOGY OF VARROA DESTRUCTOR ON AFRICANIZED HONEY BEES UNDER THE TROPICAL CONDITIONS OF COSTA RICA

No 171

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Varroa destructor is a worldwide ectoparasite of serious economic importance for beekeeping. Severe colony mortality is routine in parasitized European honeybees (EHB) colonies in Europe, Asia and North America. Nevertheless, regional differences in season length, weather conditions and bee and mite genotypes make it difficult to characterize the mite reproduction over a widespread area. In Costa Rica, some beekeepers have reported loss of hives and reduced production of honey as a consequence of V. destructor introduction, but other beekeepers believe that varroa is not a real problem and they have not applied a strict control program. Therefore, the real impact of varroa on Africanized honeybees (AHB) in Costa Rica is not clear.
The study was carried out in Heredia in the Central Valley of Costa Rica. The area has a tropical climate; February through April are dry months, and May through July are rainy months. The reproductive ability of varroa mites was determined in 19- to 20-day-old worker brood from 318 cells in AHB and 307 cells in hybrids (HF1). Several variables were measured for foundress female mites: fertility (defined as the successful production of offspring); production of a mature female mite (i.e., a potentially reproductive offspring); fecundity (number of progeny); production of only immature offspring; and production of only female or only male offspring.
No significant differences were found between AHB and HF1 in the percentage of fertile foundress mites (AHB=69.8%, HF1=76.5%), the percentage of foundress mites that produced mature female offspring (AHB=28%, HF1=25.4%), the mean number of offspring per foundress (AHB=3.4, HF1=3.5) and the percentage of foundress mites that produced only immature stages (AHB=17.3%, HF1=18.2%). Nevertheless, the percentage of foundress mites that did not reproduce at all tended to be greater in AHB than in HF1 colonies (AHB=30.2%, HF1=23.5%; P=0.06). In both groups of bees, the number of fertile varroa mites was higher than what other studies have reported for AHB in Brazil (49-55%). Furthermore, the percentage of non-reproducing mites was greater than the percentage reported for mites in EHB and lower than the percentage reported for mites in AHB in Brazil. Thus, the AHB population we monitored in this study may be less tolerant to varroa than AHB populations in Brazil.
In conclusion, mite fertility in worker brood cells was similar between AHB and HF1 colonies. Factors that limited varroa population growth included non-fertile female mites, foundresses that produced only immature stages, foundresses that produced only one adult sex, and mortality of emerging mites. The combined effects of these factors results in less than 30% of the foundress mites producing viable female offspring during one reproductive cycle in both AHB and HF1 colonies.

DELAYING VARROA ECONOMIC THRESHOLD WITH INTEGRATED PEST MANAGEMENT

No 172

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In many parts of the world, non-chemical Varroa control practices rarely can singly or indefinitely keep mites at non-damaging levels. Under these situations it seems most practical to think of IPM as a means to delay, not eliminate, chemical treatment. If a beekeeper can prolong the inter-treatment interval as long as possible this not only reduces net chemical use and its attendant hazards to bees, honey and the environment, but also enables mites through genetic recombination and reproduction over time to conserve their chemical susceptible genes, thus prolonging the useful life of an acaricide. In conference we report on two independent, long-term (17 months and 87 weeks) studies designed to

appraise the effects of published integrated pest management practices on colony varroa mite levels, length of time before onset of economic threshold, and other measures of colony productivity. Screen hive floors tended to reduce colony varroa mite levels (24-hr sticky sheet counts), sometimes significantly. Resistant queens tended to reduce colony mite levels, sometimes significantly; number of mites on sticky sheets decreased as the percentage expression of hygienic behavior in a colony increased, and on the majority of sampling episodes the number of mites retrieved on sticky sheets was numerically lower in colonies with queens expressing suppressed mite reproduction (SMR). Time until achieving economic threshold was significantly delayed in colonies with SMR queens (ca. 72 weeks) compared to non-selected queens (59). In one experiment stored honey was higher in colonies with screens (4 frames) than solid floors (ca. 2), but the reverse was true most sampling weeks in the second experiment. Moreover, stored pollen was also lower in screen colonies (0.9 frames) than on solid floors (1.3). Finally, SMR queens tend to have reduced brood production, sometimes significantly. The effects of apiary isolation were shown to be virtually non-significant in any variable of interest.

THE EFFECT OF OXALIC OR FORMIC ACID TREATMENT ON LARVAE IN A HONEYBEE COLONY

No 173

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Honeybee larvae experience various chemical stresses. The chemicals that are most often encountered are acaricides against the Varroa destructor parasite. We tested whether different treatments of honeybee larvae with "alternative" Varroa control substances such as oxalic and formic acid cause cell death. We have attempted to study the distribution of cell death in treated honeybee larvae.
The effects of oxalic (OA) and formic acids (FA) on honeybee larvae in colonies were assessed and evaluated. Cell death was detected by the TUNEL technique for DNA labelling. In 3- and 5-day-old larvae exposed to OA, cell death was found in 25% of midgut epithelial cells 5 hours after the treatment, using an 'In situ cell death detection kit, AP' (Roche). The level of cell death had increased to 70 % by the 21st hour and the morphology of the epithelium remained unchanged. Fifty hours after the application, cell death was established in 18% of the epithelial cells of the 3-day-old larvae and had increased to 82% in the 5-day-old larvae. A "DeadEnd" apoptosis detection kit (Promega) showed sporadic cell death mainly in the larval fat body 5 hours after treatment. Twenty-one hours after the OA application cell death was found in 4% of the larval midgut epithelial cells. Evaporated formic acid induced extensive apoptotic cell death in the peripheral, cuticular and subcuticular tissues that preceded the cell death of the entire larval body.
Quantification of cell death could be used in effectively monitoring the effects of organic acids on larval tissue, when applied to larvae in a honeybee colony. Used methods are thus useful for evaluating the detrimental thresholds of larval tissue. Further clinical field tests to determine larval and/or adult bee death are needed to evaluate the full effects of substances used in bee colonies.

CONTROL OF *VARROA DESTRUCTOR* USING DIFFERENT INTEGRATED PEST MANAGEMENT STRATEGIES

No 174

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The economic impact of the bee parasite Varroa destructor has been and still is a major concern for many beekeepers around the world. Our research has been dedicated to the development of an integrated pest management (IPM) strategy based on the use of screened bottom boards and organic acids such as oxalic acid and formic acid.
Beekeeping characteristics of our region can be summarized by short harvesting periods and long winters (5 to 6 months) during which bees must be protected from cold. All our bees are kept in typical Langstroth hives.
One hundred selected colonies where distributed during spring 2004 in different experimental groups (three) and a control group. The experimental model has three independent variables: three different IPM strategies, two wintering strategies (one or two hive bodies), beekeeping sites (four); and various dependent variables: exponential varroa population growth during summer, honey production, varroa and honeybee population before and after wintering. Statistical analysis of data is accomplished by using the GLM procedure (SAS system) and a t test LSD for the comparison between different groups.
Results show that IPM strategies are an efficient way to control varroa populations and will help to assure economical viability of commercial beekeeping in our northern regions. Best results are obtained when the IPM strategy uses bottom boards to trap naturally falling varroa mites and when bee colonies are wintered in single hive bodies.

BREEDING FOR TOLERANCE AGAINST VARROOSIS - FACTORS INFLUENCING COLONY SURVIVAL WITHOUT TREATMENT IN A LONG-TERM SURVEY

No 175

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In 2004, a long-term breeding project was started in Germany with the aim of selecting bees on tolerance against varroosis. The project follows a two-step strategy: in a first step more than hundred beekeepers in whole Germany collect data from about 1,800 test colonies on Varroa infestation levels and hygienic behavior of the bees. In a second step a preselected group of colonies is tested in a viability test without treatment. During this test, data on colony development, the infestation of bees and brood, Varroa reproduction and virus infections are collected. The correlation between these parameters and the colony survival will be evaluated. The bee population decrease during winter serves as an important criterion for the selection of the next generation of breeder colonies among the untreated population.

DEVELOPMENT OF BIOASSAY FOR HYGIENIC BEHAVIOUR AGAINST BROOD MITE, *TROPILAELAPS CLAREAE* IN *APIS MELLIFERA* COLONIES

No 176

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The studies on bioassay for hygienic behavior and screening of mite resistant colonies were conducted in the colonies of European honeybee, Apis mellifera maintained at the apiaries of University of Agricultural Sciences, Bangalore, India. The observations clearly indicated that, among the bioassays developed with reference to removal of introduced dead brood, the workers showed similar tendency in removing the freeze killed dead brood in queen right, queen less, full sized and nucleus colonies. The mean minimum and maximum time taken for complete removal of the freeze killed brood were 1.94± 0.62 and 2.40± 0.75 in full sized and queen less colonies respectively. However, healthy colonies removed the dead brood in a faster rate than mite infested colonies. Similarly, the honeybee colonies were tested for hygienic behaviors in the apiary by introducing freeze killed and pin killed sealed brood. Comparatively, the worker bees removed pin killed brood in a faster rate than freeze killed brood. Out of 11 colonies tested, 7 colonies removed the dead pin killed brood with in 48 hrs. However, did not remove the dead brood completely with in 48 hrs. The mean minimum time taken for complete removal of the pin killed and freeze killed brood were 1.10 ± 0.26 days and 1.27± 0.40 days respectively. The maximum time taken were 2.91± 0.84 days and 3.78± 0.94 days for pin killed and freeze killed brood respectively. Similarly, the worker response to pin killed sealed brood was positively correlated (r =0.952) with freeze-killed brood.

MULTIFACTORIAL PROSPECTIVE SURVEY ON BEE TROUBLES IN FRANCE

No 178

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In 2002 a field survey has been initiated on French apiaries in order to monitor weakness of honey bee colonies (Apis mellifera L.).
Studied apiaries were evenly distributed in five counties located on continental France. In each county five apiaries were chosen to represent different environments. Five colonies were randomly selected in each apiary leading to a total of 125 studied honey bees colonies. During a three years (starting in autumn 2002) colonies were visited four times per year: after wintering, before summer, during summer and before wintering. At each visit, adult and larval bee population was estimated as well as adult bee mortality and colony mortality. Any clinical symptom or abnormality was noted. Broods showing disease symptoms were sampled for further analyses. Different matrix samples were collected depending on the season: pollen from traps, adult bees, foundation wax or honey. Any medical treatment reported by the apiarist was also noticed.
Surveyed pathologies were acarapisosis, nosemosis, varroosis, American foolbrood, European foolbrood and chalkbrood. Brood and adult bees were also analysed for six viruses during the first year of sampling. Studied viruses were the Chronic Bee Paralysis Virus (CBPV), the Acute Bee Paraysis Virus (ABPV), the Deformed Wing Virus (DWV), the Sacbrood Bee Virus (SBV), the Kachmir Bee Virus (KBV) and the Black Queen Cell Virus (BQCV). Specific and multiresidue analyses were performed on foundation wax, adult bees, pollen loads and honey to research residue of 43 different molecules. Fipronil and metabolites together with imidaclopride and metabolites were searched in pollen and honey during the first year of sampling, and in adult bees during the second year of survey.
An environmental survey was also conducted on studied apiaries. Every agricultural parcels within a 1.5 km radius around the apiary were monitored. The type of crop cultivated on parcels (time of sowing, varieties) and chemicals treatments were recorded and mapped. These data will be correlated with results from palynological analysis of pollen from traps.

MONITORING OF BEE COLONIES IN GERMANY

No 179

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In autumn and winter 2002 /2003 there has been a tremendous loss of bee colonies in Germany. Beside Varroosis, many other causes like other bee diseases especially secondary infections, supply of melliferous flora, pollen shortage, weather conditions as well as lethal and sub lethal effects of pesticides have been discussed. A monitoring of bee colonies in Germany is the result of several common meetings with representatives of beekeeping associations (DIB, DBIB), agricultural organisation (DBV), German Ministry of Agriculture, bee institutes and chemical industry.
In this monitoring project colleagues of the bee institutes are in charge of the involved beekeepers. Data of 150 apiaries and 1,500 bee colonies will be captured by the bee institutes. A wide range of parameters in the subject fields' location of the apiaries, apicultural practice, development of bee colonies, residues of pesticides and diagnoses of bee diseases should be monitored and recorded several times in the next years.

PRELIMINARY RESULTS ON BEHAVIOUR OF APIS MELLIFERA LIGUSTICA (SPIN.) COLONIES SUBSEQUENT TO THE APPLICATION OF THE SPAZIOMUSSI® TECHNIQUE

No 180

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Abstract
The study was carried out to evaluate the effectiveness of a biotechnique called "Mussispace®", used for the control of the varroa mite. The increased space between combs (9 vs. 10 combs) facilitates the grooming of worker bees. The biotechnique (Thesis A), was compared with treatments with oxalic acid on hemicellulose strips (Thesis B) or thymol (Thesis C). The number of mites that died when the "Mussispace®"was applied, was similar to that obtained with the oxalic acid treatment but was much lower compared to the thymol administration. In February the number of fallen mites was high after oxalic acid was dripped between the combs. The "Mussispace®" biotechnique should be integrated with a soft pharmacological treatment.

Key words: "Mussispace®", bee "colony system", Thymol, Oxalic acid

The control of Varroa destructor (Anderson & Trueman) infestations is still a serious problem because substances have not been found that are effective against the mite but which do not have negative collateral effects on the life and behaviour of Apis mellifera colonies (Calis et al., 1997; Gardi et al., 2001).
Initially, the use of chemicals was efficacious for maintaining the mites at levels which were compatible with colony survival and production. However, this situation was short-lived, due to the appearance of acaricide resistance, as well as to increasing awareness of the risk of bee product contamination. These negative aspects have led to increased interest in alternative control strategies, such as the use of environmentally-safe substances and the application of suitable biotechniques (Dung N. V. et al., 1997; Manino et al., 1996). In addition, there is a growing need to preserve the genetic purity of Apis mellifera due to the frequent introduction of non-native queen-bees and swarms into areas where their biological characteristics are unsuitable for profitable apiculture.
In Italy, programs for the conservation and genetic selection of Apis mellifera ligustica (Spin.) have been carried out for a long time (Ruttner, 1993; Bernardini et al., 2001). Their main objective has been to safeguard and improve the performance of local ecotypes of this breed (Cagnus, 1995; Piacentini, 1993). The control of pathologies, particularly the destructor mite, is fundamental to such programs and the use of environmentally friendly methods is preferred. To date neither "soft" chemiotherapy nor the most common biotechniques, such as the use of a trapping comb or queen confinement, have given satisfactory results. The use of synthetic chemicals is discouraged because persistent residues may accumulate in the honey and, particularly in the wax (Bernardini et al., 2001).
While the long-term negative effects of such substances on the bee "colony system" are unknown, it has been shown that some insecticides have a genotoxic action. Other efforts have therefore been made to find more suitable biotechniques. One example is the use of a suitable space beetween the combs, called "Mussispace®", which according the inventor Francesco Mussi, makes it easier for the bees to groom.
In an attempt to verify the effectiveness of this technique, the Faculty of Agricultural at the University of Perugia and the Italian Beekeepers Federation (F.A.I.) planned, with the approval of F. Mussi, a Project to verify the scientific validity of the "Mussispace®" biotechnique applied in genetically pure Apis mellifera ligustica (Spin.) colonies.
The objectives of the study are:

- To evaluate the scientific validity of the "Mussispace®" technique in order to safeguard Apis mellifera ligustica (Spin.) from the destructive action of the Varroa mite;
- Define guidelines for beekeepers that emphasize the positive characteristics of Italian bees and improve the "colony unit", in order to obtain safe, quality honeys and improve Italian and European apiculture.

The Project started in August 2004 and will continue until the end of 2006.
The results obtained from August 2004 to February 2005

have shown that the application of the "Mussispace®" biotechnique alone did not keep the number of mites at an acceptable level, at least under the conditions within the ecosystem considered. However it should be noted that an integrative pharmacological treatment could be administered in October when the colonies are broodless. In this case, the overall results should be better.
Further the beekeeper reported that in March the conditions of the A thesis colonies were better than those of the other two theses with respect to brood quantity and quality.
In addition the A thesis colonies had a greater supply of honey and appeared to be more docile.
These results are preliminary. Data will continue to be collected through December 2005 after which a more complete evaluation of the effectiveness of the "Mussispace®" biotechnique will be possible.

CURRENT EFFECTIVENESS OF AMITRAZ AGAINST VARROA IN PORTUGAL

No 181

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The varroa mite (Varroa destructor) was first detected in Portugal in 1986. Since then, there has been a frequent use of amitraz (Apivar, Acadrex) in the attempt to cope with it. Following (i) various credible international reports of increased varroa resistance to amitraz and (ii) regular claims, by national beekeepers, of poor efficacy of Apivar treatments, a large screening project was setup (2003/2004) for trying to identify honey bee colonies hosting varroa populations resistant to amitraz in continental Portugal. As a first step, approximately 1.200 beekeepers were enquired nationwide, with a view to building up a rank of apiary-specific probability indexes of varroa resistance to fluvalinate. From those beekeepers, approximately 4.000 colonies were field-tested in a similar way to the "British National Bee Unit" field testing methodology for fluvalinate, and compared to blank control tests (same kits and methodology, but without using amitraz). From those investigated colonies, 1.579 allowed conclusive testing (i.e. where 3 or more varroa per honeybee colony were submitted to the action of amitraz). Approximately 17% (272) of these colonies were considered to host varroa populations resistant to amitraz (using, as border line, 80% of amitraz induced varroa mortality). Furthermore, the efficacy of amitraz in the field tests carried out on those 272 colonies only reached an average of 60.1% (s.e.m. = 1.2%).

THE MONITORING TECHNICS OF VARROA RESISTANCE AND ROTATION OF THE VARROA TREATMENTS

No 182

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Since several years, the distribution of varroa resistance to the active ingredients of treatments against Varroa destructor has been indentified and monitored especially in Western Europe.
The different techniques used for laboratory or field tests, and for the different active ingredients used against the varroa are described. The different techniques used are discussed for their accuracy and their role for the monitoring.
The evolution of the intensity of varroa resistance in relation with the types of treatments used against the varroa mites are described. The ideal rhythms of rotation with the different active ingredients are discussed.
The example of reversion of varroa resistance to the pyrethroids in Europe will illustrate the different aspects of the rotation strategy.

HOW RESISTANT TO FLUVALINATE ARE VARROA POPULATIONS IN PORTUGAL?

No 183

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The varroa mite (Varroa destructor) was first detected in Portugal in 1986. Since then, there has been a widespread use of fluvalinate (Apistan, Klartan) in the attempt to cope with it. Following (i) various credible international reports of increased varroa resistance to fluvalinate and (ii) repeated claims from national beekeepers of poor efficacy of Apistan treatments, a large screening project was setup (2003/2004) for trying to identify honeybee colonies hosting varroa populations resistant to fluvalinate in continental Portugal. As a first step, approximately 1.200 beekeepers were enquired nationwide, with a view to building up a rank of apiary-specific probability indexes of varroa resistance to fluvalinate. From those beekeepers, approximately 4.000 colonies were field-tested according to the "British National Bee Unit" field testing methodology, and compared to blank control tests (same kits and methodology, but without using fluvalinate). From those investigated colonies, 1.536 allowed conclusive testing (i.e. where 3 or more varroa per honey bee colony were submitted to the action of fluvalinate). Approximately

57% (878) of these colonies were considered to host varroa populations resistant to fluvalinate (using, as border line, 60% of fluvalinate induced varroa mortality). Furthermore, it is alarming that the therapeutic efficacy of fluvalinate in the field tests carried out on those 878 colonies only reached an average of 26.4% (s.e.m. = 0.6%). Brood samples were later collected for laboratory reassessment of populations of varroa that had been flagged, by the field tests, as resistant to fluvalinate. In most cases, the laboratory tests confirmed the results the field tests had suggested.

CONTROL OF PYRETHROID AND COUMAPHOS-RESISTANT MITES IN NORTH AMERICA USING APIGUARD.

No 184

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Varroa mite infestations have increased in The United States over the past few years due to mite resistance to treatments currently in use. Varroa in some areas have become resistant to pyrethroids as well as to organophosphates (coumaphos or Check Mite+ Strips). Beekeepers relying solely on these products for control of varroa have lost many colonies because of insufficient control levels.
The slow-release gel, Apiguard, containing thymol has been developed especially to control pyrethroid, amitraz and OP- resistant mites; it has a different mode of action to these pesticides. Apiguard is registered and used by beekeepers in many countries and has been trialled in several sites within the USA, prior to registration. Results are reported here from trials conducted in several States and show that the product can be used successfully under a variety of environmental conditions.

EVALUATION OF FLUVALINATE, COUMAPHOS, THYMOL, OXALIC ACID AND FORMIC ACID AGAINST *VARROA DESTRUCTOR* IN EASTERN CANADA.

No 185

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Summer and fall studies to control Varroa destructor were conducted in Québec, Canada to evaluate the efficacy and safety of 1) two early-July treatments (n=30/treatment) using either oxalic acid (OA, 4%, 100ml by dripping one appl.) or formic acid (FA, 65%, 35ml Mitewipe evaporating pad one appl.) in hives with two honey supers and 2) four mid-September treatments (n=48/treatment) using either: A) formic acid (65%, 3 appl., 5 days apart, 35ml, Mitewipe evaporating pad); B) thymol (TH, 1 Thymovar® wafer, 30 days); C) fluvalinate (FV, 2 Apistan® strips, 42 days) or D) coumaphos (CM, 2 Check-Mite® strips, 42 days), each coupled with a single OA treatment (4%, 100ml by dripping) in October, November or December on hives with one brood chamber. Data from the summer study show no adverse effect of the treatments on honey production and brood rearing. Although OA increased mite drop following its application, none of the treatments resulted in a lower mite population in September ($p>0.05$). Higher FA honey concentrations were measured in the FA-treated hives (24-64mg/kg). Data from the fall study show that TH, FA and CM treatments coupled with OA in late fall or early winter achieved a similar efficacy (TH=95.2%; FA=98.1%; CM=95.5%) with less than 50 mites per hive remaining by April 2004. FV treated hives had the lowest efficacy (91.2%, $p<0.05$). Colonies that had a natural daily mite drop over 50 in September had a mortality rate of 50% and more during the winter, regardless of the treatment combination used.
In conclusion, data from the summer study show that one application of FA or OA in July was safe for the bees but did not succeed to reduce varroa populations in fall; and fall data show that a combination of either TH or FA in September coupled with OA applied when no brood is present was as efficient as CM.

A STUDY ON INCIDENCE OF TRACHEAL MITE (*ACARAPIS WOODI*) IN HONEYBEE COLONIES (*APIS MELIFERA*) IN CHAHARMAHAL AND BAKHTIARI PROVINCE

No 186

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Introduction: Acariosis is an important contagious parasitic disease that is caused by Acarapis woodi . Pathogens attack to trachea of bees and they establish disease in this way.
Today one of the problems of beekeepers in some of the countries is Acarapis woodi. Iran is one of them. Acariosis reported in England for the first time in 1904. In fact IBRA (International Bee Research Assosiations) pronounced Iran without Acarapis woodi until 1983. But some years later, in 1994, Mosadegh & Bahreany during their studies announced presence of mite Acarapis woodi in 18 provinces among 22 of Iran, which they choosed. For this reason, a survey of honeybee colinies for presence of Acaroids woody mite was started from September 2002 to April 2003 in Chaharmahal and Bakhtiari province.
Methods: Province divided to six areas, in each area ten apiaries were selected. In each apiary 10 percent of colonies were randomly sampled. Samples of (50-100) adult bees per hive were taken from the hive entrance and when available 50 dead bees from the ground in front of the same hive.

Each sample was kept in a separate jar containing 70 percent ethanol.
Live and dead bees from each hive were sectioned separately and kept in 10 percent (KOH) at room temprature (20-25c) for 24 hour.
The cleared thoracic discs were examined under a microscope (40-100x) for the presence of mite in tracheae.
Results: The results of test of 5,470 samples collected from 83 apiaries in Chaharmahal and Bakhtiari province showed no Acarapis woodi in honeybee colonies.
Discusion: IBRA reported Iran without Acarapis woodi until 1983. But Mosadegh and Bahreany in 1994 by studying the colonies of 22 province in Iran reported the disease in 18 provinces.
At this time, the most prevalence of this mite is in two provinces;Golestan and Gillan.
Billy believes this disease in areas with long winter (such as Chaharmahal and Bakhtiari), will be control because contaminated bees don't survive during the winter, so they can't transport contamination to young bees in spring. But because of transportations of hives between provinces, in different seasons is usual, the probability of observation of this disease in this province isn't so far from mind.
Therefore the annual investigation in order to diagnosis and control of the mite (Acarapis woodi) is seems to be necessary at time.

THE PRESENT STATUS OF THE USE OF GM CROPS AND IMPACTS ON POLLINATORS

No 187

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Pre-release tests of current commercial varieties of genetically modified (GM) plants, expressing Bt toxins or tolerant to herbicides, indicated that these crops would not directly affect honeybee health. Field experience thus far has borne out this prediction, although there may be some indirect effects on bees resulting from farming practices associated with the use of some GM crops. Future GM crops will express a wider range of traits, some of which could affect bees directly, particularly if the transgene proteins are expressed in pollen, nectar or sap. Bioassays have now been conducted with a several classes of candidate transgene products: protease inhibitors, a chitinase, a gluconase and a biotin-binding protein. These assays have measured not only toxicity to adults and larval bees, but also sub-lethal effects: on development, food consumption, digestive protease activity, hypopharyngeal gland development, flight activity, olfactory learning responses and foraging behaviour. Current research seeks to improve the "eco-realism" of lab tests, to include solitary bees and other pollinator species, and to further assess impacts of GM agriculture on pollinator biodiversity in the field.

MPACT OF TRANSGENE PRODUCTS ON HONEYBEE LARVAE

No 188

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In order to assess the impact that transgenic plants pose on larvae of the honeybee, Apis mellifera, several aspects of bee life history are important: (a) Information on pollen consumption is needed as this is the only direct route of exposure of toxins expressed by transgenic plants, (b) the effects of transgene products on development of the hypopharyngeal gland of adult worker bees have to be assessed because they are producing the jelly necessary for rearing of the brood and (c) this jelly has to be checked for the presence of transgene products which may be passed on to the larvae.
We conducted experiments in which small queenright colonies of about 1,000 bees were kept in field cages (8 x 14 m) containing only flowering maize plants. Fully grown worker larvae that were fed no other than maize pollen were dissected and the number of maize pollen grains counted. We could show that honeybee larvae ingested only about 2mg of maize pollen, indicating that protein provided directly to the larvae via pollen contributes less than 5% of the protein required for larval development.
The effects on the hypopharyngeal gland experiments were tested in small cages in a climate cabinet. Freshly emerged worker bees were added to small experimental hives, containing about 200 workers and a queen. Bees were exposed to Bt-maize pollen (event MON 810), Bt-toxin (Cry1Ab, 0.0015%) and to a Protease inhibitor (Soybean Kunitz trypsin inhibitor, SBTI) at 0.1% and 1% concentration. While the Bt treatments had no effect, the SBTI treatments significantly reduced the size of the hypopharyngeal gland of adult worker bees. ELISA tests did not detect any Cry1Ab Bt-toxin in the hypopharyngeal glands in the Bt pollen treatment while traces (close to the quantification level) were found in the Bt toxin treatment. These results are of high significance to conduct realistic bioassays especially for honeybee larvae.

WILD BEE ABUNDANCE AND POLLINATION IN TRANSGENIC HERBICIDE TOLERANT AND NON-TRANSGENIC CANOLA IN ONTARIO, CANADA

No 190

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Wild bees are important pollinators of many wild plants and cultivated crops and are highly dependent on floral resources for food and habitat necessary for their survival. Transgenic herbicide tolerant (THT) crops may have long-term effects on these floral resources or weeds, and therefore, it is unclear how these crops may affect wild bee populations and the important pollination services they provide. To address this, we measured wild bee abundance and pollination deficit (difference between potential and actual pollination) in THT canola and a comparable non-transgenic variety in Ontario, Canada. Bee abundance was measured in each field as well as in adjacent hedgerows during canola flowering. Pollination deficit was measured by comparing the number of seeds produced from supplemental and open pollinated canola flowers. Wild bee abundance in THT and non-transgenic canola did not differ in 2003 and 2004, and was similar at all distances into the field where collections were made. Non-transgenic canola flowers produced significantly more seeds per pod than THT canola flowers, however pollination deficit was similar in both THT and non-transgenic fields and did not differ with distance into the field. Pollination deficit in THT and non-transgenic canola was low, suggesting that the canola flowers were well pollinated, and was not significantly correlated with bee abundance. Our study suggests that in southern Ontario, where canola fields are relatively small and have surrounding hedgerows, THT compared to non-transgenic canola, did not affect wild bee abundance or pollination. This research is part of a national project examining the effects of THT canola in three different agro-ecosystems throughout Canada ranging from intensively to newly cultivated cropland. This study provides an important link between ecosystem structure and function in that bee abundance was quantified while simultaneously assessing the subsequent effects on canola pollination.

BEE-MEDIATED GENE FLOW BETWEEN OILSEED RAPE CROPS AT A LANDSCAPE SCALE

191

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With the advent of GM crops, concern has grown over issues concerning the purity of harvested crops. Although impurity, whether GM or not, can arise through routes such as impure sown seed, contaminated farm machinery, and dormant seed in the soil from previous crops, the issue of cross-pollination arouses great interest due to the difficulty predicting and controlling this source of unwanted crop types. Each crop species has a unique breeding biology and differing abilities to cross pollinate aided by different combinations of pollen vectors. Oilseed rape (Brassica napus) is a widespread temperate crop, available in GM forms, which is capable of pollination by a wide range of insect vectors as well as via airborne pollen. This presentation will describe experiments which determine that insects, predominantly honeybees and bumble bees, are responsible for this cross-pollination. In a series of field experiments in E Scotland, male sterile plants of oilseed rape were used to detect the potential for cross-pollination over a wide range of distances and in a wide range of environments. The patterns of pollen dispersal and cross-pollination on the landscape scale in these experiments have permitted predictions of cross-pollination levels in different situations. Using the opportunity provided by GM field trials together with the ability to discriminate this pollen type, the patterns and levels of cross-pollination across the landscape have been verified. Both wind and various insects are capable of acting as pollen vectors in oilseed rape, and experiments which discriminate between the various vectors will be presented. The routes taken by pollen moving over the landscape will be considered, and the different patterns of dispersal expected from different insects summarised. Bees, both honeybees and bumble bees, form the most important group of pollen vectors in this crop, and the implications of this for managing and predicting cross-pollination from oilseed rape fields will be discussed.

POLLINATOR POPULATIONS IN HERBICIDE TOLERANT GM CROPS

No 193

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Herbicide tolerant oilseed rape (Brassica napus), sugar beet (Beta vulgaris) and maize (Zea mays) were the first genetically modified crops to be evaluated at the field scale in the UK. Pollinator populations (bees and butterflies) were considered as part of the high profile "Farm Scale Evaluations" of the effects of GM crop management on biodiversity compared with the management of conventional crops. These trials took place over four years at more than 200 sites. The results demonstrate that the management of these herbicide tolerant GM crops leads to clear differences in weed populations and, in some crops, this can have a knock-on effect on the number of bees and butterflies visiting the fields and field margins. The number of pollinators visiting a GM crop, together with the behaviour of the insects on individual flowers, will influence the level of pollen movement within and between fields. Experiments designed to measure the spatial patterns of cross pollination within and between fields of oilseed rape will be discussed.

TRANGENIC SOYA BEAN

No 194

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The global hectarage planted with genetically modified (GM) crops increases consistently since the beginning of the commercialisation in 1996. One of the principal GM crops is soya, now occupying >50% of the total soyabean area in the world. The dominant trait is herbicide tolerance (HT), mainly to glyphosate-weedkillers. Resistance is conferred by the epsps gene which is part of a p35S/CTP insert. The gene construct can be used as target for a PCR-based detection assay for GM HT material as it had been done in this study. Soyabean flour is used for the production of pollen substitutes. Thus it appears conceivable that GM soyabean material might enter bee feed and bee products. We assessed this assumption on German pollen substitutes and German honeys harvested in 2000.
In 2000 we checked 11 pollen substitutes. Soyabean material and the synthetic P35S/CTP construct was detected in 4 products. Recently in 2005 we checked another 10 samples of 6 brands. Three products (5 samples) contained minor amounts of GM HT material which did not exceed 1% as tested by real time PCR. Sediments of 389 honey samples from a local honey show in 2000 were examined by light microscopy. "Fish scale-shaped" fragments were recognized in 23 samples (i.e. 5.9% of all samples). This shape can be characteristic for crashed soya beans. 19 of the 23 samples were checked by PCR for soya and for GM material. The PCR assay found soya fragments in 17 samples thus largely confirming the microscopic results. GM HT material was detected in 11 honey samples. The beekeepers whose honeys were checked in the PCR assay had been interviewed individually by telephone. The use of pollen substitutes had been reported by 17 beekeepers. 15 of them had yielded honey with soya residues. The 11 honey samples containing GM material came from beefarms having used the brand of pollen substitute in which we detected transgenic herbicide tolerant material. Our data suggest that pollen substitute might be the origin of the soya residues and the HT material detected in some samples.

EFFICIENCY OF THE AFRICANIZED HONEYBEE APIS *MELLIFERA* IN THE TRANSFER OF POLLEN OF SOY (*GLYCINE MAX.* L. MERRIL) ROUNDUP READ™ VAR. BR 245 RR

No 195

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The genetically modified soy has been cultivated more and more due to the smallest production cost. In Argentina 75% of the planted soy it is transgenic, followed by the United States with 52%. Brazil occupies the fourth position with 10% of the production composed by transgenic soy. The structure of the soy flower ensures for the honeybee the foraging, favoring the transfer of the pollen and increases the production (Erickson & Garment, 1979). This research was carried out to evaluate the efficiency of Africanized honeybee Apis mellifera in pollen transfer of transgenic soy Roundup Read™ (Glycine max. L. Merril), var. BR-245 RR – and conventional BRS-133. It was established three treatments: covered area with Africanized honeybee colonies with three brood combs and two with honey + pollen; covered area without honeybees and in uncovered area. Each treatment was constituted of six replications, 24 m2 each, and, the planting of the soy was performed in eight inserted lines, two to two with the tested varieties. In covered areas, pollination cages were installed, made in nylon screen with mesh of two millimeters, supported by pipes of inch _ in PVC, forming cages in semi-arch, with four meters of width, six meters in length and two meters of height in the highest part. The culture of soy was monitored during the whole period, mainly the blossoming, that had beginning on December 31, 2003 and it extended to January 28, 2004. The harvesting was accomplished line by line of the replication. A thousand seeds of each conventional line were planted. The pollen transfer percentage was obtained through the resistant plantlets to the application of Roundup™. The data were submitted to the NPARWAY WILCOXON procedure using the SAS software. There was no difference in the percentage of pollen transfer ($P>0.05$) among the treatments uncovered area (1.659 ± 0.222) and covered area with honeybee (1.597 ± 0.274). However, these treatments differed ($P=0.0001$) from the covered area without honeybee (0.197 ± 0.074). The honeybees were responsible for 96.26% of the pollen transfer from the transgenic soy - Roundup Read™ var. BR-245 to the conventional variety, BRS-133.

FAST REARING OF QUEENS

No 197

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A man, being involved into beekeeping, has specialised in the artificial rearing of queens.

This is characterised by new methods of rearing of queens. First of all, obtaining three mated queens from one mating nook in a month and in two ways, by newly brooded queens and old unmated ones. The result of this way of rearing of queens is that there always were two queens in the brood, one involved in brooding and the other in adopting.
Then, the application of the method of parent-starter-builder colony. With this method, the queens are reared in one colony having three functions, as the name itself says, and that in the presence of mated queen of such colony. The queen is only taken when starting of larvae and is brought back to the colony after 24 hours.
The research about extinguishing the sexual heat is also interesting, with unmated queens where the moment, the sexual heat is extinguished was proved, how long it could be inactive and how long the unmated queen could spend in the cage without any harmful consequences.

MINI-SYRINGE FOR MULTIPLE INSTRUMENTAL INSEMINATIONS OF QUEEN HONEY BEES

No 198

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The techniques of instrumental insemination of Apis mellifera queens are today, very important in both, apiculture and research with bees, especially in programs of selection and genetic improvement, by allowing the total control of mating. With the advances of the instrumental insemination technique a lot of changes have been made in the apparatus to make the insemination easier and quicker, since the collection of semen from the drones is the most time-consuming procedure. Thus, in this work we developed a mini-syringe capable to make multiple inseminations. The new model consists of a plastic insulin syringe with a tip that is a glass capillary tube, attached with silicone tubing, what decreases the costs of construction and maintenance of the apparatus. There is also a stainless steel base and holder. We tested the mini-syringe in several queens. Almost 95% of them survived and started to lay eggs a few days after the insemination. The whole process became faster, easier and more efficient. The construction using inexpensive but durable material is another advantage. The new mini-syringe also allows us to inseminate queens with stored semen in glass capillaries, by just changing the insemination tip for another pointed capillary with stored semen.

A MINI-STARTER FINISHER HIVE MODEL THAT FACILITATES QUEEN REARING

No 199

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The queen rearing is a very important practice for both beekeepers and researchers. In Brazil, the most common way to rear queens is to use queenright queen rearing colonies. These colonies consist of two Langstroth hives superposed and separated by a queen excluder. However, these colonies are heavy, hard to manage and need large bee populations to attain good results. We developed a new model of mini-queen rearing hive called "Ribeirão Preto mini-starter finisher hive model" that consists of a five frames mating nucleus placed over a 10 frames Langstroth brood chamber. The bottom of the nucleus is adapted with a queen excluder to avoid the passage of the queen to the upper hive. Tests were made comparing grafted larvae acceptance and the weight of newly-emerged queens in six trials made with three types of hives: a four frame upper queen rearing nucleus, a five-frame upper queen rearing nucleus and a traditional two-hive-body queen-rearing colony. The five-frames mini queen-rearing colony gave results as good (in terms of percentage grafted cells that reached the adult stage) as the two-body-hive model and the four frames mini-queen rearing hive, with the advantage of needing a smaller bee population and is easier to manage than the traditional model. The mean weight of the virgin queens reared in the five-frame queen rearing devices was greater (208mg, n = 120) than those reared in the larger, two-hive-body colonies (193mg, n = 115) or in the four-frame queen rearing box (182mg, n = 104).

METHODOLOGY FOR SUCCESSFUL QUEEN REARING

No 200

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Queen rearing is the most important key to successful beekeeping.
There are three main problems in raising good queen cells: providing poor nutrition, using old larvae, and using dry larvae. In this situation, most of the queens will be small, weak, and unable to produce enough pheromone. The queens produced in these conditions will have a weak immune system and be vulnerable to chalk brood disease; and the colony will supercede the queen at the first opportunity. Methodology for making large amounts of worker jelly (for 1 day old larvae): A- We feed 2 litres of liquid protein (Caspian Solution*), to 4 frames of population; B- 48 hours later we introduce 1 frame of eggs to the 4 frames of population; C- When the larvae are full of worker jelly, they are ready for grafting.
The best way to gauge the nutrition of any colony is to

look at the amount of worker jelly that the one and two day old larvae are being given. Queen raisers report that the size of their queen cells change with the different seasons and this seasonal variation is most certainly linked to the protein (pollen) resources available from the environment.
We grafted 30-45 larvae, and gave it to 6 - 8 frames population, and we had more than 97% accepted queen cells, and all being very large and the same size. The secret was providing 6 to 10 litres of liquid protein (Caspian Solution*) 2 days prior, up until 5 days after larvae introduction.
*Note: Caspian Solution is a liquid protein diet rich in royal jelly that contains a pheromone. Available from Caspian Apiaries in Canada.

PLANT BASED ATTRACTANTS FOR HONEYBEES IN INDIA

No 201

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Introduction: Attractants for honeybees in India were not studies till mid eighties. Study of Nasonov gland pheromone led to the dedvelopment of the pheromone based lures. Lures for Apis florae were also subsequently developed. However, preparation of these lures was difficult for the common beekeeper. It was, therefore, thought worthwhile to investigate the attractive properties of certain plant materials.
Methods: Plants, frequently visited by the bees, were collected after consulting the beekeepers. Extracts of the plant materials were obtained. Formulations of the extracts in liquid paraffin were made by the standard methods. The attractiveness of each formulation towards Apis cerana, Apis florea and Apis mellifera (maintained in India) was determined by the standard rotating table bioassay. Data generated were graphically and statistically analysed.
Results: The attractive properties of the formulations towards the honeybees maintained in India were clearly brought out by the graphical analysis. Moreover, it was found that the attractive properties did not get reduced at higher concentrations. Even the 'neat' extract also possessed the attractive properties. Statistical analysis by the Kruskel Wallis test indicated the data to be significant.
Discussion: The observation that the attractive properties are shown even at the higher concentrations makes the plant based attractants superior to the pheromone-based attractants. Moreover the easy availability of the plant material makes these extract cheap.
Utilization of such plant based lure may be useful in invreasing the efficiency of pollination. Such extracts can also be employed for the procurement of Unifloral honey.

EARLY SPRING DIGESTIVE PROBLEMS IN COLD CLIMATES

No 202

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Disease and the Cause: If there is a period of unseasonably mild winter weather, as has occurred this year, a queen will start to lay eggs despite the fact that there is no pollen available from outside of the hive. The bees must respond to the new brood by using the protein potential from their bodies and pollen stored in the comb to make jelly for the larvae. Inevitably cold temperatures return before the brood emerges and the bees will be unable to go out of the hive to get water for the new generation. The emerging bees will need pollen and water for the first three days. When the bees cannot fly out of the hive they will use water that has condensed in the corners. For larvae to grow the temperature in the hive must be maintained between 32 and 37 degrees Celsius, but in cold weather the corner temperature will be as low as 25 Celsius. Stagnant water held at 25 degrees Celsius is a perfect breeding ground for protozoa such as Nosema Apis, the cause of Nosema disease, and Malpighamoeba mellificae, the cause of Amoeba disease. Protozoa and other micro-organisms cause diarrhoea and diarrhoea amplifies the severity of the disease. In some colonies that have experienced a mild spell that caused the queen to lay eggs if the temperature turns cold the bees cannot defecate and they will become constipated. These bees will have fat (bloated) abdomens. When the abdomens of these bees are squeezed dry pollen will come out. This problem can be fixed with a mixture of: 70% hot water, 25% honey and 5% lemon juice. Spray 100 grams of this solution for each single box of population on a sunny day at mid-day. For prevention and treatment we use high protein nutrition with acids from fruit, hygienic bees and providing minimum amounts of medication.

DO GENETICAL ORIGIN OF HONEYBEE DRONES AFFECTING THEIR LONGEVITY, PERFORMANCE, AND QUALITY OF THEIR SEMEN?

No 203

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Drones produced from four different genetical sources of bees (Carniolan, Italian, first hybrid Carniolan, and Egyptian) were evaluated through determination of their weight, longevity, flight performance, and quality of their semen. Data showed that drones of Carniolan bees and its first hybrid recorded the heaviest weight, while

Egyptian drones were the lightest individuals. Also, Carniolan drones lived the longest period (31.00 days), in comparison to the drones of other tested races (17-26 days).
Concerning flight performance, Egyptian drones showed a highest flight velocity (6.12 meter /second), however the lowest velocity (5.46 m/s) was recorded for Carniolan drones. Counting sperm content of different drones revealed that Carniolan drones produced the highest number, followed by Italian drones, however Egyptian drones produced the lowest number. Sperms of Egyptian drones showed a highest and longest viability.
Artificial insemination with different sperms proved that sperms of Egyptian drone migrated to the inseminated queen's spermatheca in a largest number and their fertility was the highest level. These findings confirmed the high comparative reproduction potential of Egyptian drones, in spite of their reduced weight and small number of their sperms. It can be predict that existence of Egyptian drones in a particular area may result in inheritance and dominance of Egyptian bee's char

STUDIES ON SOME FACTORS AFFECTING DRIFTING AND ACCEPTANCE BEHAVIOR OF HONEYBEE WORKERS

No 204

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Effects of three factors (time of the year, distance among the hive entrances and races of bees) on drifting behavior of honeybee workers were studied. While acceptance of these drifted workers was investigated through studying the influence of the internal conditions (queen age, the area of brood honey, and pollen) of the receiver colonies and state of the drifted workers.
Results revealed that the highest percentage of the drifted workers was recorded during January and July while the lowest one was found at September and December. Italian bees showed more attendance for drifting than Carnolian bees. Also keeping the hives entrances at a distance of 80 cm. or more contributed in drifting avoidance.
On the other hand, results indicated that the orphan bees or these colonies having old queens accepted easily the drifted bees for a long time. Also, existence of a large area of brood seem to encouraged bees to accept more introducer bees, while either of honey or pollen area did not show a notable effect on acceptance of these individuals. Pollen carrier workers were easily accepted but also disappeared in a short time.

SOME INITIAL SUCCESS OF APPLYING INSTRUMENTAL INSEMINATION IN BEE BREEDING OF *APIS MELLIFERA* IN VIETNAM

No 205

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Today, the use of instrumental insemination, in Vietnam, is practical and highly successful in Apis mellifera. Virgin queen (at 6 days old after emerged) was inseminated with 8 mm^3 semen collected from 10-20 sexually mature drones had 3.87 million spermatozoa in her spermatheca and the early queens started laying her first eggs in 10.3 days after emerged.
Our mating designs and practical field selection methods offer an auspicious and exciting future in honeybee stock improvement.
A. m. ligustica was introduced to Vietnam in beginning of 1960s with small number of about 200 colonies and in 1980s. A.m. caucasica & A.m.carpatica were introduced but not successful. Developing from a small population so Apis mellifera in Vietnam shown up inbreeding: low egg laying number, high number of diploid drones and low honey yield therefore it needs to be improved. From 2001 we imported queens from Germany, New Zealand, Austria and Italia to improve our gene pool and to research in hybrid by using artificial insemination to control cross-breeding. After four years selected, we have had some pure-bred lines from imported queens such as some lines from A. m. carnica, A. m ligustica. Comparative tests of hybrids have shown their superiority with these desirable characteristics: fast spring build-up, intensive honey production, and good handling qualities. Selected hybrids increased honey production from 59.5% to 72% compare to Vietnam A. mellifera, number of diploid drones reduced and ranging from 1.2 to 1.7 percent.
Artificial insemination is an essential skill. The ability to control the breeding stock will open new opportunities to develop and maintain selected lines.

NESTING BEHAVIOR OF GIANT HONEYBEE (APIS DORSATA)

No 206

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A study was carried out to investigate the nesting behavior of giant honeybee Apis dorsata in Nepal from September 2002 to March 2005. More than five hundred nesting sites of A. dorsata colonies including old and new located at different parts of the country were visited and studied for the nesting behaviour. Combs of broods

and honey were collected from different nesting sites of A. dorsata and studied. A.dorsata bees built single comb as nest to rear broods and store food. The bees preferred more to build the nest on tall and safe buildings followed by on trees and rarely on rocks. They gave highest preference to the strong-cemented water tank and then to residential buildings having flat slab made out of bricks, iron and cement for making their nests. In absence of such buildings, the bees built the nests preferentially on the strong live big branches of simal (Bombax ceiba) and rarely on other tree species. They never built the nests on an old and weak buildings and dead trees that were not strong enough to support the load of the nest. The bees built the single comb at an elevation of 2m to 50m from ground level towards the sunny, open and undisturbed area. Highest preference was given to the same spot of previous year's nest to rebuild their nest. The bees never rebuilt their nests on the spot of previous nest if it was burnt on fire or treated with chemical(s) or washed or painted with paints. Several colonies lived friendly together very close to each other sometime touching each other's nest. The size of the nest varied from 5cm to 150cm in length, 4cm to 15cm in breadth and 10cm to 50cm in height with a shape of mostly conical at the beginning and elliptical with the growth of comb. The elliptical shape of the comb is plain, bent, curved or angular depending upon the nature of the nesting sites. Bees did not rebuild the brood comb after cutting. Honey and pollen is stored at one of the upper most corner of the nest providing beneath more area for brood production except at the center in one nest. Worker and drone broods are reared on the same size of hexagonal cells raised over the thick and strong foundation. The length of each side of worker and drone cell is 3.0mm with a depth of 15mm. The shape of queen cell is round with a diameter of 9.0mm at the top. The wall of queen cell is thicker (up to 2mm) than that of worker cells (>0.5mm). Honey and pollen store are the combination of horizontally extended long, soft and thin cylindrical cells measuring up to 10cm in length built to both sides in the thin foundation. The cells at the comb attachment point are very hard to press used to store pollen and honey measuring up to 5cm in length and 1mm in thickness. The giant honeybee A. dorsata has specific preferences for selecting the site to build the nest and live many colonies friendly together. They leave the nest and fly away in search of food and better nesting sites when food becomes shortage or weather becomes unfavorable or are disturbed frequently by any means. Several colonies of A. dorsata can be attracted every year to man made buildings and retained for longer duration for the production of honey, bee bread, bee wax and various other purposes through better management.

Key words: Apis dorsata, Nest, Behavior, Building, Tree

VOLATILE COMPOUNDS FROM AFRICAN, MITE-RESISTANT AND NON-RESISTANT BEE LINES AS DETECTED BY SPME (SOLID PHASE MICRO-EXTRACTION).

No 207

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Solid Phase Microextraction (SPME) techniques were used to collect unique volatile compounds from five strains of honeybees. These strains were chosen to determine the differences between the mite resistant and susceptible strains of bees. For the mite-resistant strains, a hygienic line from a commercial queen breeder was used, and the Russian and SMR lines from the USDA-ARS Honey Bee Breeding, Genetics & Physiology Laboratory (Baton Rouge, LA). Control was a strain unselected for mite resistance from Hawaii. Local African bees were also compared. We have examined workers and drones, in all life stages of the bee, egg to adult, to ascertain the presence of volatile chemicals emanating from these stages and analyzed them by GC/Mass Spec. We found some volatile compounds varied with the age of the bee and between strains. The greatest differences were between the AHB and the EHB lines.

LYSOZYME OF HONEYBEE'S HYPOPHARYNGEAL GLANDS AT DIFFERENT PROTEIN NUTRITION

No 208

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The development of hypopharyngeal glands is known to depend on protein presence in honeybee's food. In this connection the influence of protein food quality on producing lysozyme by these glands was studied. Sample colonies were formed from 1-day aged bees which were maintained in conditions of isolation. The bees of the control colony received natural food: honey, bee bread and water. The bees of the second colony were given dry pollen load, honey and water. The bees of the third colony were fed only with sugar syrup and water. Hypopharingeal glands in 1, 5, 12, 19, 26-day aged bees were studied to determine lysozyme activity by using cap-agar diffusion test. We found that dynamics of producing lysozyme by hypopharingeal glands was similar in all tested variants. The glands are able to produce lysozyme both with protein food of full value and with protein deficiency in food. Lysozyme level significantly varies during 1-26 days of life of the bees carrying out different functions in the hive. Lysozyme reaches its maximum level in the glands of 12-day aged

bees, engaged in feeding larvaes. Moreover the dynamics, shown in small colonies in conditions of solation, repeats the dynamics that is typical for standard colony. At the same time the quantity of lysozyme, produced by hypopharingeal glands, depends on availability and quality of protein food. The lowest lysozyme content was found in bees, deprived of protein food. In this case its level made on the 5th day - 65.7%, on the 12th - 82.8%, on the 26th - only 44.1% of the control. In the glands of the bees received such protein food as pollen load, lysozyme level appeared to be the same as with protein deficiency in the food. This evidences that pollen from dry pollen load that has not been changed into bee bread, does not contain available components necessary for producing lysozyme by the glands. So, both protein deficiency in food and change of protein food quality, in particular substitution of bee bread to pollen load, can infringe the ability of hypopharingeal glands to produce lysozyme – one of the main factors in honeybee's immunity. Beekeepers should always remember this and provide bees with the protein food of full value – bee bread.

ESTIMATING THE POPULATION PARAMETERS OF THE BEE COLONY ON THE BASIS OF THE MATHEMATICAL MODELING

No 209

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In modern scientific studies of the biology of the bee colony and technology beekeeping the methods of mathematical modeling and to population ecologies are not used enough.
For study population-dynamic features of the bee colony the basis models of Exponential growth with continuous breeding, Geometric growth with discrete generations, Logistic population growth age structured population growth and the other (Forrester, Lotka, Leslie, Verhulst-Pearl) have been used, as well as computer modeling based MS Excel, Statistica, VB.
On the bases of constructed mathematical model of the development and vital activity of the bee colony, the following population parameters have been determined: per capita instantaneous growth rate to bee colony, it life table and fecundity schedule, stable age distribution by bee in colony, average generations length, imago's basic reproductive rate and other to population factors. So the growth rate (r) decreases from beginning to the end of the season from values r=0,3-0,02 in spring period (the exponential growing to colony) to values r=0,02-0,005 in a period of the deceleration of growth of the colonies and up to r= –0,01 in autumn period. The analysis r done with the help of Markov's processes has shown the following: the higher averages value of r in a period of exponential growth of the colonies the more probability of swarming. The maximum parameters of survival has been noticed in the colonies with an average number of bees, in contrast with the colony with low and high number of bees (P=99%), particularly in periods after and before the winter. The survival depends on the amount of brood in colony, this correlation in spring time and - autumn is negative (the correlation coefficients – (0,7-0,93). This dependency is positive (the correlation coefficients 0,86-0,92) in summer.
Population-dynamic parameters and mathematical models of the colony can be use for study of the biology of the bees, for analysis and for the improvements technology of keeping and reproduction of bee colony.

DISCUSSION AND EVALUATION OF THE STRATEGIES FOR PROTECTION OF THE BLACK BEE *APIS MELLIFERA MELLIFERA* ON LÆSØ.

No 210

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The isolated island of Læsø was declared a conservation area of the black bee, Apis mellifera mellifera in 1993. Only black bees should be allowed on Læsø, and no imports were permitted.
A few beekeepers questioned the legal background of the regulation and obstructed the conservation. Legal battles took place through several years until the European Court and local courts finally declared the conservation area legal. Change of government in Denmark gave new momentum to the battle against the conservation area.
The new minister of Agriculture, Fisheries was basically against the conservation. The Ministry made report on the rationale behind the conservation area. The conclusion was the conservation of the black bee was justified. But for political reasons the report gave several solutions to solve the problems.

- To keep Læsø as a conservation area.
- To make a protected mating station for the black bee in the very eastern part of Læsø and allow other bee races on other parts of Læsø.
- To suspend the conservation of the Black Bee for some years, but keep a mating station on the eastern part of Læsø.
- To abolish the protection of the Black Bee totally.

The ministry took steps to implement the solution 2. With the limitations that the area is only protected until 20 July each year.
The Danish Beekeepers Association propose to the ministry:
1. All other bees except black bees must be removed from the island.
2. Beekeepers with Black Bees should receive a small grant to stimulate all the beekeepers of Læsø to have Black Bees.
3. Marketing of honey form the Black Bee of Læsø as a unique product.
4. The authorities must keep former agreements about

the conservation.
The goal is to preserve the black bee and tomake beekeeping with Black Bees on Læsø more profitable. The Black Bee does not survive unless beekeepers care for it.

THE ACTIVATION OF BUMBLEBEE QUEENS UNDER LABORATORY CONDITIONS

No 211

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There are several methods for the activation of laboratory reared bumblebees. Ethanol extracts of female and male larvae, pupae, whole cocoons and adult queens of bumblebee were prepared and tested in this work as a possible means of support and accelerate bumble-bee queens oviposition.
Experiments were performed during 3 years, in time of biological inactivity of bumblebees, i.e. September – March. Queens Bombus terrestris were placed separately into plastic cages supply with sugar solution and pollen as a food and lure of cocoons ("pseudococoons") treated with mentioned extracts. We found extract from the male bumblebees cocoons (pupaehe most active. There were compared two groups, together 90 treated queens and 90 control queens. Queens in treated cages started egg laying in 50% during two months, and in 24% by control group. The only differences by using extract of male cocoons were significant.
Results give us further possibility use this stimulus for better start of bumblebee nests in laboratory.

POSITION OF BEE COLONY IN THE BEE YARD

No 212

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The position of the colony in the bee yard may be: permanently good, temporary good, permanently bad and temporary bad.
Permanently good position is when the bee colony has good microclimatic living conditions at the position it was located throughout the year. So for example, bee colony located under a deciduous tree has permanently good position in the bee yard.
Temporary good position is when the bee colony has good microclimatic living conditions during a short time period of the year, and mostly bad. As an example for such position, a bee colony located under a coniferous tree or under the penthouse could be taken.
Permanently bad position is when the bee colony has bad microclimatic living conditions throughout the year. A good example for this position is the beehive located the vicinity of the western wall of some building. Temporary bad position is when the bee colony has t microclimatic living conditions during a short time pe of the year. A beehive located in the sunny place is regarded to be in the temporary bad position.

BEHAVIOURAL STUDIES ON SOME RACES AND HYBRIDS OF HONEYBEE IN ASSIUT REGION, UPP EGYPT

No 213

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Carniolan race was highly infested by varroa mite in ca of workers brood and adult workers, followed in a descending order by Carniolan hybrid. Meanwhile, workers brood and adult workers was the lowest infested by varroa mites in case of Egyptian race, followed in descending order by Italian hybrid. Regardi to the infestation level during the months, it varied considerably from one month to another. For the work brood infestation, the average rate being lowest in Ma and the highest was during October. In case of adult workers infestation, the lowest rate was during April a the highest during September. Italian hybrid and Egypti race were with the highest grooming behaviour. In contrast, Carniolan race had the lowest grooming behaviour. Meanwhile, the grooming behaviour was medium in case of Carniolan hybrid and Caucasian hybrid. The highest hygienic behaviour was found in the Egyptian race followed by Italian and Carniolan hybrids. While the lowest values, were observed in Caucasian hybrid and Carniolan race, respectively. Egyptian race revealed the highest defensive behaviour, while Carniolan race was more gentle, easily handled and showing a mild defensive responses. Smoking was significantly reduced the aggressive behaviour of bees. Opening the hive or exposure the balls to workers on th comb tops after the lid and remove it markedly increase the aggressiveness. Geraniol was active in inducing aggressive response and severe stings. Highly significan and negative correlation was detected between cubital index and aggressiveness in studied races and hybrids. Six behavioural characters were used for evaluation, or scoring method for tested hybrids and races. Total score and (ranking order) of behavioural characters were: 114 (1), 167 (2), 211 (3), 250 (4) and 288 (5), in Italian hybrid, Egyptian race, Caucasian hybrid, Carniolan hybrid and Carniolan race.

PHYSIOLOGICAL AND BIOCHEMICAL STUDIES ON SOME RACES AND HYBRIDS OF HONEYBEE IN ASSIUT REGION, UPPER EGYPT"

No 214

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The newly emerged workers for Carniolan hybrid, Caucasian hybrid and Carniolan race were with the highest thorax fresh weights (mg/bee). Meanwhile, Egyptian race had the lowest weight. In case of thorax dry weight (mg/bee), Carniolan hybrid and Carniolan race were with the highest weight. Meanwhile, Egyptian race had the lowest weight. The highest nitrogen content was found in Carniolan race, whereas, the lowest nitrogen content was noticed in Egyptian race. The same trend was obtained for total protein content (%). The newly emerged workers for Carniolan hybrid, Caucasian-hybrid and Carniolan race had the highest head fresh weights (mg/bee), whereas, Egyptian race had the lowest weight. For head dry weight (mg/bee), Carniolan hybrid was the highest. Meanwhile, Egyptian race was the lowest. Carniolan hybrid, Caucasian hybrid and Carniolan race were with the highest K content (ppm), whereas, Egyptian race had the lowest value. The highest Ca content (ppm) was detected in Carniolan race. Meanwhile, Egyptian race was the lowest. Maximum Na content (ppm) was found in Carniolan race. Meanwhile, Carniolan hybrid, Italian hybrid and Caucasian hybrid were with the lowest values. Maximum Mg content (ppm), was found in Carniolan hybrid. Meanwhile, Egyptian race was the lowest. Carniolan hybrid and Caucasian hybrid were with the highest (K/Na) ratio. Meanwhile, Egyptian race was the lowest. The highest (Mg/Ca) ratio was noticed in Carniolan hybrid, whereas, Carniolan-race was the lowest. The newly emerged workers for Carniolan race had the highest total fat content (mg/bee). Meanwhile, there were insignificant differences between Carniolan hybrid, Italian hybrid, Caucasian hybrid and Egyptian race. Workers with 12 days old were with the highest degree of hypopharyngeal gland (HG) development in all tested hybrids and races. On the other side, workers, with 3 days old were with the lowest degree of (HG) developmental in all tested hybrids and races of honeybees. Maximum degree of development of (HG), and maximum acinal area of lobes were noticed in Carniolan hybrid workers.

A STUDY ON ADVANTAGE OF ARTIFICIAL NUTRITION AND SUGAR SYRUP ON POPULATION AND PRODUCTION OF HONEYBEE COLONIES

No 215

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Introduction: Honeybee like other animals need food productes for growth and multiplying which involve carbohydrates, proteins, fats, minerals substans .In ordinary, honeybee supply their nutritional needs from nectars and pollens. But in bad occasion and inapperiate environment they'll deprived from sufficient foods, so their productions will be diminished and their body sizes will be decreased. These subjects show the necessity of honeybee artificial feed for increase of output and efficiency of bee colonies in such conditions that they can't supply their needs from natural ways. We should remember that in artificial feed, sugar syrup, as usual in apiaries, now can't eliminate their needs,but we must also use supplements like ,proteins and vitamins
Methods: For these study we selected 30 colonies with normal position in Chaharmahal and Bakhtiar in random, then divided them to 3 groups; one of them as witness and others as cases which feeding by protein cake with different viscosity (15% and 30%), as supplement.
Each case group divided in two 5 members groups for feeding with carbohydrate syrup with one part water and one part sugar for one of them and one part water and two parts sugar for another one.This study began from December to February in the other word; in bees spawning; and continued for two months.
These honeybees tested for parasites and bacterial diseases, hive numbered and weighed, and population and numbers of combs and spawning of each colony recognized for registerations of the results. After that honeybees feeded every 10 days by pulpy cake of protein materials (soya powder) which was sweetened by honey and sugar syrup; and every other day feeded by sugar syrup for two or two and a half months.
Results: Population amount, increase of larvae and honey bees population, pleasant to taste at the cakes, the weight of the hives and the resistant of the colonies considered in spring and summer colonies operation. Results are as below:
Spawning and growth of population in cases groups 15% more than witness. They (cases groups) showed 30% better operation to compare with witness group. They also were more successful in health and daily activities.

PHEROMONAL ACTIVITIES OF THE MANDIBULAR GLAND PHEROMONES ON FORAGING ACTIVITY OF DWARF HONEYBEES

No 216

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The pheromonal activities of mandibular gland pheromones; 1-eicosanol, eicosane, heneicosane and 2-heptanol were investigated by applying the chemicals with various concentrations from 0.1%, 0.5%, 1.0%, 5.0% and 10.0% (v/v) in n-hexane on Mimosa pudica

Linnaeus during foraging activity of Apis andreniformis and Apis florea. The data were analyzed by using one-way ANOVA at 95% confidential level. The finding shows that the chemicals which act as the repellence to A. andreniformis foragers are as follows; 5.0% eicosane, 5.0% and 10.0% 2-heptanol. While, 0.5% and 1.0% 1-eicosanol, 0.1%, 0.5%, 1.0%, 5.0% and 10.0% eicosane, 0.5%, and 1.0% heneicosane and 1.0%, 5.0% and 10.0% 2-heptanol are repellent substance to A. florea foragers. The chemicals with act as attractant to A. andreniformis foragers are 0.1% 1-eicosanol, 10.0% eicosane, 1.0%, 5.0% and 10.0% heneicosane and 0.1% 2-heptanol. However, no chemical with the concentration shows attractant properties to A. florea foragers.

Keywords: Apis andreniformis, Apis florea, pheromones, mandibular glands, honeybees, 2-heptanol, eicosane, 1-eicosanol, heneicosane

THE HISTOLOGICAL AND HISTOCHEMICAL STRUCTURE OF THE HYPOPHARYNGEAL GLANDS OF THE ASIATIC AND THE EUROPEAN HIVE HONEYBEES

No 217

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The histological and histochemical structure of the hypopharyngeal glands of the Asiatic hive honeybees, Apis cerana Fabricius, 1793 and the European hive honeybees, Apis mellifera Linneaus, 1758 in four stages of workers; pupae, nurse, foraging and guardian bees were investigated by using paraffin and staining techniques; hematoxylin & eosin, ninhydrin Schiff's and periodic acid Schiff's reagents (PAS) were used for studying histological structure, histochemical structure of proteins and carbohydrates, respectively. The finding shows that the histological structure between species are similar. However, the differences are found among stages within both species. The histochemical structure of proteins and carbohydrates among four stages within both species are different.

Key words Histological structure, histochemical structure, hypopharyngeal glands, Apis mellifera, Apis cerana, pupae, nurse bees, foragers, guardian bees periodic acid Schiff's reagent (PAS), ninhydrin Schiff's reagent

GENETIC VARIATION OF MITOCHONDRIAL DNA OF CHARACTERS FOR HONEY BEE

No 218

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Honeybee is a kind of society insect. The races fed in China are Apis mellifera imported form abroad and native Apis cerana cerana. In this study, the genetic variation of mitochondrial DNA (mtDNA) of characters for some honeybees were analyzed in the purpose of detecting the phylogenetic relationships of honeybees.
The mtDNA polymorphismin four species of Apis mellifera and Chinese bees (Apis cerana cerana) from six localities were analyzed with 15 restriction enzymes of 6 base pair recognition. Four kinds of Apis mellifera could be divided into two groups:
Apis mellifera carnica and Apis mellifera carpatica
Apis mellifera caucasica and Apis mellifera acervorum
Apis cerana cerana from six localities could be divided into two groups from: Jilin, Fujian, JiangXi, Gongdong, Kongming and Beijing. The Jilin bee is the result of the ECOR site lose of Apis cerana cerana from other regions. The mtDNA polymorphisms in egg, larva, pupa and adult bee of Apis cerana cerana were studied with RFLP. The heterophasmy of mtDNA in different development periods was not detected. Apis cerana cerana from six localities were discriminated with Hinf including groups from JiangXi, Beijing and Jilin, Gongdong and Kongming, Fujian.

Key words: Honeybee, Mitochondrial DNA

QUEEN BREEDING AND SELECTION IN EAST HERZEGOVINA BIH

No 219

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In this area Carniolan bee is the only race that has been raised for years. It has adapted to all honey flows and climate conditions. Main characteristics of this race of Carniola bee are good wintering, low food consumption during wintering, disease resistance, tranquillity, rapid spring development, good honeybees.
Ministry of Agriculture has initiated a project on protection of this race of Carniolan bee. It is led by known specialists in this field. Its title is "Project on protection of genetical resources of bees of the area EH".
As a selection station an isolated and ecologically pure place has been chosen. This apiary is circled by high mountains and make it possible to gain high level of well controlled mating. In this apiary there are 250 beehives. 86 beehives are included in this selection which has 8 lines. All queen mothers are from this area. Modern methods of queen breeding are used. There are 500 mating nucleuses. 30% are 4-frame LR nucleuses, 70% are baby 4-part nucleuses, which have proved as very

good ones. During this selection we pay a very strong attention on: pure line breeding, swarming impulse, good honeybees, tranquillity, high productivity.
During this project 4 ways of bee feeding have been used: bees fed with honey, with sugar, with the mixture of honey and pollen, and bees were not fed.
We have also checked and recorded their influence on the number of accepted and raised queen cells, length and structure of queen cells, their volume, and weight of bee queens before mating.
The percentage of queen fertilization is 89% in 2003, 95% in 2004.
In 2004 we produced 2,000 bee queens, but we expect to produce 5,000 in 2007.

COMPARATIVE ANALYSIS OF NUTRITION NEEDS OF *APIS MELLIFERA* FROM TROPICAL ANDES AND HOMO SAPIENS, WITH EMPHASIS IN REPRODUCTION BUDGET: A PREGNANT SUPERORGANISM HYPOTHESIS

No 220

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We have studied the pollen harvested per day in 100 colonies of Apis Mellifera adansonii in "Mitològica Farm", situated at 1,300 meter over sea level in wertern Andes, Venezuela. We make morning daily observations per minute at hive entrances observing the number of bees with pollen load. Our study was made from 1999 until 2001. We use pollen trap, and then the pollen loads were classified by color and weighted. Thus, we estimated the weight of harvested pollen per hive/day in different period of the apiculture year. All colonies had an average harvest over 50g pollen per colony/day, with an average of 200g pollen per colony/day (October-November- honey period). We used this maximum average of harvesting of pollen, comparing it with nutritional values reported for mineral and vitamins of bee pollen. We estimated the average content of vitamin and minerals demanded by an average colony in different steps of Apiculture year. We emphasize the following vitamins and minerals as key indicators: Vitamin A, Vitamins B1, B2, B6; Folic Acid; and the minerals Iron, Manganesum and Zinc. The nutritional Apis- budget was compared with nutritional needs of Humans in different steps of development. We conclude that the nutrition allocation for an average colony of Apis mellifera is well adjusted to the nutrition of female human during pregnancy and breast-feeding period. We discuss the implications of this comparison to manage natural swarm and colonies. The physiology of a female pregnant superorganism, suggest that the human female needs (Hormone like relations and human female perception and feelings) must bee applied to Apis female superorganism.
We propose a new theory of Apis colony as a pregnant superorganism making use energy-space-time concepts of quantic physic.

RAPID COLONY INCREASE FROM 200 COLONIES TO 1,700 COLONIES IN EIGHT HOURS USING 3 BEEKEEPERS

No 221

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With large scale nucleus production, the difficulty arises with high labour costs and drifting of nucleus populations due to a variety of reasons. Drifting results in weak hives, chilled brood and a low percentage of hatched and mated queens. With the practical and proven method described here, these problems are eliminated. There are four primary causes of loss of adult population (drifting) when making nucleus colonies. Adult bees drift towards colonies with strong queen pheromone, colonies with strong larval pheromone, colonies with the same colour of the mother hive, and colonies at the sunny end of the bee yard.
Methodology: Step 1: Early Spring, Feed 200 hives Caspian Solution* until they have 30 frame population (average 2 months time). This will stimulate large scale brood production. Step 2: Remove queen, 2 frames of brood and 1 frame of extra population. This makes 200 new nucleus colonies in one hour. This also removes queen pheromone from the mother colony and encourages the main colony to finish feeding & capping young larvae. Step 3: (Same day as step 2) Feed the queenless mother colonies (27 frame population) three feedings of 200ml Caspian Solution in 6 litres 2:1 sugar syrup every 3 days. This ensures quick production of young brood. Step 4: (Four days after Step 3) After four days, there are no eggs and very little young larvae Divide 27 frames into 1,500 colonies & add a queen cell. This will take three beekeepers eight hours. Step 5: (One day after Step 4) Check new nucleus colonies for those with no adult population due to drifting (less than 5%) and redistribute those frames to the original 200 nucleus colonies.
Results: There will be less than 5% drifting due to lots of emerging brood and very little queen pheromone or larval pheromone. The labour costs will be minimal as compared to convention methods of nucleus production.
Note: * Caspian Solution is a liquid protein diet rich in royal jelly that contains a pheromone that causes bees to work extra hard.

THE ORIGIN OF EUROPEAN FOREST BEEKEEPING

No 222

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The book "The Archeology of beekeeping" written by Eva Crane states that forest beekeeping first developed in the middle course of the Volga and in the lower course of the Kama river 2000 -1000 B.C. where a branch of Finno-Ugrian peoples lived. Later on forest beekeeping spread with the Finno-Ugrian peoples westwards to the Baltic. From these people the beekeeping practices were passed on to the Slavs and from the western Slavs to the Germans.
However there is no evidence given in the book. In order to prove this hypothesis we have carried out a survey of bee tree constructions and bee hive open side constructions appeared afterwards. Both constructions were traditionally used in the mentioned territory. The variety of types, their likeness and simplicity confirm the fact of forest beekeeping origin in this area. The most ancient is Udmurt type of bee tree with slit-like entrance which served as a prototype for bee tree with slit-like entrance in the door and side wall.

RADIOECOLOGICAL ASPECTS IN PRODUCTION OF BEE PRODUCTS

No 223

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One of basic conditions of manufacture of high-quality products of beekeeping is the non-polluting inhabitancy of bees. However it is difficultly achievable in practice at presence of the enterprises which work is connected to high ecological risk. In this connection the territory of Ukraine is not exception. It is given that the significant part of high-efficiency apiaries in the country located in the areas which have suffered from intensive radionuclide contamination of Chernobyl origin. On a global scale consequences of Chernobyl atomic power station accident have led to significant increase of contamination levels of planet vegetative cover with radionuclides 137Cs and 90Sr.
In connection with above-stated, the purpose of our researches was to study the influence of radiation component on quality of beekeeping products, made on territory of the country.
It has been established, that radioactive pollution of pollen is caused by radionuclides 137Cs and 90Sr, honey - 137Cs. In samples of bee products, that have been taken from radionuclide contaminated areas, the radionuclide content was in 10-100 times higher in comparison with areas which were safe in this respect. The radionuclide ratio of 137Cs/90Sr in samples of pollens was different: from 0.2 up to 1.4 - for clean a and 36 - for the territories suffered from Chernobyl atomic power station accident. The highest level of pollution has been found out only in one settlement: pollen it has made 300 Bk/kg as regards 137Cs and 8 Bk/kg - as regards 90Sr; for honey it has made 428Bk as regards 137Cs.
On the basis of the received results we made the conclusion, that at the present stage of post Chernob accident, pollution levels of the Ukrainian origin beekeeping products are not harmful for the Ukrainian population health. At the same time, the carried out research has evidently shown an opportunity of use o plant pollen (bee pollen load) as the indicator of radioecological safety of honey yield territory.

ORGANIC ACIDS IN HONEY

No 224

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Honey contains a whole series of organic acids. We tested the hypothesis that the spectrum of organic acid in honey may give evidence of the autenthicity of the honey, its botanical and geografical origin.
Honeys for analyses were obtained directly from bee yards in the Czech Republic. The determination of acids was based on HPLC method with UV detection.
All honey samples contained kumaric acid (up to 9 ppm) ferulic acid (up to 3 ppm) and benzoic acid (up to 28 ppm). The salicylic, syringic, protocatechic and other acids in some honey samples were present.

ANÁLISIS ISOENZIMÁTICO EN POBLACIONES DE *APIS MELLIFERA* L. EN COLOMBIA

No 225

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Los análisis isoenzimaticos en poblaciones de Apis mellifera en el continente americano, han demostrado que las abejas africanizadas son un polihibrido compuesto principalmente por las subespecies scutellata, mellifera y ligustica. En este trabajo se presentan los resultados del estudio de 900 abejas adultas colectadas en diferentes zonas biogeográficas colombianas. Se Analizaron 6 individuos por colonia de un total de 150 colonias, pertenecientes a 15 localidades de 5 departamentos. Las muestras fueron colectadas desde los 15 y hasta los 3000 msnm. Las

determinaciones isoenzimáticas para Los locus Hexokinasa (Hk-1) y Malato deshidrogenasa (Mdh-1), se realizaron en la Universidad Federal de Sao Carlos SP Brasil, el laboratorio de genética y bioquímica. El estudio permitó comprobar, que las frecuencias de los alelos de estos locos en muestras de A. mellifera en Colombia son similares a las observadas en poblaciones de abejas del Brasil, presentando una frecuencia para Hk-1 del alelo F = 0.5679, M = 0.0768 y S =0.3554; y para Mdh-1 valores para F = 0.7286, M = 0.2436 y S = 0.0277. Las abejas revelaron un alto grado de africanizadas de grado heterogéneo, presentando niveles distintos de introgresión de los genes africanos en las poblaciones europeas residentes. Estas poblaciones se encuentran en equilibrio genético de Hardy-Weinberg y no presentan desequilibrio de ligación para estos locos, evidenciando que posiblemente el proceso de africanización en Colombia ya se completó. Además, se verificó un gradiente altitudinal, corroborado por el análisis de correlación linear (r = 0.70, P<0.001), que lleva a suponer un efecto de selección sobre los fenotipos de la Mdh-1.

THE INFLUENCE OF BEES AND QUANTITY OF CELL TO THE PROFIT OF HONEY IN BEE COLONIES

No 226

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The purpose of this work is to determine correlative relations between the quantity of bees, cell and profit of honey in bee colonies.
Applying statistic methods, regression analyses it is possible to quantify and determine a direction of changes correlatively connected properties.
In our two years research it has been observed bees and cell on the honeycomb surfaces during the spring (the last week of march and the last week of april) to 36 bee colonies and it has been estimated the quantity of mentioned properties in 1/10 LR of frame. The quantity of profit of nectar has been measured during the first three days of robinia flow by partial method of measuring - (method of Szabo, 1982.).
On the basis of the statistic calculations, the next data were obtained of the first spring observation: the quantity of profit of honey brings about the increase of bees by 0.89kg and brings the reduce of cell surface by 0.29kg.
To the second spring observation (about thirty days before robinia flow) the quantity of nectar brings the increase of bees by 0.08kg and of quantity of cell by 1.26kg. In the next year during the first observation it can be seen that the quantity of nectar brings the increase of bees by 2.73kg and the reduce of cell by 1.19kg. On the basis of the data from the second observation in the second year it can be seen that the profit of nectar brings the reduce of bees by 0.42kg and the increase of cell by 0.78kg.

On the basis of the analyses and by testing of the obtained results it has been determined that there were differences and reciprocal relations between followed parametars.

COMPARISON OF THE PERFORMANCES OF IMPORTANT HONEY BEE(APIS MELLIFERA L.) RACES AND ECOTYPES IN DIFFERENT REGIONS OF TURKEY

No 227

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In this research, peformance tests of important honey bee races and ecotypes between North (Thrace) and South (Cukurova) regions of Turkey have been compared. Colony livability, adult bee population, brood production, swarming tendency, flying activity, aggresiveness and honey production have been evaluated.

In Thrace region, the differences among the Anatolian, Caucasian, Thrace and Mugla races and ecotypes have not been found significant (P>0,05) according to the livability where as the same groups have exhibited significant differences (P<0,01)in Cukurova Region. In Thrace, races and ecotypes have indicated higher performance (P<0,01) for adult bee population and brood production fllowed by Mugla, Thrace, Caucasian and Anatolian, respectively. In Cukurova conditions, the differences among groups according to adult bee population have been found important (P<0,01). Mugla ecotype has indicated higher performance (P<0,01) than all the groups in brood production whereas Anatolian was higher than Thrace (P<0,05) and Caucasian (P<0,01). Thrace was higher (P<0,05) than Caucasian.
In terms of swarm tendency, no significant difference (P>0,05)has been observed between the races and ecotypes in the conditions of Thrace and Cukurova. According to flying activity and aggresiveness the difference between races and ecotypes were not significant (P>0,05) in Thrace conditions where as differences were important (P<0,01) in Cukurova conditions. In Thrace Region conditions, average honey production of Caucasian, Anatolian, Mugla and Thrace races and ecotypes were 29,971 ± 7,797; 24,857± 8,545; 23,171 ± 7,721 and 19,529 ± 4,067, respectively. On the other hands,in Cukurova conditions, average honey production of groups were 20,544 ± 1,386; 24,670 ± 3,353; 34,862 ± 3,576 and 17,381 ± 2,852, respectively. Caucasian ecotype in Thrace conditions and Mugla ecotypes in Cukurova conditions have yielded the highest honey production.

UTILISATION OF TROPHALLAXIS BEHAVIOUR IN ENVIRONMENTAL RESEARCH

No 228

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Food transmission from mouth to mouth is termed trophallaxis, and is common between the honeybee workers and also from worker to queen and drones. The trophollaxis is very important behaviour for honeybees' social life and especially in the process of honey making. Honeybee collects her nectar reward with working hard. Several hundred visits may be necessary to obtain a load of nectar from small flowers such as those of sweet clover. House bees wait for the field bees near the entrance of the hive to receive their nectar load. The bees exchange the food by trophallaxis behaviour. The house bees know better where to store honey in the colony and the field bees know exactly where to find more nectar. Therefore trophollaxis is important in honey making.
Fakhimzadeh & Lodenius (2000, Apiacta 35:85-95) investigated the amount of heavy metals in Finnish honey, pollen and honeybees. The amount of heavy metals in honey was only 10% of the accepted level in food material in Finland. The same metals were considerably higher in bees than in honey. For example in Harjavalta the mean value of Cd in bees was (1.2±0.51 mg/kg dry wt) was 133 times the level of Cd in honey (0.0089±0.0125mg/kg). In Harjavalta Pb, Cu and Zn was 36, 180, 42 times higher in bees than in honey, respectively. As honey possesses excellent surface to collect any pollution and bees were highly polluted, one can hypothesis that the bees filter the honey and accumulate metals pollutions in them.
Until recently the examination of this hypothesis was not easy. However, recently a series of cages were made to examine the hypothesis. From one colony, samples of 78 bees (range 49-107) were confined in each cage and the cages were assembled over each other with a net in between. Bees in the three lower cages had no access to food. Sugar solution was supplied only to the top cage. It is known that bees without food die within few hours. However, in this experiment hungry bees transferred the sugar solution to the lower cage while they had to beg the food from the bees in their top cage. All bees including the queen bee (kept in the lowest cage) lived in this manner in a dark laboratory for several days of the experiment. This bio-filter (bees fed in this way) makes it possible to examine the hypothesis of accumulation of metal pollution in bees' body during honey making.

THE DEFENSIVE BEHAVIOUR OF *APIS MELLIFERA CYPRIA* AGAINST THE HORNET VESPA ORIENTALIS

No 229

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The honeybee Apis mellifera cypria has not been studied in detail despite the fact that it is interesting from a scientific point of view on two accounts: it is a distinct race which has a small area of distribution and it possesses a pronounced and effective defensive behaviour against attack by hornets and wasps which try to penetrate hives to rob them.
Our study focused on the different parameters of the defensive behaviour of this honeybee race against the hornet Vespa orientalis at different periods of the year. The observations were performed on 40 colonies.

SOME DEVELOPMENT AND REPRODUCTIVE CHARACTERISTICS OF THE ITALIAN, CARNIOLAN, CAUCASIAN AND ANATOLIAN QUEEN HONEYBEES (*APIS MELLIFERA* L.) AND THE EFFECTS OF JUVENILE HORMONE ANALOQUE (METHOPRENE) APPLICATION ON THE QUALITY OF THE QUEENS

No 230

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In this study some development and reproductive characteristics of the Italian (Apis mellifera ligustica) Carniolan (Apis mellifera carnica), Caucasian (Apis mellifera caucasica) and Anatolian (Apis mellifera anatoliaca) queen bees and the effects of juvenile hormone analoque (methoprene) application on the quality of queen bees were determined.
The grafting rates in Italian, Carniolan, Caucasian and Anatolian queen larvae were found to be 82.7%, 62.9%, 62.9 %, 78.2%; the length of the capped queen cells were 24,4±0,2mm, 24,9±0,2mm, 24,6±0,3mm, 24,8±0,2mm; diameter of the capped queen cells were 11,3±0,1mm, 11,4±0,1mm, 11,5±0,1mm, 11,5±0,1mm; weight of the queens at emergence were 196,3±2,3mg, 223,6±2,9mg, 204,4±3,1mg, 204,9±2,5mg; diameter of the spermathecae were 1.17±0.05mm, 1.14±0.01mm, 1.18±0.01mm, 1.20±0.01mm; the number of spermatozoa in the spermathecae 3.820± 0,520 million, 4,466 ±0,520 million, 4,320±0,52 million, 4,830±0,520 million respectively.
Application of methoprene (0.05 mg/larvae) increased the

weight of the queen bees; however it caused high larval mortality. The application of acetone as the solvent of methoprene also caused high larval mortalty. Acetone and acetone dissolved methoprene at 0.05mg/larvae should not be used in queen rearing.

Key words: Honeybee (Apis mellifera L.), genotypes, queenbee, methoprene.

POLLEN ANALYSIS OF SOME UKRAINIAN HONEY

No 231

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The pollen analysis of honey or mellisopalinological research finds use at definition of a botanical and geographical origin of honey. It is known, that because of certain species of plants in the fodder base for bees, honey from different regions of the world have characteristic pollen spectrum.
In Ukraine botanical spectrum of honey are studied unsufficiently. The works Cherkasova (1970) are known. Recently is investigated species structure of pollen load (Lokutova, 2004). The purpose of our work was study of pollen spectrum Ukrainian honey. The samples of honey were prepared by the method of Louveaux et al, (1978) in laboratory of pollen analysis of IPF, Poland (Teper, 2004). 10 samples were selected from the central and 2 - from southern region of Ukraine.
The results of our researches show that honey named as monofloral have poor pollen spectrum. In them prevails or contains the pollen those of plants, which name they carry (sophora, robinia, tilia, fagopyrum, onobrychis). Multifloral honey have wider pollen spectrum. These honey contain pollen of agricultural plants (helianthus, fagopyrum, brassica, trifolium ets.), pollen of garden culture, wood, field and grassy plants (salix, crataegus, garden cultures, taraxacum, echium, centaurea, cirsium, artemisia ets.). In honey from southern part are found out pollen of lavandula and majorana. This fact confirms a geographical origin of honey.
In general should be noted, the honey central part of Ukraine characterized to the high contents of pollen from echium, helianthus, fagopyrun, trifolium, centaurea ets.

INVESTIGATIONS OF DIFFERENCES OF HEAVY METALS AMOUNT IN HONEYBEE BODIES AND THEIR HONEY - INDICATION OF HONEYBEE BIO-FILTER ABILITIES

No 232

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In this work, investigations of heavy metals amount were done in samples of honeybees and their honey from two apiaries from Serbia. The first apiary (7 hives) is an experimental school apiary of Faculty of Veterinary Medicine in Belgrade and it is situated on the hill which is 30 m distant from highway. The second apiary (7 hives) is located on Sjenica-Pester plateau, far away from sources of environmental pollutants (control apiary). Honey and 300 honeybee workers (150 house bees and 150 field bees) were sampled from each hive. Among house bees, only young, barely emerged workers were sampled.
Contents of Pb, Cd, Zn, As, Cu and Fe in samples of honey (14) and honeybee bodies (4,200) were determined by atomic absorption spectrometer AAS (Varian AA 375 and Unicam 969 AA).
The analyses of honey and honey bees from Belgrade apiary showed the following results: the mean values for Pb, Cd, Zn, As, Cu and Fe in honey samples from Belgrade apiary were <0.20 mg/kg, <0.03 mg/kg, 1.347 mg/kg, <0.20 mg/kg, 0.246 mg/kg and 2.197 mg/kg, respectively; in samples of house bees: 0.352 mg/kg, <0.03 mg/kg, 1.552 mg/kg, 0.588 mg/kg, 0.735 mg/kg and 2.883 mg/kg. The highest mean values for Pb, Cd, Zn, As, Cu and Fe were affirmed in samples of field bees: 1.452 mg/kg, 0.992 mg/kg, 3.844 mg/kg, 0.965 mg/kg, 1.658 mg/kg and 11.212 mg/kg. In addition, those field bees lived 1.5-3-2 days shorter and had darker fatty tissue.

DIVERSITY INVESTIGATIONS OF INDIGENOUS APIS MELLIFERA CARNICA ECOTYPES IN SERBIA

No 233

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Comparative cytogenetic, morphometric and behavioural investigations of three honeybee ecotypes of Apis mellifera carnica from Serbia were performed. Adult honeybee workers were sampled from 30 different localities in Serbia, allocated in three regions, some 200 km apart, with different climatic, geographic and floristic features. The analysis of variance (ANOVA) for each character in whole speciment revealed statistically highly significant differences ($p<0.001$) in the means of 22 morphometric characters and significant differences ($p<0.01$) in the means of 4 characters. The results of cytogenetic investigations point to a great inter- and intraecotype diversity of G-bands on chromosomes of investigated honeybee ecotypes. The greatest differences in G-band number and distribution were registered in chromosomes 1, 2, 4, 11, 12, 13, 15 and 16. Moreover, differences in exertion of hygienic and grooming behaviors were affirmed within and among investigated ecotypes, with potential of hygienic behaviour ranged from 81.24% to 99.50%, and potential of the grooming behaviour ranged from 20.68% to 42.14%. Considering affirmed cytogenetic,

morphometric and behavioural diversity it can be concluded that analysed indigenous ecotypes A. m. carnica represent a remarkable genetic resource. To preserve such honeybee diversity, conservation of those ecotypes in Serbia is necessary, for example by forming segregated apiaries in their original regions.

THE EFFECT OF QUEEN ABSENCE ON THE PRODUCTIVITY OF HONEYBEE COLONY

No 234

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Introduction: The problem of the effect of queen absence on the honeybee colony productivity was long the aim of the analysis of bee-keeping theorists and practitioners. In the hitherto literature there are divergent opinions that matter. The results of the tests executed in that field confirm the increase in honey production by honeybees in some cases, in the others – its drop. Dzier_on (1859), for instance, claimed that before the main honey flow it is necessary to make an interval in oviposition of breeder queens by removing them from the honeybee colony so as to decrease honey consumption needed for larvae rearing. Also Berlepsch (1869) offered the removal of bee queens in the hive 36 days before the end of main flow. However, Butlerow (1886) and Maurizio (1975) have stated in their studies that the lack of bee queen as well as young unsealed seal brood in the honeybee hive results in a considerable drop of honeybee activity and also restraint in the range of executed functions.
Such large divergences in the evaluation of the above mentioned view to a large extent result from too general treatment of the state of the analysed colony.
It is widely known that in some cases (e.g. during intensive development of a honeybee colony) the bees react to the queen's absence extremely strongly, while at the pre-swarming period the loss of the queen seems not to be noticed by the other honeybees.
As the results of many authors' research concerning this problem are contrary and they do not explain the reasons of such big divergences, there has arisen the need to study honey production dynamics in the colony – from the moment of their orphaning to the appearance of the bees coming from a young bee queen.
Methods: The experiment was carried out on ten Caucasian honeybee colonies. The observations were performed during the whole vegetation season in 2002 –2004 in an apiary near Lublin. During the observations, the volume of honey stock and propolis accumulated in individual hives and also the surface of a brood comb in particular periods of growth were measured. The obtained results were analysed by determining the dynamics of productivity and colony's development according to the state of an orphaned honeybee colony.
Results: The analysis of the obtained results proved that there was a dependence between the collection of food and the inner state of the honeybee colony. In this range confirmed six fundamental stages of honeybee behaviour were observed (comparing with the controls):
From the moment of orphaning the colony to setting up queen cells – in that time the weight of the collected food decreases significantly;
From setting up queen cells to gnawing out of a young bee queen - the productivity of the honeybee colony increases and often reaches the initial value;
From gnawing out of a young bee queen to the start of brooding – the tendency to the decrease in the productivity.
From the beginning of brooding till the moment of gnawing out of young bees – significant increase in the activity in the colony, the number of worker bees, however, drops. In consequence – no increase in productivity.
From the beginning of gnawing out of the bees descended from a young bee queen to their start of work outside a beehive – the bulk of brood increases - further decrease in productivity.
From the beginning of work by honeybees descended from a young bee queen outside the colony – further increase in the intensity of accumulating stock food by the colony
Discussion: The analysis of the results received when carrying out the experiment described above proves that the term 'orphaned colony state' used to date in bee-keeping practice is very general and ambiguous.
The theory of the sense of removing the bee queen from the bee colony prior to the main flow or 36 days before its termination, generally accepted in bee-keeping practice, calls for specifying and verifying, regarding the stage of developmental advancement of the orphaned colony. Thus, according to final conclusions determined on the basis of the analysis of productivity of bee colonies at individual stages of orphaning, it ought to be stated definitely that the above mentioned theories are most correct, on condition, however, that the colony will be deprived of the bee queen at such a date which will ensure that the phases of production prosperity arising at the developmental phases pointed to in the conclusion of the hitherto study will fall on the period of the main flow.
The above analysis shows that a very negative consequence of orphaning a bee colony prior to or at the main flow is the situation when the reaction of apathy in the industry of bees resulting from being orphaned falls at the time of full main flow.
Moreover, the statement of some authors of apiarian scientific studies in the view of above presented research appears not to be fully valid as the phases of the prosperity of bee activity in orphaned colonies do not threaten with lowering the intensity of using the flow by the bees comparing with the colonies not deprived of the bee queen during the whole vegetative season.

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THE AGGRESSIVE PATTERNS OF WORKER HONEYBEES TOWARDS A FOREIGN QUEEN: THEORY AND EXPERIMENT

No 235

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Introduction: When introducing a new queen honeybee in a protective cage, bees often display hostile behaviors on the cage collectively known as balling. Ideally, the number of aggressive bees displaying this behavior often decreases to zero before the queen's release; if not, the queen may be killed.
Methods: Queens in standard introduction cages were introduced with and without attendant bees. The number of balling bees on the cage screen was recorded twice a day. This observational data was compared to a mathematical model of queen introduction that we derived.
Results: Several factors may extend the duration of balling. One factor is the presence of attendant bees accompanying the queen. During queen introduction without attendant bees, the number of balling bees typically exhibits an exponential decay to zero. With attendants if the number of ballers decreases, the decay is usually slower. However, other aggressive and erratic patterns are also observed. With chronic balling the number of ballers never decreases to zero. With a reversion, the number decreases to zero and then dramatically increases, and either subsequently decreases to zero again or never decreases to zero (reversion and chronic balling).
Discussion: To our knowledge, chronic balling has never been previously reported. We interpret this chronic balling as a permanent state of queen rejection. These experimental results suggest a mathematical model whose dependent variable is the number of bees balling the cage over time, along with a parameter describing the intensity of aggression due to attendant bees. The model mimics the experimental data and displays mathematical chaos when the simulated aggression of the recipient colony is high.

EFFECT OF PROPOLIS PRODUCTION ON HONEY YIELD AND POPULATION OF HONEYBEE COLONIES

No 236

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Propolis, a resinous wax-like substance produced by honeybees (Apis mellifera), is well known in recent years, some curable diseases by propolis include bad breath, eczema, eye infections, throat infection, ulcers and urinary tract infections. Propolis is available for purchase as an ingredient in capsule form, lip balm, skin cream, tincture, toothpaste and sore-throat lozenges. Considering the importance of the propolis, four propolis-producing methods were studied between 1999-2000 in the Research Centers of khojir and Alborz. These methods were Net (mesh18), Tarpaulin, Fiber, and Roland bell trap. In these experiments, population of adult bees and broods, the amount of honey and pollen in the hive were uniformed, and also, young queen sisters were introduced to the colonies. This study was conducted for 3.5 months in 1999 and 2.5 months in the year 2000. Amount of propolis was estimated every twice a week, population once per months, and amount of honey at the end of autumn. The Rolland bell produce propolis was significantly lower than the others in October. However, it did not different significantly effect compared to others in December. The maximum amount of harvested propolis, was 51.27g/hive, using the Fiber method. Population density of colonies did not significantly different ($p<\%5$) among the methods in this study. Propolis-producing methods did not indicate undesirable effect on propolis was observed and there was not noticeable difference among honeybees colonies population.
A significantly positive correlation was observed between population and honey yield, and between honey yield and propolis ($p<5\%$). These results indicated that propolis-producing methods might not have undesirable effects on bee population density and honey production.

POLLEN FORAGING LOADS OF APIS CERANA INDICA UNDER DIFFERENT AGROCLIMATIC OF KARNATAKA, INDIA

No 237

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The foraging loads of Apis cerana indica was determined under different agroclimatic ecosystems during 2003-2004. Attempts were made to study the size of the foraging population with reference to the number of foragers gathering pollen, nectar, and both pollen nectar during different hours of the day and different months of the year in different agro-ecosystems.
Pollen gathering activity showed greater fluctuations than the nectar gathering activity. The pollen load carried by A.cerana indica was maximum between 09.00 – 11.00 hrs, however the number of pollen collectors were moderate during evening hours. The mean number of pollen foragers during the study period showed peak

during September, October and second peak again during the months of March, April and May. The minimum numbers of foragers were observed during the months of June, July and August.
Pollen gathering activity steadily increased from March to June. It was observed that, the worker bee carried less quantity of pollen during July and August. The amount of pollen carried progressively increased from August to the end of the season. The daily flight shows precise foraging time of bees in a day. The foraging profile shows that there was a definite ratio among pollen gatherers and nectar gatherers. Many factors like the frequency of trip, pollen collection frequency, foraging time, length of foraging life and size of the foraging loads were also determined in different agroecosystems are discussed.

COLONY PERFORMANCE OF THE INDIAN HONEYBEE, APIS CERANA INDICA UNDER DIFFERENT AGROCLIMATIC REGIONS OF KARNATAKA, INDIA

No 238

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The colony performance and foraging index of Apis cerana indica was determined to find out the efficiency of the bees foraging under different agro-ecosytems during 2003-04. Attempts were made to find out the foraging index in different regions and its relation to honey and pollen production. The brood rearing activity has also been recorded during the study period. The maximum brood rearing activity was between January to March ranging between 30.25 – 37.56 cells/inch2 with a moderate between September – December ranging 21.35 – 31.17 cells/inch2 and the lowest was recorded during April – June with only 14.36 – 19.14 cells/inch2. On an average it was noticed 4-6 brood combs during most of the year and 8 frames during the peak honey flow seasons. The quantities of pollen production, honey yield have been correlated in relation to the foraging behaviour and the brood rearing activity. It was found out that the average honey production per annum was very high in the forest and also in monoculture agriculture ecosystems. Honey production ranged between 8 – 12kgs per annum and pollen production was 150 – 260grams/day during the peak honey flow season. Information was also obtained on the said parameters in migratory apiary sites and non-migratory apiary sites and its economics was also worked out. Further details on the colony with comparative studies on performance in different agro-climatic region and its sustenance have been analysed and discussed.

HISTORY AND APPRECIATION OF HONEY BEE FER COLONIES ON KANGAROO ISLAND SPECIFICALLY FOR A QUEEN BREEDING PROJECT

No 239

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Introduction: In the absence of meaningful production records it is necessary through observation of feral colonies to establish a suitable selection programme fo queen rearing of the Kangaroo Island Ligurian Honey Bee.
Methods: Feral colonies were assessed for balance in fecundity and honey production. All outstanding established colonies (< 1 year history) were used.
- Retained Honey was weighed.
- Queen and Brood pattern assessed
- Evidence of swarming tendency noted
- Uniformity of bees in the colony assessed
- Evidence of Hygiene visually observed
- Temperament

Selected colonies were transferred into Langstroth equipment for further observation, quality testing and a initial programme of queen breeding.
Results:
1. Disparity in Honey Storage
2. Good honey storage correlates with a sound brood pattern
3. Swarming tendency is high in 96% of feral colonies.
4. Colonies of uniform colour and size bees performed well. However, evidence of inbreeding such as deforme bees. And drones with white/red eyes detracted from performance.
5. All selected colonies demonstrated a high standard o hygiene. More specific tests on hygiene will be done.
6. Great variation in temperament.
Discussion: Outstanding and tenacious quality of bees that work in adverse conditions (temperatures between 13 and 43 degrees C and in light rain. High hygiene results in minimal disease on Kangaroo Island.

A STUDY OF COMPARISON OF MUGLA (*APIS MELLIFERA ANATOLICA*), ITALIAN (*APIS MELLIFERA LIGUSTICA*) AND CARNIOLAN (*APIS MELLIFERA CARNICA*) BEE GENOTYPES IN THE HATAY REGION WITH RESPECT TO THEIR BEHAVIOUR CHARACTERISTICS

No 240

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In the present study behavioral characteristics between Mu_la (Apis mellifera anatolica), Italian (Apis mellifera

ligustica) and Carniol (Apis mellifera carnica) bees were compared.
The result of behavioral studies showed that the time period for the first sting to tennis ball was 30.76±0.84, 32.88±0.75 and 23.76±0.76 sec; the number of sting were 2.58±0.14, 2.25±0.10 and 3.64±0.19; the number of swarm cups were found as 6.04±0.73, 9.57±1.23 and 7.16±1.09 per colony; the propolis production for two weeks were as 1.45 ± 0.12, 1.26 ± 0.10 and 2.07 ± 0.28 g per colony; pollen yield were 52.31±3.46, 53.16±4.32 and 42.69±3.07 g per colony for 3 days for Carniolan, Italian and Mu_la bee genotypes respectively.
Mu_la (Apis mellifera anatolica) bees, which showed higher aggressive behavior than those of other two genotypes. It was determined that the tendency of swarm was lower in Carniolan (Apis mellifera carnica) and Mu_la (Apis mellifera anatolica) bees in comparison to Italian (Apis mellifera ligustica) bees while propolis production was high in Mu_la (Apis mellifera anatolica).

Key words: Apis mellifera L, A. m. anatoliaca, A. m. ligustica, A. m. carnica, Physiological characteristics, Behavioural characteristics.

MELIPONINA IN AN OLD INSULAR REGION

No 241

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Meliponina is a pantropical group of eusocial bees, with largely occurrence in Brazilian regions. This group has a great importance on the functioning of this rain forest, yet its natural community have been poorly studied, particularly in islands. This study examines some parts of a bee community structure, pointing out the hypothesis that the studied island follows the similar pattern with others one already studied. For this, these results were also compared with the others surveys on island and mainland communities. The study was carry out in Ilha Grande State Park (23o09'05"S, 44o23'W), an island with 190km2, the average yearly temperature is 22.5oC and rainfall of 2,242mm. Highly Apidae was captured in year round samples, which followed a standardized method, in tropical habitats in different strata. In this reserve 12 stingless species and Africanized honeybee (AHB) were found, the primer being the most abundant flower visitor. In the understory, the relative abundance was expressive comparing with others studies conducted in Brazilian rain forest. Bees visited 105 flowers species, the majority was in the understory and subcanopy, where small-sized bees were more prevalent (56%) than medium to large-sized bees. A strong predominance of Apidae, mainly Meliponina is similar in some mainland habitats, where there are no AHB's apiaries. However, this pattern contrasts with those of Brazilian islands communities, which are characterized by low species richness and abundance of Meliponina. The major presence of aggressive bee species, the limit distance of swarming system used by stingless bees (1,000m from the hive), a poor presence of crossing water gaps to reach the mainland and the incapacity of stingless bees to cross water gaps are evidences that these species were not introduced in this island. Since, in Ilha Grande Meliponina species have been introduced a long time ago, why have its bee richness not been decreased, as occurred in others Brazilian islands. The ecological and history aspects of Ilha Grande are being discussed to reinforce the conservation management of this reserve.

BIOLOGICAL STUDIES ON *MEGACHILE UNIFORMIS* (A) (HYMENOPTERA – MEGACHILIDAE) IN EGYPT

No 242

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The duration of the immature stages of Megachile uniformis (A) was studied at room temperature. The incubation period ranged between 2-4 days with an average of 2.86 ± 0.133 and 2.8 ± 0.223 days in 2001 and 2003, respectively. The larva has 5 instars , the 1st instar larva lasted between 2-4 and 1-4 days with an average of 2.93 ± 0.153 and 2.13 ± 0.274 days , the 2nd instar larva ranged 2-4 and 1-3 days with average 2.6 ± 0.19 and 1.87 ± 0.236 days , the 3rd from 2-4 and 1-3 (average 2.87 ± 0.133 and 2.07 ± 0.118 days) , the 4th took from 2-5 days with an average of 3.87 ± 0.225 and 3 ± 0.239 days , the 5th instar larva lasted from 3-5 and 2-5 days with an average of 3.93 ± 0.206 and 3.4 ± 0.214 days in the two years , respectively. Prepupa took about 8-11 and 7-12 days with an average of 9.87 ± 0.256 and 9.8 ± 0.335 days and the pupal stage took from 21-25 and 18-25 days with an average of 22.6 ± 0.335 and 21.6 ± 0.55 days respectively. Pupa male ranged between 7-21, 8-9 days with average of 14.11 and 8.5 days whereas pupa female lasted 8-21, 8-13 days with average of 13-7 and 10 days respectively. The mean weight of female pupa was 22-22mg, while the mean weight of female pupa was 26.47mg.

REMOVAL OF HONEYBEE EGGS AFTER TREATMENT WITH WATER SOLUTION SPRAYS.

No 243

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Spraying of water solutions is a practice commonly used in apiculture. Solutions such as lactic acid and amitraz

demonstrated acaricide action. Lactic acid and amitraz have been widely applied against Varroa, Tracheal mite and Tropilaelaps. Some other water solution sprays, like diluted aniseed oil, are applied for direct unification of honeybees from different colonies, a practice commonly used in Greek apiculture. Many research results are available for the adverse effects of the above solutions to adult bees and brood, but very few are available concerning effects on eggs.

In order to assess the effect on honeybee eggs when applying the above solutions, two experiments were carried out in September 2003 and August 2004.

Ten colonies of equal populations and brood areas, were divided into five groups of two and received five applications of each of the following treatments: a) spray with 5ml amitraz (Mitac®) solution b) spray with 5ml of lactic acid solution c) spray with 5ml of aniseed oil solution d) spray with 5ml of water e) no treatment (control colonies). Spraying was applied to all frames by hand-operated atomizers every 5 days.

In order to estimate the number of eggs removed after each treatment, 100 eggs were marked by the use of a transparent slide on one side of the frame. After marking the eggs, the marked side which was covered with workers, was sprayed. Four days after treatment empty egg cells were counted.

During the first experiment, removal of eggs (average) was 56.7% for amitraz, 66.8% for lactic acid, 33.8% for aniseed oil, 19% for water and 4.9 % for control. During the second experiment, removal of eggs (average) was 87.7% for amitraz, 89.9% for lactic acid, 34.7% for aniseed oil, 39.2% for water and 6% for control.

The results of the two experiments indicate that all types of water-solution sprays (even water spraying) cause egg removal by worker honeybees. Amitraz and lactic acid caused significantly higher removal in both experiments. Aniseed oil and water also caused significantly higher removal compared to control colonies.

IN SITU HYBRIDIZATION OF ALPHA GLUCOSIDASE IN STINGLESS BEES, SCRAPTOTRIGONA BIPUNCTATA

No 244

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Young (YB) and old (OB) stingless bees, Scraptotrigona bipunctata, were collected according to their behaviours. YB crawls on the floor and cannot fly while OB can fly to forage food. The paraffin sections of head and abdomen of YB and OB were made on glass slides. For probe preparation, a sequence of 120 bp of alpha glucosidase (AG) based on the AG sequence of A. mellifera in GenBank (accession number D79208.1) was synthesized by MALDI TOF MASS. The chosen sequence was linked to T7 promoter (AGTAA TACGA CTCAC TATAG GG) at both ends in order to synthesize sense and antisense probes. Forward and reverse primers were designed from the mentioned AG sequence above. Sense and antisense reactions were performed under the optimal conditions (annealing temperature at 55oC for sense and 50oC for antisense reactions). For sense reaction, the concentration of product is 1.46ug/ul (with the ratio of O.D. 260/280 = 1.74) while for antisense reaction, the concentration of product is 4.14 ug/ul (with the ratio of O.D. 260/280 = 1.71). The obtained PCR product was sequenced and purified. Then, it was labelled by AmpliScribe T7 high yield transcription kit (Epicentre) AS3107 or AS2607. The quantity of DIG RNA was determined by 3 methods, optical density at 260nm and 280nm, formaldehyde gel electrophoresis, and dot blot analysis. Hematoxylin staining of paraffin sections was performed as control. After in situ hybridization, the different patterns of AG expression from head of YB and OB and from abdomen of YB and OB were clearly visible.

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ALPHA GLUCOSIDASE FROM HONEY OF APIS DORSATA

No 245

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It aims to purify alpha glucosidase (AG) from honey of Apis dorsata, one of Thai native honeybees. At the beginning, honey was dialysed against 50 mM Sodium acetate, pH 4.5 at 4oC for 3 days. Then, the dialysed supernatant (DS) was condensed by centriprep YM50 (MW cut off at 50 kDa). The condensed supernatant (CS) was preserved in 0.02% Sodium azide at 4oC. Total protein of DS (0.34 mg/ml) and CS (1.1mg/ml) was determined at O.D.280. Maltose activity of DS (0.03u/ml) and CS (0.1u/ml) was determined by using Glucostat reagent and measured at O.D. 505. Sucrose activity of DS (0.08u/ml) and CS (0.28u/ml) was determined by using Glucostat reagent and measured at O.D. 505. The pNPG activity of DS (0.2u/ml) and CS (0.7u/ml) was determined at O.D.400. Five bands (MW in the range of about 50-70kDa) were visible on SDS PAGE. Only one active band was observed on Native PAGE stained with 4-methylumbelliferyl-alpha-D-glucoside and Coomassie brilliant blue R250. The active band was cut out of Native PAGE and used for N-terminal amino acid sequence. The result showed that the N-terminal sequence was blocked. The active band on Native PAGE was coincided to the approximate 65kDa band on SDS PAGE. This band

was cut out off the SDS PAGE. It is used for tryptic digestion in order to determine the internal amino acid sequence by using MALDI TOF MASS. The amino acid sequence of AGIII from A. cerana japonica was used as a reference sequence. It indicated that the difference of amino acid sequences of AG from both species is significant.
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PHYLOGENY OF ALPHA GLUCOSIDASE OF APIS SPP. AMONG OTHERS

No 246

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Apis cerana and A. florea are one of Thai native honeybees. The cDNA sequences of alpha glucosidase (AG) in both Apis were obtained by reverse transcriptase-PCR (RT-PCR). The primers were designed from the AG sequence of A. mellifera (accession # D79208). The nucleotide and deduced amino acid sequences were aligned by using Genetyx program. The cDNA sequences were aligned and compared to the sequences of maltase 1 in A. mellifera (XM_393379), Drosophila melanogaster CG14934-PA (NM_135678), glucan 1, 6-alpha-glucpsodase putative in Enterococus faecalis (GI: 29343377), sucrose specific enzyme II of the PTS (ScrA) and dextran glucosidase (dexB) genes in Lactobacillus sakei (AF401046), and Culicoides sonorensis clone CsMAL1 maltase (AY603565). The AG cDNA of A. cerana is compared to that cDNA from other organisms. It is partially similar to the alpha-glucosidase in A. mellifera at 82.81% (1,557 bp comparison), to maltase in A. mellifera at 53.44% (1,570 bp comparison), to maltase in Culicoides sonorensis at 48.75% (1,600 bp comparison), to CG in Drosophila melanogaster at 53.66% (1,584 bp comparison), and to Sucrose-specific enzyme II of the proton transport system, PTS (ScrA) in Lactobacillus sakei at 50.82% (1,159 bp comparison). Phylogenetic trees of AG among these organisms were made.
This research was financially supported by Thailand Research Fund, grant # MRG4780007 and RTA4580012 and Center of Excellence in Biodiversity, Faculty of Science, Chulalongkorn University.

BEHAVIOR DIVERSITY OF *APIS FLOREA* AND *APIS ANDRENIFORMIS:* TEMPERATURE CONTROLS BY FANNING AND RAIN PROOFS BEHAVIOR

No 247

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Apis florea and Apis andreniformis construct a single comb in on a twig exposed to sun in summer and rain in rainy seasons. In this study, temperature controls and rain proofs behaviors of A. florea; and A. andreniformis were observed in northern parts of Thailand. When the nest directly exposed to the sunlight, curtain formation bees of A. florea were fanned, deformed and took a short flight to reduce brood temperature. Subsequently, A. andreniformis, fanned but did not deform, formed a tail like structure from the bottom of the nest. During the rainy time, all the curtain formation bees of A. florea came up on the dancing floor and formed an umbrella shaped by spread wings up on wings and formed a roof of waterproof jacket to protect the nest from rain. In case of A. andreniformis, curtain formation bees oriented their heads upwards and rest compactly against the brood cells and spread the wing in_ _-shaped, so that one wing can overlay another wing of curtain formation bees. In both species, the honey cells sizes are double than the brood cells serve as a roof of nest.
This research was financially supported by Thailand Research Fund, grant # RTA4580012.

ATTACHING CELLS IN THE HONEYBEE COMBS

No 248

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Natural honeybee combs are fastened to the upper, sloped or even vertical surface of the nest cavity. In the modern hive frames combs are also joined to the upper, side and lower bars. E Zander (1927) proposed to use terms "top outermost' and "side outermost" cells, but these terms weren't clearly defined. Zander's classification is inapplicable to the cells, which join the comb to any rigid object, inserted into the central part of the comb.
We proposed to use the term "attaching cells" for the cells, which connect the comb with any surface. These cells are distinguished from the others (bees', drones' and transitional cells) by the presence of one plane, formed by the material of surface (usually wood or plastic in modern frames).
We faced the problem of classification of attaching cells for description of new kinds of comb honey (Komissar, 2002), when rigid horizontal or vertical sticks were built into the body of the comb.
Attaching cells are divided into upper, side and lower ones according to the disposition of the surface to which they are joined. The shape of attaching cells can be different depending on the vertical anisotropy of cell disposition in the comb, which results from the angle of 9-14∞ from the base to opening of the cell to prevent honey from running out. The upper attaching cells differ from the lower ones by the relation of height of opening to the height of the bottom: in lower cells it is >1 and in

the upper - <1. In the normal cells side walls are parallel and this value is equal to unity.
Transitional cells unlike attaching ones are disposed usually between the areas of the comb with bee and drone cells or along the line of the lateral fusion of two neighboring tongue-shaped combs, but all planes of transitional cells are always formed from wax.
The study of attaching cells is necessary for improving of the small section frames for the comb honey and frames for the mating micronucs, where the task of minimal quantity of irregular cells exists, as these cells are unfit for the brood rearing and sometimes for storage of honey.

RESIDUES OF COUMAPHOS IN HONEY AND WAX AFTER THE TREATMENT OF BEE HIVES WITH CHECKMITE,

No 249

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CheckMite, is a plastic strip, which is used for the treatment of Varroa infestations in beehives. In the USA it is also used for the treatment of infestations of the Small Hive Beetle.
CheckMite, contains the well established active substance coumaphos. An official Maximum Residue Limit (MRL) of 100 µg/kg in honey was granted by the European Medicines Evaluation Agency.
Two residue studies were conducted in Germany according to the label instructions for Varroa control. One study was conducted in autumn, the other in spring during the honey flow season. The concentrations of coumaphos in all honey samples taken from the honey chambers were significantly below the MRL at all sampling dates. These results were confirmed by studies in the USA, which considered both, Varroa control and Hive Beetle control.
The concentrations of coumaphos in wax samples from the US studies were in the range of 1 - 40mg/kg. In a special study, wax foundations containing coumaphos at a concentration of 5mg/kg were hung into the honey chamber of an untreated hive. The coumaphos residue in honey extracted from the resulting frames was below 10µg/kg.
The validated routine analytical method for monitoring coumaphos residues in honey is presented, which has been accepted by the European Medicines Evaluation Agency.
Based on the approved Maximum Residue Limit of 100µg/kg, the possible intake of coumaphos by the consumer will represent only 13% of that acceptable intake, which has been confirmed to be safe by the European Medicines Evaluation Agency. Considering the residues after use of CheckMite,, the possible intake of coumaphos is even much less.

HONEY-SPECIFIC YEASTS AS PRODUCER OF HIGHE ALCOHOLS

No 250

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Honey is only somewhat susceptible to microbiological spoilage due to its natural composition, nevertheless a very few yeast species will always be able to grow. These yeasts are natural and were detected in honey as well as in nectar and pollen, its raw material. The following species were very often identified in honeys from different countries: Z. rouxii 6701, Candida magnoliae, Schizosaccharomyces. octosporus, Debaryomyces hansenii and Rhodotorula.
These yeast species were first isolated and then accumulated in glucose-bouillon or on diluted wort-Agar by the Institut für Honiganalytik (Bremen) before the solutions were then analysed for obtaining an overview of their metabolism products. Within the scope of these investigations the formation of the so called higher alcohols was also analysed. This was carried out by using the method described in § 35; L 37.00-1 (LMBG). Bouillon solutions und wort-agars were analysed after an accumulation time of 29 days. The higher alcohols were determined in the distillate by means of a double column system with FID detection. The results will be presented.

MORPHOLOGIC FEATURES OF THE TATAR POPULATION OF MIDDLE-RUSSIAN BEES

No 252

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Middle-Russian (Dark European Forest) bees, that differ such qualities as good winter hardiness, resistance to a number of diseases, high egg-laying capacity of queens, consider-able strength of colonies, enabling to use stormy late summer honeyflow effectively, represents a valuable genetic material, which is necessary to protect from cross-breeding in every possible way and use in selection.
For many years the north of Tatarstan republic has been considered as a place of localization of the Tatar population of Middle-Russian breed of honeybees.
The purpose of our work is a study of breed belonging of the bees of Sabinsky, Mamadishsky and Baltasinsky

regions of Tatarstan by generally accepted methods (N.I. Krivtsov et al. 2000). Selection of samples was conducted in August and the first half of September in 2002-2004. A valuation of exterior features of worker-bees of 10% colonies of bees from each apiary was carried out according to the following parameters: proboscis length, length and width of the 3d tergite and cubital index of a wing. Alongside with that they took into ac-count the results of a questionnaire survey of beekeepers and oblique indexes, particularly the colouring of bee chitin involucre, reaction to smoke and character of honey capping.
The results of the study of exterior features showed that on 70% apiaries average pro-boscis bees were revealed (6,15mm – 6,27mm), the indicators of cubital indexes were 61%, and an average width of the 3d tergite was about 5mm. These results along with oblique indica-tors allow us to talk about predominance of Middle-Russian breeds on the experiment apiaries.
The amount of genuine Middle-Russian colonies of bees, localized in the regions of in-vestigation in Tatarstan republic (10000), allowed creating a federal brood factory on this base. Besides, an isolated breeding centre on the island in the water area of Kamsky storage reser-voir was prepared for controlled mating of brood queens and drones.

GENETIC AND MORPHOMETRIC COMPARISON OF HONEYBEE (*APIS MELLIFERA L.*) POPULATIONS OF TURKEY AND IRAN

No 253

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Five honeybee populations of Iran and one population from Turkey are compared with morphometric and mitochondrial DNA analyses. On a total of 250 worker bees 23 morphometric characters were measured. Data were analysed by multivariate statistical methods (PCA and DFA). Five Iranian populations formed four distinct groups and Turkish population (Hakkari) clustered separately from all five Iranian populations. Multigroup discriminant analysis showed that FL, BDG, and d variables have the highest discriminant weight among other characters. We also observed that there is a positive correlation between size and altitude, that is, bees become increasingly larger with increasing altitude which demonstrates the effect of biogeographical conditions on morphological traits of honeybees.
PCR amplification and DraI digestion of the COI-COII intergenic region of mitochondrial DNA showed no variation, all of them had exhibited the same C1 pattern. All the samples studied were A.m.meda.

CONSERVATION AND SELECTION OF APIS MELLIFERA CAUCASICA IN MACAHEL (ARTVIN-TURKEY)

No 255

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The Caucasus honeybee (Apis mellifera caucasica) is one of the five honeybee races in Turkey, being distributed in North-east of Turkey bordering to Georgia. This honeybee subspecies is one of the most sought after honeybee subspecies in the world because of its high productivity and imported into different parts of the world, especially into the regions with colder climates. Genetic and morphopmetric investigations were conducted on subspecies of Turkey using different techniques such as morphometry, allozymes, mtDNA and microsatellites. Therefore it is possible to distinguish A. m. caucasica from the other subspecies.
Conservation efforts on one of the ecotypes of Apis m. caucasica were started earlier at the village of Camili, an isolated place by preventing honey bee movements into the area from other regions. The results of our studies showed that the local honeybee population in that region kept its original genetic and phenotypic structure as there were no migrant beekeepers visiting the area. The second step was initiated after preliminary research and the queen production was started. After surveying the local beekeepers, the best colonies were determined to serve as breeding colonies during queen production. Local area beekeepers were educated as part of the rural development project and several beekeepers produced queen bees to be distributed in areas where A. m. caucasica introduction is appropriate. The last step, which is in progress, is the further selection of a better A. m. caucasica breeds for high yield of honey, hygienic behavior, aggressiveness and disease resistance.

DISCRIMINATION OF APIS MELLIFERA SUBSPECIES USING GEOMETRIC MORPHOMETRY

No 256

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The identification of Apis mellifera subspecies is normally based in morphological characters and the qualitative difference are restricted mainly to the rank of Apis species. Up to now, the DNA analysis is the only method that is able to clarify both, species and subspecies. However the usage of multivariate morphometrics has improved and facilitated the discrimination of these subspecies. In this work we tested the modern

techniques of geometric morphometry based in relative warps in a sample of 3 Apis mellifera subspecies, Apis mellifera carnica, Apis mellifera ligustica and Africanized honey bees with 30 individual each sample. The three groups separated very well and all the individuals were correctly classified in their respective groups. From the 90 individuals, 87 were classified with a P = 1.00 and the other three were classified with a P > 0.99. The Mahalanobis square distance between groups are 147.5 for Africanized honey bees and Apis mellifera carnica, 57.5 between Africanized honey bees and Apis mellifera ligustica, and 70.2 between Apis mellifera ligustica and Apis mellifera carnica. The relative warps technique does not consume a large time, and is a very powerful tool to discriminate these subspecies.

THE THREE OCELLI AS A POWERFUL NAVIGATION AID

No 257

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The three ocelli on the heads of bees are also found on the heads of a wide range of other insects (e.g. dragon-flies, locusts). They evolved over 200 million years ago from a two ocelli form. They must have some important function, still not understood, that cannot be provided adequately by a single ocellus.
The lens of each ocellus does not form an image, but it collects a quantity of polarized light, mainly ultra-violet light, from a whole region of the sky. This is focused well below the rhabdoms that sense the light in the retina and thus the light is spread over a large number of rhabdoms. By averaging, this would enable the intensity of the polarized light to be measured more accurately than it would be possible with light focused on a single rhabdom.
In this paper it is shown for the first time that three accurate intensities of polarized light from the three ocelli can be used to find the exact orientation and elevation of the sun after first finding the direction and degree of polarization of the light. The light can come from any single region of sky. Two ocelli would not be sufficient (except if overhead). A condition is that the three axes of polarization of the three ocelli must be different from one another, optimally inclined at right angles to one another to produce the most accurate directions.
These three axes are determined by microvilli that sense the polarized light within the rhabdoms. It follows that the corresponding rhabdoms and the structures containing the rhabdoms of the 3 ocelli should be at right angles to each other. To facilitate the neural processing the nerves need to come together below these structures. So the three structures should converge to form an upside-down tetrahedron, with the three lenses forming a triangle on the surface. There is evidence in the literature and in particular in a recent NMR study that this is indeed the structure below the three ocelli.
All of this suggests strongly that the 3 ocelli are a simple but powerful navigation aid, based on 3 measurements of polarized light from any region of sky.

MORPHOMETRIC ANALYSIS IN *APIS MELLIFERA* IN DIFFERENT AREAS OF ARGENTINA

No 258

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Honeybees (Apis mellifera L) have evolved in different environments and have developed different ecotypes. The MeGA (Argentina Honey Bee genetic Program) has selected honeybees adapted to different areas using a large number of colonies as base population. Morphometric analyses have been included as a tool to characterize genetic materials that are being selected. The objective of this work was to study if it was possible to use this technique to detect differences between honeybees from four areas in Argentina and to choose the variables that could be used for better discrimination. Thirty morphological variables were analyzed in honeybees from colonies in four different areas in Argentina. The Image-Pro was used for morphometric measures and statistic multivariate techniques were used for analysis. R analyses were used. Some variables allowed to discriminate honeybees from different areas and it was possible to detect similarities between two of these regions. Morphometic analyses allowed to detect differences between ecotypes and could be associated with behavioural differences.

MOLECULAR IDENTIFICATION OF THE SPERMATOZOA IN SPERMATHECAE OF *APIS CERANA* FAB. QUEENS NATURALLY MATED IN AN *A. MELLIFERA L.* APIARY

No 259

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Four virgin queens of Apis cerana colonies that emerged in September successfully mated and laid eggs in the apiary of Apis mellifera in Suwon, South Korea. There were plenty of A. mellifera drones and only a few A. cerana drones. The eggs from two mated queens, which were proved to have mated only with A. cerana drones, developed into normal A. cerana workers. The rest two queens laid the abnormal eggs, which were unhatched and removed by worker bees or hatched and developed into drone bees. The spermatozoa in the spermathecae of two groups of queen were identified by several polymorphic DNA profiles and mitochondrial CO1

sequences of ten amplified DNA strands per queen. The spermatozoa from abnormal egg-laying A. cerana queens were composed entirely of A. mellifera drones. We collected another twelve queens of A. cerana in Chungju where two Apis species distributed sympatrically. All spermatozoa from these A. cerana queens were identified as A. cerana. It was concluded that A. cerana queens from a few colonies reared in circumstances with high population of A. mellifera could encounter interspecific mating without any mingle of conspecific drones.

THE EVALUATION OF TURKISH HONEYBEE POPULATIONS BY USING MITOCHONDRIAL DNA PCR–RFLP MARKERS.

No 260

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Apis mellifera is composed of three evolutionary branches: branch A for African subspecies (intermissa, monticola, scutellata); branch M for western and northern European populations (mellifera subspecies) and branch C for Eastern European and Mediterranean subspecies (caucasica, carnica, ligustica). Honeybees were collected from 18 different localities in Turkey. Totally 194 worker honeybees were analyzed. The mitochondrial genomes of these honeybees were surveyed for the presence or absence of four restriction sites that differentiate three lineages of honeybee mitochondrial DNA. These restriction sites are cytochrome oxidase b (cytb), large ribosomal subunit (lsRNA), 3' end cytochrome oxidase I to 5' end cytochrome oxidase II (COI-COII), 5' end cytochrome oxidase I (COI). Based on these diagnostic sites, Turkish honeybees belong to Mediterranean lineage.

DISTRIBUTION OF HONEYBEE FORAGERS ON NECTAR PATCHES: A COMPUTER-SIMULATION STUDY

No 261

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Honeybee colonies have to be efficient in collecting nectar. In a stable environment a good strategy is to recruit massively on the best of all known nectar sources. In a fluctuating environment, that is an environment that contains nectar sources that change in quality over time, a colony has to adapt its strategy: It has to allocate its foragers among all known nectar sources, without neglecting even the poorest one, because a poor nectar source can suddenly change into a good (profitable) one. We used a multi-agent computer-simulation of a foraging honeybee colony to investigate which strategy emerges from the recruitment behaviour of individual bees as it is described in literature: The higher the net energetic efficiency of a nectar source is (that is the more energy can be gained per invested units of energy), the longer a foraging bee advertises this source via (waggle) dancing. Similar to the behaviour of real bees in nature, the agents in our simulation assess the source profitability individually and modulate their advertising behaviour accordingly to it. The ultimate result of thousands of these proximate behaviours in parallel is the collective foraging strategy of the colony: the allocation pattern of foragers among all nectar sources. In our simulation experiments we confronted the simulated honeybee colony to different kinds of environmental fluctuations. All simulation scenarios started with two equidistant nectar sources, one offering a high sugar concentration and one offering a poor sugar concentration. In all runs, the good nectar source worsened and the poor source improved in quality, so that at the end of the simulated period (8h) the two nectar sources switched their initial qualities. The duration of the transitional period was varied within the simulation runs between 36sec. and 8h. We found that in all simulation runs (independent from the dynamics of the environmental fluctuation) the colony was able to adapt its foraging strategy according to the changes in the environment. It showed that rapid fluctuations (in contrast to the slower ones) lead to a small improvement of the colony's net honey gain, suggesting that the adaptation process itself provides energetic costs for bees.

CHOOSING QUEEN REARING METHODS SUITED TO SMALL SCALE BEEKEEPING IN VIETNAM

No 262

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Traditional Apis cerana beekeeping has been practiced for long time in the mountainous and highland villages of Vietnam. However, most beekeepers were not able to keep their colonies in sustainable development because they lacked basic knowledge and experiences in management techniques of bee colonies, especially in queen rearing techniques.
During two last decades, through more than 30 beekeeping development projects for the ethnic minorities and poor farmers in Vietnam, we introduced four queen rearing methods to the beekeepers to find the methods corresponding to the beekeeping conditions in these areas: Using natural queen cells from colonies having tendency to swarm, emergency queen rearing, Jensen method of queen rearing and queen production on a large scale by grafting techniques. Practical results showed that three former methods could suit to the beekeepers keeping bee colonies in small scales with poor management techniques of bee colonies. The

beekeepers in mountainous and highland areas of Vietnam adapted easily and effectively practiced these methods in their beekeeping. Last method should only be applied with beekeepers operating large scale beekeeping with more advanced beekeeping techniques.

Key words: Small scale, minorities, swarm, emergency queen rearing, Vietnam

DISTRIBUCIÓN CLIMATICA Y CORRELACION CON EL SISTEMA APICOLA COLOMBIANO

No 263

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Colombia es el cuarto país en extensión en Suramérica, después de Brasil, Argentina y Venezuela, su posición geográfica al norte del continente en plena zona tropical hacen del que el país sea atractivo para el desarrollo intensivo de las explotaciones apícolas, posee una superficie de 2'070.408 Km2, de los cuales 1'141.748 Km2 son tierras emergidas. Las condiciones climáticas del país lo enmarcan dentro del sistema tropical e influenciado por un sistema de cadenas montañosas provenientes del sur del continente, generando tres orogenias diferentes y separadas una de otra por los valles longitudinales de los Ríos Magdalena y Cauca, Las condiciones de sabana del Caribe, la Orinoquía y la selva de la Amazonía y el entorno en el océano Pacífico, hacen del territorio nacional uno de los países de más alta biodiversidad del mundo. La circulación atmosférica es dependiente del sistema de confluencia intertropical (ITCZ), donde confluyen masas de aire de los trópicos ejerciendo condiciones especiales de humedad relativa, presión y temperatura en distintas zonas de vida a lo largo y ancho del país, al igual que para el departamento del Tolima. Conforme a los pisos altitudinales se suele usar el criterio de las cotas convencionales, que marcan diferencias ecoclimáticas importantes entre la unidad andina mayor de 1000 m.s.n.m. y la basal de 0 a 1000 m.s.n.m, esto indica que el país cuenta por lo menos 10 clase de coberturas principales atendiendo a su extensión superficial, de las cuales en orden de magnitud se mencionan: Selvas y bosques, agroecosistemas, sabanas, pantanos, xerofitia, áreas de páramo, cobertura rupícola, manglares, cobertura hídrica y asentamientos humanos. Para el departamento, las cotas van de 0 a 3000 m.s.n.m. En contexto anterior el grupo de Mellitopalinología de la Universidad del Tolima se ha propuesto evaluar la producción de miel en cinco zonas biogeográficas del departamento del Tolima, considerando los parámetros climáticos de brillo solar, humedad relativa, precipitación y temperatura, estimando en cada caso la evapotranspiración potencial. En este trabajo se presentan los resultados asociados al sistema apícola productivo desde el punto de vista climático. Se analizan los factores climáticos medios, relacionados con la precipitación, evapotraspiración, temperatura, humedad relativa y brillo solar, a partir de los datos de 10 años y en cinco zonas biogeográficas: bosque húmedo y seco tropical, bosque húmedo, muy húmedo premontano y muy húmedo montano bajo (bh-PM; bmh-PM; bmh-MB) en el departamento del Tolima. El régimen pluvial mas alto correspondió a la zona de bmh-PM con topes de 516 mm; las condiciones de evapotranspiración favorecen a la zona de bmh-MB, la producción apícola en función de las cosechas de miel en Kg/colmena año son mayores en la zona de bh-PM con 28.7, seguida de bh-T con 28.1, mayor que bmh-PM (27.2), mayor que bmh-MB (26.5), siendo la más baja la de bs-T (20-22)Kg/colmena-año.

QUALITY CONTROL OF BEEKEEPING PRODUCTS IN THE RUSSIAN FEDERATION

No 264

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Quality control of beekeeping products corresponds to the operating state standards of the Russian Federation (all-Union State Standards). 360 honey samples, 42 wax samples, 270 propolis samples, 87 pollen load samples were analyzed according to organoleptic, microbiological and physicochemical indices over the period of 2000-2004.
Moreover honey conductivity, veterinary drugs and pesticides residues in honey, chromatography-mass spectrometry analyse of propolis and its' plant sources, antibacterial activity of propolis were examined.
Presented information reflects key problems of apiproducts quality control in the Russian Federation and the Commonwealth of Independent States.

IMPROVING THE IMPACT OF FOREIGN VOLUNTEER EXPERTS TO THE BEEKEEPING EFFORTS OF BEEKEEPERS THROUGH LOCAL NON GOVERNMENTAL ORGANIZATIONS IN BANGLADESH

No 265

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Educating beekeepers as a limited time foreign honeybee volunteer expert has partial successes. Local trainers do not have usable educational materials and a poor understanding of up to date beekeeping practices to train others after the expert has left the host organization and country.
Two new projects have been started in Bangladesh. The first is to spend more time training local NGO reps as

field extension agents by providing them with necessary skills and usable educational materials to work with the local beekeepers.
In this program training and testing of these field extension agents to improve their knowledge has been initiated to insure that agents can handle issues that confront beekeepers long after a foreign bee volunteer has left.
The second project is to eliminate the lack of technical educational materials in the local languages or technology transference. An effort in translating technical educational materials has been started on a limited scale with funds for printing currently being provided by a local business that has ties in the beekeeping industry.
Conversion of educational materials into the host country's languages and the intensive training of local agents has more impact and longer lasting results for the foreign aid donations currently given to the host country

A FIELD SURVEY OF HONEY QUALITY AND HONEYBEE DISEASES IN CHILE

No 266

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Since 2004 a survey has been initiated in several Chilean apiaries in order to ensure honey quality produced by small beekeepers associated to a national network. The first step involved the determination of honey color and humidity. Additionally, the incidence of varroosis, acaropisosis and nosemosis in honeybee colonies was studied.
Honey samples were collected between summer and early autumn of 2004, from 116 apiaries randomly selected from eight districts distributed from north to south. From the same apiaries and hives, adult honeybee samples were taken from the brood chamber between autumn and early winter of the same year. A spectrophotometer was used to determine color and humidity of honey samples. For the analysis of adult bees, the methods used in order to determine presence or absence of the diseases were based on those recommended for a large amount of samples; for varroosis the infestation level was also calculated as a reference.
Six of the seven Pfund scale colors were recognized on the analyzed honey with the following order of predomination: light amber, amber, white, extra light amber, dark amber and extra white. Most of these honey samples had fewer than 18% of humidity. Almost all the analyzed honeybee samples presented varroosis with infestation levels that were critically high in some cases while acaropisosis and nosemosis were detected only in a small amount of these samples.
Until 2007 further parameters, as residue levels in honey and apicultural practices will be associated with the results already obtained, as well as additional sampling will be done each year in order to achieve a complete vision of local beekeeping.

IMPROVEMENT OF COLLECTING HONEY FROM APIS DORSATA AT RIAU PROVINCE INDONESIA

No 267

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Apis dorsata is still the main producer of honey in Indonesia. Because of its aggressiveness, honey harvesting usually is done at moonless night and the entire comb is cut. The comb is squeezed to extract honey which make honey is mixed with debris such as wax, pollen, brood etc. This condition makes honey easily adulterated and more over the water content of honey is very high (>26%).
Since seven years ago in the district of Rokan Hulu and Kuantan Sengigi, Riau Province, with proper protection and simple equipment, the honey collectors have been collecting honey during the day. This technique makes easier for the honey collectors to take only the portion of the comb that content honey. This method also makes safer for the honey collectors and more over honey can be harvested seven to eight times a year.

BEEKEEPING FOR RURAL MICRO INDUSTRIES.

No 268

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Apart from producing honey, bees are known for producing other products that are useful for mankind use. Like beeswax, propolis etc.Unfortunately the usefulness of these products are less known in the rural areas where beekeeping is a potential activity for income generating.
in the paper we see how it is posible to start a small scale creame/jellies producing industries using beewaxes ,propolis mixed with vegetable oils and other natural herbs with all the benifits that goes with all this. This products is natural and having medicinal value and friendly to the environment and skin

HONEY AS A MARKETING STRATEGY ON UNA SANA CANTON

No 269

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Una Sana Canton is located in the north-western part of Bosnia in an area of moderate climate with relatively strong winters and warm summers. The medium January temperatures are below 10oC and medium July temperatures are between 18,7oC and 22,7oC
The total area of Canton is 4.837km2, out of which 47,9 % is covered with forest, 40,58 % ploughed fields, pasture and orchards. There are 358,000 inhabitants and over 40 % is depending of agriculture. Native flora is seen by the beekeeper as a positive advantage it can provide the richest honey. The representative species Apis carnica produce 5 kind of honey in a value of 100t/year. Technology of producing is very traditional. This study was conducted to determine the quality of honey, weaknesses of production and to design a plan of action for sustainable beekeeping and income. The biggest problem is with health of bees, chemical using, there is no low and organisation for management and honey production strategy planning.

Key words: beekeeping, Apis carnica, the quality of honey

L'APICULTURE EN AFGHANISTAN

No 270

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L'Afghanistan est un état de l'Asie occidentale situe' entre le Pakistan au sud,l' Iran a'l' Ouest,le Turkménistan,l'Ouzbénistan et le Tadjikistan au nord et la Chine a'l'est.Ce pays couvre 650.000km2 pour une population de 20.000.000 habitants parlant le pachto ou le persan.capitale:Kabul.
L'Afghanistan est trés montagneux ,surtout dans sa partie nord avec notamment l'Hindu Kuch et le paropamisus .Le climat est sec (moins de 250mm de pluie par an). Il existe cependant quelques vallées telles que l'Amou-Daria au nord ou Hilmand au sud.Au pied des reliefs, relativement arrosés,se sont développés des cultures céréalières et un élevage nomade de moutons, l'une des principales ressources du pays qui a donné naissance a une industrie textile importante.Jusqu'en 1965, l'apiculture Afghane était essentiellement de forme traditionnelle avec l'exploitation contribution de la F.A.O., des colonies d'Apis Mellifera ainsi que du matériel 'apicole ont été importés d'Europe, afin d'assurer le développement d'une apiculture moderne.

La race d'abeille et le genre Apis en Afghanistan
Les quatre espèces d'abeilles ,les plus connues ,Apis dorsata, Apis.florea, Apis cerana et Apis. mellifera ,sont présentes en Afghanistan,les trois premieres y sont d'origine et se rencontrent a'l' état sauvage , en plein air, dans les arbres ou dans les creux de rocher suivant le mode de nidification de chacune .Apis.cerana fait essentiellement l'objet d'une apiculture paysanne, dans des ruchers sédentaires de ruches traditionnelles .Avec cette Abeille,il n'est guère possible de faire plus 6 à 7 kg de miel par ruche et par année. Depuis les années 2000, l'exploitation de ruches à commencé é à se développer. De nos jours, la plupart des apiculteurs professionnels contruisent eux-mêmes leurs ruches à cadres, Généralement de type langstroth avec des cadres de 48,5 x 22cm.et les peuplent avec de l'Apis.mellifera. Ces ruches sont aptes à produire entre 15 et 20 kg de miel chacune.
En Afghanistan,le prix du miel est extrêmement élevé.En effet, au détail, le miel se vend couramment entre 6 et 10$ lekg .Une ruche peuplée se négocie entre 150 au 200$, une ruche vide 50$

Les ruches
A defaut de recensement , il n'est guère possible de déterminer avec précision le nombre de ruches existant en Afghanistan.On estime simplement qu'il y en aurait environ 30.000 à 40.000. Celles-ci se trouvent concentrées dans les régions mellifères favorables à l'Apiculture; Ailleurs il n'ya pas de ruche. Outre les ruches à cadres,construites et gérées par des apiculteurs professionnels,comme nous l'avons vu plus haut, les ruches traditionnelles paysannes sont réalisées en poterie,en argile,en tronc d'arbre ou en vannerie (branches de saules)suivant les materiaux leur disposition.

Maladies et parasites des abeilles
Bien que les maladies, parasites ou ennemis des abeilles soient nombreaux, le pays ne dispose pas d'organisation sanitaire ni de laboratoire spécialisé permettant d'organiser une lutte efficace contre les maladies et parasites des abeilles. Les vétérinaires, quand à eux, sont pratiquement ignorants de l'apiculture. Au cours de mes investigation, j'ai pu cependant diagnostiquer les maladies suivantes :
-Maladies du couvain: loque européenne, loque américaine,sacbrood , mycoses diverses.
-Maladies des abeilles adultes:nosemose, dysenteries et viroses diverses.
-Parasitoses: notamment dues àTropilalaps clarea et à varroa destructor.
Bien que la plupart des apiculteurs Afghans affirment qu'il n'y a pas de varroa destructor en Afghanistan, nous sommes d'un avis contraire, avis qui est partagé par la plupart des chercheurs qui ont étudié ce problème et qui sont depuis longtemps persuadés de sa présence. Par ailleurs, les colonies d'abeilles sont confrontées àdivers ennemis tels que les parasites des rayons (Galleria mellonella L.(grande teigne),ou Achroia grisella

Fab.(petite teigne), la mite des étoffes, des acariens du pollen (Tyroglyphus,Glyciphagus) ou encore des guêpes, des triongulins, des fournis, des araignées, diverses espèces de dyptères ou de coléoptères, des oiseaux, des rongeurs (souris ou rats) qui contribuent tous,plus ou moins,à réduire le rendement et donc la rentabilité du cheptel apicole du pays.

Technologie apicole

En Afghanistan, les techniques utilisées en apiculture reste plutôt traditionnelles. Il existe cependant des apiculteurs qui ont su se moderniser, notamment aux niveau des ruches mais il ya par ailleurs trés peu de progrès. Sides apiculteurs Afghans possèdent des ruches à cadres, ils ne savent pas, la plupart du temps, les exploiter correctement. La technologie du miel est pratiquement inexistante. De ce fait, les apiculteurs produisent un miel de mauvaise qualité. Sa présentation commerciale est défectueuse car l'apiculteur manque la plupart du temps de matériel moderne dans sa miellerie. La qualité du cheptel laisse également beaucoup à désirer car rien de valable n'est fait dans le domaine de la sélection et de l'élevage des reines.

Conclusion

Depuis plus de deux décennies, les Afghans vivent dans un état de guerre permanent. Pour des raisons d'ordre politique, ce peuple demeure sous-développé et les paysans, faute d'être en mesure de développer leurs activités traditionnelles, se réfugient dans la culture de l'opium. Il serait donc nécessaire que ce pays soit aider pour lui permettre de s'en sortir.

Le développement et la modernisation de l'apiculture pourraient contribuer à l'apport économique dont les Afghans ont tant besoin. Au cours de mes visites dans ce pays, j'ai pu constater l'existence d'un trés grand potentiel économique en matiére d'apiculture .Par l'Application d'un plan rationnel de développement étalé sur cinq ans, on pourrait obtenir facilement la création d'emplois pour au moins 10.000 personnes avec 1.000.000 ruches à mettre en place. Ceci serait facile à réaliser si l'on tient compte du climat et de l'énorme potentiel apicole de ce pays. Malheureusement, l' apiculture est une science qui est actuellement complètement négligée. Il manque d'ouvrages et de formation organisésur le sujet; les apiculteurs Afghans sont encore totalement ignorants des méthodes apicoles de production intensive!

Dansun pays où l'arboriculture fruitière occupe une place importante, il serait indispensable d'enseigner et de développer tout ce qui touch à la pollinisation des vergers pour en accroître et en améliorer les rendements. Ceci est vraiment fondamental pour ce pays.

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Summery

L'Apiculture en Afghanistan
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L'Afghanistan est un état de l'Asie occidentale situe' entre le Pakistan au sud l' Iran a'l'Ouest, le Turkménistan, l'Ouzbénistan et le Tadjikistan au nord et la Chine a'l'est. Ce pays couvre 650.000km2 pour une population de 20.000.000 habitants parlant le pachto ou le persan capitale: Kabul. Jusqu'en 1965, l'apiculture Afghane était essentiellement de forme traditionnelle avec l'exploitation contribution de la F.A.O., des colonies d'Apis Mellifera ainsi que du matériel 'apicole ont été importés d'Europe, afin d'assurer le développement d'une apiculture moderne.

Les quatre espèces d'abeilles, les plus connues, Apis dorsata ,Apis.florae ,Apis cerana et Apis mellifera, sont présentes en Afghanistan, les trois premieres y sont d'origine et se rencontrent a'l'état sauvage ,en plein air, dans les arbres où dans les creux de rocher suivant le mode de nidification de chacune. Apis.cerana fait essentiellement l'objet d'une apiculture paysanne, dans des ruchers sédentaires de ruches traditionnelles. Avec cette Abeille, il n'est guère possible de faire plus 6 à 7kg de miel par ruche et par année. Depuis les années 2000, l'exploitation de ruches à commencé é à se développer. De nos jours, la plupart des apiculteurs professionnels contruisent eux-mêmes leurs ruches à cadres, Généralement de type langstroth avec des cadres de 48,5 x 22cm.et les peuplent avec de l'Apis.mellifera. Ces ruches sont aptes à produire entre 15 et 20kg de miel chacune. A defaut de recensement, il n'est guère possible de déterminer avec précision le nombre de ruches existant en Afghanistan. On estime simplement qu'il y en aurait environ 40.000. Les ruches traditionnelles sont réalisées en poterie, en argile, en tronc d'arbre ou en vannerie (branches de saules) suivant les materiaux leur disposition.

Depuis plus de deux décennies, les Afghans vivent dans un état de guerre permanent. Pour des raisons d'ordre politique, ce peuple demeure sous-développé et les paysans, faute d'être en mesure de développer leurs activités traditionnelles, se réfugient dans la culture de l'opium. Il serait donc nécessaire que ce pays soit aider pour lui permettre de s'en sortir.

Le développement et la modernisation de l'apiculture pourraient contribuer à l'apport économique dont les Afghans ont tant besoin. Au cours de mes visites dans ce pays, j'ai pu constater l'existence d'un trés grand potentiel économique en matiére d'apiculture .Par l'Application d'un plan rationnel de développement étalé sur cinq ans, on pourrait obtenir facilement la création

d'emplois pour au moins 10.000 personnes avec 1.000.000 ruches à mettre en place. Ceci serait facile à réaliser si l'on tient compte du climat et de l'énorme potentiel apicole de ce pays. Malheureusement, l'apiculture est une science qui est actuellement complètement négligée. Il manque d'ouvrages et de formation organisésur le sujet; les apiculteurs Afghans sont encore totalement ignorants des méthodes apicoles de production intensive!

LOS COLMENEROS. HISTORIA Y TRADICIÓN DE LA APICULTURA EN TENERIFE

No 271

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El trabajo describe la evolución de la apicultura insular desde la conquista europea a finales del siglo XV hasta la actualidad. Asimismo, se describe el conjunto de manifestaciones etnográficas de la apicultura tradicional (fijista), mantenida en claro retroceso hasta los últimos tiempos. Para el estudio de la evolución histórica se han consultado las actas capitulares transcritas durante la primera mitad del siglo XVI, en las que se contiene abundante información sobre la producción y las regulaciones mercantiles de la miel y la cera, distancia entre colmenares, etc. Igualmente, en los protocolos notariales se ha encontrado una notable información sobre los contratos de compraventa y arrendamientos de colmenares y de compraventa de miel y cera. También se han consultado las crónicas de la conquista, literatura de viajes, historias regionales, etc. y estadísticas (siglos XVIII-XX). Se analiza la producción y comercialización de miel y cera, los conflictos entre viñas y colmenas, los usos de la miel y la cera, diezmos, ilustrados y apicultura, etc. El declive de la apicultura durante el siglo XIX y su modernización durante la segunda mitad del siglo XX también son estudiados. El estudio etnográfico comprende, igualmente, la descripción de aspectos como el oficio de la colmenería, el espacio geográfico (asientos, vegetación, etc.), la trashumancia, la utilización de las colmenas tradicionales de corchos y la producción de miel y cera. También se incluye un capítulo sobre la apicultura en el folklore (cantares, décimas, romances, dichos, refranes, adivinanzas, toponimia, etc.), así como un léxico de los colmeneros tinerfeños y un calendario apícola. Este trabajo de investigación constituye el primer estudio exhaustivo sobre la historia y la etnografía de la apicultura insular. Permite valorar la relación de la apicultura insular con la apicultura de la Península Ibérica, la importancia de la producción de miel y cera durante el Antiguo Régimen y apunta la posibilidad de que la apicultura insular pudiera haber desempeñado algún papel en el origen de la apicultura americana. Finalmente, pone de manifiesto el alto valor de las manifestaciones apícolas tradicionales que aún se conservan en la isla.

COMPARISON OF EUROPEAN HONEYS TO TROPICAL HONEYS -- EFFECTS OF YEAST CELL NUMBERS ON THE CONCENTRATION OF ESPECIALLY SELECTED COMPONENTS

No 272

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Theoretically, honey is only somewhat susceptible to microbiological spoilage due to its natural composition. But a special problem with honey is created by yeasts. These are natural components of honey but may lead to a sensory change in the product caused by the metabolic activity of yeasts. European honey is only rarely affected by this due to climatic conditions. Highly endangered, however, is honey from regions with a tropical climate. Russmann proposed limiting the number of yeast cells (50.000/g) and the content of glycerine (300 mg/kg). But Beckh and Lüllmann (1999) reported that limiting the values cannot be given without characterizing the yeast species.
From our investigations – we analysed a number of European and tropical honeys – it is more suitable to speak of fermentation by relying on parameters like the sum of selected free fatty acids or the sum of their fatty acid ethyl esters. The latter could only be identified in honeys with a higher ethanol content, their occurrence already having been described in association to yeasts (Wagner and Rapp, 1998; Timmroth and Speer, 2003).

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PROPOSED BEEKEEPING DEVELOPMENT PLAN FOR ANGOLA

No 273

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Angola was once described as one the food baskets of Africa. More than three decades of war have left the country with very limited training and skills, poor infrastructure, unemployment and communities that are getting poorer. The country is now on the brink of a new democracy but to rebuild economic activity is not going to be that easy but one has to start somewhere.
It is internationally accepted that the most efficient way to restart economic activity is by means of establishing viable and sustainable rural agricultural enterprises through community driven programmes. The success of this intervention is based on the large number of unemployed people becoming participants and owners of their own programmes. Infrastructural development follows and basic life skills are taught, followed by higher levels of formal training and education. Many international agencies, including the World Bank and the United Nations Food and Agricultural Organisation in particular, recognise community based beekeeping programmes to be of vital importance in rebuilding and kick-starting economic activity.
Beekeeping is for all as young and old, male and female can practice it. The proposed programme will be targeted at ex soldiers as the main beneficiaries and recognising their role in rebuilding economic activity. Various beekeeping projects were also successful in creating job opportunities and income for the physically handicapped. This aspect will receive special attention from the project facilitators as Angola is listed as being the country suffering the most as a result of landmines.

HONEY MARKETING AND SALES METHODS USED IN A DEVELOPMENT PROJECT IN MALAWI

No 274

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The paper outlines the problems facing beekeepers in the Nkhata Bay area of Northern Malawi and some methods used to ameliorate them. The problems were determined using rapid rural appraisal techniques among village beekeeping groups and included limited access to reliable markets. The unpredictability of the market impacted on honey prices leaving beekeepers susceptible to glutted markets and disinclined to invest in improvements. Trading from a position of weakness left producers vulnerable to opportunistic travelling traders. Enabling isolated rural producers to move honey to city markets was key to the project.
Seed corn funding was used to support a newly established grass roots beekeepers organisation. Support was given to ensure a democratic and participatory organisational infrastructure to help beekeepers address their problems. The project is designed so that it can be financial viable after donor withdrawal. Sustainability includes training and capacity building for key project personal. An examination system has been developed with the support of the British Beekeepers Association (BBKA) to help trainers disseminate consistent beekeeping practise. Profitable sales of good quality honey provide a predictable price for producers, finance organisational costs and fund training and other benefits to beekeeper members. Examples of the way a large producer organisation has benefited village beekeepers are described.
Producers have linked to the market in a variety of ways notably developing business planning, a group built processing facility and seed corn donor funding to purchase honey for retailing. The presentation describes successful market testing methods and looks at the difficulties encountered including accessing export markets. Issues of product branding and different market perceptions of product and practical problems arising from selling honey onto the retail market especially honey quality and honey labelling are discussed.

AS SWEET AS HONEY: APICULTURE AND POVERTY ALLEVIATION IN CAMEROON

No 275

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Cameroon located in the Guinea-Congolian tropical rainforest region of Sub-Saharan Africa (SSA). Amongst her floristic regions of high biodiversity conservation value is the Cameroon highlands, a global biodiversity hotspot. The Cameroon highlands support a high human population density, due to its fertile volcanic soils. It has experienced habitat loss due to farming which has led to decimation of its wildlife population, which includes the endangered African Elephant (Loxodonta cyclotis) and the Chimpanzee (Pan troglodytes). In response to the Government of Cameroon's (GoC) ratification of the UN Convention on Biological Diversity (UNCBD) in 1992, the government initiated measures to conserve the nation's rich biological diversity.
These measures were multilateral and bilateral agreements with donor agencies such as the World Bank and the Department for International Development (DFID). This led to the establishment of integrated conservation and development projects (ICDP) in areas of high conservation value. Major ICDP's in the Cameroon highlands were the Birdlife International Kilum-Ijim Project and DFID funded Mount Cameroon Project (MCP) Limbe. Strategies adopted by these projects included the introduction of alternative livelihood options, based on sustainable use of the forest. A notable livelihood intervention was in the area of apiculture or beekeeping. While exploitation of honey from forest is an age-old practice in the Cameroon highlands, the ICDP's introduced a conservation friendly and more financially rewarding approach.
Recent studies in the Cameroon Highlands of selected beekeeping groups using semi-structured questionnaires

reveal that these are receiving meaningful benefits from apiculture. Constraints faced by these groups include poor market intelligence, inadequate capital and lack of government support. The sector in is struggling to meet local demand. To fulfil its potential there is a need for a long term research and development strategy.

HONEY TRACEABILITY AND MARKET TRANSPARENCY: A PILOT MODEL FOR HONEY CHAIN MANAGEMENT

No 276

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Introduction: The crisis in food sector the last years has made very clear that consumers need to be sure about the safety and quality of the products that they consume, something that makes the traceability in food very important.
The objective of this study is to increase consumer confidence and consequently market transparency in honey supply chains by developing a complete traceability model. This study demonstrates that honey products can be linked to their source. It also shows that the traceability of genetically modified organisms is also possible.
Methods: Based on extensive literature review on honey traceability and marketing, a qualitative pilot study is currently ongoing to examine the factors that influence its adoption and ease-of-use.
Results: The results from the qualitative study are going to be tested using a quantitative survey. Using the results from the empirical methods, a web-based model of honey traceability is proposed.
Discussion: This study points out that through effective Supply Chain Management and traceability, honey producers and companies can enhance market transparency and thus gain consumer confidence and competitive advantage.

Key words: Traceability, Supply Chain Management, Transparency, Web-based supply model.

HONEY AS A MARKETING STRATEGY ON UNA SANA CANTON

No 277

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Una Sana Canton is located in the north-western part of Bosnia in an area of moderate climate with relatively cold winters and warm summers. The medium January temperatures are below 10°C and medium July temperatures are between 18,7° and 22,7° C. The total area of Canton is 4837km2, out of which 47.9% of area is covered with forest, 40,58% are cultivable fields, pastures and orchards. There are 358,000 inhabitants living there and over 40% of population depends of agriculture. The beekeeper consider native flora as a positive advantage that can provide the richest honey. The representative species Apis carnica produces 5 kinds of honey in value of 100t/year. Technology of producing is very traditional. This study was conducted in order to determine the quality of honey, weaknesses of production and to design an action plan for sustaining the beekeeping and income. The biggest problem is with the health of bees and usage the chemical. There is no low and organisation for management and honey production strategy planning. The results of the control laboratory analysis showed that all samples of honey met the quality criteria regulated in B&H regulations for honey.

Key words: beekeeping, Apis carnica, the quality of honey

EFFECT OF APIS MELLIFERA L VENOM ON CHRONIC OSTEOMYELITIS

No 278

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Introduction: Osteomyelitis is a serious infection that is often difficult to diagnosis and treat. Inadequately treated osteomyelitis results in avascular necrosis of bone and the formation of islands of nonvascularized and infected bone.
Patients with chronic osteomyelitis may have intermittent episodes of disease actively manifested by increased local pain and the development of drainage of infected material through the sinus tracts.
Methods: A 33-year-old female Chinese had traffic accident on May 17,1992. Her left lower extremity was hit by an vehicle when she was driving a motorcycle. She developed multiple open fractures of left femur, left tibia and left fibula. Her surgeon recommended for amputation of her left lower extremity. Because she developed severe acute pyogenic osteomyelitis. However, she refused for amputation of her left lower leg.
But she developed chronic osteomyelitis with intermittent episodes of local pain and pus drainage through the sinus tracts of left leg during the last 12 years. Patient received Apis mellifera L (AML) venom therapy three times weekly for 16 weeks since August 2,2004. Serum IgG and IgE were examined every 2 weeks as indicators to adjust the appropriate dosing during AML treatment.
Result: She found that the pus drainage and local pain of her lower extremity were disappeared after 16 weeks of AML venom therapy.
Discussion: Mellitin, the major component of Apis

Mellifera L venom, is a well-known antimicrobial and cytolytic transmembrane peptide against both gram-positive and gram-negative bacterium. The chronic osteomyelitis patient may find that AML venom will prevent the recurrent episodes of further infections in future.

CLINICAL THERAPEUTIC EFFECT OF APITHERAPY ON BROCHOGENIC ADENOCARCINOMA.

No 279

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Introduction: Lung cancer is the leading cause of death in Taiwan. Scientist believes that the cause of lung cancer is highly related to exposure to tobacco smoking. The causal connection between cigarettes and lung cancer is now established through identification of carcinogens in tobacco smoking and the analysis of these carcinogens effect on specific oncogenes expressed in lung cancer. Apis mellifera L. (AML) bee venom inhibited the proliferation of cancer cells in Bronchogenic Adenocarcinoma cell line study.
Method: A 65-year-old male Chinese presented with persistent cough, weight loss and anorxia for 3 months. Chest radiography and CT scan showed a 3.0x2.5x2.5cm solid mass was found over right lung. Lung biopsy reported brochogenic adenocarcinoma of right lung. No lymph nodes metastasis lesions were found. Patient referred for apitherapy before surgical treatment. He received Apis mellifera L venom therapy every two day and propolis capsule, 800 mg four times daily.
Result: The CT scan showed the size of the brochogenic adenocarcinoma decreased from 3.0x2.5x2.5cm to 1.0x1.0x0.5cm after patient taking 6 weeks of apitherapy. Patient received surgical resection of the remaining cancer. He continued the apitherapy with AML venom therapy every two days and propolis capsules 300mg twice daily for 12 months. No recurrence of the cancer was reported after one year of surgical treatment and apitherapy.
Discussion: Mellitin, the major component of Apis mellifera L venom, is a well-known antimicrobial and cytolytic transmembrane peptide against both gram-positive, gram-negative bacterium, virus and cancer cell. Apitherapy with AML venom and propolis may provide the alternative treatment in Brchogenic Adenocarcinoma in future. .

THE ART OF BEE-ING: NATURE'S PERFECT LIFE PLAN©

No 280

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Throughout the ages, bees have been associated with hard work, harmony and prosperity; values esteemed in all cultures. **The Art of Bee-Ing: Nature's Perfect Life Plan©** provides the framework by which to experience sustainable personal and professional excellence.
The Art of Bee-Ing teaches:
Bee-Yourself
Bee-Hold Your Purpose
Bee-Long
Bee-Come the Solution
Bee-Courageous
Bee-Willing To Rest
Bee-True To Your Dance
Bee-Planful About Tomorrow
By applying the instinctive wisdom of honeybees the author invites others to explore the not-so-hidden secrets of living life in the fullest.
The Art of Bee-Ing: Nature's Perfect Life Plan© offers effective life lessons based on a solid review of scientific honeybee research and applied personal achievement methodologies. Learning and applying these eight lessons provides a sound foundation for individual and organizational effectiveness. The synergies found between human and honeybee behaviour is insightfully explored in this presentation.
The author's clinical social work background and professional speaking and consulting career afford her the ability to present her science-based content in an entertaining style.
This upbeat presentation is also appropriate for an Accompanying Person's Luncheon Program.

VETERNIARY ASPECTS OF APITHERAPY IN EGYPT

No 283

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Recently apitherapy has a great attention especially in Egypt that directed to study all aspects of apitherapy as in veterinary practices. The evaluation of the therapeutic efficiency of honey in septic and aseptic wound in animals using honey was carried out. The antibacterial activity against Gram positive and Gram negative bacteria of crude honey was studied.
Egyptian propolis has antibacterial, antiviral, antifungal and immunostimulant activities which were also studied. The activity of propolis and its relation with its geographic zone against Staphylococcus aureus; Streptococcus faecalis; Corynebacterium pseudo-tuberculosis; Aeromonas hydrophila, Escherichia coli, Salmonella typhimurium; Aspergillus niger and Candida albicans were determined. Immunostimulant activity of propolis was used in chicken also the antiviral activity against avian viruses were observed.

DETERMINATION OF CHEMICAL COMPOSITION AND ANTIMICROBIAL ACTIVITY IN HONEYS WITH DIFFERENT FLORAL ORIGIN

No 284

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Four honey samples from different floral sources (acacia, coriander, sider and palm) were investigated by GC/MS and HPLC. 88 compounds have been identified. Acacia honey was characterized by the presence of 18.7% of 2-hydroxypropanpoic acid, 10.5% 2-hexenoic acid, 8.27% 5hydroxy-n-valeric acid & luteolin (52.76µg/100g. honey) as major compounds. Coriander honey was characterized by the presence of apigenin (225.6µg/100g. honey). Palm honey was characterized by the presence of 28.72% succinic acid, 4.15% 4-hydroxybenzoic acid and 3.05% vanillic acid as major compounds. Palm honey was characterized by the presence of 15 aliphatic acids (64.1%) from which 7 are dioic acids (37.66%). Acacia honey was characterized by the presence of 20 aliphatic acids (54.73%) from which 7 are dioic acids (5.9%). Sider honey was characterized by the presence of 20 aliphatic acids (22.87%) from which 4 are dioic acids (1.17%). Finally, Coriander honey was characterized by the presence of 20 aliphatic acids (8.72%) from which 4 are dioic acids (0.16%).
For detecting honey marker, using the GC/MS analysis, 2-hydroxypropanpoic, 2-hexenoic, 5hydroxy-n-valeric, benzoic and cinnamic acids, 2,4-bis(dimethylbenzyl)-6-t-butylphenol could be used for acacia honey. For coriander honey, 3,4-dimethoxybenzoic acid, 3,4-dimethoxybenzeneacetic acid, 2,3-dimethoxy benzaldehyde and vanillyl alcohol could be used. 2-amino-benzoic acid, furyl acrylic acid, p-hydroxy-dihydrocinnamic acid and 1,2-benzenediol-3,5-bis(1,1-dimethylethyl) could be used as honey marker for sider honey. For palm honey, 4-hydroxybenzoic acid, vanillic acid, 3,4-dimethoxy cinnamic, caffeic acids, 3-hydroxy pyridine, picolinic acid and succinic acid could be used. As honey marker, using the HPLC analysis, luteolin and 2 unknown compound could be used for acacia honey. apigenin and 2 unknown compound could be used for coriander honey.
The antimicrobial activity against Staphylococcus aureus, Escherichia coli and Candida albican was also investigated. The honey samples showed inhibition in the growth of the examined pathogens but the inhibition varied according to the honey origin.

QUEEN BEE'S SYNDROME

No 285

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Purpose: Rejuvenascence of facial skin, hands skin and the whole organism.
Methods: 1. Application of cream with queen jelly.
2. Biological way of defence from varroa tick.
Results: For three years I have been making up the cream with queen jelly using it myself and prescribing it to my patients. Facial and hands skin restores and cellulitis areas recover. Skin becomes delicate and beautiful and wrinkles disappear. Vessels recover in case of atherosclerosis of lower extremities and brain, memory recovers, intracranial and arterial pressure regulates, migraine attacks stop, vision improves and hearing recovers. In case of cholecystitis, sinusitis, maxillary sinusitis, rhinitis and osteochondrosis inflammation stops. After inflammatory processes and surgical intervention commissurae resolve and infertility can be cured. The cream is applied for treating tumoral processes in brain (positive result according to tomography and clinical data. It is a supporting medicine in a neglected state). The best time for cream application is morning as being absorbed it gives strength and good spirits.
Conclusion: New technology - home preparation: In the middle of May we put a building frame between frames with drone brood. Bees can't stand emptiness so they quickly build the frame of drone dimensions and a queen bee lays ova soon. When 1/3 of frame is sealed we take the frame out, cut it off and put it back (as a matter of fact it is a biological way of defence from varroa tick). Then we put the pieces of drone brood into the juicer and squeeze out some drone extract. (It contains queen jelly, honey, bee bread and a growing body of larval that gives a huge supply of energy to those who take it). After that we mix drone extract with honey in the proportion of 1:4 and keep it in the fridge. We take one-half teaspoonful under the tongue in the morning. Cream (olive oil, wax, and drone extract) is applied to any area that pains. Microcirculation will be restored and pain will be over. In the morning being applied to the face the cream will wake up and hearten you even if you haven't slept enough. And all day long you will feel men's looks at you – not understanding the reason they will sense your magnetic force.

WATER SOLUTION OF PROPOLIS: CHEMICAL COMPOSITION AND EFFECT ON HEART MITOCHONDRIAL FUNCTION

No 286

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It is not surprising that propolis collected in different regions has different chemical composition and biological properties. Chemical composition of propolis water solution (WSP) made from in Lithuania collected propolis has not been investigated yet. Moreover, there are no data on the action of propolis on mitochondrial function.

Heart mitochondria are important organells of the cell, producing energy required for heart contraction. Thus, the aim of this study was to determine the chemical composition of WSP and its effect on rat heart mitochondrial respiration.
Using GC-MS 48 chemical compounds were identified in WSP, main type of them were phenolic compounds and esters of aromatic acids. Rat heart mitochondria were isolated in the mannitol-sucrose medium and respiration rate was measured oxygraphically at 37∞C with succinate as substrate. No effect of WSP on the state 2 (- ADP) and maximal (+ ADP) respiration rates of mitochondria was observed at 10-3 % and less concentrations of phenolic compounds present in WSP. At 9x10-3 % and 2x10-2 % phenolic compounds WSP caused the significant decrease of state 2 and the maximal respiration rates by 24%, 54% and 58%, 70%, respectively ($p<0.05$). Respiratory control index decreased by 38%.
In conclusion, the WSP effect on cardiac mitochondrial respiration was dose- dependent. WSP induced decrease of mitochondrial respiration rate with succinate as substrate was probably due to the inhibition of succinate dehydrogenase activity caused by phthalic acid esters found in WSP.

THERAPEUTIC EFFECT OF APITHERAPY ON CELLULITIS.

No 287

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Introduction: Cellulitis is an acute diffuse spreading inflammatory condition of the skin that is characterized by localized pain, erythema, swelling and heat. Melittin, the major component of Apis mellifera L. (AML) bee venom, is a well-known transmembrane antimicrobial peptide that plays an important role in innate immunity to microbial invasion. In Taiwan, we apply the using of combination of the knowledge of modern medicine, biotechnology and Oriental Medicine in Apitherapy. And we found that the result of modern Apitherapy was exciting.
Method: A 55- year-old female Chinese developed severe local pain, tenderness and swelling over right lower limb after a traffic accident. A 1.5x1.0.x1.0cm bleeding wound associated with 15.0x10.x05cm contusion wound was also found over right leg. Patient developed cellulites over right lower leg later. She received Apis mellifera bee venom treatment every day. She also received propolis capsule, 800mg four times daily.
Result: The cellulites of right lower led was completely healed after three weeks of Apis mellifera venom and propolis capsules treatment.
Discussion: Cellulitis may be caused by a wide variety of exogenous bacteria (e.g. S. aureus and S. pyogenous). Bacteria may gain access to the epidermis through cracks in the skin, abrasions, cuts and surgical incisions. Bee venom contains strong anitmicrobial peptides. Up to the present time, we do not find any bacteria resistance to bee venom. The combination of bee venom and propolis provide a strong antimicrobial treatment for both gram positive and gram-negative bacterial skin infection. Apitherapy with AML venom and propolis may provide the alternative treatment in skin infections. .

VISUAL FUNCTIONS IN PATIENTS WITH ENDOCRINE OPHTHALMOPATHY TREATING WITH BEE'S MILK

No 288

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Introduction: The problem of visual functions in patients with endocrine ophthalmopathy treating with bee's milk has not been investigated up to now. The purpose of the work was to investigate visual functions of patients with endocrine ophthalmopathy treating with bee's milk.
Methods: There were investigated 29 patients (I group) 48-65 years old with endocrine ophthalmopathy who were treated with bee's milk tablets (70mg twice a day). 15 patients (II group) were not treated with bee's milk. All patients earlier were treated with prednisolone (60-80mg per day). There were investigated the data of visual acuity, exophthalmometry, ophthalmoscopy, visocontrastometry, campimetry. The examinations were done before the treatment with bee's milk and after three months after the course of treatment. Results were statistically analysed by using Student's t-test. Relationship between parameters was determined by calculating correlation coefficient.
Results: The results showed that before the treatment with bee's milk visual acuity was decreased, contrast sensitivity was reduced in lower frequencies and enlargement of blind spot was found. In patients with endocrine ophthalmopathy treated with bee's milk an improvement of visual functions and reduction of retinal blind spot ($p<0.05$) was noted in comparison with those patients who were not treated with bee's milk.
Conclusion: In conclusion, bee's milk can be recommended together with other methods of conservative treatment of endocrine ophthalmopathy.

20% HONEY EYE DROPS AND PULSED ELECTROMAGNETIC THERAPY IN PATIENTS WITH GRAVES' OPHTHALMOPATHY

No 289

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Introduction: The effect of treatment with 20% honey eye drops and pulsed electromagnetic therapy in patients

with Graves' ophthalmopathy was not investigated. The purpose of our work was to investigate the effect of 20% honey eye drops and pulsed electromagnetic therapy in patients with Graves' ophthalmopathy.
Methods: There were examined 30 patients (60 eyes) with Graves' ophthalmopathy (mean age – 43.4 years old) before and after the treatment. 14 patients were treated with pulsed electromagnetic field (10 procedures) and 16 – with pulsed electromagnetic field (10 procedures) and 20% honey eye drops (three times a day). There were evaluated eye signs (eye microsoft tissue, cornea state, optic nerve function), proptosis before and after the course of treatment. Results were statistically analysed by using Student's test. Relation between parameters was determined by evaluation the correlation coefficient.
Results: In patients, proptosis measurements before the treatment with pulsed electromagnetic field and 20% honey eye drops were 19.7 mm, after the treatment – 18.8 mm ($p>0.05$). Oedema of conjunctivae and eyelids was noted in 81.3% of patients before the treatment and after the treatment the swelling of the eyelids and conjunctivae was only in 31.3% of patients with endocrine ophthalmopathy. Sensitivity of the cornea was decreased before the treatment in 50.0% of patients, after the course of treatment – in 18.8% of treatment. The best results were achieved when the treatment was started early while the eye soft tissue signs, swelling of the extraocular muscles and infiltration of retrobulbar cellular tissue predominated and there was no fibrosis of the microsoft tissue of the eye.
Conclusion: According to the results of investigation there was more positive effect of 20% honey eye drops and pulsed electromagnetic therapy than magnetic field alone on the state of ocular microsoft tissue and the cornea in patients with Graves' ophthalmopathy.

THE PHENOLICS CONTENT IN POLISH HONEYS WITH DIFFERENT FLORAL ORIGIN

No 290

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The quality of honey is judged by the botanical origin or floral origin and chemical composition. Traditionally the floral origin has been identified by the analysis of bee pollen present in honey. It is suggested, that flavonoids and phenolic acids could be used for authenticating honey floral origins.
The aim of our study was to evaluate and identificate the content of phenolics in 15 samples of honey. The phenolic acids (absisic acid, ellagic acid, galeic acid) and flavonoids (luteolin, quercetin, kaempferol, apigenin and chrysin) were analyzed by HPLC after extraction from honey using procedure reported by Lihu Yao et al. All of the analyzed honeys contained variable amounts of absisic acid, luteolin, quercetin, kaempferol, apigenin and chrysin. Galeic acid was found in 1 samples and ellagic acid was not found in any samples. The most shares in the total percentage of absorbance in all investigated samples had absisic acid. Rape honey was characterized by the presence of chrysin, heather honey by quercitin and apigenin and accacia honey by luteolin and kaempferol. This preliminary study shows on differences in phenolics contents of particular monofloral honeys. Further studies will be continued in order to find correlation between botanical origins and phenolic profiles.

EFFECT OF WATER SOLUBLE DERIVATIVE OF PROPOLIS AND ITS POLYPHENOLIC COMPOUNDS ON FUNCTIONAL ACTIVITY OF MACROPHAGES AGAINST TUMOR CELLS

No 291

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Effect of two preparation (Croatian and Brazilian) of water-soluble derivative of propolis (WSDP), caffeic acid, quercetin, chrysin, naringenin (components present in WSDP) on the development of Ehrlich ascites tumour (EAT) was evaluated. Test components (50mg/kg) were given by gastric intubations (po) or intraperitoneally 2 hour prior the intraperitonel injection of EAT (2 x106) cells. It was observed that WSDP and its compounds effectively inhibited tumour growth and the proliferation of EAT. The volume of ascitic fluid induced by EAT cells and total number of cells present in the peritoneal cavity was markedly reduced in EAT-bearing mice treated with test components. Treatment with test components increased the number of polymorphonuclear (PMN) cells and decreased the number of macrophages in the peritoneal cavity of treated animals. The macrophage spreading revealed that WSDP and all test compounds affected the functional state of macrophages increasing their tumorcidal activity. The results indicate that the WSDP and its polyphenolic compounds significantly reduced the tumour growth and proliferation of EAT cells; the antitumour effect of test components might be due to an increase of peritoneal macrophage activity and not to an increase in macrophage number.

DISTRIBUTION OF MINERALS IN COLOMBIAN PROPOLIS

No 292

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Propolis can be defined as a complex mixture of biological origin elaborated from resins, balms, rubbers and other sweets of the plants that the honeybee (Apis

mellifera) picks up and it modifies, adding them wax, pollen and enzymes among other materials. A primary analysis of any propolis sample allows to determine the presence of wax (20-30%), resins and aromatic balms (40-50%), essential oils (5-10%), pollen (4-5%) and mechanical mixtures (10-30%). Nearly 19 minerals hare been reported in propolis. One very important of them is zinc. For Argentinian propolis levels of zinc ranks from 10.3 to 105.8 mg/kg. Inside the apiary the results were comparable using other two different collection methods (30.7 to 58.8 mg/kg and 11.6 to 64.8 mg/kg).
This work shows the analytical results about the mineral composition of the Colombian propolis, collected at the biogeographical area of Tropical rain forest (bh-T: 2,000-4,000mm/year; 24°C and 0-1,000 m.s.n.m.), Premountain rain forest (bh-PM: 1,000-2,000mm; 17-24°C; 800-2,000 m.s.n.m) and Tropical dry forest (bs-T: 1,000 to 2,000mm; 24°C; 0-1000 m.s.n.m.). 18 samples of propolis from three biogeographical areas were collected, corresponding to two departments and 15 municipalities in Colombia (Tolima and Valle). The observed average in samples according to the biogeographical origin, presented smaller variability for the iron content in the propolis from (bs-T), with a range of 686mg/kg followed by (bh-PM) and (bh-T), with 983 and 1094 respectively. The most representative elements in all cases corresponded to calcium and sodium. In the last one with variations among 18.3 mg/kg for the propolis from (bh-T), 181 and 331.4mg/kg for (bh-PM) and (bs-T) respectively. The fluctuations for calcium levels corresponded to 2,377.5, 1,451.2 and 1,094mg/kg for (bh-PM), (bs-T) and (bh-T) in this descending order. The contents of zinc observed in the Colombian propolis, were 161.3 (bh-T), 442.9 ~ 443.2mg/kg for (bh-PM) and (bs-T). The presence of manganese and nickel complete the spectrum of minerals, with averages of 6.4 (bh-T), 30.2 (bs-T) and 37.2 mg/Kg for samples from (bh-PM) for nickel. The values observed for manganese oscillated between 6.9 and 61.5mg/kg.
The propolis of the three studied biogeographical areas of Colombia showed significant differences in minerals composition. Atomic absorption spectroscopy indicate that the smaller variability is showed in iron levels from (bs-T). The most representative elements were calcium and sodium. In the last one the variations ranked from 18.3mg/kg for propolis of (bh-T), 181 and 331.4mg/kg for (bh-PM) and (bs-T) respectively. The observed content of zinc was bigger than the one reported for Northwest region of Argentina. For the Colombian ones, the observed values were in the order of 161.3 (bh-T) and 442.9 ~ 443.2mg/kg for (bh-PM) and (bs-T) respectively.

EFFECTS OF COMPOUND SOFT CAPSULES OF ROYAL JELLY ON THE SLEEP IMPROVEMENT OF MICE

No 293

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Aim to investigate the effect of Compound Soft capsules of Royal Jelly on the sleep improvement of mice. Compound Soft capsules of Royal Jelly was composed of Royal Jelly, Ziziphus jujuba Mill. Var,Ganoderma lucidum (Leyss. Fr.) Karst and Radix Acanthopanacix Senticosi.
Method: The investigation was composed of three trials with 180 Balb/C male mice. In each trial 60 Balb/C male mice were randomly divided into 4 groups including solvent group, Compound Soft capsules of Royal Jelly (CSCRJ) 0.13, 0.27, 0.80£Á·£Î£Á-1 group. In trial 1 with prolonged mice sleep time test which induced by pentobarbital sodium, we studied the prolonged effect of the CSCRJ on pentobarbital sodium sleep time. In trial 2 with barbital sodium threshold dosage hypnotize tests, we studied the sleep rate of the mice after barbital sodium was administrated in 30 min. In trial 3 with barbital sodium sleep incubation period tests, we studied the effect of the CSCRJ on the barbital sodium sleep incubation period.
Results: The main results from three trials are given in Table 1. Administrated CSCRJ 30d to mice through stomach, the mice sleep time of middle dosage group was prolonged obviously ($P<0.05$), and high dosage group was prolonged significantly ($P<0.01$). Mice sleep rate of high dosage group was increased obviously ($P<0.05$). The sleep incubation period of mice in middle dosage group was decreased obviously ($P<0.05$), and the sleep incubation period in high dosage group was decreased significantly ($P<0.01$).

Table 1 Compound Soft capsules of Royal Jelly on the sleep improvement of mice.

Treatment (CSCRJ)	Sleep time -min- (±s)	Sleep mice (n) (30 min after injection)	Sleep incubation period (min) (±s)
0 g/kg.BW	25.8±6.3	2	26.4±5.5
0.13 g/kg.BW	32.6±7.9	3	22.5±5.2
0.27 g/kg.BW	34.9±9.9*	6	19.4±3.4*
0.80 g/kg.BW	38.0±9.0**	8*	17.5±3.1**

* P<0.05 ** P<0.01

Conclusion Compound of Royal Jelly, Ziziphus jujuba Mill. Var,Ganoderma lucidum (Leyss. Fr.) Karst and Radix Acanthopanacix Senticosi can improve the mice sleep effectively.
Key words: Sleep improvement; Compound Soft capsules of Royal Jelly

TOXICOLOGICAL ASSESSMENT OF PROPOLIS COMPLEX CAPSULE ON ANIMAL

No 294

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Objective: Propolis complex capsule is a kind of constituent of herbal medicine and propolis compounded preparation of tradition. It was necessary to make the toxicological assessment. Methods: The acute toxicity LD50 test in mice, micronuclei test of bone marrow cell and sperm shape abnormality test and chromosome malformation analysis of testicle reproductive cell in mice Ames test 30 days feeding test in mice.
Result: According to the result of acute toxicity LD50 test in mice, the Propolis complex capsule has not acute toxicity. All three genotoxicity tests had negative. The developmental toxicity and embryotoxicity had also not been found in teratogenicity test. Abnormal phenomena had not been found in 30 days feeding test.
Conclusion: Propolis complex capsule is safe in using.
Key words: Propolis complex capsule; Safety; toxicity tests

EXPERIMENT STUDIES OF HYPOGLYCEMIC ACTION ON THE PROPOLIS COMPLEX CAPSULE

No 295

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Objective: The Propolis complex capsule is a kind of constituent of herbal medicine and propolis compounded preparation of tradition. To study hypoglycemic action of the Propolis complex capsule by observing the effects of the Propolis complex capsule on blood glucose levels in many alloxan animal models.
Method: The blood glucose levels in alloxan animal model was determined after oral administration ,with the model of diabetes induced by alloxan of hyperglycemic mice and normal mice.
Result: The Propolis complex capsule had good therapeutical action on diabetes mice induced by alloxan, but had no significant effects on blood glucose levels of normal mice.
Key words: The Propolis complex capsule; hypoglycemic action ; animal experiment

THE STUDY APPLICATION OF PLANT EXTRACTS DISTILLATES IN HONEY BEE NUTRITION IN ORDER TO INCREASED OF ENZYME AND PHARMACOLOGICAL PLANT FACTORS LEVELS IN NATURAL HONEY

No 296

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In order to increase of honey enzymes and the main pharmacological plant factors used solutions that prepared of natural honey and plant extract distillate. This solution contain natural honey and plant extract distillate include of Labiatae (Mentha sativa), Salicaceae (salix aegyptiaca), Labiatae (origanum vulgare), Labiatae (mentha pulegium) with 1:1(v/v) concentration prepared and used in 30 honey bee colonies nutrition. This research conducted with CRD design in 5 treatments (1 control, 4 experimental solutions) and each treatment with 6 replicates.
After two month nutrition with this solution, sampling of all colonies and samples send to laboratory for analyses with HPLC and spectrophotometer method for pharmacological factors and used enzyme determine kits for evaluated enzyme levels. Data analyzed with computer statistically soft ware (SAS).
Results showed all enzymes in this research increased and main pharmacological factors transport to honey produced. However all treatments have significant different compared with control group ($P<0.01$).

THE PSYCHONEUROECOLOGICAL BASIS OF BEE VENOM THERAPY: EVOLUTIONARY CLUES OF PROTEIN-DOPAMINE LANGUAGE FOR CONSCIOUS LEARNING IN HOMO SAPIENS.

No 298

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Our bee venom therapy has considered the psychoneuroecological approach for autoimmune and nervous system diseases. We present evidences of clinical improvement in notable patients in each one of the following diseases: Multiple Sclerosis, Tropical Spastic Paraparesis, Lupus, Psoriasis, Rheumatoid arthritis, schizophrenia, addiction and paranoic states. All these pathologies, however characterized by allopathic Medicine, are individual experiences related with Genetic Authenthicity (GA) and Social Conditioning (SC). Genetic confers legitimacy, and social conditioning "teachs" about to be afraid of disease. Nevertheless of the individual differences between patiens, the perception and pain management of bee sting is more than only physical experience. Bee Venom Therapy (BVT) conects physical perception and conscience and then is an experience against fear. We have detected that BVT increase concentration, attention, memory, and qualities as selfperception, selfconfidence, self-preservation, self-expression, self-determination, self-rejoyce and self-knowledge. These are variables directly affect conscience and then how the patient lives its disease and which way can consider to catch an individual equilibria. Thus, the course of present disease summarize the similar chain of events along evolution. This is a fundamental clue: disease onthogeny revive memories of disease phylogeny.
We propose a model of bee venom action that is depending of dopamine-protein system present in apitoxin. We make biochemical, ecological and

evolutionary correlations. Our conclusion is really a new theory. The bee venom has been a ecological modulator between bees and its predators. Particularly and more deeply, bee venom in Apis mellifera - Homo sapiens relationships means a delicate molecular warning ("Molecular learning") to become aware of dangerous and to escape. We are talking about selfconscious learning, not of a mortal combat against an enemy, disease is not an anemy, is a chance to self-learning. These approach is beginning to explain the importance of bee venom therapy on conscience. Bee venom is a key and ancient evolutionary way to open the door of our learning, and then is a language to understand our addictions and to begin a real way for our self-healing.

ELECTROSPRAY IONIZATION – MASS SPECTROMETRY CHARACTERIZATION OF SAMPLES OF APIS MELLIFERA PROPOLIS FROM BAHIA, BRAZIL.

No 299

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The chemical composition and plant sources of Apis mellifera propolis from temperate zones have been the object of study for many years and are now well known. On the other hand, the composition of propolis from tropical and sub-tropical areas in the world were European Apis mellifera bees have been introduced, is largely unknown. In the present study, samples of propolis from Bahia, Brazil were analysed by negative mode Electrospray Ionization – Mass Spectrometry (ESI-MS) and the results compared by Principal Component Analysis (PCA).
The samples were collected from 14 hives placed in the same area in Cruz das Almas, Bahia, in February 2003: Samples A were collected in July and Samples B in December of the same year. Therefore bees collected the plant resins during different months for the two groups of samples. For further comparison, samples of propolis collected in a different region of the State of Bahia were also analysed. ESI-MS fingerprinting is a fast, accurate and reliable technique for the characterization of natural products, the negative mode ionization being particularly suited to those with acidic and phenolic components, such as propolis.
The ESI-MS fingerprints of the samples show there was greater variation in the composition of Samples A. PCA grouped all Samples B in the same quadrant, whereas Samples A were divided; some in the same quadrant as B and some in another one. The samples from the other region were placed separately. The loadings show that the ions of m/z 345, 347, 371, 373, 375, 401, 455, 469 and 471 were responsible for grouping Samples B and some of A. Tandem MS analysis of these compounds shows that most of them have analogous structures and are possibly derived from the same plant. Studies are being undertaken to ident0ify this species, which is apparently a main source of resin. Ions of m/z 197, 285, 299, 301, 215 and 319 were responsible for grouping the rest of Samples A, possibly indicating a secondary plant source. These results are important for the characterization of propolis from Northeast of Brazil and their plant sources.

COMPARISON OF THE COMPOSITION AND ACTIVITY OF SAMPLES OF BRAZILIAN PROPOLIS AND CASEARIA SYLVESTRIS

No 300

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Both propolis and the medicinal plant, Casearia sylvestris, are used topically in Brazilian popular medicine for their healing properties, which are frequently related to components with antimicrobial activity. The main purpose of this study was to compare the chemical composition and antimicrobial activity of extracts of samples of propolis and Casearia sylvestris. Samples were extracted by maceration and using the Soxhlet extractor. The samples of Apis mellifera propolis tested came from the southeast (3 samples) and northeast (2 samples) of Brazil. A sample of Apis mellifera propolis from Mozambique and one of Tetragonisca angustula propolis from the southeast of Brazil were also tested. The general composition of the extracts was evaluated by negative mode Electrospray Ionization – Mass Spectrometry (ESI-MS) fingerprinting and by Thin Layer Chromatography (TLC). The total phenolic content of the extracts was determined using the Folin-Ciocalteau method. The antimicrobial activity was evaluated directly on the TLC by bioauthography with Staphylococcus aureus.
The ESI-MS fingerprints of the propolis extracts showed differences due to the species of bee and geographic origin. Different forms of extraction did not affect the qualitative composition of the C. sylvestris extracts. The TLC plates showed that the less polar components of propolis were lost during the Soxhlet extraction. The samples of green propolis from the southeast of Brazil had the highest concentration of phenolic compounds whereas the extracts of C. sylvestris had the lowest. The components of high to medium polarity were responsible for the antimicrobial activity of all the extracts tested, with the C. sylvestris extracts showing the smallest inhibition zones, therefore the lowest inhibitory activity. The extracts of C. sylvestris had the lowest concentration of phenolic compounds and antimicrobial activity, suggesting that its wound healing properties are due to another mechanism. Most samples of propolis, on the other hand, showed strong antimicrobial activity, which could contribute to the cicatrisation of wounds.

EFFECT OF COMPOUND SOFT CAPSULES OF ROYAL JELLY ON THE IMMUNE FUNCTION OF MICE

No 301

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Abstract: Compound Soft capsules of Royal Jelly was composed of Royal Jelly, Ziziphus jujuba Mill. Var,Ganoderma lucidum (Leyss. Fr.) Karst and Radix Acanthopanacix Senticosi. Objective to study effect of Compound Soft Capsules of Royal Jelly£®CSCRJ£©on the immune function of mice.
Methods: The phagocytosing functions by cock RBC, the plaque forming cell (PFC) and HC50 testing were assessment with 48 male Balb/C mice of 18-22g (group_), the mice were randomly divided into 4 groups including solvent group, Compound Soft capsules of Royal Jelly 0.13, 0.27, 0.80-1 group, until 30 days. The lymph cell transformation by ConA and NK cell activity were assessment with other 48 male Balb/C mice of 18-22 g (group_), the mice were randomly divided into 4 groups including solvent group, CSCRJ 0.13, 0.27, 0.80-1 group, respectively, until 30 days. Other 48 female Balb/C mice of 18-22g (group_) were divided into four group as the same treatment, The phagocytosing functions by carbon powder were assessment. The data were statisticed by Stata soft.
Results: (1) The CSCRJ had no statistically obviously effects on the ratio of thymus and body weight. (2) By contrast with solvent group 0.27g/kg BW dosage can remarkly increase the lymph cell transformation by ConA (P£º0.01), and increase the phagocytosing ability by cock RBC (P<0.05). (3) But 0.80g/kg BW dosage can increase he lymph cell transformation by ConA (P£º0.05), and increase the phagocytosing ability by cock RBC (P<0.01), and increase the phagocytosing functions by carbon powde (P<0.05). (4) The CSCRJ had no effects on the body weight of mice.
Conclusion: Compound of Royal Jelly, Ziziphus jujuba Mill. Var,Ganoderma lucidum (Leyss. Fr.) Karst and Radix Acanthopanacix Senticosi can advance the mice immune function effectively.
Key words: Immune Function; Compound Soft capsules of Royal Jelly

DISINFECTION OF BEEKEEPING TOOLS TO KILL SPORES OF *PAENIBACILLUS LARVAE* SSP. *LARVAE*

No 302

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A part of the successful control treatment in the American foulbrood foci is disinfection of all surfaces and materials with possible survival of the pathogen in the virulent state.
We tested 17 registered preparations with declared sporocidal effects.
Very high efficacy was found by the use of magnesium monoperoxyphtalate (Dismozon ®). This preparation is environment friendly, but very expensive.
Hot solution of caustic soda (sodium hydroxide) is effective for small tools, cheap, but dangerous for man. The best effect was obtained by use the mixture of 5% sodium hydroxide and 0,5% of sodium hypochlorite. This solution worked at room temperature very well. In our laboratory experiments with this mixture the amount of 107 CFU of Paenibacillus larvae larvae was reduced to 102 CFU in 1 gram of treated material.

EVALUATION OF BIOLOGICAL ACTIVITIES AND PHYSICOCHEMICAL PROPERTIES OF A NEW TYPE OF BRAZILIAN PROPOLIS

No 304

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Propolis a resinous hive substance collected by honeybees Apis mellifera from several parts of the plants. In Europe, North America, and West of Asia, the main source of propolis is the exudates of poplar buds (Populus sp.) and therefore, only one type of propolis is found in these regions. However, in South America, this plant is not native, and there is a greater plant diversity used to obtain this resinous compound, thus making it difficult to correlate propolis with its source. A new type of Brazilian propolis produced by honeybees and known as red propolis has been shown, by in vitro studies, to have important biological activities. The objective of this study was to evaluate the chemical composition, antioxidant properties and the antimicrobial activities of this new type of Brazilian propolis. For these analyses, samples were collected from the shore regions of Maceió, in the state of Alagoas. The ethanolic extract of propolis (EEP) was analyzed by UV-visible spectrophotometry, TLC and HPLC, and the total phenolic compounds content was determined. Afterwards, the EEP was fractionated by liquid-liquid extraction with hexane, dichloromethane, and ethyl acetate, and the Minimal Inhibitory Concentration (MIC) and the Minimal Bactericide Concentration (MBC) values were determined against Sthaphylococcus aureus ATCC 6538. The antioxidant activity was determined by the DPPH method. Results obtained showed that the hexane fraction did not have any inhibitory action while the dichloromethane fraction had a MIC with values ranging from 200 to 400 µg/mL. The MBC for the dichloromethane fraction was between 800 to 1600

ug/mL. For the antioxidant activity, the tested fractions showed values that sequestered free radicals similar to that of butylated hydroxytoluene (BHT), which was 92.18%. The EEP had a mean value for the content phenolic compounds of 30 g/100 g, and this was greater than those found for other types of Brazilian propolis. The results obtained from the physicochemical and biological analyses indicate that this new type of propolis has important antioxidant and antibacterial properties.

DETERMINATION OF THE ANTIMICROBIAL AND ANTIOXIDANT ACTIVITY OF THE PROPOLIS (TYPE 6) FROM BAHIA, BRAZIL

No 305

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Propolis is a resinous hive substance collected by honeybees from different plant exudates. Its chemical composition is very complex and diverse, and it is closely related to the diversity of the vegetation from each region visited by honeybees. Propolis samples used in this study were classified as type 6 and were collected from the Atlantic Rain Forest located in the state of Bahia, in Northeastern Brazil. This type of propolis has a distinct chemical composition when compared with other types, has mainly non-polar compounds and no detectable flavonoids. This study analyzed the propolis antimicrobial activity using the Minimal Inhibitory Concentration (MIC) and Minimal Bactericide Concentration (MBC) methods. The antioxidant activity of the ethanol extracted type 6 propolis was determined by the DPPH method, which measures sequestered free radicals. The MIC and MBC values were determined by the serial micro-dilution technique against Staphylococcus aureus (ATCC 6538), Micrococcus luteus (ATCC 4698) and Bacillus subtilis (ATCC 21332) at a concentration range from 0.625µg/ml to 320µg/ml. The antioxidant activity of propolis (type 6) was 82.19%, while gallic acid was 94.73%. Bacterial growth inhibition (MIC) occurred from 5µg/mL to 10µg/mL for Staphylococcus aureus, 0.625 mg/mL to 1.25 mg/ml for Micrococcus luteus, and 1.25 mg/ml to 2.50 mg/ml for Bacillus subtilis. Data obtained for MBC showed only limited bactericidal activity for the bacteria and concentrations tested. The results obtained in this study showed that the ethanol extract of the propolis from Bahia has antioxidant activity lower than gallic acid, a significant microbial growth inhibitor, and no bactericidal activity at the tested concentrations.

HONEY QUALITY INFLUENCED BY NONTOXIC PESTICIDES.

No 306

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Moulds, bacteria and insects appearing also during blooming phases of rape, pomes and stone fruits are treated with pesticide applications during the blooming phase. Only non toxic preparations are tolerated for this purpose. Such applications don't have visible effects on the foraging behaviour of bees. The pesticides were collected together with nectar and pollen and were transported into the beehive.
A routine method was established to analyse 12 fungicides and insecticides classified as non toxic. The investigated substances were Vinclocoline, Prochloraz, l-Cyhalothrine, Deltamethrine, a-Cypermethrine, Chlorfenvinphos, Phosalone, Myclobutanil, Captan, Dichlofluanid, Fenhexamid and Iprodione. German honey samples (n=1859) submitted in 2003 were analysed. The sample preparation based on an automatic Solid-Phase-Extraction (SPE) on C18-cartriges, followed by separation and detection with a Shimadzu GC 2010/ECD system. Nine of the tested substances were not detectable in the investigated samples. Three pesticides, Vinclocoline (n=28; 3-18 ppb), a-Cypermethrine (n=5; 3-6 ppb) and Iprodione (n=5; 27-115 ppb) were detectable in few samples. Effects of dilution with nectar of other untreated blooming plants and a reduction of the lipophilic substances during honey processing may be responsible. Hydrophilic substances like Streptomycin or Carbendazim have stronger effects on the honey quality. The EU is planing a regulation for pesticide residues in animal food.

CHEMICAL COMPOSITION OF HONEYBEE (*APIS MELLIFERA* L.) VENOM

No 307

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The aim of the study was to the development of the method for the separation, identification and determination quantitatively of the major constituents of honeybee (Apis mellifera L.) venom by high performance liquid chromatography (HLPC) and determination of the chemical composition of the domestic product by running routine tests.
In the study to develop an HPLC method to assay the major venom compounds the following elements were tested: chromatographic columns with C18 packing

materials of different pore size (100, 180 and 300Å), separation temperature (25, 30 35ºC), flow rate (1.0; 1.5; 2.0 ml/min.), conditions of gradient elution (0%B - 45%B, 60 min. and 0%B – 60%B, 60 min, 5%B – 80%B, 40 min). Chromatographic separation was performed using the following mobile phases: A – 0.1% trifluoroacetic acid (TFA) in water, B – 0.1% TFA in acetonitrile : water (80:20). The assays of the separated venom compounds were made using UV detector at 220 nm wavelength. The best separation of the bee venom protein fraction was obtained on 180 and 300Å pore size columns at a temperature of 25ºC. The routine assays of bee venom chemical composition involved 29 samples collected from the apiary of the Apiculture Division, Institute of Pomology and Floriculture in Pulawy over three consecutive beekeeping seasons (2002-2004). Bee venom samples were analyzed for the following major protein fraction compoounds: melittin, phospholipase A_2 and apamine. Melittin content varied from 61.15 to 70.15 and averaged 64.40%. Phospholipase A_2 content came within a range of 11.24 to 15.05, and averaged 13,00 %, and apamine content was between 2.09 to 4.18, averaging 3,1%. Statistically significant year-to-year differences were found for melittin.

PRODUCTION OF AMNION GRAFTS FOR WOUND COVERING USING THYME HONEY AS A PRESERVATIVE AGENT

No 308

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The use of skin substitutes (biological dressing) in the treatment of burns, open wounds and post-operation wounds has been used long time ago. Many factors affect the acceptance of a specified tissue graft in wound cover using whether it was biological (allografts, xenografts) or synthetic (artificial skin, hydrogels and etc.).
The wound cover material should have the following properties; availability, inexpensive, not inflammatory to the wound, not antigenic, prevent bacterial access to the wound, decrease evaporation of body fluids and loose of electrolytes of burn sites, adhere well to the wound and encouraging granulation (epithelialization), and accelerating wound healing as well.
However, it is hard to find a single graft can provide all the above properties.
Tissue banks in developing countries become aware of processing and producing of Human amniotic membranes (HAM) sterilized by gamma rays from cobalt-60 sources. The implementation of such a biological dressing material could serve as life saving biomaterial especially in emergency and disasters.
The unavailability of radiation sources for sterilization due to the high cost and technical problems has lead to the use of honey impregnated amnion grafts as an alternative to the gamma sterilized ones for the clinical purposes mentioned above. This could achieve two go at once, preservation of the amnion grafts and accelerating wound healing at the time of application. In this paper, honey impregnated amnion grafts processed for the first time in different packing forms and kept at room temperature without further irradiatio until its use as wound covering material. The bacteriological quality control tests show obvious pasteurization effect and reduction of the bacterial counts in the processed HAM. From the results, it can be concluded that honey cannot substitute the radiatio method for sterilization but may serve as pasteurizing and preservative agent.

CORRECTION OF LIPID METABOLISM IN PATIENTS SUFFERING FROM CHRONIC JOINT AND CARDIOVASCULAR DISEASES BY BEE BREAD MIXE WITH HONEY

No 309

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The aim of the study was to investigate the effect of be bread mixed with honey on the correction of lipid metabolism in patients suffering from joint and cardiovascular diseases. A group of 36 patients, includin 29 women and 7 men, between the ages of 60 to 80 suffering from chronic joint and cardiovascular diseases were involved in this study. 26 patients (21 women and men) received 15 grams of bee bread and honey mixtu (1:1) twice a day after a meal in line with conventional medical treatment. Assessments of the general state of the patients and laboratory blood tests, including glucos level and lipid profile, were carried out before treatment and 4 weeks after the treatment. The data were compared with those of the control group of 10 patients (8 women and 2 men) who had not received any bee bread treatment.
Results. Both general health condition of the patients and blood tests improved for the group that had receive bee bread with honey. A statistically significant increase in haemoglobin, lymphocytes and a reduction in the total cholesterol and low density lipoproteins were identified compared with the control group ($p<0.05$). Our experimental evidence suggests that bee bread mixed with honey has a positive effect on patients suffering from chronic joint and cardiovascular diseases and facilitates regulation of the disordered lipid metabolism.
Key words: bee bread, chronic joint and cardiovascular diseases, lipids.

CLINICAL THERAPEUTIC EFFECT OF *APIS MELLIFERA* VENOM ON ICHTHYOSIS PATIENTS

No 310

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Introduction: The Ichthyosis is a group of disorders of keratinisation in which the skin is extremely dry and scany. Ichthyosis often invades joints and may cause joints deformities because of severe infections.
Method: Four Ichthyosis patients were selected in this study. They received Apis mellifera venom treatment every two days. Polyflower honey was also applied to the skin lesions every 12 hours. Serum IgG and IgE were examined every four weeks. Patients received apitherapy for 40 weeks.
Result:
After 40 weeks of apitherapy, all four patients found that their skin lesions of Ichthyosis were greatly improved. No severe bacterial infections were found during the 40 weeks of apitherapy.
Discussion: Mellitin, the major component of Apis mellifera L venom, is a well-known antimicrobial and cytolytic transmembrane peptide, provides a first line of defence against wide spectrum of pathogens. The result of this study indicates Apis mellifera venom is an effective antimicrobial agent in preventing skin infections in Ichthyosis patients.

EFFECT OF ROYAL JELLY ON DEPRESSIVE STATE INDUCED BY BILATERAL OVARIECTOMY IN FEMALE MICE.

No 311

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Recently, we demonstrated that the bilateral ovariectomy was able to produce a depressive state in female mice: the immobility time in the forced swimming test significantly prolonged 2 weeks after the ovariectomy. Because the prolongation of immobility time was prevented by chronic treatment with either estradiol or antidepressants it is conceivable that this phenomenon closely correlates to menopausal mood disorder. Royal jelly produced by honeybees to feed the queen of the hive is known to be effective in mental illnesses such as fatigue and depressive state in women. There is, however, little experimental proof supporting these traditional applications.
In the present study, we determined whether or not chronic treatment with royal jelly prevents the prolongation of immobility time in ovariectomized mice, and also investigated the active components of royal jelly. ICR albino female mice were used and their ovaries were resected bilaterally at 9 weeks of age. All drugs were given once per day for 2 weeks after the operation. According to the method of Porsort et al (1977) each mice was placed into a polycarbonate cylinder (25cm high x 10cm diameter) filled to a 10cm depth with water maintained at 25_ for 6 min. Behavioral testing was recorded on videotape and the duration of immobility during the last 4 min of the trial was measured using a computerized event recorder. Chronic treatment with royal jelly (300, 600, 900mg/kg/day) reduced significantly the duration of immobility time [F (7, 72)=8.34, $p<0.01$] in a dose-dependent manner. Among the fractions extracted from royal jelly, either supernatant or aqueous fraction prevented significantly the prolongation of immobility time induced by ovariectomy [F (5, 54)=14.84, $p<0.01$]. In contrast with estradiol, royal jelly did not show any increase of uterus weight as compared with the vehicle-treated control. These findings suggest that daily intake of royal jelly is effective in menopausal mood disorder, and it is clear that substance contained in the aqueous fraction, not in the organic fractions, is one of the psychoactive ingredients of royal jelly.
In our latest clinical study, we demonstrated that royal jelly was effective in women's menopausal disorder, such as depression.

ANTIOXIDANT CAPACITY AND PHYSICOCHEMICAL COMPOSITION OF HONEY

No 313

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Reactive oxygen species (ROS) such as O2_, OH_, or lipid peroxyl radical (LOO_) lead to diverse biological complications, due to oxidative damage to lipids, proteins and nucleic acids. Honey has been known to exert a significant in vitro antioxidant activity, in part due to its phenolic content. In this work, we compared the inhibition percentage of superoxide anion and hydroxyl radical of honey from Apis mellifera, Melipona favosa favosa and Trigona (Tetragonisca) angustula angustula with values of artifical honey. We found that genuine honey samples inhibited the formation of superoxide anion in a higher percentage than artificial honey. This inhibition capacity was, for genuine honey (68.9-80.2) higher than quercetin (53.0) and melatonin (53.9), but lower in artificial honey (33.5). On the other hand, we measured the antioxidant activity (AOA) values of honey samples in comparison to uric acid at 1mM. In this case, lower AOA values were found for artificial honey (0.31) and genuine honey samples (0.64-0.73), as compared to melatonin (0.83) and quercetin (0.86). There was no correlation between the values of antioxidant capacity and the physicochemical composition of acidity, ash and water.

Honey	Bee Origin	Acidity (meq/kg honey)	Ash (g ash/100 g honey)	Water (g water/ 100 g honey)
1	Apis	27.92	0.09	19.2
2	Apis	48.32	0.21	17.8
3	Apis	44.20	0.12	18.0
4	Melipona	54.60	0.07	30.4
5	Trigona	188.52	0.25	27.4
6	Artificial	8.60	0.04	19.4

ANTI-INFLAMMATORY EFFECT OF ASIAN HONEYBEE VENOM (*APIS CERENA* L.) ON INDUCIBLE NITRIC OXIDE SYNTHASE AND TUMOR NECROSIS FACTOR-ALPHA IN RAW 264.7 CELL LINE

No 314

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Several investigators have evaluated the effects of honeybee venom (Apis mellifer L.) to biological activity such as anti-inflammatory and antinociceptive effects. But, the biological activity of the venom from Asian honeybees (Apis cerana L.) is not evaluated yet. In this study, the production of proinflammatory cytokines, nitric oxide (NO) and tumor necrosis factor-alpha (TNF- alpha) was examined in a macrophage like cell line, RAW 264.7 cells, in the presence of the venom from Asian honeybees (A. cerana) water-soluble (BVW) extracts. RAW 264.7 cells activated with lipopolysaccharide (LPS) were treated with various doses of BVW extracts. Supernatants were analyzed for the production of NO and TNF-alpha using Griess reagent and enzyme-linked immunosorbent assay (ELISA) and western blotting, respectively. BVW extracts up to 10ng/ml still required to inhibit NO and TNF-alpha induced by LPS. These results suggest the possibility that BVW may be effective therapeutic agents for inflammatory diseases.

THE THERAPEUTIC BENEFITS OF HONEY IN AUSTRALASIA

No 315

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People, throughout an extremely diverse array of cultures, have used honey for its healing properties for thousands of years. Ailments traditionally treated with honey range from diseases of the gastric and respiratory systems to sexually transmitted diseases, burns and eye infections. Honey has been especially persistent as a therapeutic agent for wound dressings, due mainly to its antimicrobial properties. It exhibits significant antimicrobial activity due to high sugar content, low pH, hydrogen peroxide production and floral factors. However, the level of activity varies greatly from honey to honey, and is dependent on the floral source. There are certain honeys that exhibit broad-spectrum antibacterial activity that is just as effective against antibiotic-sensitive and –resistant pathogens. Honey also has favourable effects on wound repair, above those due to infection control. Although honey has been largely ignored by modern medicine, the past few years have seen an increased interest its therapeutic use in conventional medicine, particularly as a wound dressing. For example, in Australia and New Zealand certain honeys are being used to dress chronic ulcers, with remarkable results. Honey is also very effective as a dressing on other infected surgical or traumatic wounds and for burns. Honey possesses many ideal wound dressing properties, and while there are still questions to be answered with regard to the mode of action and the choice of honey type for therapeutic use, the potential benefits of an increased medicinal use of honey are likely to be substantial.

HONEY KILLS SOME OF OUR MOST DANGEROUS MICROBIAL ENEMIES

No 316

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Honey has been used therapeutically by many different cultures since ancient times. Much of its popularity stems from the fact that honey is a broad spectrum antimicrobial agent. Although still used in some instances today, honey has been largely forgotten by Western medicine since the advent of antibiotic therapy. However, the rapidly escalating problem of antibiotic resistance among microorganisms is arguably one of the most urgent issues facing medicine today. As our antimicrobial arsenal dwindles, people are considering alternate therapies to combat infection by antibiotic resistant organisms. In vitro data from our laboratory show that honey is effective against a range of microorganisms that are responsible for severe or problematic infections, including those that are not susceptible to conventional antimicrobial therapy. Remarkably, multiply resistant Staphylococcus aureus ("Golden Staph") is particularly sensitive to honey, with minimum inhibitory concentrations (MICs) of 5% (w/v) or less. Various members of the bacterial family Enterobacteriaceae, which is one of most commonly implicated groups in wound infection, are inhibited by honey at concentrations of 15% (w/v) or less. Similar concentrations inhibited the growth of Propionibacterium acnes, an anaerobic bacterium implicated in the pathogenesis of acne. Several species of the pathogenic yeast Candida, which is responsible for wound infections and thrush, have also been tested. MICs ranged from 10% to 47% (w/v), depending on the type of honey used. Importantly, honey inhibited all of these drug resistant organisms at concentrations that are easily achievable in a clinical setting.

FREE RADICAL SCAVENGING AND LIPOPEROXIDATION INHIBITION EFFECTS OF KOREAN PROPOLIS

No 317

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Propolis, a natural product derived from plant resins collected by honeybees, has been used for thousands of years in traditional medicine all over the world. The composition of the propolis depends upon the vegetation of the area from where it was collected and on the bee species.
In this study, propolis samples were collected from the three region of Korean Peninsula, such as central, southern, and Jeju island. Ethanol extracts of propolis (EEP) were prepared and evaluated for antioxidant activity by 1,1-diphenyl-2-picrylhydrazyl(DPPH) free radical scavenging assay system, deoxyribose OH radical scavenging assay system, and lipoperoxydation inhibition systems. EEP from central and south region had strong free radicals scavenging effect and lipoperoxydation inhibition effects. On the other hand, Jeju's sample was lower free radical scavenging effect than other regions.

COMPARISON OF ANTIBIOTIC PROPERTY OF HONEY FROM VARIOUS FOOD SOURCES IN THAILAND

No 318

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Honey is the major product from bee. It has been utilized wildly through the use for therapeutic purpose or apitherapy in both traditional and modern medicine. In this research, honey was from different floral sources (longan flower, sunflower, wildflower, and April honey). Each honey was diluted with LB media at concentration of _, _, _, and 1 (v/v). Then, they were used to test against the growth of Escherichia coli by agar well-diffusion bioassay. The diameter averages of inhibition zone (DIZ) suggest that wildflower honey and April honey are more effective than the others at any concentrations. Longan honey at concentration of _, _, _, and 1 (v/v) provides DIZ (cm) at 2.800, 3.367, 3.600, and 3.833, respectively. Sunflower honey presents 2.867, 3.300, 3.611, and 3.600 cm of DIZ, respectively. Furthermore, wildflower honey shows 2.978, 3.467, 3.811, and 3.800 cm of DIZ, separately. In addition, April honey indicates 2.922, 3.478, 3.633, and 4.033 cm of DIZ, separately. At concentration of _, _, _, and 1 (v/v), all honeys provide the same activity (one-way ANOVA, _=0.05). Wildflower honey is the most effective at concentration of _ while April honey without any dilutions presents the most effective activity (one-way ANOVA, _=0.05). Moreover, some components of honey such as proline, moisture and % invert sugar were performed. These obtained characters may be responsible for the difference of honey.
This research was financially supported by Thailand Research Fund, grant # MRG4780007 and RTA4580012 and Senior Project Fund of Chulalongkorn University.

RADICAL SCAVENGING ACTIVITIES AND ANTIBROWNING EFFECTS OF SPANISH HONEYS

No 319

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According to recent studies, some honeys have high antioxidant activity. The aim of this study is to evaluate the antioxidant capacity of 38 Spanish honeys, monofloral or honeydew. Thus, radical scavenging activity and browning inhibition capacity of these honeys have been evaluated.
Firstly, the total antioxidant capacity has been determined as the radical scavenging effect of honey on a methanolic solution of 1,1-diphenyl-2-picylhydrazyl radical (DPPH•). Furthermore, in order to study the nature of the compounds that confer antioxidant activity to the honey, ten honeys were selected among the more active samples and were fractionated. These fractions have been obtained by solid phase extraction using strong anion exchange columns, strong cation exchange columns and C-18 columns. Previously, removal of the volatile fraction was achieved. Subsequently, the radical scavenging effect of these fractions has been evaluated. The results showed a higher free radical scavenging activity in honeydews than in floral honeys, with the exception of some heather honeys which showed high activities. The analysis of the fractions showed that the highest scavenging activity was obtained when volatile and basic compounds were removed.
On the other hand, the capacity of honeys to inhibit enzymatic browning in fruits has been analysed. Thus, the effect of different honey concentration added to mince apple and to apple juices were evaluated. In general, both studies showed low enzymatic browning inhibitions with floral honeys, whereas some heather honeys and all honeydews yield medium-to-high browning inhibition percentages. The antibrowning effect of honey was more appreciable in mince apple than in juice.
Colour, polyphenol content and acidity had been described as differentiator parameters between floral honeys and honeydew honeys. The statistical analysis of our results showed correlations between total antioxidant capacity or browning inhibition with these three parameters.

THE ANTIBACTERIAL ACTIVITY OF SELECTED PORTUGUESE HONEYS

No 320

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Introduction: Ancient civilisations utilised honey for the treatment of a diverse range of illnesses. Although honey is no longer regarded as a routine remedy, the recent development of honey based wound care products in Australasia and Great Britain is generating interest from modern healthcare professionals. Historical records indicate that honeys used for ancient medical purposes were usually carefully selected but from local sources. This suggests that carefully selected regional honeys might offer potential for modern alternative antimicrobial therapy, and this inference was tested in this study.
Methods: The physicochemical properties (colour, pH, HMF, protein, water and sugar content) of a selection of 30 Portuguese honeys were determined and antibacterial activity of each honey was determined using a bioassay method that discriminates between the antibacterial activity derived from the formation of hydrogen peroxide and the activity not derived from hydrogen peroxide formation and compares them to phenol standards.
Results: All the honey samples the exhibited physicochemical characteristics of unadulterated, natural honeys. All honeys showed hydrogen peroxide-derived antibacterial activity. Seven of the honeys tested possessed non-peroxide antibacterial activity with 4 of them having an activity that ranged between 7-13% (w/v) phenol equivalent. The honeys that showed the non-peroxide activity were mainly derived from Lavandula stoechas.
Discussion: These results demonstrate that there is the potential to find honeys with non-peroxide derived antimicrobial activity in Europe for possible development of wound management products, and demonstrates the need for further screening of the honeys being produced in Portugal and the rest of Europe.

ADVANCES ON PHARMACOLOGICAL STUDY OF BEE POLLEN

No 321

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Bee pollen contains a lot of nutritive and bioactive ingredients. In this paper, a summary is made on the therapeutic effect of bee pollen in treating the following diseases: high blood fat, atherosclerosis, lowered immune function, fatigue, senility, radio-damage, liver-damage, tumor, digestive disorders, prostatitis, diabete endocrine disorders, sterility, etc.

Key words: bee pollen; pharmacology; function

TREATMENT OF ARTHRITIS AND OTHER AILMENTS USING BEESTINGS

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I got to know about the therapeutic effects of bee sting (bee venom), honey, bee pollen and propolis from a personal experience. I use to have serious pains on my waist and backbone whenever I walked some distance i the village. Sometimes I would be tempted to sit down for a while but when I started beekeeping, I learnt that one should not be afraid of bees' stings, which after all takes care of arthritis and other ailments in human body I was stung on several areas of my body and after few days the pains disappeared. I have tried therapy on a 14year old boy that had a urinary track infection that made it difficult for him to pass urine. Since then I started to treat patients suffering from arthritis, PMS, goitre, golombaron syndromes and other cases. There is a case of stone-like object in the breast of a 50year old woman, which was dissolved through bees' stings. Since I am not a medical practitioner, I would rather refe the patients to a medical laboratory scientist who would certify through laboratory examinations that they have such suspected problem. The knowledge of bee sting therapy is not popular in my country, but I hope to popularize it through paper presentations and other methods at the local, national and international platforms The use of alternative medicine has been presently welcomed in Nigeria. Apitherapy, a more healthy way of getting well will be appreciated if it is introduced with a professional protections by the medical/alternative body.
Problem: A man of 80years old diagnosed with rheumatoid arthritis and a heavy load of Staphylococcus aureas was treated with bee sting (venom) for a period of three months of a 3-sectoins of beestings in one week. He got relieved of the pains and swellings but latter on the pains kept on recurring. I do not know why he could not be freed (healed) like others who have gone back to their jobs? I believe there is going to be some improvements and definitions on how certain cases could be properly handled in the future by the use of bee venom therapy.

PHYSIOLOGICALLY ACTIVE ROYAL JELLY PROTEINS AS A REGULAR COMPNENTS OF HONEY.

No 323

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The presence of royal jelly (RJ) proteins in honey collected from nectars of different plants origin and regions and in honeybee's pollen was detected by Western-blot analysis using polyclonal antibodies raised against water-soluble RJ-proteins. The most abundant RJ-protein in honeybee products corresponded to a 55kDa protein. The N-terminal amino acid sequence of 55kDa protein was N-I-L-R-G-E. This sequence is identical to the apalbumin-1, the most abundant protein of RJ. Apalbumin-1 is a regular component of honeybee products and thus is a suitable marker tool for proving adulteration of honey by means of immunochemical detection.

The quality of honey has long been evaluated basing on its static properties that can be determined by chemical, physical, and instrumental analyses. Nowadays, it is generally understood that quality of honey should be defined in terms of a variety of physiological functions of its individual components, mainly RJ-proteins, which are present in honey. The finding that 1% honey stimulated production of TNF-alpha, while artificial honey (mixture of sugars similar to those found in natural honeys) failed to elicit tumour necrosis factor-alpha (TNF-alpha) release in human monocytic cell line raised a question what ingredients of honey were responsible for such physiological effect. We have found that RJ-proteins of honey stimulate mouse macrophages to release TNF-alpha The pronounced stimulation of TNF-alpha release was observed by the most abundant proteins of RJ named as apalbumin-1 and apalbumin-2. It has been previously described that these RJ-proteins possess interesting physiological activity. These results provide direct evidence that the release of TNF-alpha in monocytes that was observed with 1% honey was stimulated by RJ-proteins present in honey while artificial honey failed to elicit TNF-alpha release in human monocytic cell line due to lack of these proteins. The release of TNF-alpha and probable other cytokines by mouse macrophages mediated by the apalbumin-1 could explain broad therapeutic properties of honey. The similarities between the immune systems of insects and mammals showed that TNF-alpha might play a role in cytokine-induced activation of genes important for immune response of honeybees and humans. In these processes TNF-alpha could play a pivotal role as the factor participating on regulation of important cellular processes such as cell proliferation and inflammation. New data on physiological properties of RJ and RJ-proteins, such as enhanced proliferation, suppression of allergic reactions, antifatigue effect, and antihypertensive activity broaden their potential application in pharmacy and food industry. It is proposed that apalbumin-1 as the major protein component of honey could be used as potential marker for physiological evaluation of honey as a functional food by monitoring cytokines production in a suitable in vitro system. The ability of apalbumin-1 to stimulate production of cytokines release could by used as a tool for valuation of honey as a model for functional nutrigenomics.

Our results showed that apalbumin-1 is a fairly homogenous protein among the RJPs derived from different species of honeybees and is also always present in honey. In light of these findings it is possible to generalize our proposal for immunochemical testing of adulteration of all honeys as well as for evaluation of their physiological properties on the basis of presence of apalbumin-1 in honey.

HIPA HONEY INTERNATIONAL PACKERS ASSOCIATION

NO 329

The poster describes the setting up of HIPA to promote the quality and continuity of the honey supply worldwide. The Association supports beekeeping everywhere and will pursue its objectives by beekeeper training, lobbying governments, promoting sustainable livelihoods and promoting marketing in order to maintain beekeeping economics on a sound basis.

OPTICAL BIOSENSOR DETECTION OF TYLOSIN RESIDUES IN HONEY

No 330

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The emergence of bacterial resistance to Oxytetracycline (OTc) has resulted is a search for new antibiotics to control American Foul Brood (AFB) and European Foul Brood (EFB) in bee colonies. The bacteriostatic antibiotic tylosin is one of the compounds being investigated providing control for OTc resistant AFB. It inhibits bacterial protein synthesis by binding to the 50s ribosomal sub-unit in susceptible microorganisims. The European Union (EU) have set Maximum Residue Limits (MRLs) for tylosin in all food producing species, however no MRL for honey has been set therefore tylosin in currently prohibited for use in apiculture. Confirmatory methods such as liquid chromatography-mass spectroscopy (LC-MS), with detection limits between 0.1 – 2 _g/kg, have been developed insuring compliance to EU legislation. These can be time consuming and expensive therefore screening methods are used to filter out the majority compliant samples. Unfortunately the screening methods have been unable to detect sub 10 _g/kg levels.

A biosensor method has been developed that will detect tylosin in honey. Samples are prepared by dissolving honey in buffer then cleaning an aliquot by passing through a Solid Phase Extraction (SPE) column. The sample is concentrated under nitrogen then re-suspended in buffer before being introduced to the biosensor where tylosin residues can be detected.

Data will be presented revealing a screening method with a detection limit less than 10 _g/kg, complementing current confirmatory method detection limits.

EFFECT OF HEATING AND STORAGE ON HONEY HYDROXY METHYLFURFURAL AND DIASTASE ACTIVITY

No 331

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The composition of honey is depending on produced season, origin of nectar and climatic conditions. The most important factor affecting honey composition is plant origin. The honey contains proteins, enzymes, water, carbon hydrate, acids, dextrin, ash, vitamins, pollen and substance of aroma (Crane, 1975; Yaniv and Rudich, 1996; Silici, 2002; Fallico et al, 2004).
The purpose of this research was to assess the effect of temporary heating the quality characteristics of honey during storage. Honey samples obtain from Hatay were heated at 55oC, 60 oC, 65oC for 6, 9, 15, 20, 30 minutes. Honey samples were left to room temperature (21oC) and stored this ambient temperature for 29 weeks to be assessed. The samples of honey were analysed by TSE (Institute of Turkish Standards)' s and the standard methods of Association of Official analytical Chemists (AOAC, 1990).
The changes in the diastase activity, hydroxyl methylfurfural (HMF) content were observed. Heating treatment applied to honey did not effect on diastase number except the effect storage time. Also, HMF content of honey samples were affected significantly from storage time and heating.

Key words: Honey, diastase, HMF, heating, storage, quality.

METHOD OF ENSLAVED QUEEN

No 332

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A beekeeper's wish is the achievement of higher range in beekeeping. On his way to such an aim, he has been finding out new and interesting methods. This method is one of them.
With this method, a few days before main pasture, to a beekeeping colony on two brooding LR bodies (A and B), mating nook is re-arranged in such a way that the queer has been put on the bottom body (A) on the frames with empty honeycombs and one frame with the young brood. Above the first continuing part (A) a queening screen is put, then the second part (B) with complete brood, and finally the honey super (C). The hive's entrance on the bottom body is closed, and the hive's entrance above the queening screen is opened. So the queen became enslaved, without the possibility of swarming and escape of the old queen with the swarm. In addition to it, only nursing bees are left in the part with the queen, because the foraging bees and the drones are oriented to the hive's entrance above the queening screen.
With this method the continuing part on the bottom bod has been changed every 24 days, so that the queen could have enough space for brooding eggs and releasing the newly brooded drones.
With such overtaken measures, all factors influencing th colony in order to give their maximum, have been fulfilled.

CONTROLLING THE QUALITY OF THE FINNISH HONEY: DEVELOPMENT DURING YEARS 1995-2003

No 333

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The Finnish Beekeepers' Association was concerned about the domestic honey quality and induced a first investigation in 1995. Based on these initial findings was started a program to promote the quality of Finnish honey. In this purpose the Association created criteria fo the so-called swan labelled honey and started controlling quality of honey produced for the market. Most of the criteria were adopted from the quality control system of the German Beekeepers' Association: HMF content may not exceed 15mg/kg, invertase activity must be more than 35 U/kg (Siegenthaler), water content less than 19g/100g and the honey must be 100% of Finnish origin according to pollen analysis. During years 1995-2003 1.427 samples were examined.
In the year 1995 the average HMF content of the honey samples was 20,8mg/kg and only 45,2% of the samples had less than 15 mg/kg. The HMF content decreased rapidly and in the years 1998-2003 91,3% of samples had a HMF content of less than 15mg/kg with a average varying between 4,8-9,7mg/kg.
During the examination period the activity of invertase was on average 95U/kg, with a yearly variation of the average between 70-125U/kg. Invertase activity was less than 35U/kg in only 4,1% of the honey samples.
The average moisture content varied in different years between 16,3-17,3g/100g. Only 1,6% of samples exceeded the limit of 19g/100g. Pollen analysis revealed some mixing of foreign honey with the Finnish honey at three packing plants.
Professional and semi-professional beekeepers were

greatly expanding in the late eighties and automated their honey extracting and processing. The present study shows that in some cases this resulted in the use of excessive heat for prolonged periods of time when storing, filtering, melting or packing honey. It was found that honey which has been heated for processing has to be cooled down rapidly to keep the HMF content low and to preserve the enzyme activity. These findings should be considered when new honey processing equipment is developed. Some beekeepers had to replace their equipment and to change their honey processing methods to fulfil the new quality requirements. Based on these results the beekeepers were educated in honey processing and given personal advice to avoid heat damage in honey. This work has significantly enhanced the quality of Finnish honey.

EFFECTIVE CONTROL OF RESIDUES IN HONEY – POSTER PRESENTATION

No 334

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The European Commission is focusing on the Quality Control of imported foodstuffs especially of animal origin. Through this the regulations concerning the quality control of honey have strongly increased; the honey market is concerned by an increasing number of residue problems and the honey trade is influenced by scandals caused by residues of not permitted substances in animal food e.g. in case of Chloramphenicol (CAP) - this has led to a complete ban of imports from China from 2002 to 2004.
Up to now there is no EC legislation to pesticide residues limits in honey although a proposal for a Regulation of the European Parliament and the Council on MRL of Pesticides in Products of Plant and Animal Origin (2003/0052, COD) is made.Consumers in the EU are extremely sensitive to the issue of pesticides residues in food. Honey is regarded as natural and pure should be as free from residues as possible. Therefore the number of analyses increased the last years constantly. But what about the goals? For the last five-year period data were collected according to the residues of Streptomycins (by HPLC mod. ac. Kocher), Tetracyclines (by HPLC and LC-MS/MS) and Sulfonamides (by HPLC), for the last three-year period Chloramphenicol (by LC-MS/MS) as well as Nitrofuran-Metabolites (period October 2003 to December 2004) and recently incorporated analyses of substances like Tylosin (by HPLC or LC-MS/MS) or from the Macrolid-group (by LC-MS/MS) or other Antibiotics (by LC-MS/MS).
The results will be shown in tables and figures. The number of samples with no residue detected increased for most of the tested parameters: Streptomycine, Oxytetracycline, Sulfathiazole and CAP. It increased only in the case of Sulfamethazine (and showed over 90% either) in 2003 but decreased in 2004. For Nitrofuran-metabolites are up to now no comparative data available. The overview on the latest five years show that the fact that control occurs forces the users of medicinal products etc. to observe the law – the maxim "Control leads to confidence" is universal furthermore.

THE DETERMINATION OF HONEY ADULTERATION BY INVERT SYRUPS BY SUGAR ANALYSIS USING HPLC AND GC METHODS

No 335

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Last years progress in range of methods for sugars analysis in honey by high performance liquid chromatography (HPLC) whether capillary gas chromatography (GC) creates new possibilities for the detection of invert syrups (beet, cane, corn) in honey. Canadian researchers did work with the respect to honey intentionally adulterated with invert syrups. They found fingerprint oligosaccharides in invert syrups, which were either not detectable or present in low concentrations in pure honey. There is no literature according sugars composition of product received by transforming of invert syrups by bees. Since this time there has been some controversy on the formation of oligosascharodes in inverts under heat and acid conditions.
The aim of the study was to attempt the determination of honey adulteration by invert syrups by sugar analysis using HPLC and GC techniques. The experimental material were samples of: commercial inverts available on Polish market, product received by transforming of these inverts by bees in the fed experiment conducted in apiary, natural honey harvested in the same experimental apiary. We also analysed the honey samples sent to laboratory by Polish beekeepers and trading firms for routine control. The quality and quantity content of sugars was carried out by GC and HPLC methods.
In comparison with natural honey commercially available inverts had several times higher content of saccharose, a little lower content of glucose and fructose, and trace amounts of other oligosaccharides. The sugars profile of these syrups after inverting by bees was the similar to that of natural honey. The some of commercial honey samples were characterized by improper F/G ratio, higher concentration of saccharose, maltose, isomaltose, erlose and low concentration of di- and trisaccharides. These irregularity of sugar quality and quantity content indicate of honey adulteration by sugars purchased from different plant sources, but the more studies are needed in particular in the area of product received from bee colony intentionally fed by commercial syrups.

ENTEROBACTERIA OF HONEY BEE POLLEN

No 336

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Sanitary-bacteriological analysis of pollen load presented in the market (R.G.Khismatullin and others 2002) detected enterobacteria up to 103CFU/g in pollen load. The results and identifications are given below. Kessler broth with lactose inoculated with pollen load in amount of 1, 10-1, 10-2, 10-3mg, MacConkey broth with lactose bile broth with brilliant green and lactose, the same broth but with glucose were transferred to the Endo agar in 24 hour. Gram-negative oxidase-negative facultatively anaerobic strains were identified as Enterobacteriaceae. The cultures were identified according to «Bergey's Manual of Determinative Bacteriology» (9th edn) using 34 tests.
Cultures of Enterobacter agglomerans heterogeneous species were differentiated within one species according to the tables of the corresponding chapter of the reference-book «The Prokariotes» (2nd edn).
Enterobacteria were identified in 28 samples from among 64 samples.
One kind of species was detected in 6 samples of pollen load; two kinds of species were detected in 6 samples; 3 kinds of species were detected in 5 samples; 4 kinds of species were detected in 4 samples; 5 kinds of species were detected in 6 samples; 6 kinds of species were detected in 1 sample.
Enterobacter amnigenus, E. intermedius, E. sakazakii, E. taylorae, Escherichia hermannii, Hafnia alvei, Klebsiella planticola, K. terrigena, Serratia marcescens, S. plymuthica and unidentified cultures were found in 1-2 samples. Escherichia coli was identified in 4 samples: in 1 sample - 1CFU/g, in 2 samples – 10CFU/g, in 1 sample - 102, non of samples contained 103 (). The representatives of Klebsiella species were found in 8 cases (1.3.2.2). Both species E. Vulneris and the group of Enterobacter cowanii with similar representatives of E. Agglomerans were identified in 6 samples (0.4.2.0 –both groups). Leclercia adecarboxylata with similar E. Agglomerans were found as often as E. Agglomerans which are similar to Pantoea kind (both groups – in 15 samples) but E. Agglomerans were identified in more quantity of samples: 1.8.6.0 _ 0.2.11.2. E. Cloacae was the most frequently found species but not the most numerous found in 18 samples: 3.8.7.0.

A SURVEY OF THE DETERMINATION OF CATALASE ACTIVITY OF HONEY

No 337

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Analysis of honey's catalase is very interesting because this enzyme is inversely correlated to honey's "peroxide"-antibacterial activity. Nevertheless, current methods for the analysis of honey's catalase are, imprecise and thereby, not reliable, as well as extremely tedious and time consuming. A precise and reliable spectrophotometric method, based on Schepartz and Subers' (1966) procedure, has been set up for the determination of catalase activity in a difficult sample matrix, such as honey. A previous dialysis of the samples is essential. Different dialysis' membranes, composition and quantities of dialysis' fluids, temperatures for the dialysis, quantities of sample and times for the dialysis were tested in order to get accurate results. The best data in the dialysis were obtained by dialysing 7.50g sample in a cellulose sack that retains proteins with M.W. 12,000, using 2 x 3 litres of 0.015M sodium phosphate buffer at pH 7.0 as dialysis's fluid at 4oC throughout 22 hours. Final determination of honey's catalase was performed spectrophotometrically at 400nm. Different solvents for o-dinisidine, different H2O2 and HCl concentrations and different volumes for catalase measurement were also studied. The best results were obtained by dissolving the o-dianisidine with 0.2M sodium phosphate buffer at pH 6.1. The optimum H2O2 and HCl concentrations were 3mM and 6N, respectively. The best volume for the assay was 7.0ml. The analyses were developed in triplicate. Precision (RSD %) of the method ranged between 0.48% in samples with high catalase activity and 1.98% in samples with low catalase activity.
Note: The details of the method have been published in the Journal AOAC International

STUDY ON SUGARS COMPOSITION OF FRESH AND STABILIZED HONEY DURING STORAGE

No 338

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Enzymes, especially invertase and maltase, change quantitative and qualitative sugars profile of honey during

the storage. The study was conducted on saccharides content in some samples of honey in 3 variations as follows: a) after saccharides stabilization by thermal method; b) without stabilization, storage at about 20°C; c) without stabilization, storage at about 4°C. All samples were examined after 3, 6, 12 and 24 weeks of storage. Content of saccharides was analysed using HPLC method. Stabilization was done according to Polish standard of honey.
Composition and sugars content in the honey samples did not change after thermal stabilization. The sugars content was still the same during the period of investigation (24 weeks). In non-stabilized honey samples were registered statistically significant differences in sugars content, especially in sucrose contents. In honey stored during 24 weeks in a refrigerator sucrose content decreased on average by 14% in comparison with its initial value; in 20°C, decreased even by 79%.
Obtained results suggest some complements to method of saccharides analyses of honey, which are as follows:
Honey samples to investigations of sugars profile should be transported and kept in low temperature;
Reference material for HPLC method of sugars content should be prepared from stabilized honey.

EXTRACTION OF HONEY COMBS - CLEARING BEES FROM SUPERS

No 339

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The clearing bees from supers was investigated by four methods at the extraction of honey combs: classic shaking off and sweeping of individual combs, use of bee escapes, use of repellents and use of blowers. The work time for comb extraction with 100kg honey was recorded, further advantages and drawbacks of individual extractions studied, at the repellents a pilot study was done on the impact on the life length of bees after the repellent application. The study included also repellent residues content in honey. The comb extraction connected with bee escapes, repellents and bee blower was by about 70% less time consuming in comparison with bee clearing by hand sweeping. But the repellent reduced significantly the life length of bees and its residues were found in honey. For the honey comb extraction from supers by means of blower a net cover was produced and tested at the practical use in the field. The net cover gives back the blown off bees to the top part of the open hive. The blower was equipped with the regulation - the accelerator at the blowing spout. This device reduces significantly the time when the engine of the blower runs on full turns at high noisiness.

THE INFLUENCE OF TEMPERATURE ON THE TIME OF DEGRANULATION AND ON THE CERTAIN PARAMETERS OF HONEY QUALITY

No 340

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In this research the influence of different temperatures on the time of degranulation of the meadow, linden and sunflower honey was studied. In the course of the research the change of values of the following parameters was followed during a longer time period:
- hydroximethylfurfural (HMF),
- diastasis,
- water percentage.

The research was conducted in a plant of a large purchase honey station in an industrial chamber of useful volume 15 t, where degranulation of the received granulated honey is conducted. The vessels containing granulated honey were made of prochrome, of different values. The temperature was measured in the chamber itself, on the surface and in the honey honey.
Based on the obtained values of the controlled parameters prior to and after degranulation, we can conclude that:
- HMF value is greater after degranulation, as well as at higher temperatures,
- diastasis value decreases with the time of degranulation and at higher temperatures,
- water percentage mostly depended on whether the vessels in the chamber during degranulation were open or not.

Special significance of this work reflects in the fact that the research was conducted in production conditions, with a large number of samples and during a longer period of time.

RESIDUE OF ANTIBIOTICS AND SULPHONAMIDES IN HONEY

No 341

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In our country and in the world, both legally and illegally, the apiculturists have used various kinds of antibiotics and sulphonamides without professional control in the course of breeding honey and for the preventive or curative purposes. With the aim of examining the presence of the residue of antibiotics and sulphonamides, 100 honey samples were taken directly from the markets and large market centers. On that

occasion with modified microbiological method EEZ (FOUR PLATE) the presence of the tested residues, whose infibition zone was from 0.5 to 4 mm, was established in 18-18% of honey samples. The presence of antibiotics and sulphonamides in honey was proven in the samples taken from markets and the samples taken from large market centers.
The presence of antibiotics and sulphonamides was greater in a larger number of samples of honey bought in the markets (13 samples – 7.8%) and in a smaller number of samples of honey bought in large market center (5 samples – 2%).

ENZYME AND ACIDS IN NOURISHEMENT OF HONEY BEES IN BOSNIA AND HERZEGOVINA

No 342

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Organic acids and microbiologically clean enzyme cultures are used for the split of the complex carbohydrates. Apple acid, citron acid, vinegar acid and other acids are used for the production of non-organic (artificial) fodder li the bee-farming practice in B&H, while the usage of enzymes in this chemical process is very minimal. In our experiment we used oxalic and milk acid, alongside with the set hypothesis about possible impact of those acids on Varrou destructor through bee-food. The purpose of this paper is to exam several types of artificial (non-organic) bee-fodder products and the impact they have on the life expentancy of the bees and honey production in bee communities. To feed the bees, we used sugar sirup, acid and enzym inverted sirup (as experimental groups), while the nourishement done with honey, was a controlling group. Impact of the artifical fodder on the honey bee was followed in three seasons. Experiment itself was conducted in controlled (labaratory) conditiions, using mini cages (capacity of 200 bees) outdoor (production) facilities .
Sugar syrup and enzyme-inverted syrup can be used to nourishe bees. Bees nourished with enzyme-inverted syrup lived longest compared to the bees nourished with artificial fodder (87,23% compared to bees nourished with honey). Acid-inverted syrup significantly shortens life expectancy, especially during winter, and thereby impacts productivity of the bee communities (37,18% compared to bees nourished with honey). Bee fodder, which is subjected to the process of inversion of sugars in it, was stimulating bee communities in the direction of collection of nectar. (increase of honey production from +312% t_ +390%).

Key words: enzyme, acid, honey, syrup and nourishement.

ARTEPILLIN C CONTENT OF BRAZILIAN PROPOLIS

No 343

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Artepillin C is a phenolic acid isolated as the main compound (>5%) of the Brazilian propolis. This phenolic acid has biological properties such as antitumoral, antibacterial and antioxidant activity showing that Artepillin C can be one of the most important active compounds from Brazilian propolis. It is used as a chemical marker for the quality control and exportation. Brazilian propolis contains Artepillin C mainly because th bees visit the Baccharis dracunculifolia plants which contain a large amount of this phenolic acid. The purpos of this work is to evaluate the content of Artepillin C from propolis Brazilian samples. For this, 22 samples were collected in the year of 2004 in four different geographic regions of Brazil. In order to quantify Artepill C, the RP-HPLC method, based on the procedure described by HAYASHI et al (1999)*. The extraction step was modified using methanol instead of ethanol and for quantification an ODS column and UV detector at 280nm were used. Artepillin C content varied from 0 to 11% depending on the geographical origin. The southeast region of Brazil presented the highest level of Artepillin ((5.0 – 11.0%) while the northeast region did not show any Artepillin-C.

*HAYASHI, K.et al. **Chem. Pharm. Bull.**, v.47, n.11, p.1521-1524, 1999.

EVALUATION OF SIMPLE AND DOUBLE GRAFTING TECHNIQUES FOR QUEEN PRODUCTION OF AFRICANIZED HONEYBEE APIS MELLIFERA THROUGH MORPHOMETRIC MEASURES

No 344

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The honey production can only be evaluated in periods of blooming, therefore, experiments have been accomplished to identify characteristics that are associated with the production and easy of be measured (Souza et al., 2002). The herdability of morphologic characteristics is high (Collins et al., 1984). The superiority among queens is a selection potential and it can be measured through the quality of the same ones i

relation to the weight and size of the body (Tarpy et al., 2000). This research was carried out to evaluate the efficiency of simple and double grafting for Africanized honeybee queens production using morphometric measures. The work was performed in Apiculture Sector at Universidade Estadual de Maringá, northwest area of Paraná state, Brazil, from April 2004 to January 2005. The larvae for the grafting were removed from an apiary composed of 22 colonies with queens that came from eight apiaries distributed in Paraná and São Paulo states. The Doolittle's method was used for the queen production and the system of mini-nucs as beginner colonies (Santos and Message, 1984). The Camargo and Gonçalves' method (1970) was used for double grafting. In the 10th day the queen cells were removed from mini-nucs and placed in an incubator with 34ºC, identified properly, in which they emerged between the 11th and 12th days, after the simple or double grafting. Each queen was anesthetized with CO2, weighed, measured (with digital paquimeter) as for the length and width of the wing and abdomen. The comparison of averages was made through the Kruskal-Wallis analysis and the Spearman correlation using the SAS software. We obtained 584 queens from 730 grafting, so 368 from simple and 216 from double grafting, showing 80% of efficiency in queen production. The queens presented larger weight (193.074 ± 1.073mg), wider wing (0.384 ± 0.016cm) and longer abdomen (1.040 ± 0.007cm) from double grafting in relation to the simple grafting (weight – 189.288 ± 5.123mg; width of the wing – 0.382 ± 0.005cm and length of the abdomen – 1.005 ± 0.005cm). The correlations of the characteristic weight of the queen with length and width of the wing and length of the abdomen were 0.25 (P=0.0001); 0.14 (P=0.0007) and 0.59 (P=0.0001), respectively. The technique of the double transfer presented better results, mainly, in relation to the characteristic weight that is correlated with the length of the abdomen.

PRODUCTION OF ROYAL JELLY IN QUEENRIGHT COLONIES

No 345

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We developed a method of production royal jelly in queenright colony without restriction of the queen. The queens were young (less than 1 year old) and at the first (and only the first) grafting a queenless colony was used to keep the grafted queen cells for one day and increase the acceptance.
We compared this method with others that produced royal jelly a) without the queen (queenless colonies) and b) have the queen restricted in triple – horizontal colonies.
The production of royal jelly from three (3) queenright colonies was 0,11 gr / cell and the acceptance 54,8% after 31 graftings. From three (3) queenless colonies the production was 0,19 gr / cell and the acceptance 87,2% after 31 graftings. The two (2) triple – horizontal colonies produced royal jelly 0,13 gr / cell after 30 graftings. The acceptance at this experimental group was 66,5%.
The production of royal jelly can occur despite the presence of the queen, when grafted artificial queen cells are used. Although the acceptance and the production is not as high as in queenless and triple – horizontal colonies, this method has some advantages and allow the beekeepers (especially the amateurs) to produce royal jelly by using small number of hives.

MICROBIOLOGICAL CHARACTERIZATION OF ORGANIC AND NON-ORGANIC HONEY OF AFRICANIZED HONEYBEES PRODUCED IN DIFFERENT REGIONS OF BRAZIL

No 346

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The organic honey market is in the middle of expansion and products with that certification receive better remuneration, contributing decisively to the improvement of the beekeepers' income that produce the organic honey. The analysis were accomplished with the objective to evaluate the quality of the honey of the organic and conventional production systems, contributing to its physico-chemical characterization produced in Brazil. It was analyzed and compared 22 samples of honey being 11 organic and 11 non-organic collected at the islands of the area of the triple border between Sao Paulo, Parana and Mato Grosso do Sul states and in different areas of the country respectively, from December 2004 to January 2005. The samples were identified for an abbreviation of each State followed by a number and, studied for the following parameters: water content (%), hydroxymethylfurfural - HMF (mg.kg-1), diastase activity, colour, total sugars (%), reducing sugars (%), sucrose (%), ashes (%), viscosity (mPa.s), electrical conductivity (mS), pH, acidity (meq.kg-1) and formol index (mL.kg-1). The analysis were accomplished according to the methods adopted by Instituto Adolfo Lutz, National Laboratory of Animal Reference and Association of Official Analytical Chemists. The averages of the variables were appraised through the F test and the value level - 5%. We verified in the organic honeys, larger water contents, HMF and diastase index and smaller pH values, protein content, ashes, viscosity, electrical conductivity than non-organic honey. In organic honey, all the analyzed samples presented water content values among 23.5 to 24.4%, according to the Brazilian legislation, the maximum water content of the honey

should be 20%, the definition of water content patterns for this honey should be reviewed because its higroscopicity of the honey depends on the sample composition, mainly in relation to the climatic conditions and the floral origin. In studied area, the summer is hot and rainy with higher saturation of the air and great nectar flow, which can constitute difficulty to the honeybees for removal of the water of the nectar. Two samples of non-organic honey presented apparent sucrose and HMF above the allowed maximum (6% and 60 mg.kg-1, respectively), associated probably to the processing fail. The pH varied among 3.90 to 4.59, for the non-organic honeys, and 3.84 to 3.91 for the organic ones, which is due the particularities of the floral composition in the areas of collections, once the pH of the honey can be influenced by the pH of the nectar, differences in soil composition, or the association of vegetable species for final composition of the honey, that would influence in the physico-chemical composition. The physico-chemical analysis contribute with the fiscalization of produced honey, and it is very important to evaluate and to guarantee the quality of this product in the market.

Key words: physico-chemical analysis, organic honey, Apis mellifera, Africanized honeybee, non-organic honey

MICROBIOLOGICAL CHARACTERIZATION OF ORGANIC AND NON-ORGANIC HONEY OF AFRICANIZED HONEYBEES PRODUCED IN DIFFERENT REGIONS OF BRAZIL

No 347

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The food contamination is a risk for the supplier as for the distributor, and to the costumer's health. In recent years, it increased the interest in natural and healthy products. It was analyzed and compared 22 samples of honey being 11 organic and 11 non-organic collected at the islands of the area of the triple border between Sao Paulo, Parana and Mato Grosso do Sul states and in different areas of the country respectively, from December 2004 to January 2005. The samples were identified for an abbreviation of each State followed by a number and studied for the coliforms presence to 35ºC, coliforms to 45ºC and enumeration of mould and yeasts. Starting from 25 grams of honey, took place the first dilution in 225ml of peptone water buffered 0.1%. The preparations of the subsequent decimal dilutions were accomplished in tubes containing 9 mL of the same diluent up to 1/1000. For each dilution, it was made three replications for the test of the most probable number of coliform (MPNC) in lauril sulphate triptose broth (LST) and three replications for inoculation in Petri dish in depth of 1 mL twice of each decimal dilution, using the potato dextrose agar (PDA) acidified with tartaric acid 10% up to pH 3.5. The incubation gave in bacteriologica greenhouse to 35ºC during 48 hours and 25ºC during fiv days for the tests of MPNC and counting of mould and yeasts, respectively. The averages of the variables were appraised through the Tukey's test with 5% of probability. In all analyzed samples the coliforms enumeration to 35ºC and coliforms to 45ºC presented results <3.0 MPNC/g. For mould and yeasts enumeration, it was obtained maximum value of 1.3 x 103 and minimum 1.9 x 102 colonies former unity - CFU/g for organic honey and maximum of 2.7 x 102 and minimum 1.6 x 101 CFU/g for non-organic honey. Analyzing the results, in what concerns the significant increment of the mould and yeasts content observed in the samples of organic honey in relation to the non-organic, it can be inferred that this contamination is possibly related with the primary sources of contamination, especially with your botanical origin and, consequently, geographical and environmental (islands). The collections take place in the rainy months, presenting higher humidity in function of the saturation of the air and great nectar flow that it happens soon after the rains hindering the water removal of the nectar by the worker honeybees. The microbiological analysis is constituted an efficient tool for the characterization and comparison of the quality of organic natural and conventional products. Through the microbiological parameters appraised, the non-organic honey presented better quality in relation to the organic honey.

Key words: microbiological analysis, organic honey, non organic honey, Africanized honeybees.

FILTH TEST AS A TOOL TO ASSESS AND IMPROVE HONEY PROCESSING PROCEDURES

No 348

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Filth test has been demonstrated to be an indirect tool t investigate and monitor the compliance of the procedures applied in food processing with the current standard requirements. In fact, the application of the HACCP system to food processing requires to monitor the operations recognised as CCPs. In honey processing purification step, other than filling, is indicated as CCP. Filth test can then be applied to verify the effectiveness of purification and to indirectly collect information on the hygienic conditions applied during honey production and

processing. A total of 74 honey samples of different botanical origin were collected from hobby and professional beekeepers of Verona Province (24 samples, Veneto Region, northeastern Italy) and Siena Province (50 samples, Tuscany Region, central Italy). Briefly, 300 g of each honey sample were solubilised in 500 ml of hot distilled water and vacuum-filtered through black-band paper filter. The filter was examined under stereomicroscope (16x) for extraneous materials. 73 (98.6%) of 74 honey samples were characterised by the presence of burnt particles derived from the smoker used to remove honeybees from the hive during hive inspection and supers removal. In 70 (94.6%) samples fragments of vegetal origin were present, as a consequence of poor care during supers removal operation in the apiary. 4 (6.7%) samples contained extraneous component of animal origin (hair, insect fragments). The results obtained confirmed the effectiveness of filth test to reveal the presence of extraneous material in honey, even when not recognisable at naked eye. Beekeepers need to improve their honeybees removal technique in order to prevent honey contamination due to burnt particles. A less intense use of smoker and more appropriate burning material is likely to solve the problem. Furthermore, much care must be taken of supers removal so that no vegetal materials could contaminate honey. The limited presence of extraneous material of animal origin is indicative of adequate hygienic conditions in honey room. Despite the positive judgement on the hygienic conditions of honey processing, a monitoring programme is recommended.

NEW KINDS OF COMB HONEY

No 349

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Production of comb honey in the traditional round or rectangular section frames needs special management of colonies. Usual section weight is near one pound of honey, but customer needs smaller dimensions up to one-time portion.
But bees refuse to work in the smaller sections and number of problems increases together with decreasing of section dimensions. On our opinion the main reason of this phenomenon is the increasing of the quantity of irregular attaching cells. We proposed to use the term "attaching cells" for the cells, which connect the comb with any surface and these cells obligatory have one plane, formed by the material of surface (usually wood or plastic in modern frames). Construction of such cells is very complex task for bees and they avoid building combs with large number of irregular cells.
At appropriate mutual disposition of wax foundation and bars of section frames bees build attaching cells up to regular pentagonal bee cells, which can be used for bee larvae rearing and bee-bread storage.
We proposed designs of several section frames with decreased number of irregular attaching cells and this permits to decrease the section dimensions.
The best way of simplification of comb honey production is to refuse from traditional frame design at all. We propose new "frames" with three planes only. Comb in such "frame" has one open edge and it is possible to bite off small peaces of combs
The simplest variant of comb honey is the comb, attached to the upper bar alone and we propose new name "bar comb honey" for such kind of comb honey (Patent of Ukraine, 2002). It is possible to produce the bar comb honey of different dimensions from 1 pound to one-time portion or even to testing portion (comb on stick). It is easy to insert such honey into standard glass jar and this is the real way to pack comb honey for supermarkets. These new kinds of comb honey will open the way of comb honey to the festive tables, supermarkets and even cafes and restaurants in the form of testing portions

FAST SPE EXTRACTION AND LC/ESI/MS/MS ANALYSIS OF FLAVONOIDS AND PHENOLIC ACIDS IN HONEY.

No 350

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As generally recognized, flavonoids and phenolic acids are the most important components of honey if related to its antioxidant power.
A simple SPE extraction procedure was developed to acquire fractions for the determination in honey of antioxidants components, like phenolics, flavonoids and organic acids. An acified honey solution was passed trough a 500mg C18 and/or SDB polymeric SPE column to obtain a clear fraction containing phenolic acids and flavonoids. Then the filtrate is neutralised and passed on a SAX SPE column to obtain the fraction containing organic acids.
The procedure was validated analysing the extracts with HPLC-DAD methods to determine repeteability r and recovery %.
Coupled reversed phase HPLC-Mass Spectrometry Detection with an ESI (Electro Spray Ionisation) interface in the negative ion mode was then used for analysing the fraction containing phenolics and flavonoids.
Detection and Quantification limits resulted very low. The LC/ESI/MS/MS with full SCAN, DAUGHTER SCAN and MRM methods, permitted so far to identify and quantify, by mean of their specific m/z and fragmentation patterns, eight tipical flavonoids and seven tipical phenolic acids in some species of unifloral Italian honeys (Robinia, Castanea, Eucalyptus, Helianthus, Erica arborea).

TRACE ELEMENTS IN HONEY FROM SIENA COUNTY (SOUTHERN TUSCANY, ITALY)

No 351

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The pattern of trace elements in honey, the product of honeybee workers (Apis mellifera), can be used to characterize this food via specific markers in order to determine the environmental quality of a territory. Siena county, southern Tuscany, is a relatively clean area, since there are few industrial emissions, the cities are small, and the vehicular traffic is low with respect to European standards. These features are associated with good geochemical knowledge of the region, as high-resolution geochemical maps for a number of trace elements are available. In total, 48 honey samples were collected from hobby and professional beekeepers. About 1g of sample was added to 4ml HNO3 and 1ml H2O2 (Baker ultrapure reagents) and the mixture was digested in a Milestone Ethos 900 microwave lab-station. The analytical quality was checked using the certified reference material 8413 Corn (Zea mais) Kernel. ICP-AES and ICP-MS were used to analyse 23 elemental species (Al, As, Ba, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Sr, Th, Tl, U, Zn). The results revealed significant concentration differences among the honey samples. These differences were also evident within honey samples of the same botanical origin. For instance, in multi-flower honey (representing the bulk of our sampling), the values for Na (59-163mg/kg), Ca (136-344mg/kg), Sr (0.85-2.01mg/kg) and U (4.53-14.82mg/kg) fell within a rather narrow range, while the values for other elements, such as K (160-3050mg/kg), Mn (0.13-16.88mg/kg), Co (1.56-56.59mg/kg), Cu (0.17-5.89mg/kg), Se (2.34-17.34mg/kg) and many others, exhibited much greater variability. The overall contents, particularly of toxic heavy elements (As, Cd and Pb), were very low and consistent with most literature data. The observed concentrations and peak values are discussed in terms of the regional geochemistry and the environmental behaviour of the chemical species considered.

FLUORESCENT SPECTRA OF DEFINED MIXTURES OF HONEY

No 352

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The work concerns new way of fluorescence application to honeys research [Surface Spectrofluorimetry Shapes Analysis (SSSA)]. The results of hitherto existig investigations of identification of floral types of honey, were confirmed by the well-established melytopalynology method. The paper presents next step - results of digital analyses of such fluorescent spectra of blended honeys. Samples of several types of honeys were the subject of investigations. For all this honey samples, according to procedure SSSA, fluorescence spectra were measured and digital analyses regarding their floral origin were executed. The samples of best monofloral honeys were selected. Some various, two-component mixtures of exactly definite contents of earlier chosen and examined monofloral honeys, were executed. For all this honey mixtures fluorescence spectra were measured and special digital analyses regarding two components contents were executed. However obtained results are difficult to interpret so far. Howewer it seems possible, that further investigations in this direction will enable important conclusion about mechanism of formation and structure of fluorescence layer of honey surface. It seems quite possible also identification of blended honeys components content.

STUDY OF HEAVY METALS ANALYSIS IN HONEY BY NANO-BAND EXPLORER METHOD

No 354

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Introduction: Honey is contained much sugar, so we have to resolve it before analyze heavy metals. Nano-Band explorer (NBE) method can measure poisonous heavy metals (Pb, Cu, Cd, Hg and As) in honey without preliminaries.
Method: Weigh 5g honey, dilute with HCl solution or acetic acid buffer to 50ml.
If it's needed pretreatment, though sample solution to 0.2_ MF. Calibrate each heavy metals measurement with method of standard additions. When we need total inorganic As analysis, reduce with HCl and thiosulfate before measurement.
Results: We've gotten good results of measurement as heavy metals. The NBE method has high sensitivity, in addition, we could abridge analysis time compare to Atomic absorption spectrometry method.
Discussion: Therefore, the NBE method can analyze plural poisonous heavy metals at once, it is useful for screening and measurement of heavy metals in honey.

NITROFURAN METABOLITE IN THE APIARY: STUDY OF THE DYNAMICS AND PERMANENCE IN HONEY

No 355

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Introduction: Nitrofurans are antimicrobial drugs which are banned in Argentine, as well as in many other countries of the world. The resolution SENASA N° 248 – 1995 prohibites its use in our country. This resolution establishes zero tolerance for the nitrofurans metabolites in any biological matrix. In this work, we have analized the dynamics and nitrofuran metabolite permanence (AOZ, 3-amino-2-oxazolidinone) from one honey harvest to another.

Methods: We have studied fourteen apiaries with contamination AOZ in cage-nursery honey (Enzyme Immunoassay for the quantitative analysis of AOZ, Ridascreen Nitrofuran, R-Biopharm AG Laboratory, Germany). We have established several norms of low cost for the producer (as stop the drug administration, replace the contaminated honey in the cage-nursery, do not translate honey shallow frame inside the apiary, avoid honey contact with the wax, prevent high temperatures, etc) with the purpose of eliminate the residue AOZ in the future honey harvest. After the application of these norms, AOZ metabolite was determinated in honey from super frame in the following honey harvest. Both results were compared to evaluate the AOZ dynamics in the apiary.

Results: The fourteen apiaries analysed have presented AOZ levels between 0.36 and 11.32 mg/kg in cage-nursery honey. The 78.6 % of these apiaries have not presented the AOZ residue in honey from super frame after the application of the preventive norms suggested. As the same moment, in the 21.4%, this residue was detected with levels between 0.58 and 2.14mg/kg.

Discussion: The norms suggested to the producer were highly effective for the elimination of the AOZ residue in apiaries contaminated from one honey harvest to another. It was possible to establish that the apiaries with cage-nursery honey levels below 1.3mg/kg have not presented AOZ residue in honey from super frame, while the ones with levels above this value, have presented a variable behavior. Finally, to obtain a total elimination of this residue, it is recommendable to take others extra measures which required bigger economical inversions.

STUDY OF STREPTOMYSIN ANALYSIS IN HONEY BY PIA METHOD

No 356

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Introduction: PIA is one of the latest analytical method as antibiotics in foods. Characteristic of PIA method are convenient operating activity and quick measurement. Although PIA method has already been used for antibiotics analysis in the milk and meat industries, it isn't used in the honey industry. In this time, we researched analysis of Streptomycin (SM) in honey by PIA method.

Method:
1) Equipment
BiacoreQ(Biacore Corp. Sweden) and SM Kit were used for analysis in this study, and that conditioning was follow as according to instruction of Kit.
2) Experiment
2g of honey or experimental substance were diluted with 2ml of buffer solution, and injected into equipment. Adjust for influence of sugar content (concentration of sugars are 0 to 80%) were fructose, glucose and sucrose. Gluconic acid and plorine were used for adjustment of pH and amino acid.
Result: In this result, there was a much influence of sugar content for measurement but there isn't much influence with pH and amino acid.

Discussion: It was recognized that PIA method is useful for SM analysis in honey.
In this study, sugar content gives much influence with this analysis but sugar content of honey isn't varied so it's not big problem.

MONITORING PROGRAMME FOR HONEYBEE COLONIES LOSSES IN SELECTED AREAS OF NORTHERN ITALY

No 357

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Further to honeybee colonies losses occurred during the last years in some areas of Veneto and Emilia Romagna Regions, a monitoring programme was set up by National Reference Laboratory for Beekeeping - Istituto Zooprofilattico delle Venezie (Padova), C.R.A.-Istituto Nazionale di Apicoltura and DiSTA University of Bologna. The programme was supported by Bayer Cropscience S.r.l., Milano.
On the basis of previous preliminary field studies, the honeybee losses were usually concentrated when the principal agricultural event was the maize seeding. So, the monitoring areas were selected according to common parameters in the both Regions. The areas under investigations were characterised as follows: 1) no maize; 2) only maize; 3) combination of maize with other cultivations. A total of 144 beehives were recruited equally distributed in Veneto (72) and Emilia Romagna (72) Regions. Each of the three areas was covered by 24 hives divided in 3 stations (8 hives). The typical monitoring station was used: beehives characterised by similar strength and equipped with "underbasket cage" to collect dead bees. The weekly monitoring programme started in Winter 2004 and will continue until May 2005. During this period beehives are monitored for strength, development, bee mortality and diseases. Dead honeybees and samples of honey and pollen will be

collected, properly stored and analysed later on. Laboratory investigations were centred on agricultural pesticides routinely used in the areas, according to the information provided by the Regional Phytosanitary Service. Honeybees will also investigated for diseases in order to exclude them as possible cause of honeybee losses. In case of bee losses, pollen collected by traps could be used to trace foraged plants. The proposed programme aims to contribute to the current knowledge on the causes of honeybee colonies losses.

ECONOMIC IMPORTANCE OF APOID POLLINATORS (APOIDEA) AND BEEKEEPING DEPICTED IN POLISH PHILATELIC AND PHILUMENISTIC ISSUES

No 358

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The aim of this study was review of Polish postage stamps, postcards, occasional stempels and philumenistic labels showing bees and apiculture. Presentation was based on author's own collection and national catalogues enumerating some tens of these items issued on the occasion of apicultural meetings, philatelic exhibitions and other events, e.g. XXXIst APIMONDIA International Apicultural Congress, Warsaw, Poland, 1987, national Polish Beekeeper's Days etc. The oldest Polish stamps (2-stamp set, 1956) on this topic were printed on the occasion of the 50th Dr. Jan Dzierzon's Death Anniversary show honey-bee (Apis mellifera L.) visiting clover blossom and a portrait of the world-famous Polish apiarist (1811-1906). Analyses of collected material show that majority of issues in question were devoted to conservation of honey, solitary and bumblebees (Apis mellifera (L.), Bombus terrestris L., Bombus lucorum (L.)). These hymenopterans are presented as beneficial insects of great economic and ecological importance, mainly as effective pollinators of orchards, various agricultural and horticultural cultivars, herbs, weeds and other wild and cultivated plants (e.g. Centurea cyanus L., Matricaria chamomilla L., Papaver rhoeas L., Trifolium pratense L.). Honey-bee and other bee species depicted in the national match-box labels are usually supplemented with very communicative captions and slogans, which run as follows: "Bees grow crops", "Bees in orchard – more fruit", "Bees in orchard – grown fruits", "More bees – more fruit", "Bees grow harvest", "Bees are friends of farmers", "Bees are yours allies", "Bee – useful insect" , "Hymenopteran insects" (concerning bumble- and solitary-bees), "Let's safe bees!", "Protect bees against extermination". These inscriptions are clear, comprehensible and needn't comments. Presentation of bees and apiculture in philatelic/philumenistic values is worthy of recommendation method of popularization of bees, apiculture and idea of nature conservation. It seems to be very helpful in ecological education of society.

PLANT COMPETITION IN POLLINATION OF CANTALOUPE (CUCUMIS MELO, L) WITH HONEYBEES (APIS MELLIFERA L) IN NORTHERN MEXICO

No 359

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The purpose of the research was to determine trough the pollen identification the plants visited by bees during induced cantaloupe pollination, and how many plants can bee competitors for the crop in bloom. This work was carried out in the Comarca Lagunera, which is located in the states of Coahuila and Durango in northern part of Mexico, during the spring and summer. In these seasons, anthers of wild, cultivated and ornamental plant species were collected in order to isolate and identify the pollen, using the acetolisis technique. Plants were photographed, collected and desiccated to be preserved in the herbarium. The pollen was processed and then observed in a microscope Olympus model BH-2, connected to a TV screen and was measured with objective micrometer and 100X immersion oil. The pollen was photographed at 40X and 100X with a reflex Minolta SRT 101 camera, Rokkor lens PF 58 mm in a tripod. Color slide film ASA 100, f/9 obturation and a _ second speed. Were obtained at least 2 images at different angle and scanned in a 3500C HP scanner. During the first blooming month, a six ha commercial cantaloupe crop, were pollinated with 18 bee colonies, half of those had a bottom pollen trap. The pollen were collected twice a week, weighed and frozen. An aliquot of the corbicular pollen was processed and mounted to identify the pollen and counted in the light microscope by fields at 40X. The results showed (number of pollen grain basis): cantaloupe pollen 8.7 %, 9.8%, 17.6 %, 9.3 %, 28.1% and 83.5% respectively. Pollen size was calculate with the formula for volume V =a2b where a is the major axe and b the minor axe, then the percentage of pollen for cantaloupe was: 51.6%, 85.0%, 66.6 %, 84.4%, 68.9% and 95.0%. The cantaloupe, then, is the major pollen source and the main plants present in the sample like mesquite (Prosopis juliflora), alfalfa (Medicago sativa), creosote bush (Larrea divaricata), cucumber (Cucumis sativus), London rocket (Sysimbrium irio) and sorghum (Sorghum vulgare) are a supplementary sources. The number of different plant species including cantaloupe in the samples dates were: 7, 11,13,17, 21 and 15 respectively.

PALLINOMORPHOLOGY OF SOME MELLIFEROUS LAMICEAE

No 360

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Morphological characteristics of polen of Stachys annua L., Prunella vulgaris L. and Lamium purpureum L. were analyzed in order to contribute to the melissopalynological investigations and pollen identification of melliferous plants. These weedy species, belonging to familly Lamiaceae, are characterised with long-lasting flowering period, and are very abundant in ruderal habitats, stubble-fields, crops, and tillages and thus represents constant resource of food (nectar and pollen) for honeybee.
Morphological observations included determination of pollen shape and size by measuring the polar axis (P), equatorial diameter (E), colpus length (CL), and exine thickness (ET). Exine structure and ornamentation were also analyzed.
Pollen from fully matured anthers was acetolysed and mounted in glycerin jelly for light microscopy. For scanning electron microscopy (SEM) examination, prepared pollen grain specimens were coated with gold. Pollen is isopolar, radially symmetric, and either tricolporate or hexacolpate. Exine is semitectate and reticulate. The tickest exine was found in Prunella vulgaris (1.2-2.4_m). The pollen grains are monad and mostly medium or small size. Polar axis ranges from 28.32 to 38.02_m and equatorial diameter ranges from 21.24 to 39.29_m. Among the species investigated, the largest pollen grains on average were observed in Prunella vulgaris. The polar outlines are more or less circular, oblate to prolate (P/E= 0.80-1.36). The shapes of pollen in equatorial view are variable among the species. They are prolate-spheroidal (Stachys), subspheroidal (Prunella) and subprolate (Lamium).
These insect pollinated species, well-known as a good nectariferous-polliniferous plants, have low pollen production and poor dispersal, but the plants are so widespread that it could consider them to be a good melliferous plants.

Key words: pollen, morphology, Lamiaceae

ANATOMICAL CHARACTERISTICS OF FLORAL NECTARY OF *MARRUBIUM VULGARE* L. (LAMIACEAE)

No 361

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Floral nectaries of White Horehound (Marrubium vulgare) plants, grown outdoors in the experimental field, were studied during different flowering stages. This study utilized light and fluorescence microscopy to analyze location and anatomical structure of the gland, and the possible way of nectar exudation from nectary.
The floral nectary is located on the outer surface along the ovary base forming a four-lobed disc. In mature nectaries, according to the anatomical observations, three major zones were identified: the one-cell-layered epidermis, the sub-epidermal secretory tissue and the vascular tissue. The nectary epidermis is covered with a very thin cuticle, and it contains many modified stomata involved in the exudation process. The stomata are situated in the upper portions of the nectary. They lay at the same level of the epidermis. The secretory tissue is composed of small cells with thin walls, relatively large nuclei, dense granular cytoplasm, and small vacuoles. The floral nectary was vascularized exclusively by phloem originating from vascular bundles destined for the gynoecium.

Key words: Ocimum basilicum, nectary structure, modified stomata

SELECTION FOR HONEYBEES WITH HIGH PREFERENCE FOR AVOCADO FLOWERS

No 362

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Intensive activity of honeybees is essential for high fruit set in avocado orchards, but even when hives are located inside the orchard, many bees still search for alternative blooms. We tested for a possible genetic component for a preference of avocado bloom relative to competing bloom. Hives were placed in two avocado orchards in Israel. The honey from each hive was extracted at the end of the avocado bloom, and the concentration of perseitol, a carbohydrate that is unique to avocado, was analyzed. Colonies with the highest and lowest perseitol concentrations were selected to parent the 'high' and 'low' lines, respectively. Queens were raised from the selected hives and were instrumentally inseminated with sperm of drones from similar hives. The hives with the inseminated queens were introduced to the same avocado orchards the next year, together with the surviving selected hives.
Hives of high-line inseminated queens had greater perseitol concentration than those of the low line, and the selected hives that survived from the previous year again had outstanding, high or low concentrations, respectively. Queens with outstanding performance were selected as parents for a second generation of inseminated queens and are presently tested in the field. So far, the results reveal a genetic component for foraging on avocado flowers, which can be selected for.

POLLINATION OF GREENHOUSE CROPS WITH *BOMBUS TERRESTRIS* L. IN TURKEY: NEW PROBLEMS AND PROSPECTS

No 363

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Bombus terrestris has been used as pollinator of tomato, pepper and eggplant in Turkey since 1997. Turkey has over 22,000ha of greenhouse area and 51% of that area is used for the production of tomato. The number of colony used is being increased rapidly year by year. In 2004, approximately forty thousand of Bombus terrestris colonies are used for pollination in 2000ha greenhouse area. Bombus terrestris are widely used in the Mediterranean coastal region, where the greenhouse sector has been developed. It is estimated that 100,000 of Bombus terrestris colonies will use in 5,000ha greenhouse area in 2010. The commercial rearing of Bombus terrestris has not yet been fully developed in Turkey. Some experiments related with pollination efficiency, rearing techniques, life cycle in nature and genetic diversity of Bombus terrestris have been conducted in Turkey. Also there is a considerable concern about the possible ecological impacts of an invasion of Bombus terrestris into natural habitats in the last years.

INVESTIGATION ON THE ALMOND AS HONEY PLANT

No 364

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This paper deals with three years investigation of the almond as honey plant. Phenology of flowering, the effect of climatic conditions on extracted nectar, the production of nectar, sugars, honey and pollen on 10 cultivars of almond growed in Skopje region has been investigated. The investigations showed that there are the differences in the production between the cultivars. In the average investigated cultivars of almond offer feeding source for the honey bee during 30 days and gave 23,63kg/ha nectar, 5,22kg/ha sugars, 6,52kg/ha honey and 6,98kg/ha pollen.

INFLUENCE OF HONEYBEES AS POLLINATORS ON YIELD OF HYOLA 401 RAPE SEED

No 365

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Introduction: Aliabad is a city of Golestan province in Iran and because of numerous natural resources more than 72 crops are cultivaed in this region.
In 1927 Fechner reported cross-pollination in rape seed increase 14% weight of seeds.
Methods: Autum cultivated rape seed hyola 401 was used in this experiment in which the duration of flowering is 22-45 days.
We introduce 2-6 colonies of honeybees per hectare.
Results: In this reseach colonies of honeybees were introduced to rape seed.
The best result of pod number (91 and 76) were obtained.while absolute weight of 1,000 seed (4.2g) was the largest in cross-pollination.the pods were longer containing more seeds and greater weight of seeds. Increasing of yield was 44% obtained by introducing of honeybees to hyola 401 rape seed.

FLOWERING OF IMPORTANT HONEYBEE FORAGE PLANTS IN RELATION TO HONEY FLOW SEASONS AROUND BUDONGO CENTRAL FOREST RESERVE, UGANDA

No 366

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Introduction: This study assesses the relationship between flowering periods of important honeybee plants and honey flow seasons in and around Budongo Forest Reserve, Uganda. Important honeybee plants should be studied since amount of nectar they produce determine the amount of honey produced. A beekeeper should know when flowers bloom, whether they supply both nectar and pollen and how dependable they are.
Methods: Data was collected during the period March 2001 to April 2003 in villages including Biso, Nyantonzi and Nyabyeya in and around Budongo Forest Reserve. Techniques used included direct group discussions, semi structured questionnaires which were used to determine the honey harvesting periods from beekeepers. Observations were taken on the flowering periods of important honey plants. The list of important honey plants was obtained from observations and literature. The flowering periods of important honey plants were then correlated to the honey flow seasons.
Results: A total of 87 plants species belonging to 36 families were visited with Mimosaceae (10 species) and Caesalphiniceae (7 species) being the most important species used. Other important families include Myrtaceae (5 species), Solanaceae (5 species) and Moracese (5 species). A total of 58 species (68%) of the forage plants were located both in the forest as well as in villages. The number of plants visited for both pollen

and nectar was 50 species (57.5%). Those visited exclusively for nectar were 30 species (34.5%) while those visited for pollen only were 7 species (8%). Most plants flowered in the rainy seasons i.e. first rain season of April to May and the second rain season of August to November. It was however, noted that some plants such as Calliandra colotyhrsus and Hibiscus esclentum flowered throughout the year. The bee species used trees, shrubs, herbs. There were two major periods of honey harvesting: June to July and November to February. Thus the honey flow season immediately followed flowering periods.

Discussion: The forest supports a variety of plant families that provide good forage for the bees. The flowering periods of most trees occur in the beginning of the rain seasons while others like agricultural crops depend on the sowing date. Plants like Calliandra callothysurs flowered throughout the year which is very good for sustainable honey flow. The high number of forage plants found both in the forest and village can be attributed to some plant families that are now cultivated by farmers and domesticated to serve a variety of purposes. Honey harvesting period lag behind flowering periods because of the fact that rainfall or cold temperature induce flowering of bee forage plants. After the plants have flowered, bees begin to collect nectar which is later converted to honey.

POLLEN ISOLATION AND IDENTIFICATION OF WILD, CULTIVATED AND ORNAMENTAL PLANTS IN LA LAGUNA DISTRICT, MEXICO

No 367

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In the Comarca Lagunera region located in Coahuila and Durango states in northern Mexico, the anthers of wild, cultivated and ornamental plant species were collected in order to isolate the pollen using the acetolisis technique. The collection serves as a reference database for identifying plants visited by honeybees and the plants blooming period in the area. Beginnig in the spring of 2002 and through the year 2003 and 2004 were obtained, processed and photographed pollen of plants. Plants were photographed, collected and dessicated to preserve in the herbarium. The pollen samples were processed and observed in a microscope Olympus modelo BH-2, connected to a TV screen. Each pollen grain was measured with objective micrometer immersion oil at 100X. Pollen grains were photographed at 40X and 100X with a reflex Minolta SRT 101 camera, Rokkor lens PF 58mm mounted in a tripod using color slide film ASA 100, f/9 obturation at a _ second speed. At least 2 images were obtained at different angle and scanned in a 3500C HP scanner. The collection has, up to date,105 –wild, cultivated and ornamentals- species. We found plants of the families Acantaceae, Aloaceae, Ampelidaceae, Apocinaceae, Asteraceae, Bignonaceae, Boraginaceae, Brassicaceae, Cactaceae, Convolvulaceae, Cucurbitaceae, Drupaceae, Euphorbiaceae, Fabaceae, Juglandaceae, Labiatae, Malvaceae, Moraceae, Myrtaceae, Nyctaginaceae, Palmaceae, Papaveraceae, Pittosporaceae, Poaceae, Polygonaceae, Portulacaceae, Punicaceae, Oleaceae, Quenopodiaceae, Rosaceae, Rutaceae, Solanaceae, Tamaricaceae, Ranunculaceae, Umbelliferae, Verbenaceae and Zygophylaceae.

MORTALITY OF HONEYBEE COLONIES INFESTED WITH TRACHEAL MITES (ACARAPIS WOODI)

No 368

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It is one hundred years since the condition known as the 'Isle of Wight' disease was first identified. The tracheal mite (Acarapis woodi) has been associated with this condition that devastated honeybee colonies in Britain and Ireland from the early 1900s and that later spread to Europe, finally reaching North America in the mid 1980s. It is generally accepted that colonies going into the winter with fairly high levels of tracheal mite infestation have a significantly increased probability of dying before the springtime. This is more likely to occur in locations with cooler climates. Recent experience would indicate (particularly from North America) that mortality generally occurs without the presence of other pathogens. We postulate that the bees in heavily infested colonies have a reduced ability to use their thoracic muscles to heat the winter cluster thus contributing to temperature stress. Also, the reduced brood associated with infested colonies and the resulting reduced bee population further stresses the brood nest. We show that temperature stress gives rise to increased mite infestation in the emerging callow bees and suggest that this further contributes to the decline of the colony. A comprehensive model is proposed to explain the mortality of honeybee colonies with tracheal mite infestation.

HONEYBEES PREFER NECTAR OF COMPETING BLOOM TO NECTAR OF AVOCADO

No 369

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Honeybees are important avocado pollinators, but even

when bee hives are placed in an orchard, bees tend to prefer competing blooms, and avocado pollination is often inadequate. The possible effect of nectar composition on the preferences of bees was tested in this work using three different methods: choice between feeders, crop load and learning. When choosing between feeders containing equal sugar concentrations of sucrose solution, diluted avocado honey and diluted non-avocado honey, bees preferred the non-avocado honey and sucrose solution to the avocado honey. The crop load of bees feeding on avocado honey in the lab was smaller than the crop load of bees feeding on non-avocado honey. A similar trend was found when the crop load of bees feeding on avocado or non-avocado nectar in the field was analysed. In conditioning of the proboscis extension response, the percentage of bees that learned to associate between odour and reward was lower when the reward was avocado honey, compared to when it was non-avocado honey or sucrose solution. Moreover, an increasing percentage of bees refused to consume the avocado honey reward during the course of the experiment. The different methods yielded similar results, indicating that honeybees prefer honey that originated from competing bloom over avocado honey.

THE MONOFLORAL HONEY PARADIGMA REVIVAL IN TROPICS: BIOCHEMICAL AND ECOLOGICAL CHARACTERIZATION OF THE MOST IMPORTANT HONEYS IN VENEZUELA ALONG MANGROVE, DESERT, FOREST, PARAMO AND TROPICAL SAVANNA ECOSYSTEMS

No 370

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We are harvesting Venezuelan honeys in different tropical Venezuelan ecosytems in the last 14 years. We have characterized, making use of organolectic and palinological approach six ecological syndromes in Venezuelan Honeys producing the same flavors along 14 years:
1) Mangrove honey: From estuaries at the mangrove ecosystem coast. Bouquet Avicenia germinans-Conocarpus erectus.
2) Desert Honey: From desert shrub of Lara State. Canapire Bouquet.Croton ovalifolius bouquet (Euphrbiaceae)
3) Alcornoque Honey: From stationary Llanos of Orinoco River. Bowdichia virgiloides bouquet (Leguminosae).
4) Mastranto Honey: From irrigated Orinoco Llanos at east, Mesa de Guanipa, Monagas and Anzoàtegui states. Hyptis suavelons bouquet.
5) Pre-mountain Honey Llano: (Leguminous and Mirtaceae syndrome)
6) Cordillera mountains: Oyadaea verbesinoides bouquet (Compositae).
We present biochemical and ecological dates that open a new classification of honey monotypes considering ecological tropical syndromes. This approach is important to the origin certification of honey and to increase our knowledge about the ecological and therapeutic value of tropical ecosystems: the last source of biodiversity packed in

COMPARISON ON POLLEN COLLECTING OF ANATOLIAN AND ITALIAN HONEYBEES

No 371

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This study was performed to compare pollen collection by Anatolian, Apis mellifera anatoliaca, and Italian, Apis mellifera ligustica, honeybees foraging at the same time from the same apiary. Ten colonies of each race were used in the study, which lasted for about a month. The apiary was located in Bursa, Turkey. Hives with full-bottom pollen traps were used to collect pollen. Pollen traps were kept open at all times during the study. Pollen pellets were collected once a week, homogenized by mixing, transported to the lab on ice and stored in a deep freezer. In order to determine the plant sources of pollens, 500 pollen pellets were randomly taken from each sample and analyzed. According to the color, pollen pellets were classified, and then examined under light microscopy.
Most of the pollen collected (mean 71%) was from Cistus creticus L. (dominant pollen source). Cruciferae, Cistus salviifolius L., and Pistacia L. spp, pollen were the other major types found in the samples (combined: mean 18%). Anatolian and Italian colonies differed on the percentage of Cistus creticus L. and Pistacia L. spp. pollen collected on some dates. However, no systematic effect of honeybee race was found. That is, Anatolian bees on most dates did not differ from Italian bees in their pollen collection.

Key words: Honeybees, Pollen, Anatolian, Italian, Turkey

GENETIC CHARACTERIZATION OF BUMBLEBEES (HYMENOPTERA: APIDAE) IN SLOVENIA

No 372

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About 300 bumblebee (Apidae: Bombus) species in 38 subgenera are known in the world. Nine out of 16 European subgenera of bumblebees can be found in Slovenia based on previous studies using morphological variation. In this study we obtained mitochondrial DNA sequences for assessment of genetic structure and

diversity of bumblebees in Slovenia. We collected over 200 bumblebees from 54 different localities in Slovenia and sequenced 320-bp fragment of mitochondrial cytochrome oxidase I. The majority of sequences obtained from specimens of the same species were identical. Our sequences have been also compared to 333 sequences of bumblebee mitochondrial COI fragments, which have been already deposited in the GenBank. Sequences were highly similar or identical. In addition, species: B. lucorum, B. pascuorum, B. pratorum, B. hortorum and B. lapidaries, which are widely spread all over Slovenia, will be studied by microsatellite analysis.

PHYSICOCHEMICAL CHARACTERIZATION AND POLLEN SPECTRUM OF PORTUGUESE HONEYS

No 373

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The present work was conducted to evaluate the quality of honey samples, of a mountain region of central Portugal, from five consecutive harvests.
The qualities of selected honey samples (85) were evaluated by determining the pollen spectrum and physicochemical attributes.
Melissopalynological tests were carried out according the method proposed by Boletin Official del Estado, Spain (1986) and Louveaux, Maurizio and Vorwhol (1978).
Honeys were considered to be unifloral whenever the dominant pollen was found to be over 45%.
For the physicochemical characterization, seventeen parameters were selected. They are the most representative and most often used. The analyses were performed by methods according to the Codex Alimentarius Commission 2001 and other international honey standards (2001/110/EC, EU Council 2002), Portuguese regulations (Decreto-lei Nº 214/2003), the AOAC (Herlich et al., 1990) and Sancho, et al. (1992).
In the samples analysed, 5,88% were unifloral of Ericaceae, 34,12% unifloral of Erica sp., 14,12% polyfloral with a high percentage of Erica sp. and 45,88% of other polyfloral honeys.
The average values, standard deviation and minimum and maximum values of physicochemical parameters (colour, water, electrical conductivity, total ash, insoluble matter, pH, free acidity, lactones, total acidity, formol number, fructose, glucose, sucrose, fructose+glucose, fructose/glucose ratio and diastase, hidroxymethylfurfural, glucose/water ratio) were estimated for the several types of honey.
The samples were found to meet all major national and international specifications. However nine samples present formol number above 1,55meq/100g, indicating that bees were fed with proteins derivatives and seven samples present insoluble matter percentage between 0,1% and 0,5%.

Seventeen physicochemical parameters were measured (analysed), including colour, water, electrical conductivity, total ashes, diastase, hidroximethylfurfural (HMF), formol number, pH, acidity (free, lactone, total), fructose, glucose and sucrose, fructose+glucose, fructose/glucose ratio and glucose/water ratio.

PHACELIA AS POTENTIAL BASIS FOR HONEYBEE AND ANIMAL FOOD

No 374

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In Serbia there are around 300,000 beehives that are mostly migratory type. Natural vegetation is diverse, but most of the bee pasture is black locust. However, in last few years, buds of this plant are freezing by the spring frosts that lead to absence of abundant bee pasture.
In aim of finding out the solution for missing black locust pasture, we did two years investigation on two *Phacelia tanacetifolia* cultivars – Blanka and Julija. Examinations were done on experiment plots 2 x 2 x 2 m. Plots were agrotechnicaly prepared and sowed by phacelia in the middle of the March. During flowering time were covered with isolation cages where LR bees' nuclei were placed.
During experimental period phacelia did not suffer any damaged by spring frosts. Results of the investigation are showing that bee visited more Julia cultivar, and occurrence of bigger quantity of the honey expressed in 1/10 frame. There were no difference in quantity of brood and bees in examined cultivars.
Beside beneficial for honeybee, we examined phacelia like fodder base. Considering huge greenery, phacelia was mowed after flowering and used for preparing experimental silage. Results showed that in mixture with alfalfa, phacelia could be a very good food for animals.

THE INFLUENCE OF HONEYBEES AS POLLINATORS ON THE INCREASE OF YIELD OF SOME BLACKBERRY CULTIVARS

No 375

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The purpose of this work was to investigate the significance and influence of honeybee on the yield of two leading blackberry cultivars on a private property. The experiment was set in 2002/2003 in an orchard where blackberry was planted with cultivars Black satin and Dirksen thornless. The soil was maintained in the state of idle land and fertilized annually only with manure

and without irrigation.
Three bushes with certain number of flower buds were selected from each cultivar. In the first variant (anemophyllic-by wind) counting and marking flower buds and isolation of fruitfull twigs with the bags made of tulle was conducted. In the second variant of self-pollination the fruitful twigs with flower buds were isolated with pergament paper bags. In the third variant of entomophyllic pollination with honeybee, after counting and marking, fruitful twigs were left free. In the fourth variant castration of flowers from which anteras were taken manually from the selected flowers. Every seven days the process of fertilization, growth, development and maturation of fruits was followed, fruit mass was measured and the number of kernels in each fruit was established.
The results of the experiment show that the percentage of mature fruits was greater in the cultivar Black satin (77.78%) than in the cultivar Dirksen thornless (74.45%) in the variant of pollination with honeybee. The smallest percentage of mature fruits was recorded in both cultivars in the variant of self-pollination. Fruit mass was the greatest in both cultivars in the variant of entomophyllic pollination, and the smallest in artifical and self-pollination. The number of kernels in a blackberry fruit was the greatest in both varieties in the variant of entomophyllic pollination with honeybee (76 and 74) and the smallest in artificial (70 and 67) and self-pollination (73 and 68). We can conclude that the honeybee is the most efficient and the safest pollinator providing greater yield (of 30%) and better quality of blackberry fruits.

USE OF ANTIBIOTICS IN CONTROLLING THE DISEASES OF BEES AND THEIR PRESENCE IN HONEY

No 376

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Honeybee (Apis mellifera) is exposed to various diseases (of bacterial, viral, parasitical ethyology) and vermin which leads first to the decreased yield, and in the late phase to the loss of bee colonies. In order to mitigate the consequences of diseases in apiculture, as in other branches of livestock breeding, drugs have been applied for a number of years already. That is how antibiotics found their ample use, contributing significantly to controlling the diseases of bees. However, uncontrolled use of antibiotics results in their retention in bee products, and it is a well known fact that the presence of antibiotics in honey, as in any other kind of foodstuff, is not allowed.
In our researches we have followed the retention of oxitetracyclin in honey in the treated colonies, in weak, medium and strong ones in the kernel itself, where development is tumultuous and metabolism and circulation of food (honey and pollen) are intensive, an in the honey extracted from the treated bee hives and stored at an adequate temperature.
Based on the conducted research it was concluded th the retention of oxitetracyclin in weak and medium colonies in a bee hive is between 46 and 40 days and strong colonies 25 days. The retention of oxitetracycli the stored honey is 315 days.

BUMBLEBEES IN DINARIC FOREST

No 377

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Without influence of man Slovenia and most of the Europe would be covered with forest. Because vegetation has a high influence on bumblebee (Bombi fauna we can conclude that bumblebee's today's distribution, phenology and selection of food plants ar influenced by human. Bumblebees are traditionally treated and researched as meadow insects. Because conditions in forest are probably closer to natural conditions we are interested how these properties dif from the ones in meadow.
Sampling was taken in a part of a large area of primary forest in Dinaric region (southern Slovenia). Eighty randomly chosen sampling points were visited one to four times in a season form May to October 2004. Ea sampling point (2,000 square meters) was checked fo bumblebees and flowering plants.
Eight species of bumblebees all together were found; two of them member of a cleptoparasitc genus Psithyrus. Four most common species differ in time o abundance peak: B. pratorum reached highest abundance in June, B. lucorum in July, B. pascuorum August and B. hortorum in September. Interestingly, B hortorum's second generation had higher abundance than the first one.
Proboscis length correlated with the length of corolla neck in visited plant species. Bumblebees with long proboscis preferred plants with long corolla neck and similar with bumblebees with short proboscis. Surprisingly, in our investigation in forest, we found majority of bumblebee species living in whole area of dinaric region. Forest does not seem to be unsuitable habitat for bumblebees. Phenology and selection of fo plants resembles reducing niche overlaps and therefo minimizing interspecific competition.

USING MICROSCOPICAL ANALYSIS TO IDENTIFY THE BOTANICAL ORIGIN OF GREEK HONEYDEW HONEYS

No 378

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Honeydew honeys represent the 70-75% of the total annual honey production in Greece. The majority comes from pine honey (secretions of Marchalina hellenica) and another part is honey from Abies chephalonica (secretions of Physokermes hemicryphus). Honeydew honeys are discriminated from blossom honeys by electrical conductivity and sugars. Besides the organoleptic characteristics, no sufficient data exists to separate the different honeydew honeys according to their botanical origin. In this study we used microscopical analysis to examine the kind and number of the honeydew elements that were present in Greek fir and pine honeys in order to discriminate the botanical origin of these two types of honey.
During 2004 forty honeydew honey samples were collected from four areas of Greece that are characteristic for the production of the specific types of honey. All honeys had the sensory and physico-chemical characteristics of their type. Ten grams of each honey sample were diluted in 20ml of distilled water and centrifuged at 3,000crp for 10 min. The sediment of the solution was spread in a 22x22mm2 area on a slide and the honeydew elements were identified and counted in 20 optical areas in x200 magnification.
Coleosporium sp. was located in all pine samples while it was absent in fir honeys. Altenaria sp., Cladosporium sp., Capnodium sp. and hyphae were present in all pine and fir honeys, while Heterosporium sp., Stmpylium sp. and Helmithosporium sp. were identified only in a few samples of both types. The fact that Coleosporium sp. was present exclusively in pine honeys may be an indication, which in combination with sensory and physico-chemical characteristics, could be used to distinguish pine honeys from fir honeys.
To conclude, microscopical analysis could be used as an additional method to distinguish honeydew honeys from different botanical origin.

CHARACTERIZATION OF HONEYS FROM THE ISLAND OF RHODES, GREECE

No 379

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Samples of honey were collected during three different periods in two consecutive years (2001-2002) from Rhodes island, and analyzed for their physiochemical, microscopical, volatile, antioxidant and bacteriostatical characteristics.
The first honey harvest in spring is characterized by the presence of Cistus sp., Echium sp., Myrtus communis, Pistacia lentiscus, Sinapis sp., Trifolium sp., and honeydew elements. It's a multifloral honey with no distinct characteristics from other similar honeys produced in other parts of Greece.
The second harvest in summer is characterized by the predominant presence of Thymus sp. pollen grains, accompanied by Cistus sp., Myrtus communis, Sinapis sp., Taraxacum officinalis and Liliaceae. Its physiochemical characteristics are similar to honeys produced from the same source in other parts of Greece. Differences exist a) in the content of pollen grains (Rhodes honey has > 45% pollen grains from Thymus sp., while honey from other areas has >18%), b) in the volatile and semi-volatile characteristics (out of 106 compounds,18 are found in all samples), c) in the high antioxidant activity (averages 777_M/25mg of honey) and d)in the high bacteriostatic activity (MICs 12% for P.syringae and 10% for B.subtilis. MBAs 15% for P.syringae and 12% for B.subtilis).
The third harvest in autumn is really two harvests. During the first one, the remaining thyme honey is blended with pine honey giving a unique mixture of a tasteful honey that has more than 20% pollen grains of thymus and electrical conductivity >1,00mS/cm. This type of honey is characteristic of Rhodes Island and cannot be found in honey from other countries. Finally, honeydew honey from the secretions of Marchalina hellenica in pine forest is harvested. The HDE/P of this honey range between 0.26 and 24.3. More than 70% of the total numbers of honey samples contain Thymus sp., Cistus sp., Echium sp., Eucalyptus sp., Myrtus communis and Liliaceae. Pine honey from Rhodes has similar physicochemical characteristics with pine honey produced in other parts of Greece but differs in volatile and semi-volatile characteristics.

HEAVY METAL CONTAMINATION OF HONEY IN VENETO REGION (NORTHEASTERN ITALY): AN OVERVIEW OF THE SITUATION 2003 - 2004

No 380

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The honeybee is a good bioindicator of environmental pollution and beehive products are also considered an

accumulator of radioactive elements, heavy metals and pesticides. This paper presents the results of the monitoring on the contamination of honey produced in Veneto Region (northeastern Italy) by heavy metals such as lead and cadmium, carried out in collaboration with local beekeepers' associations.
Honey samples (120) produced during 2003 and 2004 were analysed with the electrochemical technique of square wave anodic stripping voltammetry. The results of the analyses showed a contamination level generally comparable to that detected in similar studies carried out in other Italian regions. In fact, the values ranged between 45 and 332ng/g for lead and between 0 and 39ng/g for cadmium.
The comparison of the contamination levels between honeys with different botanical origin revealed in general higher heavy metal residues in mountain multifloral honeys and Tilia honey, if compared with other honey types.
The correlation between the data obtained and the geographic sites of honey production allowed to map the pollution levels of the different area in the Veneto Region. Heavy metals contamination of the honey samples analyzed has never been a threat to human health, but a continuing monitoring is recommended for the future.

WHAT IS THE SITUATION ABOUT ANTIBACTERIAL RESIDUES IN HONEY COMMERCIALIZED IN ITALY?

No 381

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Antibacterial drugs are worldwide used for the control of American and European foul brood even if their use in beekeeping is illegal (Regulation (EEC) 2377/90 and further amendments) because no MRLs have been established. The administration of these antibacterial drugs is applied without approved protocols and instructions for use. As a consequence, this practice is responsible for the contamination of beehive products and contributes to the problem of food safety. According to Council Directive 96/23/EC laying down measures to monitor certain substances and residues thereof in live animals and animals residues, and according to Decree 336/99 (National Residues Plan), honey produced by Italian beekeepers and honey imported from third countries has been investigated for antibacterial substances. 414 honey samples collected in 2004 were analysed for antibacterial residues of tetracyclines (TCs), sulphonamides (SPs), streptomycin (ST), chloramphenicol (CAP) and tylosin (TL). 2.2% of samples wre positive for the antibacterial drugs analysed, in particular 1.2% of honey collected from local beekeepers and 1.5% of imported honeys. Furthermore, local honeys resulted positive only for SPs, whereas in the imported honeys two antibacterial substances investigated were detecte ST and TL. The results obtained are indicative of the presence of residues of antibacterial drugs in honey irrespectively of its origin. The situation appears better than that observed in 2003 when 5.0% of honey samples resulted positive to antibacterial drugs. In particular, a rather frequent use of SPs was registered both in imported honey and in that collected from local beekeepers. Furthermore, in the last group, 3 samples out to 150 and 2 out to 12 resulted positive for TCs and for TL, respectively. Finally, a continuous residues monitoring programme is needed, accompanied by an educational activity to beekeepers on hive management and a wide application of sanitising treatment of beekeeping materials to reduce the spread of bacterial diseases.

HONEY SOURCES OF THE REGIONAL RESERVE "COLLI EUGANEI" (VENETO REGION, NORTHEASTERN ITALY)

No 382

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Honey production strictly depends on botanical species existing in a landscape. The knowledge of the flora of beekeeping interest and the cartographic description of the vegetation are important tools to understand the botanical origin of honey and the potential for beekeeping. This allows us to manage appropriately honey sources and to support the expansion of some botanical species in accordance with the existing vegetation asset. The technical map of the Veneto Region (northeastern Italy), 1:5,000 scale, was used in field surveys. The Ortofotocarta digitale IT 2000 softwar of the same area was applied. The limits of the differen botanical types carried out by means of photointerpretation techniques were transferred to topographic maps. Both spontaneous vegetation types and categories related to the use of the soil were considered. The vegetation analysis was carried out using the phytosociological method (Braun-Blanquet, 1928) in June-July 2004 sampling homogeneous areas representative of the different plant communities. The scientific nomenclature follows Pignatti (1982). The different species were quantitatively evaluated, within each layer, with a 7-value-score. Finally, the map obtained was computerised using the ArcView GIS 3.2 software. The most relevant nectariferous types were a follows: Fagaceae (Castanea), Brassicaceae (Diplotaxis), Rosaceae (Prunus, Rubus), Fabaceae (Robinia, Lotus, Trifolium, Vicia), Lamiaceae (Teucrium, Thymus, Calamintha), Apiaceae (Eryngium, Foeniculum, Bupleurum), Scrophulariaceae (Odontites, Veronica) and Asteraceae (Aster, Carduus, Senecio, Taraxacum). The most represented vegetations are chestnut and black

locust woods, vineyards and olive-yards with herbaceous layers. The area was classified on a 4-level-scale basis according to the potential honey sources of the existing phytocenoses: extremely high, medium-high, medium-low, and null interest. The present survey could be considered as a pilot-study useful to improve the knowledge of the vegetation of beekeeping interest as well as to plan a more appropriate use of potential existing honey sources. Its application to other areas is strongly recommended.

INFLUENCE OF CULTIVAR ON POLLINATOR VISITING, YIELD, YIELD COMPONENTS AND SEED QUALITY COMPONENTS OF LUCERNE

No 383

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Two lucerne cultivars from Krusevac, K-22 and K-28 and cultivar Mediana were compared in this trial. Experimental plot was 2m2 and lucerne was sown in 25cm distant rows. Influence of cultivar on pollinator (honey bee, lucerne leafcutter, solitare bee etc.) visiting, seed yield, yield components and seed quality components (cluster, pod and seed setting, 1.000 seeds mass and germination) was investigated. Highest number of pollinators was attracted by K-28 cultivar, 13,3 in average within counting time of 30 minutes, by cultivar Mediana was 9,81, and cultivar K-22 9,06. Ratio between honey bee and other pollinators for all examined cultivars was about 3:1. Highest seed yield was with cultivar K-28 65,33g/m2, with cultivar Mediana was 47,28g/m2, and K-22 46,93g/m2. Cultivar K-22 had highest cluster and pod setting. Cv K-28 had highest number seeds per pod, 6,23 in average. Cv K-28 was significantly different for seed yield and number of seeds per pod from other cultivars. Differences between examined cultivars for other seed yield and quality componets were not statisticaly significant.

Key words: lucerne, cultivar, pollinators, seed yield, seed yield components

SUGAR CONTENT FROM DIFFERENT FLORAL ORIGIN OF BEEPOLLEN

No 384

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Introduction: Pollen itself is the male gametophyte in flowers. The female gametophyte produces nectar, a sweet liquid gathered and eaten by insects and other animals. This important substance, rich in sucrose and water, is the optimal environment necessary for the germination of pollinic tube and the release of its DNA into the female organ. For the fertilization of the flower, minerals are also needed and we suppose that polyphenolic compounds are also important as they are specie-specific (Campos et al., 1996) perhaps in an allelopatic way. On any individual trip from the hive or nest, a bee usually visits flowers of only one kind, ignoring others, unless the supply is very restricted. The flower constancy of bees is one of the factors restricting interspecific hybridization. Our purpose was to establish if the sugar content was also specie-specific as previously determined for phenolic content.
Methods: The method used was adapted from Campos (1989) , HPLC/DRI Method - briefly: 1 ml of CH3CN/H20 (83:17) flow through a LichroSorb CarboHydrate Column. Detection was performed using a differential refractive index (DRI) detector.
Results: Bee pollen samples randomly analysed from Portuguese market show an interval between 1.35% - 9.91% for sucrose, 4.4% - 15.8% for glucose and 7.7% - 20.2% for fructose content. The results lack further analysis to the nectar content of the flora studied.
Discussion: When beekeepers trap the pollen loads, at the entry of the hive, the manipulation of this product by bees is near null because they only agglutinated the pollen grains with nectar in order to make pellets. When they do not harvest nectar from the flowers they carry honey instead from the hive for the same purpose. Supposing that sugar content can be attributed to the nectar and/or honey that bees use to agglutinate bee pollen this causes added difficulties to the interpretation of the results obtained. Further studies need to be done but it seems that for quality control purposes of the sugar content of bee pollen, the limits can be established without include, for now, floral origin identification.

FLOWERING TIMES OF THE PLANTS OF KHARTOUM STATE WITH REFERENCE TO THEIR IMPORTANCE FOR HONEYBEES

No 385

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The survey and evaluation of Khartoum State area for flowering plants lasted for 18 successive months from February 1999 to July 2000. A list of 85 such plants is provided, bee plants abundance and dearth were clearly indicated. The various lengths of flowering periods of the various plant species, flowering density per plant and bees (Apis mellifera L. and Apis florea F.) preference for some of them were recorded. Indigenous plant species are mostly blooming during autumn and winter seasons. Exotic plants which are utilized in the area as shade and ornamental plants, many of them bloom during summer, therefore, they compensate for the lack of flowers in the dearth period.
About a dozen plant species can be referred to as good

foraging plants (key plants) in the area: Grewia tenax, Zizyphus spina-christi, Balanites aegyptiaca, Acacia nilotica, Acacia seyal, Capparis decidua, Tamarindus indica, Mangifera indica, Albizia lebbek, Plumeria spp., Eucalyptus spp. and Acacia mellifera. Guddeim (Grewia tenax) planting in the area is recommended on large scale. The important factor affecting flowering in the area was the availability of water (irrigation water, high under ground water-table and rains).
Khartoum State is rich in flowering plants, with more human efforts for green surroundings will have ample foraging sources for bees and hence suitable as a beekeeping place.

POLLINATION ECOLOGY OF HONEYBEES IN THE SUBMERGED MELALEUCA FORESTS

No 386

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The submerged Melaleuca forests have an important role in the regulation of climate and the protection of wildlife and environment in southern Vietnam. This paper deals with the pollination ecology of the honeybees in the forests. The following aspects have been investigated and data are presented on:
- The rewards of pollen and nectar of Melaleuca cajuputi Powell (Myrtaceae) and Nypa fruticans (Thunb.) Wurmb. (Palmae);
- The distribution of insect visitation to Melaleuca and Nypa flowers.

The results show the partitioning of insects by the two plants, the clear partitioning of visitation time by the two sympatric honey bee species, A. dorsata and A. florea, and also the clear partitioning of visitation time on the two different plants by either honey bee species.
Some questions raised from the above results; therefore, the following patterns of bee visitation to Nypa fruticans flowers under certain conditions were studied next:
- Apis florea while its sympatric honeybee, A. dorsata is excluded experimentally from the flowers;
- Apis florea in areas where it is the only honeybee;
- The two sympatric honey bee species, A. florea and A. cerana;
- The two sympatric species (A. florea and A. cerana) and the imported A. mellifera;
- The two sympatric species (A. florea and A. dorsata) and the two introduced species (A. cerana and A. mellifera).

The results show that in the absence of A. dorsata, A. florea forages earlier on flowers. Despite a competitive behaviour of the native A. dorsata towards the introduced A. cerana, there is temporal partitioning of food source among the sympatric Asian honeybee species. In contrast, the European A. mellifera shows fierce competition to the native A. cerana; in addition, it never visited the flowers on which A. dorsata was foraging.

INSECT POLLINATION AND PRODUCTIVITY OF HIGHBUSH BLUEBERRY CULTIVARS

No 387

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High-bush blueberry (Vaccinium corymbosum L.) is native of eastern North America. It is usually self-fertile, but cross pollination often improves berry production; flower architecture, with a tubular or bell-shaped, downwards opening corolla and anthers that release pollen through a terminal pore, makes it well suited for buzz-pollination.
High-bush blueberry was introduced into Italy in 1963 and its cultivation has spread in sub-mountain areas of Piedmont where it is now a not negligible income source for local farmers. In order to foster an adequate pollination service for this crop, the effectiveness of native insects and especially of the honeybee in achieving its pollination was lately investigated.
The trials were carried out in a single planting where several of the most interesting cultivars were grown in different plots; among them Berkeley, Brigitte Blue, and Duke were examined in the years 2002-2004, Blue Crop and Late Blue in 2003 and 2004 only.
Four plants were chosen for each cultivar; on each plant two fruit-bearing branches of similar size were selected. One of them was isolated with a net mesh sufficient to prevent the passage of pollinating insects, without hampering sensibly the action of wind, while the other one was left free. For each branch the flowers and the ripe fruits were counted; the latter were also weighed individually.
In order to grant an adequate insect pollination, four beehives were placed close to the experimental planting. During the blooming period observations were made on the presence of wild pollinators, that were however rather scanty.
For all the tested cultivars, fruit set was lower on the caged branches than on the free ones (0.62-54.59% vs 42.45-80.88%, respectively) and, moreover, the fruits on the free branches were heavier (1.02-2.12g on average) than those on the caged ones (0.37-1.32g), thus showing the usefulness of honeybee pollination.

COMPOSITION OF FRESH BEE POLLEN FROM VENEZUELAN ANDES

No 389

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Bee pollen is a highly marketable product of the hive. However, in Venezuela there are no quality control regulation. Our interest is to organize an analytical reference to provide a database with the sensorial and physico-chemical components of different pollen types produced in the country. Our sample is from a local apiary in Cacute, Mérida State, from the Venezuelan Andes. The botanical origin was identified after screening the sample into four colors and observing the palynological characteristics corresponding to the reference collection. Sensorial evaluation was done on the visual, olfactive, tasting and tactile aspects of pollen loads. Water content, ash, protein and fat content were determined following official methods for food analysis. Data presented bellow is aimed to support the proposal of Venezuelan regulations for pollen quality control.

Pollen type	1	2	3	4
Color	yellow	orange	brown	creamy
Botanical origin	Brassica napus	Fraxinus americana	Zea mays	Datura arborea
Odour	resin	straw	straw	honey
Flavour	acidic, bitter	sweet, floral	sweet, acidic	acidic, astringent
Texture	sticky	sticky	crispy	powdery
g water/ 100 g pollen	9.05	9.29	16.11	8.74
g ash/ 100 g pollen	2.75	2.55	2.15	3.39
g fat ext./ 100 g pollen	3.36	3.27	2.49	2.00
g protein/ 100 g pollen	19.92	20.31	16.54	26.30

POLLINATION OF OIL-SEED RAPE (BRASSICA NAPUS OLEIFERA) BY HONEYBEES

No 390

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Experiments with rape variety Zeus were performed in 2004 in 3 localities under cold climatic conditions of the northern Slovakia: Vlachy, Andice and Pribylina. Rape plants in all 3 localities were in good vitality and grew in soils of medium properties. Part of rape plants was bagged before pollination.
Using standard methods there were measured, observed or calculated: nectar secretion, nectar sugar concentration, honeybee density on flowers, flower and siliqua set, number of seeds per 1 siliqua and their weight, seed yields of pollinated and bagged plants. In single localities there were obtained these basal results, given as on average, respectively.
Nectar secretion of 10 flowers per 24 hours, in mg: 11,668; 14,606; 8,118
Nectar sugar concentration, in %: 52,6; 44,8; 41,1
Honeybee density per 100 m2: 488,6; 405,6; 288,4
Siliqua set of free pollinated plants, in %: 47,2; 45,0; 38,8
Siliqua set of bagged plants, in % : 44,1; 43,3; 36,6
Number of seeds per 1 siliqua of free pollinated plants: 16,9; 18,1; 13 8
Number of seeds per 1 siliqua of bagged plants: 12,7; 13,9; 10,7
Calculated seed yield per 1 ha of free pollinated plants, in t: 3,31; 3,95; 2,81
Calculated seed yield per 1 ha of bagged plants, in t: 2,48; 3,06; 2,19
Increased seed yield after pollination, in % (unpollinated control 100%): 133,5; 129,1; 128,3

SUNFLOWER AS THE SECOND IMPORTANT BEE PASTURE IN HUNGARY

No 391

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Sunflower is the second important bee pasture in Hungary. There are many sunflower hybrids available worldwide so the choice for migration is not an easy question for beekeepers. Sunflower has grown almost in all parts of the country but the nectar production of the hybrids and the sugar concentration of the nectar may vary extremely on the different agro-ecological sites in Hungary.
In this study we report the results of our analyses from 2004. We studied bee visit and nectar production of 9 sunflower hybrids. The mayor sugar components of nectar (fructose, glucose and sucrose) were determined with HPLC analysis.
The average nectar production ranged from 0,132 to 0,280mg/flower, the refraction values were 40,7-52,6 % and the sugar values were 0,064-0,114mg sugar/flower. Honeybees visited the fields all day even in hot midday hours. Our results show that there are hybrids which have got stable nectar production irrespectively of the weather conditions.

THE EFFECTS OF BROOD COMB CELL SIZE ON THE REPRODUCTIVE BEHAVIOUR OF VARROA DESTRUCTOR

No 392

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Introduction: The newly reclassified ectoparasitic mite

Varroa destructor (Anderson and Trueman 2000) is the most serious problem of Apis mellifera worldwidely. Varroa mites parasitize both adult bees and bee brood. They feed on the haemolymph of adult bee and brood, but reproduction only occurs in the sealed honeybee brood cells. So the fertility of the mites in brood cell is the key factor correlated with infestation level in the colonis. And this aspect has been well studied. Many Studies found that the size of cell strongly affected the number of invaded mites per cell.

Calis et al (1993) and Ramon et al (1993) found more mites in the smaller cells. Goetz and Koeniger (1993) found more mites in shortened worker cells. Willem J Boot (1995) reported that the type of cell affected the attractive period of the cells to the mites and the distance from larva to cell rime preceding cell capping. When this distance was larger in comparison to control cells of the same age, the attractive period of the brood cells was shorter and vice versa.

Maria H. Correa-Marques et al (2003) pointed out that the number of viable offspring that per female reproduced in a brood cells is very important. Stephen J.Martin and Per Kryger (2002) reported that reproduction of Varroa destructor is affected by the space between the developing bee and cell wall, but there is no more data in detailed.

In our study to determine the mechanism why varroa mites do not reproduce on worker brood of Apis cerana (the Asian honeybee), we found by chance that honeybee queens laid worker eggs in drone cells in the fall. We then compared the reproductive output of mites between workers reared in worker-cells (ww) and workers reared in drone-cells (md) and investigated the effects of brood comb cell size on the reproductive behaviour of Varroa destructor. Furthermore, we compared the body weight, length and width of worker broods and drone broods of the same age.

Methods: 1, Apis mellifera recently sealed (within 6 hours) brood cells were selected as transfer-hosts. We obtained phoretic mites from adult workers and transferred them into brood cells with a paintbrush after each cell was opened with a small pin. The opening was sealed with melted bee wax immediately after mite introduction. The brood frames were incubated for 9 days at 35°Ê and relative humidity 70%, after which each cell was opened and mite progeny scored.

2, The body weight of worker broods (n=100) and drone broods (n=100) with the same age was weighed with 1/1000g electronic scale and the body length and width of worker broods and drone broods with the same age was measured with a alliper with aprecsion of 0.05mm.The inner width of each worker cell (n=50) and drone cell (n=50) was also measured with the same alliper mention above. The measurements of width of a cell were made three times for each cell corresponding to the distance between the parallel sides of the hexagonal cell in all three directions. The mean width of three measurements for each cell was used for the width of cells.

Results: 1, It was found that 94.4%(51out of 54) of mites reproduced on ww but only 27.7% (13 out of 47) of mite reproduced on wd (X_c^2= 45.9 p<0.001). In other words, the percentage of reproduction of Varroa mites in workers cell rearing workers brood (ww) (94.4%) is significantly greater than that in the drone cell reareing workers brood (wd)(27.7%) (Fig.1). Further more, the number of female mite offspring of workers cell rearing workers brood (ww) averaged 3.3519±1.5560 is significantly higher than that of drone cell rearing workers brood (wd) averaged 0.4894 ± 0.9295 (t`=11.38 p<0.01). (Fig.2)

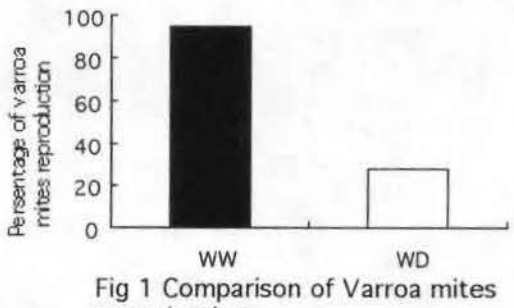

Fig 1 Comparison of Varroa mites reproduction

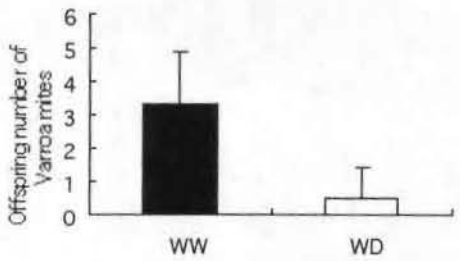

Fig 2 Comparison of offspring number of Varroa mites

2, The body weight ,body length and body width of worker broods are significantly greater than that of drone broods respectively. (Table 1)

Table1 The body weight length and width of worker brood and drone brood

	Body weight_g_x±s	Body length (cm) _g_x±s	Body width (cm)_g_x ±s
Worker brood	1.68±0.11 n =100	1.15±0.06 n =100	0.55±0.03 n =100
Drone brood	4.1±0.18 n =100	1.451±0.0601 n =100	0.73±0.05 n =100
t	-114.32	-35.29	-32.10
	P<0.01	P<0.01	P<0.01

3, The inner width of each worker cell is significantly larger than that of drone cell (t=65.39 p<0.01). (Fig 3)

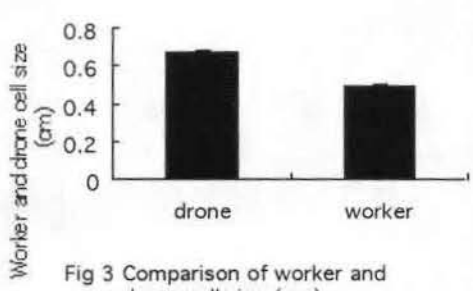

Fig 3 Comparison of worker and drone cell size (cm)

in Discussion: From test 2 and test 3, we could find that ne body weight, body length and body width of drone roods are significantly greater than that of worker roods respectively and the inside width of each drone ell is significantly larger than that of worker cell. uggesting that if the same age worker brood developed worker cell and drone cell, the space inside the two 3, ype of cells are significantly different.
o our best knowledge, this is the first study to show hat varroa mite reproduction can be affected by cell size f the host. It is not clear why mites would reproduce ess in the identical hosts that are housed in large cells. One possibility is that workers reared in drone cells are ed a different diet by nurses. The other more plausible nechanism is that workers spin large cocoons in drone ells and mites detect this "geographic" change and omehow change their reproductive behavior ccordingly.
This study supports previous studies (Calis et al 1993, Ramon et al 1993, Willem J Boot et al 1995, Stephen J.Martin & Per Kryger 2002, Maria H. Correa-Marques et al 2003) which reported honeybee brood cell size affects the reproduction of Varroa destuctor. Our results shows that Varroa mites prefer to live in smaller size brood cell and Varroa mites reproduce less on identical hosts that are housed in large cells. Giancarlo A. Piccirllo and D.De Jong (2003) reported that in Brazil, as in other countries beekeepers have tried to make bees bigger than they are naturally by inducing them to build large comb cells from foundation wax stamped with cell patterns larger than they would make themselves naturally. Larger bee has an advantage in producing honeybee products and resisting diseases. So we should extend such a management practice, in one hand we could get bigger bees, and in another hand the colonies' varroa resistance can be improved.
Conclusion: Taken together, our results suggested that Varroa destructor reproduction be affected by cell size and Varroa mites reproduce less on identical hosts that are housed in large cells.

Key words Varroa destructor, reproduction, honeybee comb cell

CURE OF AMERICAN FOULBROOD WITH ANTIBIOTICS

No 393

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In the summer of 2004 we obtained from another beekeeper 100 deep boxes of drawn comb in which the bees had died the previous year due to American Foulbrood (AFB). We could see the spores of the dead larvae in the bottom of the cells. The first of July is the middle of summer in Idaho, which is in the northwest section of the United States. For our experiment we put a box with three frames of mostly sealed brood without bees above an excluder, on top of the parent colony using the before mentioned diseased boxes and AFB contaminated frames now mixing the AFB frames into the parent hive. The following morning after the bees had come up through the excluder to cover the brood, we removed the top box with three frames of brood and adhering bees and relocated them about four miles away. As we unloaded the hives we gave them a newly mated caged queen and a gallon of corn syrup. We now had a total of 200 AFB contaminated hives since both the parent and the nuclei have AFB frames. Each of these hives received a generous 2 tablespoons of Tylosin® and Terramycin® mixed with powdered sugar. We treated all of the contaminated hives every 10 days with the Tylosin® -Terramycin® mix for the rest of the summer and into the fall. In October, we reduced the colony to two hive bodies and gave each hive a gallon of corn syrup medicated with Fumidil-B®. These hives were middle to late summer nuclei. They did not make any honey, but cleaned out most, if not all of the AFB spores and made a good cluster to go into winter.
In beekeeping in the western United States with cheap or non-existing honey prices those commercial beekeepers that are still in business rely heavily on pollination, especially the almonds in California, to stay in business. This requires bees being held in staging areas of 500 to 5,000 hives in a one-mile radius. Since there are so many bees in such a small area and very little bloom the bees often rob one another thus spreading American Foulbrood spores.
Before Tylosin® became available the AFB colonies that we found each fall were on the increase. Since we have started using Tylosin® in our

A CASE OF ACUTE INTOXICATION WITH CHLORPYRIFOS IN BEES

No 394

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In 2002 in a forest region situated near Bucharest a high and drastic mortality (85 – 100%) of bees from many apiaries has been recorded. This mortality was registered in the day of the phytosanitary treatments effectuated to the forest.
Bees and spontaneous mellifera flora samples harvested from skirt were taken for the laboratory investigations. The exam effectuated on the collector apiaries zone revealed 100% mortality in gathering worker bees in the first 24 hours. To all colonies, more than 80% of hive adult bees had chitins color alteration, because it became dark with metallic bright appearance. All dying bees presented nervous syndrome: uncoordinated movements, ventral exposition, own axe rotations, flying incapacity, wings extension, posterior feet paralyses, intermittent needle and oral system expulsion.

Bacteriological exam made from dying bees and sealed and unsealed broods were negative for the principals' species of pathologic bacteria. Parasitological exam was negative for the identification of the following mite species: Varroa destructor, Braula coeca, Acarapis woodi, Nosema apis and Malpighamoeba mellificae.
Toxicological exam was performed for pesticides using gas chromatographic method. Chlorpyrifos was identified both in bees and plants.
The cause of mortality was an acute chlorpyrifos intoxication.

A CASE OF ACUTE INTOXICATION WITH DELTAMETHRIN IN BEES

No 395

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In May 2002, in a mellifera zone situated in the east part of Romania a high mortality of bees colonies from all apiaries has been observed. The damages situated at 90% from colonies were registered during and 24 hours after, when phytosanitary treatments were effectuated to rape plantations.
Examination of all apiaries has relived many colonies organized by an average of 7-8 brood frames on different stages of development, dead worker bees and drones with no pathological modifications, massive grouped in the front of hive entrance and on whole harvested zone. Hive moribund bees had normal chitin, but presented uncoordinated movements, ventral exposition, own axe rotations, flying incapacity, wings extension, posterior feet paralyses, intermittent needle and oral system expulsion.
Usual bacteriological and parasitical exams and toxicological determinations regarding pesticides were effectuated on bees, brood and mellifera flora harvested from affected area. The results of bacteriological and parasitical exams were negative. Using gas chromatographic method deltamethrin was identified both in mellifera flora and bees.
The cause of mortality was an acute deltamethrin intoxication.

DUSTING VARROA IN CONJUNCTION WITH THE SCREENED BOTTOM

No 396

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The main objective of the project was to determine how to combat Varroa destructor with sugar. Notwithstanding the fact that the development of highly efficient method to control V. destructor was not the only outline of these trials. Safety of individual adult worker bees undergoing such sugar treatments as well as their colony development was equally as important.
Super-fine ground pure white sucrose (with no additive) was implemented in all trials (including preliminary since 1990) and are referred to as "confectioner sugar" or "powdered sugar" with a nominal mean particle size of 25 - 40µm. A simple apparatus assisted in air dusting the bees with 35g of sugar per colony treatment. Sugar dusting bee colonies is efficient tool in both the diagnosis and control of V. destructor. It was concluded that sugar dusting bees as described was safe for individual bees and colony development and should be included to the integrated pest management (IPM) program.

MITE COMPLEX ON HONEYBEE SPECIES

No 397

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A study was done to identify the types of mite and their population level on Apis mellifera, Apis cerana and Apis dorsata honeybee species at Chitwan, Nepal during rainy, autumn, winter and spring seasons from June 2002 to March 2005. Samples of hundred sealed broods (worker, drones and queens) were collected from each 100 colonies of A. mellifera, 50 colonies of each A.cerana and A. dorsata at monthly interval from 5 different apiaries and locations. The left combs of A.dorsata, A. mellifera and A. cerana and fallen mites on the bottom board of A.mellifera and A.cerana colonies were also collected after putting apistol between the brood frames. The broods and combs of A. dorsata were available from the month of October to April only. The collected samples were examined and studied under the microscope for the identification of mites and data for their population number at different seasons was analyzed statistically. Out of 100 A. mellifera colonies studied, 75 were found infested only with Tropilaelaps clareae mite and 4 with both T. clareae and Varroa destructor. The highest numbers of T. clareae per 100 A. mellifera brood and on bottom board samples were 31.8±5.5 and 49.4±15.2 during late winter and lowest 7.8±2.8 and 9.0±2.1 during autumn season respectively. Out of 50 A. cerana colonies studied, 35 were found infested only with V. destructor. The highest numbers of V. destructor per 100 A. cerana brood and on bottom board samples were 26.9±4.2 and 28.6±2.9 during spring and lowest 3.8±0.4 and 4.5±0.7 during autumn seasons respectively. Out of 50 A. dorsata colonies examined, 25 were found only with T. clareae mite with the highest number 12.1±1.4 during late winter season. The mite V. destructor and T. clareae was found on worker, drone and queen broods. The mite Tropilaelaps clareae is identified as the major

)est of both A. mellifera and A.dorsata and V. destructor)f A.cerana honeybees in Nepalese condition. The mite /. destructor of A. cerana and T. clareae of A. mellifera :olonies did not damage A. mellifera and A.cerana bee :olonies respectively even when kept close together or)n the same apiary for several years. The number of V. lestructor in A.mellifera colony was found below 4 and lid not reach at damaging level. The inability of V. lestructor mite to multiply and reach at significant lamaging level for A. mellifera colonies in Nepalese :ondition is not clearly understood. The presence of mite :pecies was regular throughout the year with the :ignificant population fluctuation during different :easons. The climate in the plains and mid hills of Nepal :avors the honeybees to be active throughout the year :nd also provides a suitable condition for the mite to nultiply and damage the honeybee colonies at any time)f the year.

Key words: Mite, Mellifera, Cerana, Dorsata

DISTRIBUTION AND PROPERTIES OF GLUTATHIONE S-TRANSFERASE IN APIS CERANA CERANAN AND A. MELLIFERA L.

No 398

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Introduction: Glutathione S-Transferases (GSTs) (EC 2.5.1.18) represent a multigene family of multifunctional proteins, widely distributed in almost all animals and plant kingdoms. The enzymes have been recognized to play an important role in the detoxification of xenobiotics, n both vertebrates and invertebrates. The presence of GSTs activity was reported in honeybees. Smirle and Wisnton (1988) confirmed the presence of GSTs and mixed function oxidase activity in the adult worker bee and reported that as the worker bee forages the specific activity of GSTs activity increases and reaches its highest levels in the adult organisms. GST activity is present in all developmental stages of A. mellifera macedonica. The highest activity towards the substrate 1-chloro-2,4-dinitrobenzene (CDNB) is found in the adult stage and the lowest in the egg. The kinetic characteristics of the whole enzyme change as the insect develops.
We are studying the distribution and properties of glutathione S-transferases from A. cerana and A. mellifera, which represents the main species of China. This study deals with a view to determining eventually their role in the metabolism and excretion of pesticides. In the present work, the result of some of the physical and catalytic properties of this enzyme are reported.
Methods: The ability of the enzyme preparations to catalyse conjugation was examined using the assay procedure described by Habig et al. (1974) with the substrates of CDNB.
Results: Subcellular distribution of glutathione S-transferases in A. cerana and A. mellifera
The GSTs are preferentially present in cytosol fraction. The occurrence of a microsomal glutathione transferase activity lower than cytosol was also demonstrated in A. cerana and A. mellifera homogenates. The enzyme activity in A. cerana microsomes was the 50% of the specific activity in mitochondrion and only the 40% of the specific activity in cytosol. In A. mellifera, the activity in microsomes was the 154% of the specific activity in mitochondrion and only the 43% of the specific activity in cytosol.
Tissue distribution of enzyme activity in the A. cerana and A. mellifera adult worker bee
Midgut represented the highest activity per insect organ in both species, then the order of glutathione S-transferase activity A. cerana was head, thorax and abdomen except midgut in descending order. No serum albumin was obtained from Beijing Tongzheng Bio. Com..
2.2. Insects
Western honeybees (A. mellifera ligustica from Australia, A. mellifera caucasica, A. mellifera anatolica, A. mellifera carnica, A. mellifera ligustica H) were supplied from the apiary of the laboratory Apiculture in The Institute of Apicultural Research ,CAAS of China. A. cerana cerana were supplied from the apiary of the College of Agronomy and Biotechnology laboratory of China Agricultural University. All colonies were healthy. Samples of bees were shaken off frames at random and were kept in the incubator at 34.3°Ê and 70% relative humidity for 4h to rid their bowel contents before being used for enzyme assays. Samples were always collected in the late morning to reduce possible diurnal variations in enzyme activity that could obscure differences between colonies.
2.3. Enzyme preparation
Adult A. cerana and A. mellifera worker or isolated organs or body sections, were homogenized in phosphate buffer at pH 6.5.
After centrifuging the homogenate at 10.000g for 20min (4°Ê). The supernatant was collected for determination of enzyme activities and Km .
The enzyme during postembryonic of A. cerana and A. mellifera was prepared from whole bodies of 8-10 individuals.
#The cell debris was prepared from midgut of 90 individuals, as described previously (Kostaropoulos et al., 1996), using a modified homogenization medium (100mM potassium phosphate buffer, pH 6.5, 1mM EDTA).
2.4. Determination of enzyme activities
The ability of the enzyme preparations to catalyse conjugation was examined using the assay procedure described by Habig et al. (1974) with the following substrates: CDNB and DCNB. Routine incubation mixture contained 0.02ml of enzyme preparation in 0.9ml of 0.1M phosphate buffer pH 6.5, 0.03ml of GSH 30 mM in buffer and 0.03ml of CDNB 30mM in acetonitrile. Enzyme activity was determined by monitoring change in absorbance at 340nm, and 25°C, was recorded for 2 min with the control solution as the instrument blank. The activity unit was converted to nmoles of CDNB conjugate using the extinction coefficient min-1.mg-1pro.

All assays were performed at room temperature and were run in triplicate. Each experiment was repeated at least three times.
2.5 Enzyme activity during A. cerana and A. mellifera development
Enzyme activity was determined with 10,000g for 20 min supernatants of every insect developmental stage. Each assay contained 0.03ml 30 mM CDNB, 0.03ml 30mM GSH in 0.1 M phosphate buffer pH 6.5 at 25°C. Homogenates of nymph, larvae and adult of A. cerana and A. mellifera worker bee were performed at 2.5 insect per ml, nymph of A. mellifera drone 2 nymphs/ml, larve of A. mellifera drone 2.5 larves/ml.
2.6. Localization of the enzyme activity in A. cerana and A. mellifera
All the designated tissues used for localization studies were excised from A. cerana and A. mellifera worker bee from ice-chilled insects. Tissue (head, thorax and abdomen without midguts) homogenates were performed in 0.2 ml of phosphate buffer pH 6.5, midguts in 0.4ml and centrifuged at 10,000 g. Enzyme assays were done using optimum ml of supernatants and 30 mM CDNB, 30 mM GSH in 0.1 M phosphate buffer pH 6.5 at 25°C.
2.7 Enzyme activity in the adult of A. mellifera worker bee development
To obtain worker honeybee of known age a single frame of capped brood were removed from a hive and incubated in darkness for 24h at 34.3°Ê and 70% relative humidity to emerge after shaken off adult bees. Emerged adult insects were transferred to a honey frame and collected randomly at desired times using a pair of tweezers. The abdomen was used for preparation enzyme insect develops. The number of isoenzymes and their rate of expression vary as the insect develops (Athanasios et al., 2004a). The enzyme is heterodimeric with subunit molecular masses of 29 and 25kDa, respectively. Two main isoenzymes with distinct kinetic properties are present, with isoelectric points of 7.40 for the alkaline and 4.58 for the acidic forms, respectively. The two enzymes are induced independently by factors such as insecticide treatments and environmental conditions, including low temperatures or starvation (Athanasios et al., 2004).

FIELD TESTING A "PUSH-PULL" IPM SEMIOCHEMICAL-BASED TRAPPING SYSTEM FOR VARROA MITE CONTROL

No 399

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Varroa mites (Varroa destructor) rapidly changed beekeeping and beekeepers following their U.S. introduction in 1987. Beekeepers, once largely chemophobic, quickly adapted to placing synthetic acaricides, and increasingly a host of other chemcial substances (i.e. acids, botantical oils, petroleum derivates), within their colonies. The varroa mite has subsequently developed tolerance/resistance to such compounds and residues from some of these materials have appeared in honey and wax products. Untreated colony infestations are considered fatal to colonies, usually within 1-2 years, although non-chemical control methods may alter this outcome, at least in the short r (Caron & Hubner 2003a & citations therein). Annual colony losses, once below 10% run 50% or higher (Caron & Hubner, 2003b) putting in jeopardy adequate pollination of several crops in the $14 billion U.S. pollination rental business.
We field tested in 2004 and plan to repeat again in 200 prior to Apimondia a "push-pull" IPM stragedy to varro mite control using bee produced semiochemicals in conjunction with IPM Technologies of Portland OR (supported by a USDA SBIR research grant "Development of Semiochemical-based Trapping Syst for the Varroa mite – 98-00199). Using commercially developed colony bottom board sticky traps (Caron & Hubner 2003a), we independently tested Nasanov glan attractants to "pull" mites to traps and semiochemicals demonstrated in smaller-scale lab studies to "repel" mites, to "push" mites from bee bodies making them vulnerable to capture in bottom board traps. In lightly infested colonies, increased varroa capture should reduce the rapid buildup of mite populations. Our field test in 2004 produced mixed results with analysis not showing hoped for increased capture rate. We will hav 2005 field test results by Apimondia to compare with o 1st season field tests.

EVALUATION OF A NEW VARROA TREATMENT IN ROMANIA

No 400

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In Romania, varroosis represents one of the most important parasitical diseases of bee colonies. A new veterinary product, VARACHET FORTE has been tested for the treatment of this disease. It was administrated l fumigation. This medicine contains two acaricide substances: amitraz and fluvalinate. Recommended doses for administration don't affect the vitality of bee colonies or the quality of hive products.
The tests have been effectuated on 360 colonies, from vertical beehives with multi-storeyed possibilities, belonging to the Institute for Research and Developme in Apiculture. After annual applications in spring and autumn, it was established the efficiency of the treatment by clinical exams in apiaries and by laborator analyses.
The veterinary medicine is authorized by the National Veterinary Authority for the Control of Drugs and by the Romanian State Office for Inventions and TradeMarks.

AN IFLAVIRUS OF HONEYBEES ASSOCIATED TO UNDULY AGGRESSIVE BEHAVIOUR IS GENETICALLY MORE RELATED TO DEFORMED WING VIRUS RATHER THAN TO KAKUGO VIRUS

No 401

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Iflavirus RNA was detected by RT-PCR in honeybee colonies displaying unduly aggressive behavior and with no evidence of morphological alterations. Sequence analysis of the 3' end of the genome (RNA-dependent RNA polymerase, RdRp) revealed that the iflavirus strain was more similar (> 99% aa) to Deformed wing virus (DWV), usually associated to morphological alterations of bees, rather than to the newly-described Kakugo virus (KV) (about 95% aa), that has been associated to increased aggressiveness. Although genetically resembling DWV, the iflavirus strain detected in the Italian hives was apparently associated to a KV-like phenotype. RT-PCR detected the iflavirus RNA in the abdomen of the workers, and only in one case in the head. Unexpectedly, no viral RNA was detected in the drones, a pattern of virus distribution across the honeybees casts that is in apparent conflict with the higher rates of infestation of drones by the mite Varroa distructor. The identification of a virus with apparently intermediate features between DWV and KV open new perspectives on the patho-biological role of iflaviruses in the honeybees.

AMERICAN FOUL BROOD CONTROL IN HONEY BEE COLONIES

No 402

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Preface: AFB make difficulties in all over the world. Because its spore is resist to normal disinfectant and also disinfectors in colony against spore is not possible. So at contaminated area it must be treated because destroying all infected colonies isn't successful and economic.
Controlling principle: The fundamental point is to control the bacteria growth and prevent spore producing by bacteria. So that bacteria will be disappear after a period and the sequent of producing bacteria and spore will be stopped. Therefore spore destroying is not possible so the bacteria growth must be stopped by oxy tetracycline.
Treatment method: first of all dividing infected colonies and non infected colonies by clinical signs (symptom) is necessary. An intensive treatment at infected colonies for treating and normal treatment at non infected colonies for prevention of disease appearance is the basic. So one dose oxy tetracycline 20% in sugar syrup 3-6 repeat with 7 days interval for infected colonies and one dose 1-2 repeat for second group is enough.
It is important to clean the colonies and remove visually infected combs with larva and burn out to prevent spreading spore around area. Change the colonies place and quarantine rule at both groups is necessary and useful. Also for wax (comb sheet wax) and reused combs (empty combs) prevention treatment must be done.
Conclusion: AFB would be controlled by this procedure successfully. However the waxes contaminated with spore and / or clinical signs at colonies before treatment must be removed and before each treatment monitoring is necessary. Treatment after 2 times monitoring at colonies with no clinical signs observed completed.

A SURVEY ON AMERICAN FOUL BROOD IN CHAHARMAHAL AND BAKHTIARY PROVIANCE FROM JAN 2003 TO MAR 2004

No 403

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Introduction: American foul brood is a kind of brood diseases. It is caused by a spore-forming bacterium called Paenibacillus larvae. It is one of the most destructive brood disease in our beekeeping industry .In our province (Chaharmahal and Bakhtiary) it is one of the causes of deaths at apiaries for this reason, we tried to investigate the spread rate of this disease. In our province, from Jan 2003 to Mar 2004 honey and larvae were collected from 99 apiaries .The samples were taken from 10 percent of the colonies. The result showed that 93 cases of honey and 33 cases of larvae were infected with bacillus larvae.
Methods: The determination of pollution of broods has done through Hanging Drop (M.H.D) and bacterial culture of honey and brood in MYPGP Agar and colombia blood agar.
Results: The studies during these months include below results:
1860 sample which were examined during14 months about 93 cases in honey and 33 cases in brood, were polluted by P.bacillous larvae.
In the apiaries which we recognized the A.F.B, we have done some hygienic care, prophylaxis treatment by drugs such as oxytetracyclin.
It is necessary to explain that this drug which is used for removing the disease in polluted beehive is effective on the vegetative form, and suppress signs of the disease

without eradicating where as it have any effects on the spore.
Some of the infected colonies were destroyed by burning. The bees were killed, and together with the combs were burned in a deep pit.
Discussion: American foul brood is one of the most destructive brood diseases. Through out the world,In different countries, different prevention and control strategies are used. This study which was carried out in had the following results:
From among the samples which were examined during 14 months, 93 cases(5%) of honey and 33 cases (1.7%) of larvae had infection symptoms. In the apiaries in which American foul brood was identified, hygienic, preventive and antibiotic treatment measures were taken. When the disease was identified and the beekeepers were informed, antibiotic treatment began. Oxytetracyclin was administered to the infected colonies. (OTC) is effective in the vegetative form of the bacillus larvae. It masks the signs of the disease.and dosen't have any effect on the spores. Therefore the prevention is more important and more effective than treatment.

NEW METHOD FOR DEVELOPING NATURAL DRUGS AGAINST BEE DISEASES: NEW AND HIGHLY EFFECTIVE REMEDIES AGAINST CHALKBROOD AND THE NOSEMA DISEASE

No 404

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Remedies created from natural ingredients, unlike antibiotics and untested chemicals, can be effective without threatening to pollute the honey. This is the reason why Chemor Ltd has chosen to focus its development efforts on products that contain no antibiotics or untested chemicals.
We have developed two new and highly effective remedies, one against chalkbrood, and the other against Nosema disease. One of them, called Beepharmacy, prevents chalkbrood and successfully treats the already developed disease, while significantly diminishing Varroa destructor external parasite infections. The product has been marketed in Hungary since the year 2000. The other, called Nonos, prevents Nosema disease and successfully treats the already installed disease. The product has been marketed in Hungary since 2004.
The development process starts with identifying hives that have historically been more resistant to one of the diseases than an average hive. Afterwards, we identify the plants and fields that the more resistant hives tend to visit. The end product of this stage is an extensive database of hives, health record and plants contacted. This is followed by a careful factor analysis to identify the likely drivers of relatively good resistance record. The number of selected factors is decreased through systematic testing. The final phase is another round of in vivo and in vitro experiments designed to identify the mos effective treatments.

ELIMINATION OF AFB INFECTED COMB, IN ALL STAGES, FROM 15,000 FRAMES USING HIVE MANIPULATION, A SPECIAL DIET, AND A SMALL AMOUNT OF ANTIBIOTICS.

No 405

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American Foulbrood is a bacterial disease referred to a Paenobacillus larvae, gram positive, that affects larvae one to two days of age. When bees receive Caspian Solution (liquid protein), their hypopharyngeal glands produce surplus jelly and the pheromone in Caspian Solution encourages pollen consumption. The result is higher jelly production, which is used for larvae and queen feeding. Larvae develop stronger immunity to bacterial disease due to higher nutrition. As adult bees clean cells and old pollen, they consume AFB spores. Some of the spores are defecated outside the hive. Some spores are fed to larvae. Spores fed to larvae germinate into active foulbrood, which is killed by the antibiotic before it affects the larvae. The amount of antibiotic is miniscule, approximately 4% of the amoun used in preventative feeding in North America. During treatment of 15,000 frames of infected comb, all hive boxes were scorched with fire. Three treatment metho were used as follows:
A: 5,000 frames containing scale and spores. Diseased frames were of two sizes, Dadant and Langstroth. Dadant frames were assembled into three-high colonie (30 frames) and Langstroth frames were assembled int two-high colonies (20 frames). Each colony was provide with a 5 kilo package of bees and new queen and fed 200 ml of Caspian Solution every fourth day for three weeks, then 100ml of Caspian Solution every eighth da for two weeks.
B: 10,000 frames with honey containing spores but no scale. Each box of 10 frames were added to one health single-brood box colony, in early spring, and fed 200ml Caspian Solution every fourth day for 21 days.
C: 200 frames with active foulbrood. Brood cappings were removed by scratching. Each box of 10 frames wa provided with 2 kilograms of package bees and a new queen and fed 200ml of Caspian Solution every fourth day for three weeks, then 100ml for two additional weeks.
In all treatment methods, AFB disease was completely eliminated. At no time were the hive boxes, frames, or comb irradiated.

PRACTICAL EXPERIENCE IN DISEASE CONTROL IN IRAN AND CANADA

No 406

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Our family has been beekeepers for 165 years. In 1980 migratory beekeepers brought disease and varroa mite to our home region for the first time and 98 percent of our bees died. These pivotal events inspired the family to research and develop pest and disease control strategies to protect our apiaries and other beekeepers from similar crises.
Caspian Apiaries has conducted experiments with powdered and liquid antibiotics incorporated in many different application techniques. The authors have concluded that the protocols suggested by medication manufacturers and most government specialists have four common problems. 1. Many methods lead to residues. 2. Large quantities of the chemical must be used and wasted, as the pathogen remains isolated from most of the medication that is placed in the colony. 3. The techniques promote the development of resistant strains. 4. Most techniques are very expensive. Many specialists suggest physical techniques such as: shaking, cobalt 60 gamma radiation, high velocity electron beam radiation or, in the case of American Foulbrood [AFB] disease, burning of combs and boxes. Obviously these procedures are: expensive, labour intensive and not practical for large commercial beekeepers. It is our experience that beekeepers view shaking, radiation and burning as their "last desperate choice", therefore, diseases reach epidemic levels before they are considered. In addition, operational problems in disease control stem from lack of information, misinformation, poor procedures, and insufficient education. The Caspian Apiary team is unique as it is a collaborative effort involving beekeepers, microbiologists and bee specialists from private, academic and government research groups. The colonies included in the studies are from northern and southern Iran, British Columbia and Alberta. Caspian Apiaries promotes the use of natural and biological disease control as the future in this field. This paper will report the successful application of two biological disease control products: Caspian Solution, a blend of royal jelly, pheromones, and other natural ingredients, and a new bacteria phage.

STUDY ON THE ACARICIDAL EFFECT OF SOME ETHEREAL OILS ADDED TO THE FOOD OF BEES

No 407

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The acaricidal effect of ethereal oils of salvia (Salvia sclarea L.), basil (Ocimum basilicum L.), white marjoram (Origanum heracleoticum L.) and dill (Anethum graveolens L.) added to food of bees (honey – sugar candy) is investigated. The experiment is carried out in the autumn of 2003. Two control and four experimental groups are formed from equal bee colonies.
Bee colonies are fed three times at an interval of seven days with honey – sugar candy (100g single dose), including 1% ethereal oil for experimental groups. The extensinvasion among bee colonies at the beinning and the end of the experiment and the number of mites (Varroa jacobsoni) fallen at the bottom of the hive at an interval of seven days are detected. Colonies from first control group (K1) are treated with RODOVAR (active substance amitrase) and those from second control group (K2) are not treated with acaricidal preparation aiming detection of the number of naturally fallen mites. Control treating with APIPROTECT (active substance coumafos) is done at the end of experimental period.
The effectiveness of the tested ethereal oils as acaricidal means is calculated based on the results.
It is found that ethereal oils of salvia, basil, white marjoram and dill, added to honey – sugar candy in a dose 1%, have an acaricidal effect on the mites Varroa jacobsoni. The current lower effectiveness (37,38 – 43,21%) than the effectiveness of treatment bees with RODOVAR (99,07%) is as a result of the attachment of the tested ethereal oils to the food of bees.

STUDY ON THE ANTIBACTERIAL AND ANTIMYCOTIC ACTIVITY OF SOME ETHEREAL OILS TO STRAINS OF MICROORGANISMS CAUSING DISEASES IN BEES AND BROOD

No 408

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The antibacterial and antimycotic activity of the ethereal oils of savoury (Saturea montana L.), thyme (Thymus vulgaris L.), white marjoram (Origanum heracleoticum L), salvia (Salvia sclarea L.), dill (Anethum graveolens L.), chamomile (Matricaria chamomilla L.), Hyssopus officinalis, basil (Ocimum basilicum L), peppermint (Mentha piperita L.), lavender (Lavandula angustifolia Ch.) and thymol (crystals) to some strains of microorganisms has been studied. The experiment was conducted in 2004.
A total of 25 strains of the various microorganisms isolated from sick bees, brood and bee honey: Paenibacillus larvae var. larvae, Paenibacillus alvei, Paenibacillus paraalvei, Ascosphera apis. The antibacterial and antimycotic activities have been established by determining the minimum inhibiting concentrations (MIC) by method approved by NCCLS.
High antibacterial activity (MIC = 0,012 - 0,025%) to the tested microorganisms has been established in ethereal oils from savoury, thyme, white marjoram and thymol (crystals). Salvia, dill, lavender, basil and peppermint oils have MIC = 0,1% to all agents causing disease in bees and brood. Low antibacterial activity (MIC ≥ 0,2) to all tested strains has been recorded in chamomile and Hyssopus officinalis oils.
With regard to the antimycotic activity ethereal oils from savoury, thyme, white marjoram and thymol (crystals) show MIC = 0,025%, basil and peppermint oils – MIC =

0,1% and lavender, dill, salvia, chamomile and Hyssopus officinalis oils – MIC ≥ 0,2 to the Ascosphera apis strains.

AEROSOL TREATMENT OF BEE COLONIES AGAINST VARROOSIS

No 409

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The experiments in the autumnal months compared the efficacy of the treatment of honeybee colonies against varroosis by fumigation, by aerosol based on water solution and by aerosol on acetone solution at the use of minimalized dose of amitraz (6-7 mg per colony). Method of cross treatment was applied, outdoor temperatures ranged from 11 °C to 15 °C. No significant differences between the efficacy of individual application methods were found, the efficacy reached values 95%.

AGAINST VARROA ALL YEAR ROUND IN THE CZECH REPUBLIC, INTEGRATED CHEMICAL CONTROL WITH MINIMALIZED DOSES

No 410

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For more than 15 years on the territory of the Czech Republic there is applied an organized system of varroosis control based on following scheme. At the summer end beekeepers on exposed areas monitor the natural fall of mites on double pads. If daily falls also at individual hives are about 5 and 10 mites per a colony, on the whole bee yard and as far as possible also on neighbouring bee yards after the last honey harvest medicaments are applied on carriers with long time effects (1,5g acrinathrin on a strip). In the months October to November bee colonies are treated twice to three times by fumigation or by aerosol of medicaments with the active substance amitraz in the dose 6mg per colony and the treatment or by fluvalinate in the dose 1mg per colony. In November and December at temperatures below 10°C these medicaments are applied in the aerosol form. Winter debris of all colonies is investigated as to the presence of mites. If on average more than 3 mites per colony are found, the whole site is treated by painting the sealed brood by fluvalinate water emulsion in maximal dose 3mg per colony. In the crop period no chemical medicaments are to be applied. The implementation of this system in the practice is based on the close co-operation of the Czech Association of Beekeepers and State Veterinary Administration as well as in close co-operation with the Bee Research Institute Dol. Up to the present time no mass mortalities due to the varroosis have been recorded. 2003 and 2004 at the investigation of winter debris 39 and 42% of sites respectively were without find. The regular residues monitoring has not recorded any case of the content of the applied substances above the limit of applied methods. The values of amitraz and its degradation products in the beeswax have not exceeded 20ppb.

SURVEY ON THE _13C VALUES OF DIFFERENT HONEY TYPES

No 411

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In 1979 the first official method for adulteration of honey with C4-sugars by stable carbon isotope ratio analysis (SCIRA) was established in the US as AOAC 978.17. In 1991 the method was improved by adding the internal standard procedure (ISCIRA, AOAC 991.41) as with the difference between delta 13C honey protein and delta 13C honey adulteration can be detected more accurately. In 1992 (Roßmann et al.) and in 1998 (White et al) different data for honey worldwide have been published. Results of the QSI database are compared with these published data. Basis are the results of imported honey tested by QSI for private industry in Germany within their quality control during the last six years (honey source as declared by the clients). The maximum, minimum and the average _13C honey and _13C protein values for all samples resp. for selected honey types as well as the main range are presented. Differences resp. correspondence with published data are discussed.

THYMOVAR CONTAINS THE NATURAL SUBSTANCE THYMOL TO CONTROL THE VARROA MITE – FIELD RESULTS FROM DIFFERENT COUNTRIES.

No 412

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THYMOVAR is a natural means of controlling the varroa mite that is well tolerated by bees. It consists of the essential oil Thymol loaded onto a sponge (rectangular wafer) allowing for a slow release of this active substance. The THYMOVAR wafers can easily be placed on the top bars of the combs.
Several field studies from different countries confirm the good efficacy, if the treatment is optimally adapted to the prevailing conditions (especially temperature) and to the different types of hives.

CONTROL OF THE VARROA DESTRUCTOR WITH OXALIC ACID

No 413

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In sequence of several treatments made in apiaries with registed products, we have noticed that varroa is still destructing hives. Therefore we have decided to experiment the application of oxalic acid with Varrox vaporizer.
Treatments took place in winter, because there are less closed breeding and also because bees are in period of hibernation. We have made treatments using 2grams of oxalic acid by colony, totalizing 60 hives. Two treatments have been made with a 15 day break, due to the existence of one to two breeding frames.
During 3 years of study we have verified that bees tolerate the oxalic acid. There are no signs of queens` death and the average efficiency in reducing varroa population was 93%. According the following field investigation we have concluded that this method might be a good alternative to the control of Varroa destructor.

INTEGRATED CONTROL STRATEGIES AGAINST VARROOSIS IN HUNGARY

No 414

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The Millennium has brought serious new challenges to the apiculture and honey production. Honey as human food of animal origin has to meet increasingly strict quality requirement, therefore, strategies of bee disease prevention, including varroosis, have to be managed accordingly, in the light of such requirements.
Early hopes about the eradication of Varroa using chemotherapy have vanished in the passing years. This work offers options for solutions of general approval (as have been achieved in some countries already), acceptable for both the Hungarian veterinary authorities and apiculturists securing the reputation of quality of Hungarian honey.
Two types of integrated control strategies are recommended here against varroosis. Type „A" version consists of oxalic acid and formic acid treatments which suits to ecologic apiculture guidelines. Type „B" version allows amitráz fumigations and coumaphos diagnostic treatment along with the oxalic acid and formic acid treatments.
Integrated strategies can be effective only if the work is based on organized diagnostic procedures. The continuous observation of the natural mite fall, conforming the number of foretic mite populations, and in scheduling optimally timed treatments is equally critical as well as to constantly monitor the efficacy of the management care progress, and to scrutinize the drug resistance of the mites.

DETECTION OF DRUGS AND ACARICIDES IN HONEY

No 415

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Hungarian honey has an excellent reputation in the European market. Because of the presence of some bee diseases regular control measures have to be used in our country. To prevent drug contamination a modern honey analytic laboratory started working in our institute at Gödöll_, recently.
We have adapted separation and concentration methods to detect different antibiotics. Special Hungarian honeys as linden honey contain flavonoids that components disturb the detection of tetracyclines. That is why we had to look for new resolutions absent in the literature. The determination was performed by High Performance Liquid Chromatographic (HPLC) method. Using micro extraction column this method is able to separate nine different antibiotics in our conditions. Samples were washed and solved from that column and evaporated with vacuum concentrator later on injected into HPLC system under isocratic condition. HPLC separation was carried out by simple acetonitrile/water = 25/75 mixture and U.V. detector. We were able to determine 200ppb concentration of each antibiotic compound.
To determine amitráz in honey a simple method has been adopted recently. Honey samples were mixed with hexane and the upper phases separated subsequently twice in each case. Than we united hexane fractions and dried with vacuum concentrator and at last injected into HPLC system to detect this akaricid often used to combat Varroa. By this method we could detect 300ppb of amitráz as well as from beeswax. Calibrations of determinations under our conditions were linear.

DETERMINATION OF 1, 4-DICHLOROBENZENE IN HONEY AND ROYAL JELLY

No 416

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Wax moth Galleria mellonella attacks and destroys honeycombs during storage. Beekeepers to avoid this damage use several insecticides. Among them 1,4-dichlorobenzene (PDCB) is the most worldwide known.

However, this substance is lipophilic and absorbed in wax, so it is carried in honey.
In this work, we examined the transfer of PDCB in honey and royal jelly. For this purpose, four new combs treated with PDCB, ventilated and placed in two hives. The colonies fed with syrup and when broad appeared in the treated combs the queen was removed. Queen cells were formed and the royal jelly was collected. Simultaneously ripe honey was harvested from the same frame. After the collection, the combs return into the hives and the process restarted. All samples were stored at -18_C until analyzed. The experiment repeated twice. A Purge & Trap system was used for the extraction of PDCB. Detection and the identification of the analyte were performed on a Gas Chromatograph attached to a Mass Spectometer system. The calibration curves were carried out by spiking aliquots of residue-free honey and royal jelly with known concentration of PDCB acetonic solutions. Each sample of honey and royal jelly analysed twice
1, 4-dichlorobenzene was detected in all samples. The quantitation shown that the concentrations of PDCB in honey were significant lower than in the royal jelly. In some cases, the contaminated royal jelly had some hundred times more residues than the honey from the same frame.
In conclusion, PDCB not only can be found in honey, but also may appear in royal jelly in high concentration, especially when it is collected from queen cells that bees construct on frames that previously had been treated by PDCB.

HOW SMALL HIVE BEETLE (*AETHINA TUMIDA*) DENSITY AFFECTS BEETLE OVIPOSITION IN BEE BROOD AND SUBSEQUENT REMOVAL OF BROOD BY EUROPEAN HONEYBEES (*APIS MELLIFERA*)

No 417

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In this study we determined how small hive beetle (Aethina tumida) density affects beetle oviposition in bee brood and subsequent removal of brood by European honeybees (Apis mellifera). In 32 Langstroth colonies, beetles in each of four densities (5, 10, 15, 20) were allowed to oviposit on a 10-cm2 section of capped bee brood for 24 hours. The location of individual brood cells in which beetles oviposited (determined by identifying beetle-made perforations in brood cappings) was marked with a sheet of transparent acetate; brood was then returned to the colonies for an additional 24 hours, removed, and proportion of cells removed by bees determined by examining the acetate reference sheets. Bees removed more perforated brood (brood in which beetle oviposition perforations were present) than control brood (brood in which beetles were not allowed to oviposit) – 35% and 0.6%, respectively. Further, bees removed more perforated brood if the brood cell was bordered by at least one empty cell (44%) than if the brood cell was totally surrounded by other brood (25%). This probably occurs because brood bordering empty cells offers beetles two oviposition sites – through the cell capping and through the cell wall. On average, perforated cells bordering empty cells were more likely to contain beetle eggs and contain more eggs (57% containing eggs with 25 eggs/cell) than perforated cells completely surrounded by other brood (32% containing eggs with 16 eggs/cell). Concerning beetle density, bees removed more brood exposed to 15 and 20 beetles (40% each) than brood exposed to 5 or 10 beetles (29% each). Oviposition rates were similar for all beetle densities except at 10 beetles (44%, 60%, 47%, and 49% for 5, 10, 15, and 20 beetles respectively) as were the number of eggs/cells except at 5 beetles (13, 24, 25, and 21 eggs/cell for 5, 10, 15, and 20 beetles respectively). Because oviposition rate and number of eggs/cell varied only slightly among the four beetle densities, it is likely that the total number of cells in which oviposition occurred (6.7, 6.3, 9.6, 10.3 for 5, 10, 15, and 20 beetles respectively) played a more critical role in the number of perforated cells removed by the bees. The data suggest that bees can detect and remove all brood in which beetles have oviposited.

DETERMINING AN ECONOMIC THRESHOLD FOR THE SMALL HIVE BEETLE (*AETHINA TUMIDA*) / VARROA (*VARROA DESTRUCTOR*) PEST COMPLEX IN HONEYBEE COLONIES OF THE SOUTHEASTERN UNITED STATES

No 418

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We report preliminary data on determining an economic threshold for the small hive beetle (Aethina tumida, SHB) / varroa (Varroa destructor) pest complex. The experimental design was a split-plot ANOVA blocked on state (Georgia or South Carolina USA). Within each state, each whole plot consisted of one of 5 apiaries in which average colony SHB populations were manipulated to achieve 0, 150, 300, 600, or 1200 adults. Within each whole plot (apiary) each colony was randomly assigned one of three fluvalinate treatments (continuous, August, October, two colonies per treatment) in order to experimentally vary varroa numbers (0, 3172, and 6662 mites respectively). Colony strength parameters were sampled bi-monthly to determine SHB/varroa effects on colonies. These parameters included cm2 brood, adult bee population, bee weight, number of varroa on a 24-hour sticky screen, number of beetles in a 12 hour sample jar, level of tracheal mite infestation and colony weight.
In 2004 there were no significant effects of any SHB population on colony weight ($F = 2.5$; $df = 4, 26$; $p = 0.10$), number of adult bees ($F = 0.7$; $df = 4, 26$; $p =$

0.61), or cm2 brood (F = 2.7; df = 4, 26; p = 0.08), nor was there an effect of varroa treatment time on colony weight (F = 1.6; df = 2, 26; p = 0.25) or cm2 brood (F = 1.7; df = 2, 26; p = 0.22). There was an effect of varroa treatment time on bee population (F = 4; df = 2, 26; p = 0.04). Trends in the data suggest that colonies having few (150) or no SHB were heavier and contained more adult bees by the end of the first season than were colonies having $300 SHB. Colonies receiving continuous fluvalinate treatments were heavier and contained more adult bees and more cm2 brood by the end of the first season than did colonies receiving fluvalinate treatments in August or October (both decreasing respectively). Data from one season show no conclusive evidence that any tested population of SHB negatively affected colonies in any of the measured strength parameters, although trends exist. A second season of data should more conclusively illuminate how SHB and varroa interact to the detriment of colonies.

CLASSIFICATION AND QUANTIFICATION OF THE DAMAGES TO *VARROA DESTRUCTOR* AS A CONSEQUENCE OF GROOMING BEHAVIOR OF SYENICHKO-PESHTERSKI HONEYBEE ECOTYPE

No 419

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Behavioural defense of honeybees against Varroa destructor implies grooming behaviour, an important mechanism which enables individuals and groups of bees within a colony to remove dust and pollen from their bodies, to disperse pheromones, and to remove ectoparasites. In grooming, adult bees detect and remove phoretic Varroa mites from themselves (auto-grooming) or from nestmates (allo-grooming). In the process, the legs of the mite may be cut off or the cuticle of the idiosoma may be damaged by the bees' mandibles, causing the damaged mite to fall to the bottom of the colony. Grooming behaviour involves biting and licking with the mouthparts and movements of the mesothoracic legs (Boecking and Spivak, 1999). As differences in the rates of specific types of mite damages, such as damaged legs, may be indicative of tolerance capabilities by the bees, such investigations were undertaken in this work. Varroa mites were collected from bottom-boards of 20 potent honey bee colonies (10 with one-year old queens and 10 with two-year old queens) of of Syenichko-Peshterski honey bee ecotype). Classification and quantification of the damage to Varroa destructor were done in accordance with the criteria established by Correa-Marques et al. (2000).
The most frequent category of damage was damaged legs (53.38% in potent colonies with one-year old queens and 52.02% in potent colonies with two-year old queens), while other types of damages were less frequent. In potent colonies with one-year old queens there were: 22.25% damaged shields + damaged legs, 17.03% hollow in the dorsal shield + damaged legs, 3.00% depression or hollow in the dorsal shield, 2.74% carcass empty dorsal shield, 1.60% damaged shields. In potent colonies with two-year old queens the analysys revealed: 21.16% damaged shields + damaged legs, 16.23% hollow in the dorsal shield + damaged legs, 5.74% depression or hollow in the dorsal shield, 3.53% carcass–empty dorsal shield, 1.32% damaged shields.

PHYLOGENETIC DIVERSITY OF CENTRAL-EUROPEAN BLACK QUEEN CELL VIRUS GENOTYPES.

No 420

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The phylogenetic relationship of Black Queen Cell Virus (BQCV) genotypes from Austria, Hungary and Poland was investigated in this study. Larvae, prepupae and pupae of queens, and adult worker bee samples were homogenized and from the supernatants viral RNA were extracted. Two primer pairs amplifying partial genomic regions of the helicase gene and the structural polyprotein gene were designed, based on the complete BQCV sequence published in the GenBank database. Amplicons were produced using one-step reverse transcription polymerase chain reaction (RT-PCR). The nucleotide sequences of the RT-PCR products were determined in direct sequencing reactions. The phylogenetic analysis was performed employing the ClustalX and TreeView softwares.
The European BQCV genotypes showed 82-84% nucleotide (nt) identity and 93-95% amino acid (aa) identity in the helicase domain region; and 91-93% nt identity and 98-100% aa identity in the structural protein coding region to the South-African reference strain. The European genotypes were 83-96% similar to each other in of the helicase domain, and 90-98% in the structural protein region. The Hungarian and the Austrian genotypes were more similar to each other in both regions, than the Austrian and the Polish genotypes or the Hungarian and the Polish genotypes.
Phylogenetic trees were constructed to demonstrate the relationship between the investigated genotypes. The genetic diversity of the investigated viruses reflects to their geographical origin: the Hungarian and Austrian genotypes are phylogenetically closer to each other, than to the Polish ones. The South-African reference strain is unambiguously separated in each tree. Interestingly, the position of some Hungarian and Polish isolates differs in the two trees, which might be explained by genetic recombination. Further investigations are needed to determine the factors influencing the genetic diversity of BQCV, as well as its role in the pathogenicity, and

therefore the possible economical impact of BQCV in queen rearing.

OCCURRENCE OF SIX BEE VIRUSES IN HUNGARIAN APIARIES

No 421

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A survey on the occurrence of the six honeybee pathogen viruses, the Acute Bee Paralysis Virus (ABPV), the Black Queen Cell Virus (BQCV), the Chronic Bee Paralysis Virus (CBPV), the Deformed Wing Virus (DWV), the Kashmir Bee Virus (KBV), and the Sacbrood Virus (SBV) was carried out using single tube one-step reverse transcription-polymerase chain reaction (RT-PCR) method. Samples of adult bees were collected between 1999 and 2004 in 52 Hungarian apiaries situated in different regions of the country. Samples were checked for the presence of Varroa destructor. Mite samples were also collected from the varroa-infested bee samples. Specific primer pairs were designed from the complete or partial genomes of the investigated viruses, published in the GenBank database. One-step RT-PCR reactions were performed on the RNA extracts of 65 honeybees, and 11 mite samples to detect the aforementioned viruses in separate reactions. Positive results were verified by direct sequencing of selected amplicons.
The majority (94%) of the apiaries were infected with at least one of the investigated viruses. DWV was found in 60%, BQCV in 54%, ABPV in 37%, and SBV in 2% of the apiaries, respectively. Neither CBPV, nor KBV was detected in the investigated samples. Single virus infection was found in 36% of the apiaries, while in 46% two viruses, and in 12% of the apiaries, three viruses were found. In mite samples only DWV and ABPV were found; simultaneous infections were detected in these samples too.
According to the results of the survey, DWV is the most widespread in Hungarian apiaries. Interestingly, compared to the occurrence and distribution of these viruses in the Western-European countries, the Hungarian apiaries show slightly lower frequencies of infections, and diversity of viruses. Further surveillance might reveal the changes in the occurrence of bee-infecting viruses in the country in the following years.

ACARICIDE RESIDUES IN GREEK AND CYPRIAN HONEY

No 422

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Acaricides residues have been detected in honey samples analyzed in various countries at ppb levels. The most often reported residues found in honey, are the acaricides bromopropylate, coumaphos, malathion and tau fluvalinate. A survey for pesticide residues in honey was carried out between honey producers, beekeepers and commercial samples from Greek and Cyprian market during the years 2003-2004. Moreover, the compliance of beekeepers with Good Apicultural Practice was investigated.
Analyses were performed by a multiresidue method including a C18 Solid Phase Extraction procedure for the isolation of acaricides and GC/ ECD detection, covering over 40 pesticides. A HP6890 gas chromatograph equipped with a _ECD, an intermediate polarity DB-608 capillary column and a HP7683 autosampler was used for the determination of acaricides. Confirmation of the results was performed by analyzing the samples on a HP5890 GC, equipped with an ECD, a non-polar HP-5 capillary column and a HP7673 autosampler. A total number of 183 Greek and 148 Cyprian honey samples were analyzed.
In 74.6% of samples collected from both countries (a total of 331) at least one pesticide was detected. The most often found acaricide was coumaphos, present in 68.0% of samples while tau fluvalinate was determined in 32.3% of all samples. Finally bromopropylate was not found in any sample. In 0.8% (1 out of 129) of samples from market and 3.0% (6 out of 202) of samples collected from beekeepers, concentrations of coumaphos residues were exceeded the MRL, which is 0.1mg/kg. Totally, 2.1% of all samples was exceeded the E.U. and national MRL of coumaphos. Furthermore, residues of malathion, a non-registered for apiculture insecticide, were found in 6.6% of samples. Consequently, 29 of 331 (8.8%) samples were not compliant with the EU regulation.

AN IFLAVIRUS OF HONEYBEES ASSOCIATED TO UNDULY AGGRESSIVE BEHAVIOUR IS GENETICALLY MORE RELATED TO DEFORMED WING VIRUS RATHER THAN TO KAKUGO VIRUS

No 423

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Introduction: The aggressive behavior of the bees was not correlated to specific gene(s) but to the presence of a novel picorna-like virus, genus iflavirus, termed Kakugo (ready to attack). Kakugo virus (KV) RNA has been

detected in the brains of aggressive worker honeybees. KV is similar to another iflavirus of honeybees, Deformed Wing Virus (DWV) that is transmitted via the bee mite, Varroa destructor. The aim of the present study was to investigate the presence of KV/DWV in the honeybees, where aggressive behavior of honeybees had been observed.

Methods: Total RNA was extracted and reverse transcribed. PCR was performed with gene specific primers 8388-8415 and 8745-8765. In order to obtain additional sequence information, an additional primer, ValR, spanning from nt 10110 to 10135, was selected. PCR fragments, 378 bp, were sequenced.

Results: Nucleotide (left side) and amino acid (right side) comparison of the iflavirus strain identified in Italy with other iflaviruses. The matrix of comparison was inferred on a fragment of about 1750 bp.

	Viral strain					
Strain/Country/Year	PA	DWI	DWF	VT	KV	VDVI
PA/USA/2003	•	100	99.77	99.32	98.65	95.71
DWV I/Italy(Brescia)/ 2002	99.33	•	99.77	99.32	98.65	95.71
DWV F/France/2003	99.41	99.49	•	99.55	98.87	95.94
VT/Italy/Basilicata/2004	98.82	98.45	98.67	•	98.65	95.71
KV/Japan/2004	95.05	94.82	94.89	94.82	•	95.71
VDVI/Holland/2003	84.46	84.31	84.68	84.31	85.12	•

Discussion: The present study contributes to the knowledge of iflaviruses in honeybees. The presence / persistence of KV/DWV-like viruses in Italian honeybees requires an extensive, continual surveillance, as changes of pathogenicity to the DWV-like disease could occur, that is characterized by severe malformations of the bees, or even to new diseases, by acquisition of a few nucleotide/amino acid mutations.

VARROA MITES IN IRAN

No 424

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Varroa was first found in Iran in the 1980s and for two decades Iranian beekeepers have had to deal with this mite.Various treatements were evaluated and Apistan® became the most popular. However , in 1996 their problems worsened when Apistan® resistant populations of varroa emerged . The parasitic mite varroa destructor is well known to beekeepers becaause in many countries it is the most common cause of death of Apis mellifera colonies.It was fist found in Iran in the 1980s,and we have been faced with this problem for over two decades. Mothods of controlling the mite have been investigated and several products are now approved for use.A recent difficulty in Iran as well as in other countries has been the development of resistance in varroa to tau-fluvalinate
(Apistan) . This has led to high mortality of colonies worldwide,and we have therefore investigated various new control products on sale.

BENZETHONIUM CHLORIDE AND CETRIMONIUM BROMIDE IDENTIFICATION BY MASS SPECTROMETRY IN GRAPEFRUIT EXTRACTS USED IN BEEKEEPING

No 425

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Grapefruit seeds extracts (GSE) were used by some beekeepers, because of their antimicrobial activity, to fight American foulbrood of honeybees.
Sixteen samples of GSE were analyzed for the detection of inhibiting agents; 4 of them were marketed as powder products while the remaining 12 were sold as solutions. Benzethonium Chloride and Cetrimonium Bromide identification was carried out using a high resolution gas chromatograph coupled with a low resolution mass spectrometer (HRGC-LRMS).
Results showed a variable concentration of Benzethonium Chloride (from 0.003% to 21.50%) in 14 samples. Beside Benzethonium Chloride, 5 samples showed also a variable concentration of Cetrimonium Bromide (from 3.20% to 11.65%), while only two samples resulted negative to the presence of the two chemicals.
The antimicrobial activity of the 16 GSE samples was also analyzed in order to assess its efficacy against Paenibacillus larvae subsp. larvae, the causative agent of American foulbrood of honey bees and against Bacillus subtilis BGA, Bacillus cereus 11778, Bacillus cereus K250, Micrococcus luteus 9341.a, germs routinely used in labs for the detection of inhibiting agents in food.
The samples containing one or both preserving chemicals inhibited the bacterial growth in the five test organisms, while the two samples where the growth occurred were the samples negative to the presence of Benzethonium Chloride and Cetrimonium Bromide.
On the basis of the results relevant to the analyzed samples it could be assumed that the antimicrobial activity of GSE may be due to the presence of the two preservative chemicals.

NOSEMA APIS AND *VARROA DESTRUCTOR* FROM HONEYBEE COLONIES OF EUCALYPTUS SPP. FORESTATIONS IN URUGUAY

No 426

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In Uruguay there are more than 500.000 ha of Eucalyptus spp forestation that means a huge potential for honey production. Although higher honey yields, the beekeepers found great honeybee colonies mortality

after the finishing of flowering. A study for determining the incidence of Nosema apis and Varroa destructor on the weakening of the colonies was done. Sanitary samples were done at different Eucalyptus' flowering moments for identification of N. apis spore presence in young and foragers bees, and varroa infectations. During this period we also obtained samples of corbicular pollen, for an estimation of pollen resource disponibility. Results indicate a significant increment of Nosema at the apiary associated with a drastic diminution of pollen resource variability. Nosema presence, which was insignificant at the beginning of flowering, affects all the colonies at the end of this period. V. destructor presence also increases along the flowering period, from 2.9% at the beggining to 11.9% through the end. The two sanitarian problems control, specially Nosema, is crucial for the nectar potential explotation of Eucalyptus forestations, reducing colonies mortality.

ANTIMICROBIAL IMMUNE PROTEINS OF THE BUMBLEBEE, *BOMBUS TERRESTRIS* (APIDAE)

No 427

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In insects, humoral antibacterial factors are induced upon injury and bacterial infection. Generally, bacterial infections or experimental injections with particulate and soluble foreign bodies induce appearance of de novo synthesized or increase in previously present antibacterial activities. Antibacterial activity of native (non-immune) haemolymph of the bumble bees is associated primarily with lysozyme and the acquired immunity is associated with the de novo synthesis of apidaecins. The low innate level of lysozyme (about 5µg/ml) in hemolymph of the worker bumble bee, increased drastically following infection with bacteria (Escherichia coli D31) The highest level of this enzyme was noted after 24 hr since infection (11.9±1.9_g EWL/ml) and persisted up to 96 hr since bacterial induction (10.1± 1,2_g EWL/ml). The enhanced activity of lysozyme together with haemocytic defense reactions reduces the risk of generalized bacterial infection during the first 24-48 hr after the penetration of bacteria in the insect body cavity. Apideacins are the most prominent component of the bumblebee's inducible defense against bacterial invasion. A sharp increase of apidaecin transcript levels occur 4-6 hours after infection with living cells of Escherichia coli, followed by a steady rise for several more hours. Peak concentration of apidaecins in the bumble haemolymph was within 48-72 hour post-infection, and then the concentration of the apidaecin compounds declined in blood gradually and it disappeared completely after 144 hr since the bacterial induction.

CELL-FREE IMMUNE RESPONSES OF THE WINTERING HONEY BEE, *APIS MELLIFERA* L.

No 428

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The honeybee developed various specific and effective strategies against microbial infections, attacks from parasites and predators. Among the mechanisms of the bee resistance to bacterial infections a key role play cell-free mechanisms involving antibacterial activity of lysozyme and secretion of apidaecins into the hemolymph. The activity of lysozyme and the level of apidaecins were determined every two weeks in the worker bees one month before (group A), during (group B) and two months after wintering (group C). The mean level of the native antibacterial activity of lysozyme in bees was low, but it was significantly higher in the wintering bees (3,0±0,6µg EWL/ ml). After bacterial induction with Escherichia coli D31 (15x103 cells injected into haemocoel) the antibacterial activity of lysozyme slightly increased in the wintering bees comparing to group A and C. Only trace amounts of apidaecins were found in the wintering bees. Immunization with Escherichia coli D31 significantly increased the level of apidaecins in the haemolymph of bees before wintering and during wintering.

KEY MECHANISMS OF HEMOCYTIC IMMUNE RESPONSES IN BUMBLEBEES

No 429

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The immune responses of the bumblebee (Bombus terrestris; Apidae) show an interesting originality in that they include the rapid appearance in the haemolymph of a potent antibacterial activity that protects efficiently an individual against a great number of microbial pathogens. Cellular defense reactions that appear in insect body cavity are associated with haemocytes. In normal, non-immune haemolymph, haemocytes appear to be mostly passive as they float in the circulating haemolymph or residue on tissue surfaces. In phagocytosis, the most active are plasmocytes and adipohemocytes whereas prohemocytes and granular cells are less active in this cellular defense reaction. Phagocytic index increased significantly after 24h since bacterial induction (4.1±1,0 cells/haemocyte), peaked at 72h (6.0 ± 0.8 cells/haemocyte). Phagocytosis was accompanied by changes both in the number of circulating haemocytes and in the relative proportions of the different haemocyte

types in blood. Generally, the infection initiated a premature differentiation of haemocytes and increase of the percent of basophils asnd granular haemocytes. The percent of haemocytes participating in phagocytosis (Wright's number) increased significantly after infection or artificial injection of bacteria into the body cavity of the bumblebee. At the peak that is noted after 72h since bacterial induction more than 10% of blood haemocytes is active in phagocytosis. After 120h since the induction, the number of phagocytic cells decreases to the level noted before the bacterial induction.

TRIALS TO EVALUATE THE LEVEL OF ANTIBACTERIAL IMMUNITY IN THE WINTERING HONEYBEE, *APIS MELLIFERA* L. USING THE PROTECTION TEST

No 430

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In honeybees, host defence is efficient and relies both on innate and adaptive immunity. Bacterial challenge in the wintering honey bee, Apis mellifera L. triggers two types of immune response, which cooperate to fight the infection: the haemocytic response involving mainly phagocytosis of the pathogen and the humoral responses involving activation of the fat body to produce immune-proteins (lysozyme and apidaecins) secreted into the haemolymph. The intensity of the response to artificially occurring aerosol infection of Pseudomonas aeruginosa H5, pyocyanine producer (2x103 cfu/ml) was investigated in the naïve wintering worker bees (BI, BII), bees before (AI, AII) and after wintering (CI, CII) and in the bees injected into the haemocoel with 14x103 cfu of E. coli D31 /ml (AIII, AIV, BIII, BIV and CIII,CIV).

DETECTION OF *PAENIBACILLUS LARVAE* FROM HONEY

No 431

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Detection of spores of Paenibacillus larvae from honey is a good method for the preliminary diagnosis of American foulbrood. Honey sample is easy to take and send to the laboratory, and it gives a reliable result whether spores are present in the hive. American foulbrood is common in Finland. Last year we analyzed more than 1,500 honey samples and 37% contained spores of Paenibacillus larvae. In 2003 our culture method was validated and accredited.
In validation, undiluted natural honey samples were boiled for 30 min and 10_l of the samples were cultured on bovine blood agar and T-HCl-YGP-agar plates, both with and without nalidixic acid (Steinkraus and Morse 1996). In addition, culture of diluted and undiluted natural and spiked honey samples using different boiling times was analysed.
Altogether 295 natural honey samples were cultured in validation. Seventy of these were positive on T-HCl-YGP agar and 52 on blood agar. A total of 75 honey samples were positive when results obtained with both agar plates were combined. Thus T-HCl-YGP agar was superior to blood agar in the routine culture of P. larvae from honey samples.
Boiling times of 5, 15 and 30 min were tested with undiluted natural honey samples and samples spiked with spores (RSK-16 spore standard, Celle, Germany). The boiled samples were streaked onto T-HCl-YGP agar plates. The spore count decreased dramatically between boiling times of 15 and 30 minutes. The use of diluted and undiluted honey was also compared, and dilution was not found to improve detection.
We decided to use 10 min boiling time of undiluted honey before culturing 10_l onto two T-HCl-YGP agar plates, one with and the other without nalidixic acid to prevent the swarming growth of Paenibacillus alvei. The threshold value between high and low spore counts was estimated to be 40 spores in 10µl of honey. This method was accredited during spring 2004 (Decision T014/M13/2003).

POLISH HONEY – METHODS OF PESTICIDE RESIDUE CONTROL

No 432

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Honeybee, the most important beneficial insect, is inseparable part of the agricultural ecosystem. The contact of bees with pesticides that also play an important role in agriculture is unavoidable. During the last years several chemicals have been used as acarides to Varroa control. Wrong utilization of such preparations leads to the presence of residues in bee products. Honey possesses valuable nourishing, prophylactic and healing properties and must be free of objectionable contents. The aim of our study was the optimisation and validation of analytical methods for determination of residues of acaricides used in the control of Varroa in Poland as well as determination of pesticides causing serious losses to beekeeping.

EVALUATION OF SYNTHETIC ACARICIDE RESIDUES IN BEESWAX

No 433

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Introduction: Many synthetic acaricides are fat-soluble substances and as such tend to accumulate in apiculture products. They can be found in parts per million levels in beeswax, and could be the origin of contamination of honey and other products. This background makes the analysis of synthetic acaricides in wax especially important.
The objective of this work is to evaluate the sanitary risk derived from the synthetic acaricides treatments (bromopropylate, coumaphos, 4,4 - dibromobenzophenone and fluvalinate) of beehives. Beeswax samples have been analyzed with an analytical method, which was developed and validated in our laboratory.
Methods: Twenty-two samples of beeswax from different parts of Spain were taken and analysed after different treatments. Method for the analysis of synthetic acaricides consists of a sample extraction with an n-hexane solution using a test tube heater for dissolution of the wax. Then repeated freezing and centrifugation eliminated high molecular compounds. The n-hexane supernatant was purified with solid phase extraction (SPE) using a Florisil column. The elution of the synthetic acaricides was made with acetone/hexane (3:1). Eluate was concentrated to dryness and dissolved in acetonitrile. Determination of the synthetic acaricide, bromopropylate, coumaphos, 4,4 -dibromobenzophenone and fluvalinate is made by HPLC with a DAD detector. For the method validation, repeatability and reproducibility studies have been carried out, as well as a recovery analysis.
Results: Validation of the analytical method in our laboratory was satisfactory. The statistics of results is still in process.
Discussion: The analytical method allows the reliable and precise determination of residues of bromopropylate, coumaphos, 4,4 -dibromobenzophenone and fluvalinate in beeswax. According to European Union regulation Nr. 2377/90 EEC, coumaphos has a Maximal Residue Limit (MRL) of 100ppb in honey. For fluvalinate, 4,4 dibromobenzophenone and bromopropylate MRL for honey and beeswax are not established.

THE SURVEILLANCE OF HONEYBEE DISEASES IN ROMANIA BY LABORATORY EXAMS

No 434

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Romania is one of the most important honey producers from Europe and it has many melliferous zones of acacia, lime and sunflower plantations, all over the country. In this way, in Romania, in 2004, there were registered 723,014 bee colonies of Apis mellifera carpatica species. There were obtained 19,275.5 tones of honey and 8,756.9 tones from this quantity, in value of 17,718.9 thousand represents export in the European Community countries. The surveillance of notifiable diseases is carrying out by laboratory investigations, at the Institute for Diagnosis and Animal Health, in the National Reference Laboratory for Honey-Bee Diseases and in the other 41 county laboratories.
The bee diseases are surveyed by laboratory exams in accordance with the National Programme of Medical Veterinary Surveillance, which is financed from the state budget. In the National Reference Laboratory for Honey Bee Diseases are used diagnostic methods from the O.I.E. Manual of Diagnostic for Terrestrial Animals, for Acariosis, Varroosis, Nosemosis, American foulbrood and European foulbrood. Ascosferosis is other disease which is included in the National Surveillance Program, due of its economic impact to bee colonies. There are presented the laboratory tests which are performed in our Institute, statistic data regarding the number of samples worked between 2002-2004, notifiable diseases, and the other major causes of bee mortality encountered in colonies, in this period.

THE VETERINARY MEDICAL SURVEILLANCE OF THE BEE COLONIES' HEALTH IN ROMANIA, BETWEEN 1998-2004

No 435

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The surveillance of health and the prevention of diseases at bee colonies represent a permanent concern of the veterinary services in Romania. The Romanian state sustains beekeeper through tax fee policies and other fiscal facilities established by normative measures. The National Programme of Surveillance of Animal Diseases, including at bee, is financed from the state budget.
The surveillance and the bee diseases are monitored at regional and national level. The main monitored diseases are those notified at O.I.E.: Acariosis, American foulbrood, European foulbrood, Nosemosis, Varroosis, as well as those with economical implication at national level. The registered prevalence in Romania for these diseases between 1998- 2004, has been conditioned by
- The growth in the monitored period of the number of bee colonies;
- The practice of pastoral beekeeper and the constituency of some temporal agglomeration of apiary with different epidemiological situations:
- The effectuation of incomplete treatments for the fighting against diseases with inobservance of treatment diagrams indicated by the veterinary authorities at national level;
- The application of chemical products used in the phyto sanitary domain;
- The unilateral and on long term use of ox tetracycline which has determine the growth of resistance of

pathogenic bacteria strains;
- The elimination from use of certain antibiotics (streptomycin, nalidixic acid) for fighting against bacterial diseases;
- The inapplicability of obligatory hygiene and sanitary measures imposed by law.

EXOMITE™ APIS: A PRODUCT FOR VARROA MITE (*VARROA DESTRUCTOR*) DEVELOPED FOR INTEGRATED PEST MANAGEMENT

No 436

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Exomite Apis is a new thymol based product for Varroa mite. It employs a natural wax powder, Entostat™, as a delivery system for small quantities of thymol. As bees enter the hive, they pick up the powder from a bespoke applicator and distribute the powder and thymol combination throughout the hive.
Generally, thymol is not thought to be as effective in cold climates, however studies have shown high efficacy with this product in cool conditions. Product development will be discussed, together with field trial results.

CHRONIC SUB-LETHAL IMPACT OF SPINOSAD, CLOTHIANIDIN AND THIAMETHOXAM ON MICRO-COLONIES OF BUMBLEBEES, *BOMBUS TERRESTRIS*

No 437

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Pollinators are often impacted by chemical pesticides used in agroecosystems. There is a plethora of scientific information available on the impact of agricultural pesticides on honeybees, however this cannot be said of other insect pollinators, including bumblebees. To address this, we determined the chronic sub-lethal impact of the biopesticide – spinosad (doses = 0.35 mg/kg (low) & 3.5 mg/kg (high)), and 2 systemic seed treatment insecticides - clothianidin (doses = 0.006 mg/kg (low) & 0.036 mg/kg (high)) and thiamethoxam (doses = 0.001 mg/kg (low), 0.006 mg/kg (medium) & 0.4 mg/kg (high)), on bumblebees (Bombus terrestris) using a modified micro-colony laboratory bioassay. Micro-colonies, consisting of 3 worker bees, were fed pollen contaminated with the insecticides doses (n=20/treatment) indicated above for 35 days and then monitored until only one worker was left in the colony or for 63 days, whichever came first. Results indicate there was no significant effect of any of the treatments on initiation of oviposition, mean weight and number of larvae discarded, mean weight of drones produced, and overall survival time of the micro-colonies. We did determine that worker longevity was significantly decreased in the high clothianidin (42 days (d)) and high thiamethoxam (40d) treatments compared to the untreated control treatment (51d). The first day sealed larval cells were seen in micro-colonies was significantly delayed in the high spinosad dose (23d) compared to both doses of clothianidin (low= 13 & high=16d) and the high thiamethoxam dose (11d). However, the remainder of the treatments, including the untreated control (21d), were not significantly different from the high spinosad dose. The first day drones were seen in the micro-colonies was significantly earlier in the high clothianidin (22d), low spinosad (25d) and high thiamethoxam (17d) compared to the untreated control (32d). None of the other treatments were significantly different from the untreated control. We feel that micro-colonies are an extremely useful lab bioassay technique. With fewer bumblebees per unit, replication can be increased, allowing for the generation of statistically accurate and valid scientific results.

FUNGICIDAL PROPERTIES OF EXPERIMENTAL SAMPLES OF MEDICINAL AND PROPHYLACTIC WAX FOUNDATION

No 438

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Fungi Ascosphaera apis, Aspergillius niger and others are the source of brood diseases of honey bees. Effective medicines against fungi diseases are absent now and weakening of honeybee colonies with corresponding losses of profit often takes place.
We propose to use the native protective drugs for prophylactic and treatment of fungi diseases. Natural honeybee combs contain propolis, which is the main protective component in the nest of bees. But its properties are lost after heat treatment of wax at processing and sterilization.
We propose to return the natural protective properties to wax foundation by adding of propolis extract to wax with the aim of prophylactic of the brood diseases (Patent of Ukraine No 33532 A 01 K 51/00)
It was founded in the laboratory investigation in the Prokopovich Institute of Apiculture that the addition of propolis extracts to the wax foundation killed 85-95% of fungi Ascosphaera apis and Aspergillus niger during 5 days. Different concentrations of propolis in wax were tested and the optimal one was found.
The method of addition of propolis extracts to the wax foundation without loss of fungicidal properties was elaborated. These foundations were tested during 4 years at the apiary with 200 colonies. We didn't have cases of fungous diseases at the experimental apiary while usually up to 5% of colonies at the neighboring

apiaries, using common foundation, had different stages of brood damages by stone brood disease. Our investigations gave possibilities to recommend the wax foundation with propolis extracts for the wide use with the aim of prophylactic and even as the medical treatment at fungi diseases of the honeybee brood. The advantage of proposed method of prophylactic of fungous diseases is based at the use of natural substances. The use of natural drugs excludes pollution of the hive products.

CONTROL OF AMERICAN FOULBROOD DISEASE WITHOUT ANTIBIOTIC USE

No 439

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With regard to the prohibited use of veterinary preparations containing antibiotics and sulfonamides in apicultural practice in the Republic of Bulgaria, attempts for healing apiaries affected by American foulbrood without recourse to these drugs were performed. Three apiaries with a total of 119 bee families were healed. The healing of bee colonies was achieved via quarantine, destruction of affected bee families via burning and disinfection of hives with 4% sodium hydroxide.
Following two negative examination at 15-day intervals for clinical signs of diseased bee families, a microbiological examination of bee honey, sampled from all families in the apiaries, for contamination with Paenibacillus larvae ssp. larvae spores was performed. The bee families, contaminated with spores, were moved as an "artificial swarm" in disinfected hives on new frames with wax foundation. Prior to moving, the bees were kept for 48 hours without food in a cool premise.
In bee families, diagnosed as diseased at the end of the active season, the examination of honey for contamination with spores and the transfer of swarms was done in the spring of the next year. The old combs of these families were melted and the nests were broadened with new frames for building combs.
The apiaries were considered as healed and the quarantine was removed one year after the last destruction of a bee colony and negative results in the examination of honey samples for contamination with spores.

VARROACIDAL ACTIVITY AND APITOXICITY OF THE NEW ANALOGUES OF COUMAPHOS

No 440

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Coumaphos is a known insecticide, and due to its varroacidal activity, it is used in the protection of bees against Varroa destructor. Unfortunately, coumaphos has relatively significant toxicity to animals (LD50 for rats: 60 mg/kg), as well as an unnegligible oral and contact apitoxicity (LD50: 20.5 and 316.3 mg/kg, respectively). The aim of this work is to examine the above mentioned biological properties for a number of the new derivatives of coumaphos, as active as coumaphos itself, but simultaneously without its above described, undesired features.
Over one hundred (112) analogues of coumaphos were prepared and evaluated for their varroacidal activity in in vitro tests against mature females of Varroa destructor. The twenty compounds, that had shown the varroacidal activity equal or higher than coumaphos itself, were tested for their apitoxicity (both oral and contact).

EFFICACY OF THYMOL TO VARROA CONTROL IN AN EXPERIMENTAL NETWORK AT NATIONAL LEVEL

No 441

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Our Apicultural Research Center has set in motion a experiment network at national level to devise a strategy designed to fight against varroa. This strategy must be based on several products combination and a treatment timetable in accordance with the different apicultural realities.
The first results achieved from four experiments with thymol in representative commercial apiaries located in different places of the country are presented.
Efficacy differs according to the study area. It was around 80-90% in two regions and below 50% in another two. Bearing in mind influential factors, the type of hive revealed as the most important factor to explain these differences.

BIOLOGICAL CONTROL OF *VARROA DESTRUCTOR* - IMPACT OF SPORE INOCULUM ON BEES.

No 442

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We are investigating entomopathogenic fungi as potential microbial control agents of V. destructor. Initial laboratory bioassays identified isolates of fungi that were pathogenic to V. destructor under the abiotic conditions of the honeybee colony, but that had low impact on bees and other beneficials. Isolates of Beauveria bassiana, Metarhizium anisopliae and Lecanicillium spp. are being assessed further for impact on bee and mite populations. We are examining the effects on V. destructor and bees of fungi applied as spore powders to bee populations. Honeybees dusted with conidia powder are likely to acquire inoculum orally as a result of grooming behaviour or by the ingestion of contaminated pollen loads. To evaluate the susceptibility of bees to fungal infection by this route we fed honeybee adults and larvae spore powders mixed with pollen or in suspension. Adult bees fed high doses of spores in suspension (1 x 108 spores ml-1) showed a range of survival from 10 to 98% after 15 days. Differences in the susceptibility of bees were observed between and within species of fungi. However, bees are unlikely to ingest such a high dose when preparations are applied topically for varroa control so we also fed powdered spores mixed with pollen to cages of bees. At a dose of 1 x 109 spores per cage of 25 bees, survival rates for most isolates were above 95%. This indicates that anti-fungal properties in pollen could be preventing infection of bees by this route. A method has been developed to feed suspensions of conidia to honey bee larvae and their susceptibility is being tested for a selection of candidate isolates. The methods and results of these experiments will be presented and the potential of fungi for biocontrol of varroa will be discussed. Since the honeybee is used widely as a representative beneficial organism in toxicological tests, we also discuss the importance of using the feeding techniques developed here in such tests.

A METHOD FOR THE CONTROL OF *VARROA DESTRUCTOR* INFECTION USING CELLULOSE STRIPS SOAKED IN OXALIC ACID

No 443

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The control of Varroa destructor infection using oxalic acid (OA) is a common practice in central Italy area. The most practiced method applied to control the Varroosis in honey bees is the direct application of an oxalic acid sugar solution trickled with help of a syringe into each space between the occupied combs. We describe here a new method of administrating the OA utilizing cellulose strips to deliver the drug, as initially suggested by the Toscany Region beekeepers association. To verify the efficacy of this new method, a field trial was performed during April, May, June and December 2004 and January and February 2005. During this period, the drug was administrated in 6 different experimental apiaries placed in various localities of the Toscany and Latium region. OA was administrated twice at a 14 days interval.
The evaluation of the new cellulose OA administration method, was realised using the dead mites count for all the beehives included in the experiment. An equal number of beehives were keept untreated. The comparison between treated and untreated beehives was realised by daily count of the dead mites subsequently to the administration of anti-varroa chemichals of known efficacy (coumaphos and trickled AO).
The values obtained in the treated beehives using the new method were not statistically different from those obtained in the untreated beehives where the varroa mites natural fall could be evaluated.
The OA is a well known effective compound against the varroa infection if sprayed, trickled or vapourised. Consequently, it was tought a promising candidate to develop an easier beehive treatment method, which could reduce the expences connected to the time consuming and more labourious classical treatments. Unfortunately, the method chosen in this study, proved to be not effective, most probably, because of the uneffectiveness of this method in creating a sufficient acidic environment.

THE IMPORTANCE OF BEE POLLINATION IN THE CONSERVATION AND PRESERVATION OF WILDLIFE AND BIODIVERSITY IN SOUTH AFRICA

No 444

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The fauna and flora of southern Africa is one of the richest in the world. Seed and fruit produced not only ensures the survival of plant species but directly or indirectly plays an important role in the nourishment of invertebrates, birds and mammals. When mature seed and fruit are seen on a plant, the importance of the pollinating agent is long forgotten.
Southern African has a rich indigenous bee population, which includes nine families with about 135 genera and more than 1600 species. Bees are believed to be responsible for more than 80% of all insect pollination. Special behavioural and structural features enhance these bees' ability as flower pollinators.
As plants are sessile, various specialised mechanisms have evolved to ensure genetic variability by preventing self-fertilization. Dioeciousness is the simplest method, but even in bisexual plants self-fertilization is effectively controlled. Good pollen movement is required to prevent self-fertilization. This is more often than not facilitated by insects of which bees are the most specialized pollinating agents. During this desk study more than 800 South African plant taxa were recorded which were

visited by bees. Various plant taxa have different pollinator requirements, but all these plants benefit to a lesser or greater extent from these bee visitations. This report brings together our knowledge of indigenous plants known to be visited by bees and their pollination requirements. This information is significant to botanists and agricultural extension workers in the fields of Rural Development Programmes and various Land Care Programmes and to practicing beekeepers throughout South Africa.

ASSOCIATED FORM STONEBROOD AND VARROA

No 446

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In these latter years there have been not infrequent cases of originating mycoses (chalk brood, stonebrood) against development of a mite Varroa. We carried out some researches of seasonal dynamics of the pathological process at the mixed run of aspergillomycosis and varroatosis. An object of the researches was colonies of bees which have some signs of infection by associated form of these activators. Two groups of 4 colonies consisting of 4-5 and 6-7 beeways between combs were formed. Then during the season (May-September) after each cycle of reproduction of worker-bees we selected the tests of brood and bees for identification of disease activators according the established procedure (O.F. Grobov, 1987). In parallel they did accounting of the quantity of sealed brood for determin-ing a degree of damage of a bee inclusion.
The received results showed that the peak values of a mixed damage due to aspergil-lomycosis and varroatosis occur in the middle of June. Then a level of fungal infection of colo-nies of bees decreases, but varroatosis after summer decreasing displayed an active develop-ment already in September. It is accounted for a turbulent development of colonies in the period of disease anteceding the peak values of development, and later on it is accounted for the time of main honey flow.
In the group with a start strength index of a colony of 4,5 beeways the dam-age due to fungus increased 42% and varroatosis – 40 %, while analogous factors for stronger colonies of bees (6,5 beeways) were 25 and 14% relatively.
So the analysis of the received results showed that the development periods of activa-tors of basic diseases of bees during beekeeping season coincide rather often. The given circumstance should be taken into consideration when developing the means and modes of treat-ment-prophylactic measures.

DEVELOPMENT OF FUNGUS *ASPERGILLUS NIGER* IN DIGESTIVE TRACT OF BEE LARVAE

No 447

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Stone brood is a dangerous disease of honeybees, causing significant damage to beekeep-ing. While developing the means of treatment and the preventive measures of contagion of fun-gal etiology, it's necessary to study the character of communication and distribution of causative agent in organism. The purpose of the present work is to study development of a causative agent of bee asper-gillomycosis in a midgut of larvae. Artificial infection was run by means of spraying the comb frames with fungus (Aspergillus niger Tieghem) suspension in concentration 20 _ 104 cl/ml in sugar syrup. The larvae were collected from the honeycombs and exhausted their intestines, the midguts of which were separated and placed into a fixing solution (3%-s' glutaric aldehyde on a phosphate mixture) for 24 hours. The treated area of the midguts was lavaged in a buffered solution of neutral reaction and conducted an additional fixation of glutaric aldehyde. Then water depletion by ethyl alcohol was carried, after that the healthy and infected areas of the midguts of bee larvae were grinded up and selected with the help of a microscope (_ 400).
In result they established that penetration of conidium of stonebrood causative agents into the larvae's intestines occurs on the 4th day after infecting. In the experiment preparations of the midguts 2 hours after aspergillus got inside, assembly of conidium was found on the surface of the mucous, without any traces of epithelial tissue's damage. In 10 hours we recorded intensive development of fungus, accompanied by the beginning of destructive processes of epithelial colony-forming of intestines' mucous. The developmental prototypes of the infected larvae' intestines, recorded in 72 hours, showed already considerable destruction of epithelial tissue and intestine's villuses, as well as pullulation of fungus's mycelium into a cavity of a larva's body.

PATHOGENS OF HONEYBEES IN THE HUMID FOREST OF NIGERIA

No 448

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Apart from production of honey whose use had become unlimited, part of which are food values, medicinal and

high economic value, honeybees also produce wax, pollen and propolis and much more act as a pollinator. As any other insects, honeybees are subject to infection leading to high mortality. So, this study is designed to investigate the pathogens that affect honeybees in certain part of Nigeria.
Thirty five dead honeybees and thirty five dead larvae, obtained from eight different apiaries at four different ecological locations in the humid forest of southern Nigeria, were surface sterilized in sodiumhypochlorite for one minute and rinsed in four successive changes of sterile distilled water and blot-dried. These were then plated on sterile solidified potato dextrose agar (PDA) in an inoculating chamber and incubated for seventy-two hours. Another ten dead honeybees and ten dead larvae were singly placed in 10ml of sterile distilled water. These were serially diluted and the suspension streaked on PDA and incubated for seventy –two hours.
The microbes found associated with the dead honeybees and larvae are Aspergillus flavus, A. niger, Rhizopus spp. and Bacillus spp. The percentage occurrence for each micro-organism are as follows: A. flavus – 22.2% for dead honeybees and 32.2% for the dead larvae; A. niger – 4.4% for dead honey bees and 8.9% for the dead larvae; R. spp. – 4.4% for the dead honeybees and 2.2% for the dead larvae; and B. spp – 17.8% for the dead honeybees and 7.8% for the dead larvae.
Identifying microbes associated with the death of adult honeybees and brood can assist in instituting a control measure so as to avoid subsequent mortality and consequent extinction. This can also help in controlling honeybees where their existence becomes inimical. The effect of these microbes on honey with respect to toxin production cannot equally be overlooked.

EFFICACY ROTATION OF PREPARATION AGAINST *VARROA DESTRUCTOR* MITES

No 449

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10 fields experiments were conducted in 1994-2004 at the apiary of the authors (Ukmerge region, Lithuania) The Research objective is to find optimum rotation of preparations use for killing Varroa mites in order to prevent the formation of resistant mites, residue accumulation in bee products and manage with one treatment of bee colonies in autumn. Every year in the second half of August honey was extracted and mites infestation of bees and brood was identified. Based on the obtained data groups Caucasica x Carnica hybrid were formed. All bee colonies of each apiary were treated with the same preparations: two strips Apistan, Apifos or Gabon for one bee colony. Formic acid was used 2-3 times in Czech type packets, changing them every 7 days. Oxalic acid was used at the end of September. After the strips and treating in October mite infestation of bees and brood was identified again.
Apistan and Gabon PA 92 were very effective against Varroa mites. Their average efficacy for seven years (1994-2000) – 98,2%. In the eighth and ninth years (2001-2002) their average efficacy decreased. Mites resistant to them started to form. 20% of bee colonies preparations did not work. Further use in the same bee colonies this preparations is not advisable. As a result of preparations, to take no notice in their efficacy , is need every 2-3 years to change to other preparations. One of them is produced in Poland under the name Apifos. Its average efficacy according to the data mean of 6 years is not different from Gabon and Apistan. To rotation of preparations is necessary to introduce oxalic and formic acids. They efficacy is similar, but is lower than the average efficacy of Gabon, Apistan and Apifos. The use of formic acid together with one strip of Gabon, Apistan or Apifos to destroy Varroa mites reduces the possibility of accumulating residues in bee products.
In 2002 the average samples of experimental apiaries honey, bee breed and wax were submitted to the laboratory of Dr.C.Lüllman from the Quality Services International GmbH to investigate the residues of the preparation used to kill Varroa mites. In 2004 the average samples of 4 experimental groups were submitted to the laboratory University of Hohenheim to investigate the residues of fluvalinat, acrinathrin, amitraz, thymol, and bromfenwinfos. Residues of this preparations were identified in average sample of wax 2003 from the experimental apiaries. In the average samples of honey, bee bread, and wax taken in 2002 neither acrinathrin, nor fluvalinat was found. 2004 in the average samples of honey obtained from bee colonies in witch for treatment preparations was exchangeable on neither fluvalinat, acrinathrin, clorfenvinfos nor amitraz was found. 0,9mg/kg of fluvalinat in wax 2003 of experimental apiaries was found. To use in apiaries rotation of preparation for control Varroa mites we can have bee products without residues. EU laws regulating the registration of the preparation for controlling Varroa mites. These preparations should be registered as a disinfectant for the bee colonies.

EFFCIENCY USE OF BACILLUS THURINGIENSIS (A MICROBAIL INSECTICIDE)IN CONTROLING WAX MOTH PET ON THE BEEHIVE.(A CASE STUDY IN NIGERIA

NO 450

Moth is the most severe and common problem to beekeepers in Nigeria,this
is so because moth strive well in temp of 15-30 centigrade(59- 86 F)
above and when temperature is below wax moth tend to perish.
Arising from this study ,20 bee farmers was selected from each of the 6 geopolitical
zone in Nigeria.a total of 60 beefarm was visited.in each of the beefarm
visited ,between 2-5 beehive were found to be affected with wax moth.Bacillus Thuringiensis
was introduced to each of the affected hive.

Random sampling procedure was used to chose 60 respondents 9apiarist).
descriptive statistics was used to the methods of usage.
It was reconmended among others that wax moth can be effectively control
with adequate farm planing strategies in order to minimize the spread of moth.

BEEKEEPING IN PORTUGAL. AN UPDATED OVERVIEW FOCUSED ON COPING WITH VARROA

No 451

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In Portugal, there are no official, statistically validated, records that can allow an objective data-based analysis of the national beekeeping sector. This was the first study that set out to try a first nationwide characterization of beekeepers and beekeeping operations most frequently carried out in the context of our apiculture, particularly the type of operations expected to impose some selection pressure on national populations of varroa. The starting point of this project (2003) was the package of approximately 1200 interviews/enquiries carried out/answered by beekeepers well distributed across the whole continental part of the country. As a very superficial overview of the obtained results, we can say that:

- The Portuguese beekeeper is, on average, a 56 years old male;
- Most beekeepers (62%) have less than 4 years of official general education and their level of specific beekeeping training is, at best, very deficient;
- Each beekeeper has a mean number of 2 apiaries, were circa 48 colonies are kept. The 2 most used hive models are country-specific ("Lusitana" in the north, and "Reversivel" in the southern part of Portugal), followed by Langstroth hives. It is not rare to find beekeepers that build their own hives;
- Treatments against Varroa have been based on Apivar (43%), Apistan (26%), Klartan (17%) and the Acadrex (10%). Other substances are becoming increasingly more frequently used, such as the alarming Supona (chlorfenvinphos) or the welcome timol;
- On average, 2 annual treatments against varroa are introduced into honey bee colonies for 4 to 6 weeks, predominantly between January/March and later on in July/September (after honey harvest); and
- Most beekeepers (83%) annually replace 3 old drawn combs by newer wax foundations sheets, particularly during spring time.

ACTIVITIES INVOLVED IN *APIS MELLIFERA* HYGIEN BEHAVIOR IN PRESENCE OF BROOD AFFECTED BY ASCOSPHAERA APIS

No 452

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Hygienic behavior of honeybees involves cell uncappin and affected brood cell removal from comb. The objective of this work was to study the activities performed by honeybees of different ages on cells containing brood affected by Ascosphaera apis in hygienic (H) and non-hygienic (NH) colonies. Four observation hives (two H and two NH) were used. Emerging honeybees were numerated and introduced observation hives. Pieces of comb containing mummie obtained by inoculation with A. apis spores were introduced in each observations hive (H and NH) and th cells were filmed. Observer Video-Pro was used for analyses. It was registered the frequency of numbered honeybees doing different activities on cells with mummies. Inspection, Uncapping, Removing and Inactivity were considered. Honeybees age, frequency and duration of activity were analyzed. Honeybee age was analyzed with a t-test. Percentage of honeybees performing an activity were compared with a Chi-squar test. The average age of honeybees performing inspection was 15 and 16 days for uncapping and removing and no difference was detected between H and NH colonies. Percentage of bees that performed hygienic activities was higher in H colonies ($p<0,0001$). The average frequency of inspection, uncapping and removal by a single bee was greater in NH colonies. Honeybees that were registered uncapping and removing brood in NH colonies performed more than o visit to the cells more frequently than in NH colonies ($p=0,0159$ for uncapping and $p= 0,1650$ for removal). Tim invested for each bee to uncapping ($p=0,0012$) and removal ($p=0,0206$) was greater in NH colonies. From a total amount of 67 mummies, H colonies removed 98 % and NH 70 %. Filming allowed to describe the sequen of hygienic behavior.

HONEY MONITORING FOR *PAENIBACILLUS LARVAE* SUBSP. LARVAE SPORES IN THE STATE OF RIO GRANDE DO SUL, BRAZIL – 2003 TO 2004

No 453

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American foulbrood (AFB), one of the most significant diseases of honeybees, has not yet been detected in Brazil. Since the disease is widely spread in some Latin American countries, including some bordering Brazil, the Brazilian authorities and beekeepers are concerned about the major economic implications due to the risk of AFB introduction to Brazilian beehives. Accordingly an improved method of detecting spores of Paenibacillus larvae subsp. larvae spores in honey has been developed (Schuch, Madden and Sattler, 2001) and officially adopted by Agriculture Ministry of Brazil. As part of the Brazilian animal health authorities strategy, the national monitoring of Paenibacillus larvae subsp. larvae spores programs have been implemented since 1998. Accordingly to Schuch, Tochetto and Sattler (2002), in the year of 2000 few P.larvae subsp. larvae spores were found in a healthy beehive in the State of Rio Grande do Sul (RS). This finding resulted in a variety of governmental actions. Since the analysis of honey from beehives for the presence of Paenibacillus larvae subsp. larvae spores is the most effective measure to achieve an early detection of the colony infection and to avoid the spread of American Foulbrood, it was implemented by the animal health authorities of Rio Grande do Sul State, as the first strategy, a wide official AFB State Monitoring Program, which is based on analysis of honey samples from all apicultural regions in the State. From September 2003 to September 2004, 1,315 samples of honey from 427 townships of RS were analyzed by Brazilian official method and all (100%) were found to be negative for Paenibacillus larvae subsp. larvae spores. Results are indicative that no spread of P.larvae subsp. larvae spores from the previously studied area occurred. As four years passed from the first isolation of P.larvae subsp. larvae spores in a comb from a healthy beehive, and as no spread to other areas was observed, we conclude that this fact is probably due to the higher disease resistance of the africanized Brazilian bees.

PERFORMANCE COMPARISON OF NESTED PCR PROTOCOL AND THE BRAZILIAN OFFICIAL MICROBIOLOGICAL METHOD FOR THE DETECTION OF PAENIBACILLUS LARVAE LARVAE SPORES IN HONEY

No 454

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Paenibacillus larvae larvae is the casual agent of the disease "American Foulbrood", the most important disease of Appis mellifera broods. This disease occurs in some Latin American countries, including some bordering to Brazil, but not yet in Brazil. The availability of sensitive methods to be used in the national programmes of Paenibacillus larvae larvae spores monitoring is essential to avoid the entry of contaminated products in the country and to monitoring the possibility of beehives infection and the spread of the disease. With the aim to control the presence of spores in imported hive-on-products by Brazilian sanitary authorities it was developed at Laboratório Nacional Agropecuário (LANAGRO/RS), previously known as LARA/RS, a highly sensitive and specific microbiological method (Schuch, Madden and Sattler, 2001) to detect P.larvae larvae, which is based on concentrating spores by centrifugation, inactivating vegetative cells and then inoculating onto a newly developed selective solid medium: Paenibacillus larvae agar (PLA). Suspect colonies are then selected and cultures confirmed by biochemical identification. The method presents enough sensitivity to detect fewer than 10 viable spores of P. larvae per millilitre of honey. This method was adopted as the Brazilian official method. To improve the laboratorial performance and to reduce the time to get a negative result it was implemented the nested PCR accordingly to Lauro et al, 2002, using the sequence SSU rDNA (AY030079 and AY03008). The original protocol was optimised with the objective of be carried out in our laboratory and all changes were validated. Resulting protocol presented satisfactory detection limit and excellent reproducibility. The present work shows the performances comparison of the validated nested PCR protocol and the official microbiological method. McNemar test for marginal homogeneity demonstrated that there was no difference between results produced by both methods.The calculated Kapa index accordingly to Fleiss (1981), reinforces our conclusion and is indicative that there was an excellent agreement between methods.

DECLINE OF FLUMETHRIN RESISTANCE IN VARROA DESTRUCTOR AFTER ABANDONING USE OF SYNTHETIC PYRETHROIDS TEMPORARILY

No 455

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Fluvalinat resistance in Varroa destructor has been found in some areas, since some years. As Flumethrin, the active substance of Bayvarol®, belongs to the same group of substances of the synthetic pyrethroids it was affected similarly. For a period of 5 years, the CVUA Freiburg made examinations at 10 apicultures in South West Germany to verify the development of this

resistance. All beekeepers, even those who formerly had utilised synthetic pyrethroids for Varroa control, dropped using any substance of this group during the whole examination period. Always in August, one brood sample was extracted from each of the constant number of 10 colonies to determine the extent of resistance. During the two last years, the effect of Bayvarol® was simultaneously tested in the field. During the first years, the effectiveness of Flumethrin varied considerably between the individual apiaries. Also on the apiary itself, there were differences between the colonies. On one part of the apiaries, the effectiveness was so low that from this a resistance could be concluded. In the course of the years, this resistance decreased more and more. This was also confirmed by the examinations in the field. However, in the last year, one apiary still showed a reduced effectiveness. This leads to the conclusion that after stopping treatment with synthetic pyrethroids resistance will decline already within a few years. In singular cases, however, the effect can be reduced because of a transfer of resistant mites from the environment. The beekeeper can identify those colonies from the persisting mite fall-off over a longer period. When Bayvarol® works fully effective the mite fall-off increases significantly during the first days, before it decreases correspondingly afterwards. The beekeeper can use Bayvarol® for a save Varroa control if he controls the mite fall twice in the first week.

BEESWAX FOUNDATIONS WITH IMPREGNATED THYMOL FOR VARROA CONTROL

No 456

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The use of essential oils and organic acids is generally accepted as an alternative tool for the control of the Varroa Destructor levels in bee's colonies, avoiding mite resistance and reducing the residues contaminations resulting from the systematic application of synthetic chemicals.[1]
Under all the alternative substances, thymol is the most studied and used, presenting under certain application conditions an acaricide efficiency close to 100 %.[2] Due to the non-polar properties of these organic compound it is mostly insoluble in water, but dissolves easily in fat substances like beeswax. Nevertheless, its high volatility leads to a quick concentration deflection in wax, specially if under hive conditions.[2] These properties took as to explore the use of beeswax as a potential matrix for the application of thymol in Varroa control.
The study was made using 21 Langstroth hives, divided in three groups, with bottom boards for mite fall counting. One group was used as the control, where no treatment was applied, while on the other groups two different methodologies were tested, changing the thymol dosage and the number of impregnated beeswax foundations. The infestation level was accessed countin the natural mite fall before treatment, and the efficiency was measured counting the mite mortality during the treatment and after the applications of Apivar.
The acaricide effect of the beeswax foundations impregnated with thymol is evident, with a mite fall increasing between 3 and 10 times more after inserted in the hive. In terms of efficiency the use of two foundations impregnated with 9 grams of thymol and inserted with a 10 days interval showed better results than the use of one foundation with 18 grams.
[1] Imdorf S.; Charrière J.; Kilchenmann V.; Bogdanov S.; Fluri P. (2003); Alternative strategy in central Europe for the control of Varroa destructor in honey bee colonies. Apiacta 38, 258-285.
[2] Bogdanov S,; Imdorf A,; Kilchenmann V, (1998) Residues in wax and honey after Api Life VAR treatment Apidologie 29, 513-524.

STUDIES TO ASSESS THE EFFICACY OF BACILLUS CBB AND APIGUARD® AGAINST ASCOSPHAERA APIS UNDER FIELD CONDITIONS

No 458

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In order to control Chalk brood disease, the bacillus CBB, developed by Dr Yacobson in Israel, was found to inhibit the growth of Ascosphaera apis in vitro. It was also found to be harmless to bees. Another environmentally friendly product, Apiguard® (Vita-Europe LTD) containing thymol crystals and applied against varroa mites, was also found to inhibit the growth of this fungus.
To assess the efficacy of CBB alone or in combination with Apiguard®, against chalk brood disease in field conditions, two experiments were contacted during spring and summer of 2003 and 2004 in the area of Thessaloniki, North Greece. In 2003, 30 colonies of Apis mellifera macedonica, artificially infested by A. apis, were divided in three batches for the trials. In batch 1, there were four applications of 1 liter syrup (60%) containing CBB. In batch 2, there were four applications at weekly intervals of 1 liter syrup (60%), containing CBB plus one application of 25 g Apiguard®. In batch 3 (control) there were four applications at weekly intervals of 1 liter syrup (60%). In 2004, another batch was added on which one application of 25 g Apiguard® was contacted.
For the 2003 treatments, in batch 1 the decrease of the infection was estimated at 77.2%, in batch 2 at 83.9% and in batch 3 (control) at 7.8%. Furthermore, the growth of colonies (number of bees and brood frames) was significantly better in colonies of batches 1 and 2 compared with control.
For the 2004 treatments, the efficacy of the bacillus was lower than in 2003. In batch 1, the decrease of the

infection was estimated at 58.9%, in batch 2 at 61.1% and in batch 3 at 9.1%. In batch where only Apiguard® was applied, the decrease of the infection was estimated at 53,9%.
Results of the two experiments indicate that both CBB and Apiguard®, alone or in combination, demonstrate fungistatic action against A. apis.
In order to estimate efficacy under real conditions, a third experiment, (using the same treatments as in 2004) is being conducted in the spring of 2005 at 5 different apiaries, naturally infected by A. apis. Results of these applications are expected in June, 2005.

PERFORMANCE OF ALTERNATIVE ACARICIDES IN ORGANIC BEEKEEPING UNDER PORTUGUESE NORTHEST CONDITIONS

No 459

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The use of chemical acaricides in organic beekeeping is legally restricted to natural compounds such as essential oils and organic acids. Generally, these alternative methods present good efficiency to control Varroa destructor levels in bee colonies and avoid residues contaminations of honey.[1] Their main disadvantage lies in the chemical hazard of this compounds and in the efficacy dependence on natural conditions. Therefore, refined methodologies used in northern or central Europe countries cannot be applied directly to southern countries without further testing. In Portugal the difficulties to apply these products seem a major obstacle to the attraction of beekeepers for the organic production.
To stimulate the Portuguese organic honey production in the Northeast areas, several natural acaricides were tested on field under different conditions. Four organic apiaries were established in two regions with distinct climatic conditions. In each apiary, four groups of Langstroth hives were positioned. One group was the control (without any treatment) while others were tested for formic acid, oxalic acid and thymol. The colony vitality was accessed in the spring based on honey/pollen frames, bee population and brood combs. Varroa infestation was evaluated by counting mite fall on bottom boards. Treatment was applied in spring and autumn, after honey harvest. The results from the first year indicates clearly that all the natural compounds can be used for Varroa levels control in the hive with good efficacy, however under the conditions used in this study, the oxalic acid treatment shown high level of bee mortality, diminishing the colony strength on the next spring. Despite this effect, no queen loss was observed. In terms of honey quality, no unusual levels of acaricide was found in harvested honey, presenting chemical parameters values similar to honey collected from hives without treatment.

[1] Imdorf S.; Charrière J.; Kilchenmann V.; Bogdanov S.; Fluri P. (2003); Alternative strategy in central Europe for the control of Varroa destructor in honey bee colonies. Apiacta 38, 258-285.

OBTAINING *APIS MELLIFERA* CAPPED BROOD AFFECTED BY *ASCOSPHAERA APIS* USING PURE STRAINS

No 460

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Chalkbrood is a nice model for testing hygienic behavior and the use of compatible Ascosphaera apis pure strains could mantain homogeneity among experiments. The short viability of A. apis in synthetic media has been a problem and integral rice (IRK) is a promising for A. apis maintenance. Mycelium aging, viability, purity and capacity to produce spore-cysts were evaluated in MY20 and IRK medium. A. apis strains on MY20, developed aging symptoms at the 30th and 45th day of growing, and developed pure colonies until the 77th day of growing. These strains on IRK showed aging symptoms at the 30th day of growing, but they produce pure colonies during the 360 days of preservation. The possibility of using compatible pure strains preserved as mycelium in IRK to obtain mummies in a control way was tested. Spore-cyst obtained from pure strains preserved in IRK and spore-cysts from wild black mummies obtained from honeybee hives were used to inoculate fifth instar larvae. Pathogen inoculated treatments gave more than 82% of infected larva. Ascospores from black wild mumies or spore-cysts obtained from pure strains preserved in IRK were equally effective to reproduce the disease and this has main advantages: permanent inoculum availability and genetic homogeneity.

HONEYBEES HYGIENIC BEHAVIOR IN PRESENCE OF BROOD AFFECTED BY ASCOSPHAERA APIS OR BROOD PUNCTURED

No 461

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Most research on hygienic behavior have used pin-kill test or freezing techniques to kill the brood. The objective of this work was to study the activities performed by H and NH honeybees in presence of brood affected by Ascosphaera apis or pin-killed brood. In observation hives containing Apis mellifera hygienic (H) and non-hygienic (NH) colonies one piece of comb

containing sealed mummies (MO) and other containing punctured brood (CP) were introduced and they were filmed. Capped, inspection, uncapping, removing, honeybee on the cell and inactivity were registered. Initial and final time of uncapping and removing, frequency and total duration of each state were analyzed by PROCLIFETEST of SAS and Kruskal-Wallis. H colonies started uncapping activities earlier than NH colonies in both treatments (P<0.0081). For end of uncapping, start and end of removal, NH colonies and CP treatment registered significant greater times. Time taken for NH colonies in MO treatment did not differ from H colonies in both treatments. H colonies removed a greater percentage of dead brood in both treatments (P<0.0001) and in both groups colonies removed significantly more brood affected by A. apis (P=0.0168). Removal of the whole brood did not differ between groups (p=0,2079) but it was more frequent in MO than in CP (p=0,0250). H colonies were more efficient in the start of uncapping, with a fast response to the stimulus of dead brood independent of the method used to kill it. Once uncapping begun, NH colonies reacted in a similar way to MO treatment than H colonies. This would indicate a different stimulus level in both treatments and a better response when the brood is affected by a pathogen. H colonies removed a greater percentage of dead brood than NH colonies.

EFFECTIVENESS OF ORGANIC ACIDS IN VARROA (ACARINA: VARROIDAE) MITE CONTROL

No 463

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The effectiveness of some organic acids in Varroa (Varroidae) mite control during the broodless period was tested on honeybee colonies. Autumn field assays were done on ninety Langstroth hives with propionic, malic, citric, acetic and oxalic acids. Hives trickled with 50% sugar solution, Perizin", with Apivar" strips or untreated were the four control groups. Laboratory toxicity tests to determine the field doses to be used were carried out prior to the field trial. Only oxalic acid showed rates of success, similar to commercial control products, and no satisfactory acaricide effectiveness occurred with the other organic acids used. All the treatments, including control sugar solution caused some honeybee mortality higher than the natural rate. The higher mortality caused by propionic and acetic acids advises caution when increasing the dose to enhance the efficacy.

DETERMINATION OF MITE INFESTATION INTENSITY USING NATURAL MITE FALL AND DYNAMICS OF VARROA POPULATION IN NORTHERN AFRICA

No 464

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The relationship between total varroa mite population in colonies and natural mite fall has been followed in many instenses, sites, and seasons in North Africa. The accuracy of such parameter and its interest for beekeeping is discussed.
The dynamics of development of Varroa destructor in North Africa is described. The particular of the local climate is discussed concerning its the strong influence on varroa population dynamics.

ORGANIC *VARROA*-TREATMENT IN SEMI- AND PROFESSIONAL BEEKEEPING

No 465

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Varroa destructor was first found in Denmark in 1984. But the mite was not distributed all over Denmark until the beginning of 1990. Since then the Danish Beekeepers Association has promoted the organic way of varroa-treatment. With organic treatment we mean the use of the organic acids and bio-technical methods (drone brood removal, queen-exclusion, heat-treatment an so on).
Over the years the varroa-treatment strategies has been well adopted by the Danish Beekeepers. 82% of the beekeepers are using the organic way. We developed a "safe strategy" – which means fighting varroa "wearing both belt and braces". The Beekeepers Association recommended to make a three step treatment. spring treatment with drone brood removal, summer treatment after last honey harvest with formic acid and late summer treatment using oxalic acid trickling. Some beekeepers with a large number of colonies have over the years claimed that these methods are to time consuming and have preferred the use of the pyrethroid Bayticol on wooden sticks.
This examination is an interview with 20 semi- and professional beekeepers (managing more then 100 colonies) using the safe strategy. The aim was to find out:

- Why are these beekeepers using the organic methods
- What is the time consumption?
- How have they adopted the organic methods to their beekeeping practise?

• What kind of alterations have they made?
Conclusion: Professional and semi-professional beekeepers using the organic way are determined to make a high quality product with no residues of any kinds of medical drugs. They are very much aware that the use of medicals does not provide a long-term solution. They fear the build up of resistants to the drugs and the problem of shifting over to a new product, which is probably not allowed.
The "safe strategy" is well incorporated into the beekeeping practice. There is a clear tendency that drone brood removal is substituted by a spring-oxalic acid trickling. The use of the Krämer board is too expensive for beekeepers who are not producing them by themselves. The use of free formic acid or nassenheider evaporator has been preferred. The beekeepers do not regard the time spent on the use of the organic methods as a waste of time. The beekeepers experience only a slight increase in time consumption.
This interview shows that it is possible to make a profitable beekeeping, even for beekeepers using the organic way of varroa-treatment.

INTEGRATED PEST MANAGEMENT OF THE PARASITIC MITE *VARROA DESTRUCTOR* IN HONEYBEES (*APIS MELLIFERA* L.) UNDER IRISH CLIMATIC CONDITIONS.

No 466

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Varroa destructor is a serious pest of Apis mellifera L. In Ireland, Bayvarol, is still effective against the mite, but the need for alternative management methods is essential, as resistance will develop due to selection pressure. Previous studies have shown that botanical oils, especially thymol and the organic acids can be effective against Varroa destructor. Non-chemical control methods also have an effect on Varroa destructor populations when used alone, but their efficacy when used in combination has not been examined. This study examines the control effect of different floor types on Varroa mite populations over a foraging season. Alternative controls methods such as formic acid and apiguard are examined for efficacy as single treatments, in addition to an integrated pest management, which includes open mesh floors, drone brood trapping, formic acid/apiguard/oxamite strips as autumn treatments followed by oxalic acid as a winter treatment. Adult bee population, brood area, mite population and honey production were measured over the entire season to determine the overall colony health and treatment effect. The results indicate that open mesh floors and drone brood trapping have a positive effect on reducing mite populations in honeybee colonies early in the season. As an autumn treatment, formic acid and apiguard were more effective than oxamite strips, but oxalic acid was essential as follow-up winter treatment to reduce mite populations in test colonies. No large differences in adult bee population, brood area or honey production was apparent in any of the treatments. The relatively high mite populations remaining in colonies after autumn treatments is discussed in relation to the parasitic mite syndrome.

RADIOCHEMICAL INVESTIGATION ON THE METABOLIC FATE OF OXALIC ACID IN THE HONEYBEE

No 467

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The oxalic acid (OA) metabolisation within the honeybee colony was investigated. Forty-one millilitres of 60% sugar syrup containing 4.2% of OA were trickled onto a nine-comb colony as a control means against varroa mite. 14-C labelling and further radiochemical analyses allowed the contaminating OA being detected in various kinds of samples collected from the hive in the subsequent one-month period.
A relatively high beta-radioactivity level was measured in wax from freshly built combs and from newly secreted scales. Being the hydrophilic nature of the substance inconsistent with a direct heavy contamination, further investigations were made by radiometric TLC. The elution with different solvents put into evidence a composite structure of the radioactive fraction of wax.
A trap containing hyamine hydroxide was used to sample the CO2 from the hive and liquid scintillation was used to analyse the trap content. An early peak of radioactivity was detected, which faded soon but did not extinguish within the following month. In a laboratory trial, an homogenate of the full body of adult honeybees was put into contact with a 14-C labelled OA solution. A sharp decrease of the radioactivity was seen in the following days.
The above results agree with the hypothesis that the honeybees can metabolise the OA coming from the treatments. Intermediates may follow the pathway leading to the synthesis of wax compounds. The in vivo and in vitro trials seem to support a metabolic OA decarboxylation, whose enzymatic nature must be investigated further.

SURVIVAL AND INCLINATION TO FEEDING OF CAGED HONEYBEES CONTAMINATED WITH OXALIC ACID

No 468

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Mortality and food consumption were observed in caged honey bees that had been contaminated with oxalic acid (OA) in the field. A preliminary stage was performed to determine the time when the highest OA amount was present in the intestines. Two administration methods were considered: trickling (1.7g OA in sucrose solution) and sublimation (1.4g OA). They were applied to two different colonies of similar size from which samples of 50 adults were taken at 0, 24, 48, 72, 96 and 168h. After gentle washing, the bee intestines (except honey-sacs) were slipped off and macerated. Analyses were made on both intestine pools and washing waters to measure intestinal and external OA, that were summed up to calculate the overall OA contamination. At 24h, the bees treated by trickling and sublimation had similar total OA load (about 8.5 microg per bee). Lower amounts were detected later, but a distinctly sharper decrease occurred for sublimation, which also implied a lower proportion of the total OA being in the intestines. A further step was made on bees collected from a colony 24h after an OA treatment by trickling that previously showed the highest intestinal OA amount. 30 bees were introduced into each of 4 laboratory cages and ad libitum fed with 1:1 honey solution. Pre-treatment bees from the same colony served as a control. Food consumption and bee mortality were registered for 16d. At 24 and 48h, the food uptake was significantly lower in treated, but the average individual consumption in the whole period (1,022.5mg per bee) was not significantly different. At 16d, the cumulative mortality was 45.8 and 42.8% in treated and controls respectively. The difference was not significant. The mortality over the time in the two groups did not fit the model of probit analysis of correlated data according to Throne et al., 1995. The trial showed that the OA contamination due to the treatment may play a temporary influence on the bee attitude to feeding, that is likely to be associated to intestinal aliquot. No significant effects on the bee mortality were recorded; the results do not agree with the hypothesis of an acute OA toxicity at the usual treatment dosage.

IMPORT RISK ANALYSIS AND THE SURVEILLANCE FOR AND DIAGNOSIS OF HONEYBEE DISEASES

No 469

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We live in a global economy with trade and international exchange including honeybees and hive products increasing all the time, both in terms of means of transport and its rapidity. Movements of bees around the world has and could continue contribute to the spread of pests and diseases. Trade is now governed by the Sanitary and Phytosanitary (SPS) agreement under the auspices of the World Trade Organisation (WTO). Under this agreement the OIE (Office International des Epizooties) is the international organisation for developing standards, guidelines and recommendations relating to animal health. The aim of this the SPS agreement is to ensure that measures are applied only to the extent necessary to protect human, animal or plant life or health, i.e. they do not constitute a disguised restriction to international trade. Trade is therefore based on managed or acceptable risk, rather than zero risk, and is permitted unless there are valid scientific based grounds for restricting it. Risk Analysis is a systematic aid to decision making in support of this process. The robustness of the risk analysis depends on the quality of the available data both in the exporting and importing country. The accuracy of these data will depend on the level of and standards and systems of surveillance employed, the sensitivity of the diagnostic methods used by the appropriate authorities responsible for bee health policy and disease control. Import policies, which may include prohibition recommendations, based on the apparent absence of a pest or pathogen needs be supported up by robust surveillance data. An important element of this is a standardized approach to both disease diagnosis and surveillance for pests and diseases. A diagnostic tool that CSL routinely uses for disease identification and surveillance is TaqMan real time PCR. This approach allows delivery of very rapid, comprehensive and large scale testing services for beekeepers or and in the case of survey work to regulatory bodies.

MELISSOCOCCUS. PLUTONIUS ISOLATION FROM HONEYBEE BROOD SAMPLES WITH EUROPEAN FOULBROOD IN SOME ITALIAN REGIONS

NO 470

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During the last years, in some Italian regions, brood mortality cases recurred, often caused by European foulbrood, but sometimes absolutely atypical.
During 2004, brood samples were examined by EFB Diagnostic Kit (Vita Europe). Then, microbiological tests for Melissococcus plutonius isolation were performed. Most of the examined samples were positive for M. plutonius.
The screening confirms the seasonal presence of European foulbrood with a variable distribution and an irregular course.

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