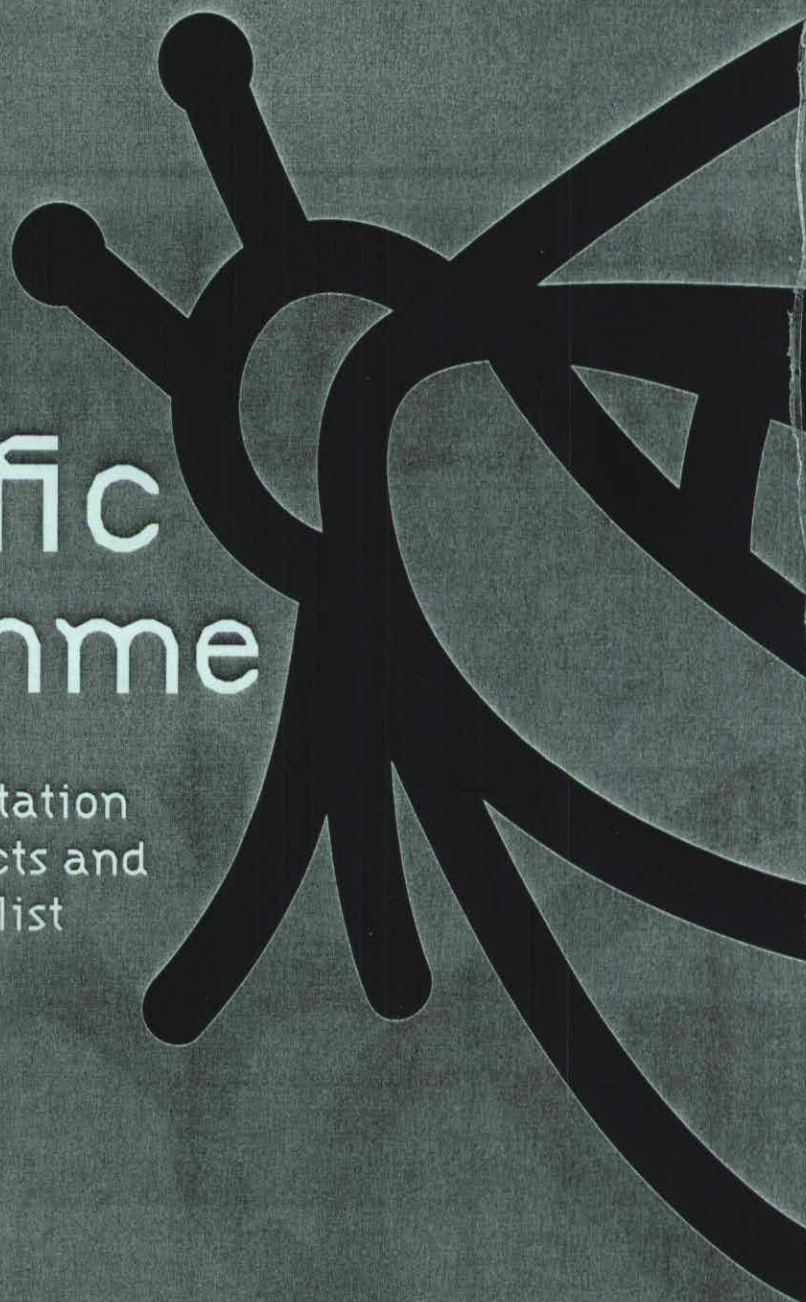


* APImondia ^{41st} congress 2009

FRANCE - MONTPELLIER • 15-20 SEPTEMBER

Scientific programme

Oral
presentation
abstracts and
poster list



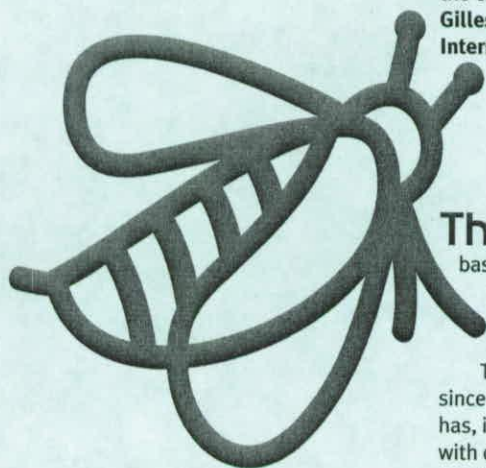
In the long line of Apimondia

Congresses (over a century of rich exchanges), Montpellier will be remembered as a great event, the one that answered the scientific and beekeeping world's expectations of a strong international federation.

This book brings you a rich, pertinent and politically committed scientific programme, the fruit of a heavy workload undertaken by the scientific coordinator, the seven Commission Presidents and the team of French organizers. This year, there are over 300 lectures – plenary sessions, symposia and round table conferences – without forgetting the 400 posters, these will give this Congress a new scope and interest.

In fact, all the main beekeeping themes of this new century are treated, in particular the problem of bee losses, which can be looked at from different angles. The material presented in this book reflects the scientific and technical groundwork of world beekeeping, as well as the main directions that we need to take to ensure the survival of bees and the excellence of hive products.

**Gilles Ratia, President of the Apimondia 2009 Congress,
International Beekeeping Consultant**



The Apimondia 2009 Congress

based on the latest news with regard to the domestic bee (and neighbouring species) and beekeeping, provides a wonderful occasion, not only for scientists from the world over, but also for those working in this fascinating sector, to present their latest achievements.

This Congress is hosted at a critical time for the bee and for beekeeping, since for several years, the death rate and the colony disruption in bees has, in many countries, risen to an all time high, not unlike the situation with other pollinating insects. Just as in other areas linked to the environment and to the maintenance of biodiversity, human interference no doubt has its share to say in the origin of such problems. Current scientific data does not justify pinpointing a single cause of the overall death rate; rather several, namely the toxic effects of pesticides, pathologies, parasites and predators, etc., each cause, nevertheless, being listed by importance: some have a key role, others a more back-seat effect.

Apimondia 2009 provides a wonderful opportunity to encounter, not only scientists implicated in current studies on the bee, but also beekeepers from the world over, directly recounting their experiences from out in the field. This Congress is also the occasion to tackle less drastic subjects, such as the marvellous cognitive and behavioural abilities of bees. During its inaugural day, Apimondia 2009 will thus have the honour to welcome one of the most prestigious bee biologists of today, Professor Randolph Menzel, whose studies on learning and memory are used as reference worldwide.

The 2009 scientific programme is especially rich, with more than 700 abstracts proposed. Hence, each commission will be the subject of a plenary session, several symposia and a significant platform of posters.

Apimondia 2009 has not only taken the initiative of inviting an external symposium, presenting work for a European research programme (Beeshop), but also innovates this year with four round tables, essentially dealing with current affairs: two on the effects of pesticides on bees (one from the beekeepers' point of view and the other by expert scientists in the field), a third on the effects of GMOs on bees, and another on the position of veterinarians in terms of the surveillance of the sanitary status of bees worldwide.

Hence, I wish you a pleasant Apimondia 2009 with its hive of events and interesting encounters!

**Gérard Arnold, President of the Apimondia 2009 Scientific Committee
Researcher CNRS (National Centre for Scientific Research) LEGS Laboratory,
Gif-sur-Yvette.**

GET THE LATEST BUZZ IN BEEKEEPING! IL Y A DU NOUVEAU DANS L'APICULTURE !



info@legaitaly.com
www.legaitaly.com

LEGA s.r.l. costruzioni apistiche

Via Maestri del lavoro, 23
48018 FAENZA - ITALY

Tel. ++39-0546-26834

Fax ++39-0546-28279

www.legaitaly.com

info@legaitaly.com

ickowicz
The French Beekeeping company

Silver Partner
Stand at
Level 0

Beeswax - Beekeeping equipment
Bee Feed - Packaging

ASK FOR OUR FREE CATALOG
ICKOWICZ - BP 70 - Rue A. Daudet - F 84500 BOLLENE
Tél. +33 4 90 40 49 71 -
Fax +33 4 90 30 46 77
miel@ickowicz.com
www.ickowicz.com



Local Organising Committee Apimondia 2009

Gilles Ratia President of the 41st Congress

Henri Clément President of

the local Organising Committee

Stéphane Libéri Vice-President of

the local Organising Committee

Gérard Arnold Scientific Coordinator

Geneviève Moralès General Coordination Manager

Samuel Layre General Coordination Assistant

Christina Quaglio International Relations

Anne Henriot Press Relations

Martine Laurent Accounting

Jacqueline Rocheblave Accounting Assistant

Christel Bonnafox Administrative Management

Apimondia Executive Committee

Asger Jorgensen President

Lucas Martinez Vice-President

Riccardo Jannoni Secretary General

Dinh Quyet Tam President of

the Beekeeping Economy Commission

Karl Crailsheim President of

the Bee Biology Commission

Wolfgang Ritter President of

the Bee Health Commission

Marinus Jan Sommeijer President of

the Pollination and Bee Flora Commission

Gilles Ratia President of

the Beekeeping Technology

and Quality Commission

Théodore Cherbuliez President of

the Apitherapy Commission

Nicola Bradbear President of

the Beekeeping for

Rural Development Commission

sommaire

p 3-28: Scientific
programme

p 29-32: Round tables

p 33-148: Oral presentation
abstracts

p 149-170: Poster list

p 171-176: Index

BEEKEEPING ECONOMY COMMISSION

PLENARY SESSION - Beekeeping economy in the present stage
THURSDAY 17th AFTERNOON

Chair: Dinh Quyet Tam (Vietnam)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:50	DINH QUYET Tam		Vietnam		
	Introduction				
14:50-15:30	PHIPPS Ronald		USA	86	p. 71
	International honey market challenges and opportunities				
15:30-15:50	ÅSEN Eli		Norway	87	p. 71
	Recruitment in the nordic countries and the Norwegian recruitment project.				
15:50-16:10	CHEN Lihong	Zhang Fuxing	China	88	p. 72
	Mode of the safety and standardization production bases of bee products promote bee products quality safety and beekeeping healthy development in China				
16:10-16:30	PRATHAPAN K.	S. Devanesan, K.K. Shailaja, K.S. Premila, O.P. Reji Rani, K.M. Sankarankutty	India	89	p. 72
	Status of beekeeping in Kerala, India				
16:30-16:50	Break				
16:50-17:10	DEVANY Liam		United Kingdom	90	p. 73
	Approaches to successful integration of bees into the urban environment as part of local food initiatives.				
17:10-17:30	REY Francisco	John Kefuss, Jacques Vanpoucke	France	91	p. 73
	To treat or not to treat, that is the question				
17:30-17:50	PICARD Philippe	Magali Ruello, Jennifer Mejean	France	92	p. 74
	Officials signs of quality and origin (SIQO): an innovative example of participation in the structuring of the honey market in France				
17:50-18:10	VERMA Laiq Ram		India	93	p. 74
	Asian hive bee <i>Apis cerana</i> as potential global genetic resource				
18:10-18:30	MATSUMA Mitsuo		Japan	94	p. 75
	Diversity of propolis: production, preparation and consumption				

BEE BIOLOGY COMMISSION

PLENARY SESSION - New development in honey science WEDNESDAY 16th MORNING

Chair: Karl Crailsheim (Austria)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	CRAILSHEIM Karl		Austria		
	What is new in honeybee science				
09:20-10:00	MENZEL Randolph		Germany	1	p. 34
	The little brain of the bee is a master in navigation, communication and learning. How does it do it?»				
10:00-10:20	ALAUX Cédric	Saurabh Sinha, Linda Hasadsri, Greg J. Hunt, Ernesto Guzmán-Novoa, Gloria Degrandi-Hoffman, José Luis Uribe-Rubio, Bruce R. Southey, Sandra Rodriguez-Zas, Gene E. Robinson	France	2	p. 34
	Fighting bees: genomic basis of aggressiveness in honeybees				
10:20-10:40	MAISONNASSE Alban	Jean-Christophe Lenoir, Guy Costagliola, Dominique Beslay, Erika Plettner, Yves Le Conte	France	3	p. 35
	Pheromones: a key in honeybee social regulation, the case of worker ovary regulation.				
10:40-11:00	ODOUX Jean-François	Aupinel P., Bretagnolle V., Toullet C., Peyrat E.	France	4	p. 35
	Landscape factors liable to influence bee colonies development				
11:00-11:20	Break				
11:20-11:40	GARNERY Lionel		France	5	p. 36
	Biodiversity of the honeybee: evolutionary history and geographical races formation				
11:40-12:00	KRALJ Jasna	Axel Brockmann, Jürgen Tautz	Slovenia	6	p. 36
	Common effects of varroosis and nosemosis on learning abilities of honeybee foragers <i>Apis mellifera carnica</i>				
12:00-12:20	RANGEL Juliana	Heather R. Mattila, Thomas D. Seeley	USA	7	p. 36
	No nepotism during colony fission in honeybees				
12:20-12:40	DAINAT Benjamin	Mark K Greco, Peter Neumann	France	8	p. 37
	Spatial distribution of diseased workers in honeybee winter clusters revealed by diagnostic radioentomology				
12:40-13:00	DIETEMANN Vincent		Switzerland	9	p. 37
	Mating isolation between subspecies of honeybee (<i>Apis mellifera</i>) on an island				

SYMPOSIUM 1 "HONEYBEE BIOLOGY"
WEDNESDAY 16th AFTERNOON

Chair: Karl Crailsheim (Austria)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:50	LE CONTE Yves		France	29	p. 46
	Pheromones and social regulation in the honeybee				
14:50-15:10	VALLON Julien	Pascal Jourdan, Nicolas Cerrutti	France	30	p. 47
	Dynamic of bees population: an example in South of France on lavender nectar flow.				
15:10-15:30	GRECO Mark K		Switzerland	31	p. 47
	Assessing the usefulness of Diagnostic Radioentomology for Population Dynamics studies of managed <i>Apis mellifera</i> colonies				
15:30-15:50	CORNELISSEN Bram	Tjeerd Blacqui�re, Sjef van der Steen	Netherland	32	p. 48
	Estimating honeybee colony size using digital photography				
15:50-16:10	BENCSEK Martin	Joseph Bencsik, Mathias Millet, Michael Baxter	United Kingdom	33	p. 48
	Non-invasive monitoring of honeybee hive activity using Principal Component Analysis.				
16:10-16:30	MAUR�CIO FRANCOY Tiago	David W. Roubik, Dieter Wittmann, Lionel Segui Gon�alves	Brazil	34	p. 48
	Temporal changes in morphogenetic variability of Africanized bees in Panam� after 24 years of Africanization				
16:30-16:50	Break				
16:50-17:10	KENCE Aykut	Rahsan I. Tunca, Sinem Yigiter, Meral Kence	Turkey	35	p. 49
	Morphometric discrimination of honeybee races and ecotypes in Turkey				
17:10-17:30	BOZIC Janko	Charles I. Abramson	Slovenia	36	p. 49
	Ethanol disruption of social communication in honeybee colony				
17:30-17:50	DIAO Qingyun	Qiuling Jiang, Tang Fang, Xiwu Gao	China	37	p. 50
	Tissue and Subcellular Distribution of Carboxylesterase in <i>Apis cerana</i> and <i>Apis mellifera</i> (Hymenoptera: Apidae)				
17:50-18:10	SU Songkun	Xiangqian Guo, Aung Si, Fang Liu, Shenglu Chen, Shaowu Zhan, Runsheng Chen	China	38	p. 50
	Expression Differences in the Caste Development of Honeybee Using Solexa Sequencing Method				
18:10-18:30	LI Jilian	Wenjun Peng, Jie Wu, Jiandong An, Jiaying Huang, Shudong Luo	China	39	p. 51
	A scientific note on a cDNA fragment of vitellogenin gene from <i>Bombus hypocrita</i>				

SYMPOSIUM 2 "PERCEPTION, LEARNING AND COGNITION IN HONEYBEES"
THURSDAY 17th MORNING

Chair: Jean-Christophe Sandoz (France)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	DYER Adrian	T.L. Smith	Australia	60	p. 59
	Taking time to see the 'roses', speed accuracy tradeoffs for difficult tasks in honeybees and bumblebees				
09:20-09:40	OSBORNE Juliet	Alan Smith, Andy Reynolds	United Kingdom	61	p. 60
	Honeybee search strategies in flight				
09:40-10:00	AVARGUES-WEBER Aurore	M Giurfa	France	62	p. 60
	Studying visual cognitive abilities of the honeybee by using free-flying bees: example of spatial relational rules learning				
10:00-10:20	MC QUILLAN HJ.	V Vergoz, LH Geddes, KT Beggs, Mercer Alison	New Zealand	63	p. 61
	Queen mandibular pheromone influences honeybee perception and learning				
10:20-10:40	URLACHER Elodie	JM Devaud, B Francés and M Giurfa	France	64	p. 61
	Modulation of learning by a social signal in an insect brain: a new role for allatostatin, a neuropeptide acting through an opioid-like pathway				
10:40-11:00	GRÜNEWALD Bernd		Germany	65	p. 61
	Cellular physiology of honeybee olfactory learning				
11:00-11:20	Break				
11:20-11:40	LOUIS Thierry	A Ahier, V Raymond-Delpech, M Gauthier	France	66	p. 62
	Modification of olfactory learning and memory induced by RNA interference targeting $\alpha 7$ nicotinic acetylcholine subunit in the honeybee				
11:40-12:00	KLINKE Ina	R Menzel	Germany	67	p. 62
	Neuronal representations of olfactory and visual associative learning in the honeybee <i>Apis mellifera</i>				
12:00-12:20	HOURCADE Benoît	E Perisse, JM Devaud, JC Sandoz	France	68	p. 63
	Glomerular plasticity associated with olfactory long-term memory in the honeybee antennal lobe				
12:20-12:40	SCHEINER Ricarda		Germany	69	p. 63
	The honeybee as a model for the plasticity of aging				
12:40-13:00	CRAILSHEIM Karl	R Thenius and T Schmickl	Austria	70	p. 64
	How can robots learn from honeybees?				

SYMPOSIUM 3 "CONSERVATION"
SATURDAY 19th MORNING

Chair: Lionel Garnery (France) & Maria Bouga (Greece)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	LIU Zhiguang	Wei Shi, Guiling Ding, Liping Lv	China	211	p. 128
	Multivariate morphometric analysis of <i>Apis mellifera</i> in Yili river valley of Xinjiang				
09:20-09:40	IVANOVA Evgeniya	Maria Bouga	Bulgaria	212	p. 128
	Genetic variability in honey bee populations from Bulgaria				
09:40-10:00	ALBURAKI Mohamed	Ali Alburaki, Lionel Garnery	Syria	213	p. 129
	Genetic analyses of Syrian honeybee populations (<i>Apis mellifera syriaca</i>)				
10:00-10:20	TUNCA Ivgin Rahsan	Gun Koleoglu, Yusuf Atagan, Meral Kence	Turkey	214	p. 129
	Genetic diversity of honeybee (<i>Apis mellifera</i> L.) populations in Turkey revealed by Randomly Amplified Polymorphic DNA (RAPD) analysis				
10:20-10:40	KEKECOGLU Meral	Maria Bouga	Turkey	215	p. 130
	Genetic variability in Turkish honeybee populations using geometric morphometrics morphometrics analysis				
10:40-11:00	KANDEMIR Irfan	Ahmet Inci	Turkey	216	p. 130
	The potential impact of <i>Apis mellifera caucasica</i> after selection, breeding, and rearing of Caucasian queen bees in Artvin and Ardahan				
11:00-11:20	Break				
11:20-11:40	GARNERY Lionel	Agnès Rortais, Isabelle Giraud, Hélène Legout, Gérard Arnold	France	217	p. 131
	Analysis of the French livestock of the honeybee <i>Apis mellifera</i> using molecular markers: implication in conservation programs				
11:40-12:00	STRANGE James	Lionel Garnery, Gérard Arnold, Walter S. Sheppard	USA	218	p. 131
	Conserving an ecotype of <i>Apis mellifera mellifera</i> through the application of morphological and genetic data				
12:00-12:20	KRYGER Per		Denmark	219	p. 132
	Laeso, a case study in the conservation of a honey bee population				
12:20-12:40	MADRID-JIMENEZ Jesús	Irene Muñoz, Pilar De la Rúa	Spain	220	p. 132
	Temporal mitochondrial variation in honeybee populations from Tenerife (Canary Island, Spain)				
12:40-13:00	BOUGA Maria	Mica Bladenovic, Leonidas Charistos, Sladjan Rasic, Fani Hatjina	Greece	221	p. 132
	Molecular markers discriminating Greek from Serbian honeybees				

BEE HEALTH COMMISSION

SYMPOSIUM 1 "COLONY LOSSES"

WEDNESDAY 16th MORNING

Chair: Peter Neumann (Switzerland)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	SHI Wei		China	10	p. 38
	Colony losses in China				
09:20-09:40	VAN ENGELSDORP Dennis	Jay Evans, Claude Saegerman, Chris Mullin, Eric Haubruge, Jeff Pettis	USA	11	p. 38
	A descriptive epidemiological study of honeybee colony				
09:40-10:00	MUTINELLI Franco	Anna Gloria Sabatini, Albino Gallina, Piotr Medrzycki, Fabio Sgolastra, Laura Bortolotti, Claudio, Porrini	Italy	12	p. 39
	Apenet: network for monitoring honeybee mortality and colony losses in Italy				
10:00-10:20	HADDAD Nizar	A. Bataeneh, I. Albaba, Dany Obeid, Shelan Abdulrahman	Jordan	13	p. 39
	Status of colony losses in the Middle East				
10:20-10:40	DE JONG David		Brazil	14	p. 40
	Colony collapse disease in Brazil				
10:40-11:00	CHAUZAT Marie-Pierre	Sarah Zeggane, Patrick Drajnudel, Marie-Claude Clement, Anne-Claire Martel, Frank Schurr, Magali Ribi�re	France	15	p. 40
	Case studies on mortalities of honeybee colonies (<i>Apis mellifera</i>) in France during the 2005-2006 winter				
11:00-11:20	Break				
11:20-11:40	CHAGNON Madeleine	Monique Boily, Genevieve Beaunoyer	Canada	16	p. 40
	Impacts of pesticides used in Quebec (Canada) corn fields on honeybee colonies				
11:40-12:00	BLACQUIERE Tjeerd	Bram Cornelissen, Lonne Gerritsen, Jozef van der Stehen	Netherland	17	p. 41
	Winter survival of honeybee colonies depends on the timing of varroa control				
12:00-12:20	HIGES Mariano	Raquel Martin-Hernandez, Encarna Garrido-Bailon, Amelia V. Gonzalez-Porto, Pilar Garcia-Palencia, Aranzazu Meana, Maria J. del Nozal, Juan Jose Jimenez, Jose Bernal, Jose L. Bernal	Spain	18	p. 41
	Honey bee colony collapse due to <i>Nosema ceranae</i> in professional apiaries				
12:20-12:40	SOROKER Victoria	A. Hetzroni, B. Yacobson, H. Voet, S. Slabezki, H. Efrat, N. Chejanovsky	Israel	19	p. 42
	Colony losses in Israel: incidence of viral infection and beehive populations				
12:40-13:00	CRAILSHEIM Karl	Ales Gregorc, Robert Brodschneider	Austria	20	p. 42
	Cooperation of laboratories from different countries searching for factors stressing honeybees				

SYMPOSIUM 2 "BREEDING PROGRAMS FOR A BETTER BEE HEALTH"

THURSDAY 17th AFTERNOON

Chair: Ralph Büchler (Germany)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-15:10	LE CONTE Yves		France	106	p. 80
	Honeybees surviving <i>Varroa destructor</i> infestations in France				
15:10-15:30	CALDERON Rafael		Costa Rica	107	p. 81
	Comparison of the reproductive ability of varroa mites in worker and drone brood of Africanized honeybees				
15:30-15:50	FLORES Jose Manuel	F. Padilla	Spain	108	p. 81
	Colony survival in untreated apiary of <i>Apis mellifera iberiensis</i> .				
15:50-16:10	ALAUX Cédric	John Harbo, Yves le Conte, Jean-Francois Martin, Sandrine Cros-Arteil, Christelle Dantec, Maria Navajas	France	109	p. 81
	Fight varroa: genomic characterization of honeybees selectively bred for Varroa-Sensitive Hygienic behaviour				
16:10-16:30	KEFUSS John	Jacques Vanpoucke, Maria Bolt, Cyril Kefuss	France	110	p. 82
	Practical varroa resistance selection for beekeepers				
16:30-16:50	Break				
16:50-17:10	UZUNOV Aleksandar	Hrisula Kipprijanovska, Sasho Gjurovski	Macedonia	111	p. 82
	Establishment of the national beekeeping breeding program in Republic of Macedonia				
17:10-17:30	BUCHLER Ralph	Marina Meixner, Ina Heidinger	Germany	112	p. 83
	Natural selection on disease resistance implemented in a selective breeding program				
17:30-17:50	COBEY Susan	John Pollard, Claire Plante, Michelle Flenniken, Walter Sheppard	USA	113	p. 83
	Cooperative stock maintenance and development of protocol for international exchange of honeybee germplasm				
17:50-18:10	SANFORD Malcom T.		USA	114	p. 83
	Conserving Genetic Variability: A Global Concern				
18:10-18:30	MEDRZYCKI Piotr	Fabio Sgolastra, Laura Bortolotti, Gherardo Bogo, Simone Tosi, Claudio Porrini, Anna Gloria Sabatini	Italy	115	p. 84
	Can the brood rearing temperature affect adult bee fitness? A hypothesis explaining the time interval between bee loss and its primary causal factor				

SYMPOSIUM 3 "HORNETS PRESSURE ON HONEYBEES"

FRIDAY 18th MORNING

Chair: Alexandros Papachristoforou (Greece) and Claire Villemant (France)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	BERGMAN J David	Plotkin Marian	Israel	126	p. 89
	Talk dedicated to the memory of Jacob S Ishay				
09:20-09:40	PLOTKIN Marian		Israel	127	p. 89
	Biophysical properties of yellow pigment granules in the Oriental hornet				
09:40-10:00	BERGMAN J David		Israel	128	p. 90
	Do social hornets and honeybees exploit ultrasonic acoustic resonance in constructing their brood combs and honeycombs				
10:00-10:20	MULLER Frank	Q. Rome, A. Perrard, C. Villemant	France	129	p. 90
	Potential Influence of Habitat Type and Seasonal Variations on Prey Spectrum of the Invasive Alien Species <i>Vespa velutina</i> var. <i>nigrothorax</i> Du Buysson, 1905 (Hym.:Vespidae), the Asian Hornet, in Europe.				
10:20-10:40	TAN Ken	H. Li, M.X. Yang, H.R. Hepburn, S.E. Radloff	China	130	p. 91
	Heat balling for attacking hornets				
10:40-11:00	MAHER Neville	D. Thiéry	France	131	p. 91
	Comparison of trap designs against the Yellow-legged hornet (<i>Vespa velutina nigrithorax</i>), a honeybee predator recently introduced in South-West France				
11:00-11:20	Break				
11:20-11:40	HADDAD Nizar	A. Bataeneh, S. Fuchs	Jordan	132	p. 91
	Review on <i>Vespa orientalis</i> research in Jordan				
11:40-12:00	PAPACHRISTOFOROU Alexandros	A. Rortais, J. Sueur, G. Arnold	France	133	p. 92
	Defending the nest against its archenemy: The Cyprian honeybee <i>Apis mellifera cypria</i> confronting the Oriental hornet <i>Vespa orientalis</i>				
12:00-12:20	ARCA Mariangela	A. Papachristoforou, G. Arnold, A. Rortais.	France	134	p. 92
	Defence behaviour of <i>Apis mellifera</i> against the invasive Asian Hornet (<i>Vespa velutina</i>) in south-west of France				
12:20-12:40	IFANTIDIS Michael	Alexandros Papachristoforou, Sebastian Spiewok, Spyridon Skareas	Greece	135	p. 93
	APIBURG® - II. A mechanical protection of honeybee colonies from hornets and other intruders				
12:40-13:00	ARCA Mariangela	C. Capdevielle-Dulac, C. Nadeau, C. Villemant, G. Arnold, J.F. Silvain	France	136	p. 93
	Genetic characterization of the invasive populations of <i>Vespa velutina</i> in France				

**PLENARY SESSION - Has beekeeping a future:
new challenges or bee health**
FRIDAY 18th AFTERNOON

Chair: Wolfgang Ritter (Germany)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:45	RITTER Wolfgang		Germany		
	Introduction				
14:45-14:50	L'HOSTIS Monique	Jean-Marie Barbançon, Nicolas Vidal- Naquet, Marc-Edouard Colin	France	158	p. 103
	Veterinarians and honey bees industry in France: vets advisor, teaching working group				
14:50-15:10	BERNARO Pierangelo		Italy	159	p. 104
	EU animal health requirements for the import (into the EU) and trade (within the EU) of bees				
15:10-15:30	LE CONTE Yves		France	160	p. 104
	Climate change: impact on honey bee populations and diseases				
15:30-15:50	NEUMANN Peter		Switzerland	161	p. 105
	Colony losses: a global problem				
15:50-16:10	ALLIER Fabrice	L. Bournez, A. De Boyer, V. Britten, P. Jourdan, I. Ieoncini, J. Vallon	France	162	p. 105
	Estimation of honeybee colony losses within professional beekeepers in France during winter 2007/2008				
16:10-16:30	PETTIS Jeff	Dennis Van Engelsdorp	USA	163	p. 106
	Small hive beetles and <i>Tropilaelaps</i> mites, real problems for beekeepers				
16:30-16:50	Break				
16:50-17:10	HIGES Mariano Pascual	Paquel Martin-Hernandez, Aranzazu Meana	Spain	164	p. 106
	<i>Nosema ceranae</i> , a new bee disease in Europe				
17:10-17:30	GAUTHIER Laurent		France	165	p. 106
	The impact of Deformed Wing Virus on the queen honeybee fitness				
17:30-17:50	ELLIS James	Tricia Toth, Mike Scharf	USA	166	p. 107
	The effects of imidacloprid and amitraz on immature honeybees (<i>Apis mellifera</i>)				
17:50-18:10	BONMATIN Jean-Marc	P.A. Marchand, M. Decoville, D. Locker, M.E. Colin, L.P. Belzunces	France	167	p. 107
	Imidacloprid contaminates the pollen of seed-coated crops: A high risk for bees				
18:10-18:30	VAN DER STEHEN Jozef	T. Blacquiére, B. Cornelissen	Netherland	168	p. 108
	Diseases and heavy metals in honeybees in the Netherlands, results of a national monitoring in June 2008				
18:30-18:40	RICHARDSON Jane	Karin Nienstedt, Sergio Potier Rodeia, Didier Verloo	Italy	169	p. 108
	Bee Surveillance Programmes, Bee Mortality and Risk Assessment				

SYMPOSIUM 4 "DIAGNOSIS AND CONTROL OF BEE DISEASES"
SATURDAY 19th AFTERNOON

Chair: Yves le Conte (France) and Wolfgang Ritter (Germany)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:50	MC MULLAN John B.		Ireland	244	p. 143
	Tracheal mite infested colonies: management options				
14:50-15:10	THRASYVOULOU Andreas	Goras Geirgios, Tananaki Chrysoula, Lazaridou Elisavet	Greece	245	p. 144
	Attempts to control <i>Nosema ceranae</i> in Greece				
15:10-15:30	COLIN Marc-Edouard	Magali Tournaire, Laurent Gauthier	France	246	p. 144
	On the epidemiology of <i>Nosema ceranae</i> in France				
15:30-15:50	RODRIGUEZ Marta S.	Marco Gerding Paris, Nelida Molina, Miguel Neira, Andres France	Chile	247	p. 145
	Entomopathogenic fungi an alternative for control of <i>Varroa destructor</i> .				
15:50-16:10	SCHÄFER Marc O.	Wolfgang Ritter, Jeff Pettis, Peter Neumann	Switzerland	248	p. 145
	Concurrent infestations by <i>Aethina tumida</i> and <i>Varroa destructor</i> alters thermoregulation in <i>Apis mellifera</i> winter clusters				
16:10-16:30	CARRECK Norman L.		United Kingdom	249	p. 146
	Can studies of Kashmir bee virus and <i>Varroa destructor</i> aid our understanding of "Colony Collapse Disorder"?				
16:30-16:50	Break				
16:50-17:10	FORSQREN Eva	Tobias Olofsson, Alejandra Vasquez, Ingemar Fries	Sweden	250	p. 146
	Novel lactic acid bacteria inhibiting <i>Paenibacillus larvae</i> in honeybee larvae				
17:10-17:30	MAORI Eyal	Nitzan Paldi, Eitan Glick, Sharoni Shafir, Ilan Sela	Israel	251	p. 146
	Israeli acute paralysis virus (IAPV): Turning reciprocal host-virus dynamics into an applicative anti-viral approach				
17:30-17:50	RIBIERE Magali	Phillipe Blanchard, Frank Schurr, Oliver Celle, Jean-Paul Faucon	France	252	p. 147
	Chronic bee paralysis virus: dissemination in honeybee colonies and diagnosis				
17:50-18:10	SANPA Sirikarn	Panuwan Chantawannakul	Thailand	253	p. 147
	Detection of honeybee viruses in northern Thailand using RT-PCR				
18:10-18:30	ZHOU Ting	Quiang Wang, Pingli Dai, Feng Liu	China	254	p. 148
	Effects of sublethal concentration of two acaricides on biological characteristics of honey bee <i>Apis mellifera ligustica</i>				

POLLINATION AND BEE FLORA COMMISSION

PLENARY SESSION

WEDNESDAY 16th AFTERNOON

Chair: Marinus Sommeijer (Netherlands)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:50	SOMMEIJER Marinus J.		Netherlands		
	Introduction, Bee pollination, problems and opportunities				
14:50-15:30	BIESMEIJER Koos		United Kingdom	21	p. 43
	Pollinator declines in Europe: overview of patterns and causes				
15:30-16:10	VAISSIERE Bernard		France	22	p. 43
	Assessing the impact of declining pollinators on world agriculture				
16:10-16:30	ESAIAS Wayne	Robert Wolfe, Joanne Nightingale, Jaime Nickeson, Peter Ma	USA	23	p. 44
	Scale hive network and satellites reveal shifts in nectar flows due to climate and land cover.				
16:30-16:50	Break				
16:50-17:10	BOECKING Otto	Ulrike Kubersky	Germany	24	p. 44
	Pollination in high bush blueberries and strawberries-who is the best pollinator?				
17:10-17:30	ROUBIK David W.	Rogel Villanueva	USA	25	p. 44
	The win-win ecology of honeybee introductions				
17:30-17:50	LAMBERT Olivier	Suzanne Bastian, Isabelle Guilberteau, Monique l'Hostis, Hervé Pouliquen	France	26	p. 45
	Honeybee (<i>Apis mellifera</i>), sentinel of environmental pollution: study in Western France				
17:50-18:10	GEMMILL-HERREN Barbara	Colette Linda	Italy	27	p. 45
	International Measures to Conserve and Sustainably Use Pollinators in Sustainable Agriculture				
18:10-18:30	SCHATZ Bertrand		France	28	p. 46
	Bee-pollinated orchids in a changing European environment				

**SYMPOSIUM 1 "CAUSES AND IMPACTS OF THE DECLINE OF THE HONEYBEE
AND OTHER POLLINATORS AND RECOMMENDED MEASUREMENTS"
FRIDAY 18th MORNING**

Chair: Koos Biesmeijer (UK) & Marinus Sommeijer (Netherlands)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	LACKNER Gottfried		Austria	147	p. 98
	Survey on the regional bee population				
09:20-09:40	IMPERATRIZ FONSECA Vera Lucia		Brazil	148	p. 99
	The Brazilian Pollinators Initiative ten years after the S. Paulo Declaration on Pollinators				
09:40-10:00	ROBERTS Stuart		United Kingdom	149	p. 99
	Impact of climate change on European pollinators				
10:00-10:20	BARTOMEUS Nacho		Spain	150	p. 99
	Invasive plants affecting native pollinators				
10:20-10:40	DIMOU Maria		Greece	151	p. 100
	Bee pollen loads to study climatic change: melissopalynol. and aerobiol. Data, emphasis <i>Olea europea</i>				
10:40-11:00	MENGASSINI Andrea	Monika Marta Grygielewicz	Italy	152	p. 100
	The strange case of <i>Phacelia tanacetifolia</i> Benth (Hydrophyllaceae)				
11:00-11:20	Break				
11:20-11:40	NAGARAJA Narayanappa		India	153	p. 101
	Does open-nesting honeybee species exhibit differential pollen collection?				
11:40-12:00	MEDZIHRADSKY Zsófia	Zoltán Herpai; Ágnes Korbonski	Hungary	154	p. 101
	Melissopalynology and chemical analyses of <i>Robinia pseudo-acacia</i> honeys from Hungary				
12:00-12:20	KOZMUS Peter	Vladimir Meglič, Meta Virant-Doberlet	Slovenia	155	p. 102
	Characterisation of Species and Population Of Bumblebees (<i>Bombus</i> , Latreille and <i>Psithyrus</i> , Lepeletier) in Slovenia based on Morphological and Molecular Markers				
12:20-12:40	LOUBLIER Yves	Monique Morlot, Agnès Rortais, Gérard Arnold, Patricia Beaune, Régine Lurdos, Florence Britis	France	156	p. 102
	Melliferous and polliniferous resources in an urban area : Saint-Denis (Surburban area of Paris)				
12:40-13:00	LORENZON Maria Cristina	Juliana Almeida Braga, João Soares Neto, Marilena Silva Conde, Érika Sales, Monika Barth	Brazil	157	p. 103
	Food sources of <i>Tetragonisca angustula</i> in fragments of Atlantic Rain Forest in Southeastern				

**SYMPOSIUM 2 "CROP POLLINATION:
ITS VALUE AND SOME NEW DEVELOPMENTS"
FRIDAY 18th AFTERNOON**

Chair: Bernard Vaissière (France) & Marinus Sommeijer (Netherlands)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:50	MARRIS Gay	Giles Budge, Tom Breeze, Simon Potts, Mike Brown, Alan MacLeod	United Kingdom	170	p. 109
	Evaluating the role of pollinating honeybees in UK Apple Orchards				
14:50-15:10	FREITAS Breno		Brazil	171	p. 109
	Pollination and honey production in castor bean (<i>Ricinus communis</i> L.) plantation for biofuel				
15:10-15:30	MOLITAS-COLTING Lita	Dan Saclangan, Luciana Villanueva	USA	172	p. 110
	Field Application of <i>Trichoderma</i> spp. on Strawberry Flowers Using Honeybees				
15:30-15:50	VIDAL Maria	Franco Vallejo	Brazil	173	p. 110
	Pollination and Fruit Set in Pumpkin (<i>Cucurbita moschata</i>)				
15:50-16:10	ORTEGON Yair	Uriel Armando Castro, Rodrigo Vásquez, Rodrigo Martines, Hugo Ballesteros	Columbia	174	p. 111
	A commercial strawberry crop (<i>Fragaria chiloensis</i>) being directly pollinated by bees (<i>Apis mellifera</i>)				
16:10-16:30	CHIFFLET Rémy		France	175	p. 111
	Oilseed rape pollen dispersal by insects in agricultural landscape				
16:30-16:50	Break				
16:50-17:10	GIRARD Mélissa	Valérie Fournier, Madeleine Chagnon	Canada	176	p. 112
	Floral diversity around <i>Vaccinium</i> fields and the health of <i>A. mellifera</i> introduced for pollination in Quebec				
17:10-17:30	SHUMAKOVA Iryna	Oleksandr Komisar	Ukraine	177	p. 112
	Alternative orchard pollinators				
17:30-17:50	VENTURIERI Giorgio	Nercy Pires, Felipe Contrera	Brazil	178	p. 113
	Management of stingless bee, <i>Melipona fasciculata</i> , for pollination of solanaceous crops in greenhouses				
17:50-18:10	HUANG Jiaxing	Jiandong AN, Jilian LI, Shudong LUO, Jie WU	China	179	p. 113
	Pollination ecology of Katy apricot <i>Prunus armeniaca</i> L. in greenhouse				
18:10-18:30	TSCHUENGUEM Fernand	Dorothea Brueckner	Cameroun	180	p. 113
	Foraging and pollination behaviour of the African honeybee (<i>Apis mellifera adansonii</i>)				

BEEKEEPING TECHNOLOGY AND QUALITY COMMISSION

SYMPOSIUM 1 "BEE PRODUCTS AND ANALYSIS" WEDNESDAY 16th AFTERNOON

Chair: Stefan Bogdanov (Switzerland) or Etienne Bruneau (Belgium)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:50	MONTENEGRO Gloria		Chile	40	p. 51
	Differentiation of Chilean endemic honeys in based of botanical origin and biological properties				
14:50-15:10	DANIELE Gaëlle	Hervé Casabianca	France	41	p. 52
	Analysis of French royal jelly for quality and authenticity controls				
15:10-15:30	ZULUAGA-DOMINGUEZ Carlos Mario	Consuelo Díaz-Moreno, Carlos Fuenmayor-Bobadilla, Ariel Cadena-Sanchez	Colombia	42	p. 52
	Advances in classification and differentiation of Colombian honeys by using an electronic nose and a physical-chemical analysis				
15:30-15:50	VOGEL Melanie	Reinhard Michel	Germany	43	p. 52
	Pesticide-analysis in honey by means of LC-MS/MS and GC-MS/MS – Investigation of the most appropriate technique				
15:50-16:10	ALMEIDA-MURADIAN Ligia Bicudo	Werner Luginbühl, Peter Gallmann, René Badertscher	Brazil	44	p. 53
	Prediction of some physicochemical measurands of honey using FT-IR ATR				
16:10-16:30	KROPF Urska	Jasna Bertoneclj, Mojca Jamnik, Marijan Nečemer, Nives Ogrinc, Terezija Golob	Slovenia	45	p. 53
	Geographical origin of Slovenian multifloral and forest honey				
16:30-16:50	Break				
16:50-17:10	NANDA Vikas	Dr Bahadur singh, Dr. A.S.Bawa, V.K.Kukreja	India	46	p. 54
	Classification of Indian unifloral honey on the basis of physio-chemical characteristics and mineral composition by Pattern recognition methods				
17:10-17:30	HU Fu-Liang	Cui-Ping Zhang, Huo-Qing Zheng	China	47	p. 54
	A Glucosidase Activity in Propolis				
17:30-17:50	WAS Ewa	Helena Rybak-Chmielewska, Teresa Szczésna	Poland	48	p. 54
	Gas chromatography with mass detector technique (GC-MS) used for detection of beeswax adulteration with paraffin				
17:50-18:10	FREYTAG Izabela	Hélène Dailly, Etienne Bruneau, Viviane Planchon	Belgium	49	p. 55
	Markers of linden honey				
18:10-18:30	GONZALEZ-PORTO Amelia V.	León-Ruiz, V, Martín-Arroyo, T.	Spain	50	p. 55
	Honeys of Savory: data for one first estimation for its definition and characterization				

PLENARY SESSION - Good beekeeping practice in apiaries
THURSDAY 17th MORNING

Chair: Gilles Ratia (France)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	RATIA Gilles		France		
	Introduction				
09:20-10:00	BRUNEAU Etienne		Belgium	51	p. 56
	The important points of a good beekeeping practice guide				
10:00-10:20	SOEKARTIKO Bambang		Indonesia	52	p. 56
	Integrated Beekeeping Development Project in Indonesia				
10:20-10:40	LARTIGOU Fabrice		France	53	p. 56
	Geographical Information System applied to modern apiary industry				
10:40-11:00	SUNAY Asli Elif	Dilek Boyacioglu, Günay Akdogan	Turkey	54	p. 57
	A valuable tool for new product development: consumer acceptance of creamed honey				
11:00-11:20	Break				
11:20-11:40	ARUNDEL Jonathan	Stephan Winter	Australia	55	p. 57
	New biosecurity strategies for migratory beekeepers				
11:40-12:00	ATAURI David		Spain	56	p. 58
	m2m beehive monitoring platform				
12:00-12:20	GÜLER Ahmet		Turkey	57	p. 58
	The effects of the shook swarm technique on honey bee (<i>Apis mellifera</i> L.) colony productivity and honey quality				
12:20-12:40	SKAREAS Spyros		Greece	58	p. 58
	Advanced beekeeping techniques for higher honey productions				
12:40-13:00	JOSSERAND Laurence	Cyril Novales, Jean-Pierre Martin	France	59	p. 59
	E-ruche				

PROPOLIS IT IS,

Propolia. BEAUTY IS

Bee'Nice



APIMAB
LABORATOIRES



PROPOLIS AND BEEPRODUCTS
SPECIALIST

- 30 years of experience
- Scientifically proven efficiency
 - Pure Propolis
- More than 50 skus much appreciated
 - Made in France

APIMAB Laboratoires - Av. du Lac - 34800 CLERMONT L'HERAULT (France)
 Phone +33 4 67 96 38 14 - Fax +33 4 67 88 06 99 - E-mail : contact@apimab.com

SYMPOSIUM 2 "QUEEN REARING AND INSTRUMENTAL INSEMINATION" SATURDAY 19th MORNING

Chair: Gilles Fert (France)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	SOERENSEN Poul Erik		Denmark	222	p. 133
	Breeding <i>Nosema</i> free colonies in Denmark				
09:20-09:40	DESROCHERS Anicet		Canada	223	p. 133
	Breeding survivors bees in organic and Nordic Canadian condition				
09:40-10:00	ZVOKEJ Lucija	Aleš Gregorc	Slovenia	224	p. 134
	Queen rearing in different conditions				
10:00-10:20	ZHENG Huo-Qing	Shui-Hua Jin, Christian W. W. Pirk, Vincent Dietemann, Robin Crewe, Fu-Liang Hu	China	225	p. 135
	Ten years of beekeeping with multiple-queen colonies in China				
10:20-10:40	BIENKOWSKA Malgorzata	Beata Panasiuk, Dariusz Gerula, Pawel Wegrzynowicz	Poland	226	p. 135
	Weight of honeybee queens and its effect on the quality of instrumentally inseminated queens				
10:40-11:00	VERJUS Olivier	Fedon T., Beder-Bresson E., Odoux JF., Bocquet M.	France	227	p. 136
	The French national bee breeders association and the breeding practise in France in 2009				
11:00-11:20	Break				
11:20-11:40	JEVTIC Goran	Mica Mladenovic, Nebojsa Nedic, Bojan Andjelkovic	Serbia	228	p. 136
	The temperament traits and the hygienic behavior of honey bee (<i>Apis mellifera carnica</i> Poll.) from Serbia				
11:40-12:00	HAKOBYAN Norak	Roza Tsarukyan, Karen Avetisyan	Armenia	229	p. 137
	The distributed honeybee stocks in Armenia and their propagation				
12:00-12:20	POLLARD John	Claire Plante, Susan Cobey	Canada	230	p. 137
	Development of embryo transfer technologies in the honeybee for specific pathogen-free queen production and international genetic movement				
12:20-12:40	CAUIA Eliza		Romania	231	p. 138
	The evaluation of honeybee colonies by using a data base software with application in honeybee breeding programs				
12:40-13:00	GREGORC Aleš	Vesna Lokar	Slovenia	232	p. 138
	Selection of Carniolan honeybee colonies (<i>Apis mellifera carnica</i>) for queen rearing				

SYMPOSIUM 3 "BEE PRODUCTS AND QUALITY"
SATURDAY 19th AFTERNOON

Chair: Werner von der Ohe (Germany)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:50	HECK Thomas	Kari Koivulehto	United Kingdom	233	p. 139
	Clean Honey - An obligation to producers and trade alike				
14:50-15:10	LICHTENBERG-KRAAG Birgit	Einar Etzold	Germany	234	p. 139
	From nectar to honey: Studies on changes of quality parameters during the ripening process				
15:10-15:30	LORENZON Maria Cristina	Rodrigo Nunes, Valmir Carneiro, Carlos Vianna, Érika Salles, Sérgio Cataño, Monika Barth	Brazil	235	p. 140
	Floral origin and honey quality from packing beehive				
15:30-15:50	VIT Patricia	Maria Mutone, Soneida Peña, Javier Ruiz, Arellys Mejias, Leandra Rial, Maria Gabriela Gutierrez, Carla Gutierrez, Meylin Arraez, Maria Teresa Sancho, Miguel Fernandez-Muiño, Ana Carolina Gonzalez, Ortrud Monika Barth, Antonio Jesus Rodriguez-Malaver	Venezuela	236	p. 140
	Setting Venezuelan quality standards of <i>Melipona favosa</i> honey				
15:50-16:10	SZCZESNA Teresa	Helena Rybak-Chmielewska, Ewa Waś	Poland	237	p. 141
	Water determination in bee products by Karl Fischer titration				
16:10-16:30	DAILLY Hélène	Etienne Bruneau, Viviane Planchon, Izabela Freytag	Belgium	238	p. 141
	How to quantify the firmness of honey?				
16:30-16:50	Break				
16:50-17:10	BERA Alexandre	Ligia Bicudo de Almeida-Muradian, Susy Frey Sabato	Brazil	239	p. 141
	Effect of Gamma Radiation in Multifloral honey				
17:10-17:30	ZHAO Jing	Xiaofeng Xue, Xiao Zhou, Liming Wu	China	240	p. 142
	The Nutritional Assessment of four kinds of Royal Jelly Protein				
17:30-17:50	GALLMANN Peter	Zoller	Switzerland	241	p. 142
	Are pyrrolizidinalcaloids in bee products a health hazard?				
17:50-18:10	ZAVALA Angélica	Idalia Colomo, Lucia Piana, Benoît Olivier, Rémy Vandame	Mexico	242	p. 142
	Characterization of tropical honeys as a strategy for rural development in Mexico and Central America: data and threats				
18:10-18:30	BARRETO Lidia	Gomes S.M.A., Orsi R.O., Brito J.S.A., Souza M.M.B., Peão G.F.R., Dib A.P.S.	Brazil	243	p. 143
	Brazilian bee pollen: quality and challenges				

APITHERAPY COMMISSION

SYMPOSIUM 1 "RESEARCH" THURSDAY 17th MORNING

Chair: Eberhardt Bengsch (Germany)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:10	BENGSCHEBERHARDT		Germany		
	Introduction				
09:10-09:20	KRYLOV Vasily N.		Russia	71	p. 64
	Bee venom stimulates the regeneration of rats skin nerve after its alteration by crushing				
09:20-09:30	SUN Liping	Xu X., Liao L., Liu K.	China	72	p. 65
	Experimental study on the anti-inflammatory and immune effect of different soluble fractions from bee collected rap pollen and GC-MS analysis				
09:30-09:40	PERCIE DU SERT Patrice	Offant P.	France	73	p. 65
	Probiotic effect of Lactic Acid Bacteria from fresh bee pollen				
09:40-10:00	BILIKOVA Katarina	Jozef Simuth, Hans Lehrach	Slovakia	74	p. 66
	Royal jelly proteins as a new class of physiologically active proteins				
10:00-10:20	MAJTAN Juraj	Pawan Kumar, Tomas Majtan, Andrew F. Walls, Jaroslav Klaudiny	Slovakia	75	p. 66
	Effect of honey and its major royal jelly protein 1 in activation of human epidermal keratinocytes				
10:20-10:40	BENGSCHEBERHARDT		Germany	76	p. 67
	Lyme Borreliosis and Apitherapy				
10:40-11:00	PICHICHERO Elena	Ciccone Rosella, Canini Antonella	Italy	77	p. 67
	Effect of chrysin detected in honey on melanoma cells				
11:00-11:20	Break				
11:20-11:30	HUTAGALUNG James S		Indonesia	78	p. 67
	Analysis of flavonoid from bee propolis which sources in Indonesia as anti-plasmodium medicine				
11:30-11:40	DUKE Colin C	Duke R., Tran V., Abu-Melal A., Koolaji N.	Australia	79	p. 68
	Novel Bioactive Prenylated Phenolics from Kangaroo Island Propolis				
11:40-11:50	SICEANU Adrian		Romania	80	p. 68
	Comparative efficacy of apiphytotherapy towards chemotherapy in chicken eimeriosis				
11:50-12:00	MIRANDA Sonia	Vit, P., Rodriguez-Malaver A.	Venezuela	81	p. 69
	Propolis increases the total antioxidant activity (TAA) of human saliva in vitro and in vivo				
12:00-12:10	CHEN Yue-Wen	Yeh S-R., An J. K., Chen C.N.	Taiwan	82	p. 69
	Plant origin and anti-bacterial activity of Taiwanese green propolis				
12:10-12:20	SALEH NEZHAD Saleh	Kermanshahi H.	Iran	83	p. 70
	Evaluate honey effects on Immune system in animal model				

12:20-12:40	SUN Liping	Liao L., Liu K., Peng W.	China	84	p. 70
	Preliminary study of active fractions and chemical compositions in bee collected rape pollen for liver protection.				
12:40-13:00	CHEN Lihong	Fuxing Z.	China	85	p. 71
	Advances in Scientific Research and Application of Propolis in China				

SYMPOSIUM 2 "TREATMENT"

FRIDAY 18th AFTERNOON

Chair: Roch Domerego (Belgium)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:50	DOMEREGO Roch		Belgium		
	Introduction				
14:50-15:10	KRIVOPALOV-MOSKVIN Igor	Fateeva E., Krivopalov, A., Krivopalov D.	Russia	181	p. 114
	The possibility of normalization of alcohol with usage of Apitoxins				
15:10-15:30	BOGDANOV Stefan	Muenstedt K.	Switzerland	182	p. 114
	Functional and Biological Properties of Bee Products				
15:30-15:50	MOHD.YUSOFF Kamaruddin	Suhaimi A., Akka Z., Mohd.Yusoff M.Y.	Malaysia	183	p. 115
	The Efficacy of Honey Dressing on Wound Healing : A Clinical Observation Study				
15:50-16:10	AOSAN Cristina		Romania	184	p. 115
	Api-Phyto-Therapy in demyelization condition - results analisys on a sample of 33 patients				
16:10-16:30	SOSSA Euloge	Dengler-Mahé, E.	Benin	185	p. 116
	Apitherapy in Benin				
16:30-16:50	Break				
16:50-17:10	DORIN Mindrescu	Mihaela O.	Romania	186	p. 116
	Treatment of multiple sclerosis				
17:10-17:30	BERETTA-SILVA Andresa A.	Bastos, J. K., Marchesan W. G., Marchetti J. M.	Brazil	187	p. 117
	Pre-clinical and clinical research of a thermoreversible gel formulation to reduce healing time of lesions in burn victims				
17:30-17:50	ADZHIGIREY Galina	Darya Adzhigirey	USA	188	p. 117
	Synergistic effectiveness of the consumption of bee products infused with medicinal herbs and berries to promote proper function of the immune system				
17:50-18:10	NNOMO DOUANIA Roland	Douania N., Yves P. J., Roger T.	Cameroon	189	p. 118
	Apiphytotherapy with honey in Cameroon				
18:10-18:30	PASHCHENKO Oleksiy	Todorova, V., Golembiovsk, O	Ukraine	190	p. 118
	Apiphytocompositions with <i>Salvia officinalis</i> L. essential oil				

APITHERAPY COMMISSION - PLENARY SESSION **SATURDAY 19th MORNING**

Chair: Théodore Cherbuliez (USA)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	CHERBULIEZ Theodore		USA		
	Introduction				
09:20-10:00	MIZUKAMI Osamu		Japan	191	p. 119
	My clinical experiences on use of propolis to cancer patients				
10:00-10:20	JAGANATHAN Saravana Kumar	Mandal M.	India	192	p. 119
	Involvement of non-protein thiols, mitochondrial dysfunction, and reactive oxygen species in the honey-induced apoptosis				
10:20-10:40	KHISMATULLINA Nailya	Khismatulina, Irina	Russia	193	p. 120
	Complex treatment for psoriasis by api-reflexotherapy and beekeeping products				
10:40-11:00	DOMEREGO Roch		Belgium	194	p. 120
	Basic clinical concepts in green medicine				
11:00-11:20	Break				
11:20-11:40	MARSIT Nagi M.	Ermithi O., Saad I., Abdalia A. Albahri A.	Lybia	195	p. 120
	Production of Amnion Grafts for Wound Covering Using Local Honey as a Preservative Agent				
11:40-12:00	KAWASAKI Hiromu	Zamami Y., Koyama T., Fujiwara H., Takaki-Doi S., Tatefuji T, Hashimoto K.	Japan	196	p. 121
	Royal jelly and propolis prevent development of insulin resistance in type 2 diabetic animal models.				
12:00-12:20	BOYD Barbara	Biancardi F., MD, de Paula U.MD.	Italy	197	p. 121
	Propolis and honey syrup as prophylaxis of oro-pharyngeal mucositis in irradiated head and neck cancer patients: ongoing results.				
12:20-12:40	JONES Richard	Cooper, R.	United Kingdom	198	p. 122
	Hive Products: from folklore to pharmacopoeia				
12:40-13:00	BENGSCHEBERHARDT		Germany	199	p. 122
	Bee products in Human health and in Science: linking empirism of apitherapy with modern Molecular Medecine				

BEEKEEPING FOR RURAL DEVELOPMENT COMMISSION

SYMPOSIUM 1 "Honey trade by small producer groups"
THURSDAY 17th AFTERNOON

Chair: Harun Baiya (Kenya)

Time	Authors	Co-authors	Country	Abstract	Page
14:30-14:50	BRADBEAR Nicola		United kingdom	95	p. 75
	Introduction to the Standing Commission				
14:50-15:10	ROY Pratim	Robert Leo, Snehlata Nath, Anita Varghese, Sumin George Thomas, Shiny Mariam Rehel, Mathew Johnsore	India	96	p. 76
	Developing markets through people and produce				
15:10-15:30	VALENTINUS Heri	Johnny Utama	Indonesia	97	p. 76
	From the bee hive to the breakfast table: marketing forest honey in Indonesia				
15:30-15:50	JOSHI Surendra Raj		Nepal	98	p. 76
	Value chain promotion of honey in Nepal				
15:50-16:10	HADDAD Nizar		Jordan	99	p. 77
	A revolving loan fund (RLF) providing small loans				
16:10-16:30	MITEMBE William		Malawi	100	p. 77
	Overcoming constraints of beekeeping for income generation in Malawi				
16:30-16:50	CHISENGA Kenneth		Zambia	101	p. 78
	Honey value chain development in Zambia				
16:50-17:10	Break				
17:10-17:30	PAUMGARTEN Fiona		Zambia	102	p. 78
	Supporting collective action and poverty reduction in the Zambian honey sector				
17:30-17:50	HUSSELMA Madeleen		Zambia	103	p. 79
	Alleviating poverty through beekeeping: lessons from Zambia				
17:50-18:10	RONDELET Yves	Céline Mondet	France	104	p. 79
	MAPWA - a medicinal Apipark in West Africa				
18:10-18:30	EDRICH Wolfgang		Germany	105	p. 80
	Secure village beekeeping: fixed-comb bell-hives and appropriate methods				

PLENARY SESSION
FRIDAY 18th MORNING

Chair: Nicola Bradbear (UK)

Time	Authors	Co-authors	Country	Abstract	Page
09.00-09.40	OLDROYD Benjamin		Australia	116	p. 84
	Conservation of Asian honey bees				
09.40-10.00	MARDAN Makhdzir	Mohammadmehdi Saberioon, Nordin Laili, Mohd Sood Alias	Malaysia	117	p. 85
	Using remote sensing and GIS in locations prediction to establish rafter beekeeping (Tingku) Technique in Marang district, Malaysia				
10.00-10.20	OTIS Gard W.	Leo Smits, Huyen Pham, Steffanie Scott	Canada	118	p. 85
	Beekeeping training utilizing participatory methodology in Vietnam				
10.20-10.40	DEVANESAN Stephen	K.K. Shailaja, Dr. K.S. Premila, Dr. O.P. Reji Rani	India	119	p. 86
	Potential of meliponiculture in rural homesteads of Kerala, India				
10.40-11.00	VANDAME Jérôme	Anna Schooffs, Bounpheng Sengngam	France	120	p. 86
	Beekeeping in Laos: various strategic choices				
11.00-11.20	Break				
11.20-11.40	BRANKOVIC Danijela	Nebojsa Nedic, Suzana Djordjevic Milosevic	Serbia	121	p. 87
	Perspectives of revitalisation of high nature area through organic apiculture				
11.40-12.00	OCHOLA Simon Peter		Uganda	122	p. 87
	Bee keeping, an integrated approach in shea tree conservation in Uganda				
12.00-12.20	MACHARIA Joseph K	L M Gitonga, S K Raina, J C Biesmejer	Kenya	123	p. 88
	From bee hunting to beekeeping: stingless bees in Kenya				
12.20-12.40	ELAMIN E. M.	Ahmed, M.A., Elsarag, M.S., Salah, F.E.	Sudan	124	p. 88
	Promoting beekeeping in the Sudan, A review				
12.40-13.00	JANNONI-SEBASTIANINI Riccardo		Italy	125	p. 88
	Linkages between beekeeping for rural development and issues of human development and food security issues				

SYMPOSIUM 2 "Cooperatives and networks"

SATURDAY 19th MORNING

Chair: Harriet Eeles (Chile)

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	BAIYA Harun		Kenya	200	p. 123
	Commercialisation of small scale beekeeping through association and collective action				
09:20-09:40	EELES Harriet		Chile	201	p. 123
	Establishing a small cooperative in Chile				
09:40-10:00	BENDINI Juliana	Ricardo de Oliveira Orsi, Lidia Maria Ruv Carelli Barreto, Ana Paula da Silva Dib, Hugo do Nascimento Bendini, Silvia Helena Modenese Gorla da Silva	Brazil	202	p. 124
	Honey from the Mantiqueira's Paulista hills: a proposal for a designation of origin				
10:00-10:20	BARRETO Lidia	A.P.S. Dib, L.E.V. Pasin, C. Carvalho, G.F.R. Peão, J.N. Bendini	Brazil	203	p. 124
	The role of the Center of Apicultural Studies Cea-Unitau-SP-Brazil, in 20 years as agent of research and extension regional program				
10:20-10:40	MARTINEZ-ANZOLA Telmo	Laura Bermúdez-Wilches, Eliécer Marín	Colombia	204	p. 125
	Use of bees in Colombia for narcotics control and preservation				
10:40-11:00	VANDAME Rémy		Mexico	205	p. 125
	Small scale beekeeping economy in Mexico and Guatemala				
11:00-11:20	Break				
11:20-11:40	CASANOVA OSTOS Raul Alberto		Venezuela	206	p. 126
	El desarrollo apicola Venezolano por la vía de las redes de innovación				
11:40-12:00	GIGIN Murat	A. Nihat Gokyigit, Ahmet Inci	Turkey	207	p. 126
	Organic honey production and marketing studies of TEMA foundation in Turkey (A successful beekeeping cooperative)				
12:00-12:20	SUNAY Aslı Elif	Taylan Samanci	Turkey	208	p. 127
	Structure of beekeeping in Turkey				
12:20-12:40	DU CHAXEL Alain	Nathalie Carazzai, Benoit Olivier	France	209	p. 127
	Beekeeping and development in emerging countries: an urgent need for networking				
12:40-13:00	KHISMATULLIN Rail	E.V. Zhenikhova, V. L. Makarov	Russia	210	p. 128
	Elements of franchising for development of beekeeping in Russia				

INVITED SYMPOSIUM: BEE SHOP

FRIDAY 18th MORNING

Time	Authors	Co-authors	Country	Abstract	Page
09:00-09:20	MORITZ F.A. Robin		Germany	137	p. 93
	Bee shop - A european research network				
09:20-10:00	TOMAS-BARBERAN Katarina	P. Truchado, A. Allende, L. Bortolotti, A.G. Sabatini, J. Simuth	Spain	138	p. 94
	Phytochemicals as markers of the floral origin of honey				
10:00-10:20	BILIKOVA Katarina	Hans Lehrach, Jozef Šimúth	Slovakia	139	p. 95
	Royal jelly proteins as a new class of physiologically active proteins with immunostimulatory and antimicrobial properties				
10:20-10:40	SIMUTH Jozef	Katarína Biliková, Hans Lehrach	Slovakia	140	p. 95
	A new view on honeybee defense system based on own proteinous antibiotics and phytochemicals				
10:40-11:00	ROSENKRANZ Peter	Eva Frey, Richard Odemer, Florence Mougél, Michel Solignac, Barbara Locke, Ingemar Fries	Germany	141	p. 96
	Variance of the reproduction of the parasitic mite <i>Varroa destructor</i> and its significant for host resistance at the individual level				
11:00-11:20	Break				
11:20-11:40	DE MIRANDA Joachim R.	Magali Tournaire, Robert J. Paxton, Laurent Gauthier	Sweden	142	p. 96
	Prevalence and seasonal variations of four more bee viruses in <i>Apis mellifera</i> and <i>Varroa destructor</i> mite populations in France				
11:40-12:00	BEHRENS Dieter	Florence Mougél, Eva Frey, Conny Geßner, F. Bernhard Kraus, Ingemar Fries, Peter Rosenkranz, Robin F.A. Moritz, Michel Solignac	Germany	143	p. 97
	Mapping Genes for honeybee disease resistance: American Foulbrood and <i>Varroa destructor</i>				
12:00-12:20	JAFFÉ Rodolpho	Ingemar Fries, Robert J. Paxton, Anna-Gloria Sabatini, Robin F.A. Moritz	Germany	144	p. 97
	European honeybees: A deep red species on the list				
12:20-12:40	SHAIBI Taher	Robin F.A. Moritz	Germany	145	p. 97
	10,000 years in isolation: The DESERT honeybees of Al Kufrah				
12:40-13:00	TITERA Dalibor		Czech Republic	146	p. 98
	Beekeeping management for Sustainable Apiculture				

Round tables





"Veterinarians and beekeeping": round-the-world experiences, points of view and methods, as well as developments in the role of veterinarians in the beekeeping field.

Up until recently, veterinary schools were little concerned by the health of bees. From now on, however, in coordination with beekeeping structures, veterinarians having followed specialised training should play an essential role in beekeeping pathology cases.

MODERATOR: Monique L'Hostis

SPEAKERS (to be confirmed):

- **Henri CLÉMENT**, Beekeeper, UNAF.

The opinion of beekeepers on the role of vets in beekeeping.

- **Jean-Marie BARBANÇON**, DMV [Veterinary Doctor], Beekeeper, FNOSAD [National Federation for County Beekeeping Sanitary Institutions].

Sanitary organisation of the French beekeeping sector.

- **Bressian GIANLUIGI**, DMV, AZ.ULSS 22, Veterinary Service.

Italy: bees, honey and veterinarians.

- **Claude BOUCHER**, DMV, MAPAQ, CQIASA – Quebec.

Veterinarians and beekeeping in Canada.

- **Levent AYDIN**, DMV, University of Uluda.

The role of veterinarians in beekeeping in Turkey.

- **Bill VANDAELE**, DMV, international beekeeping consultant.

Belgium: bees, honey and veterinarians.

- **Taoufik BEN HAMIDA**, DMV, Institute of Veterinary Research of Tunisie (IRVT).

Training and veterinary specialisation in beekeeping pathologies: current situation and perspectives in Tunisia.

- **Alfredo SANZ VILLALBA**, DMV, Arna Agrupation Apicole.

The veterinary profession and beekeeping in Spain.

- **Monique L'HOSTIS**, J-M Barbançon, Nicolas Vidal-Naquet, M.E. Colin, DMV.

Veterinarians in the beekeeping sector in France: training, research, thought-provoking group, sanitary management.

- **Laurence DELVA**, DMV, National Agency for Veterinary Medicine – AFSSA [French Food Security Agency].

The problem of the availability of veterinary medicine and MRLs for the beekeeping sector.

- **Michel POTTIEZ**, DMV, DGAI [Ministerial Food Department].

A few topics of thought on the evolution of the sanitary conditions in the French beekeeping sector.



Intoxication in bees due to pesticides: the point of view of influential beekeeping specialists in the world

For more than fifteen years, beekeepers have been confronted with severe difficulties to upkeep colonies due to an exceedingly high mortality rate, logically observed at the end of winter, but also throughout the year. They have also noted weaknesses in colonies, whether or not affected by disease, and an increase in infertility in the queen bee. Such problems observed on a world scale affect Europe just as much as the American continent or certain Asian countries.

On an economic front, they are threatening the long-lasting existence of the beekeeping sector and even, in some areas, the survival of the honey bee.

In most of the countries affected, phytosanitary products are being considered more and more as the determining causal factor, whether directly or indirectly, due to their seeming ability to encourage disease, particularly viral infections.

What are these phenomena? What exactly are beekeepers actually seeing?

Are beehives affected in the same manner in France, Spain or the United States?

Beekeeping experts from different countries will explain what they have seen out in the field: bee behaviour, impact on the bee industry... but also how to react against the threat hovering dangerously over their activity.

Following the presentations by speakers, the floor will be given ample opportunity to voice

its opinion, not only to complement the information just given, but also to find a means for setting up a better strategy, at international level, thereby attempting to constrain this problem and to guarantee the future of our bees and the beekeeping industry.

MODERATOR: Janine Kievits (CARI)

SPEAKERS (to be confirmed):

- **Lucas MARTINEZ**, President of the Beekeeping Federation in Argentina
- **Francesco PANELLA**, President of UNAAPI (Italian Union of Beekeepers) – Italy
- **David MENDES**, professional beekeepers - USA
- **F. HEICKER**, President of the German Beekeeping Union
- **Manuel IZQUIERDO**, Head of the COAG beekeeping department (Coordination of Spanish breeders and farming organisations)
- **Sophie DUGUE**, Committee Member of the French beekeeping union [*Union Nationale de l'Apiculture française*]
- **Jean SABENCH**, President of the "Pesticides" Commission with the "Confédération Paysanne" [*French farmers' union*]



Intoxication in bees due to pesticides: results from scientists

Scientists dealing with very complementary themes will host this round table. They shall take stock of the current knowledge on the risks for bee colonies generated by the use of pesticides. Since it is not possible to record all the dangers linked to every pesticide, presentations by scientists will more often than not illustrate a study example of a type of insecticide on the market most commonly used: systemic insecticides used in the coating of seeds. Indeed, for about ten years now, several European (and notably French) laboratories have been studying these active substances with the support of the European Union. Their research has enabled them to update new and pertinent parameters that will be summarised during the round table. For example, the effects of such pesticides can first intervene at the time of sowing, then during the pollen-gathering phase and finally when food reserves are stored in the hives. In addition, new risk-evaluation approaches will be illustrated. A question-answer debate will be hosted for each theme, as well as one on the desired evolution of legislation

MODERATOR: Dr Jean-Marc Bonmatin

SPEAKERS (to be confirmed):

- **Luc BELZUNCES**, INRA [French Agricultural Research Institute] - Avignon
- **Cécile FLECHE**, former Director of AFSSA [French Food Security Agency] – Bee Department (Sophia Antipolis)
- **Piotr MEDRZYCKI**, Doctor in Science, bee pathology specialist. Council for Agricultural Research and Experimentation in Beekeeping and Sericulture, Bologna (Italy)
- **Jens PISTORIUS**, Department Head for bee intoxication enquiries, from the Julius-Kühn Institute (JKI) in Braunschweig - Germany
- **Marc-Edouard COLIN**, Veterinary Doctor – Sup-Agro patho-vigilance Centre – Montpellier
- **Marie-Pierre CHAUZAT**, doctor of Technology
- **Charles Poinot**, assistant of ATMO France President
- **Alain GAZEAU**, Director of ATMO Poitou-Charentes



GMOs and pollinating insects

Scientists dealing with very complementary themes will host this round table. They shall For the first time at an Apimondia Congress, a round table will tackle the problem of genetically-modified plants and pollinating insects. This problem will be dealt with in various aspects:

- evaluation of the toxicity of pesticides on bees (insecticides produced by genetically-modified plants and herbicides for resistant genetically-modified plants).
- evaluation of the risks of gene-transfer in genetically-modified plants to such wild plants of the same botanical family as Colza, and irreversibility.

- possible responsibility of the beekeeper in pollen-transfer from genetically-modified plants to non-GMO cultures of the same species.
- labelling of bee industry products, namely honey and essentially pollen, and the impact on markets, since the majority of European consumers refuse to buy products containing GMOs.

MODERATOR: Jean-Marie SIRVINS (Vice-President of UNAF)

SPEAKERS (to be confirmed):

- **Lilian CEBALLOS**, Independent Researcher
- **Jane LECOMTE**, Professor at Paris XI Orsay University
- **Gilles-Eric SERALINI**, Professor of molecular biology CRII-GEN - University of Caen
- **Hans-Hinrich KAATZ**, Institut für Biologie/ Bereich Zoologie - Universität Halle Wittenberg - Germany
- **Lucas MARTINEZ**, President of the Beekeeping Federation in Argentina



The bee, sentinel of the environment

Everyone today agrees that the bee is a formidable sentinel of the environment. During this innovative round table, research will be presented to evaluate how the evolution of landscapes and agricultural techniques impacts the vitality of colonies. A report summarising the round tables on bee and GMO/bee pesticides will also be presented by the moderators.

For three years now, the French Beekeeping Union (Union Nationale de l'Apiculture Française), organiser of the Apimondia 2009 Congress, has been developing an ambitious awareness programme based on "the bee, Sentinel of the Environment".

To date, more than thirty partners, both institutional and private, have set up hives on top of their buildings and in their parks and gardens to encourage awareness in the general public.

This programme has already produced, via unprecedented media coverage, a true awareness of the essential role of the bee, not only in our diet, but also in safeguarding biodiversity.

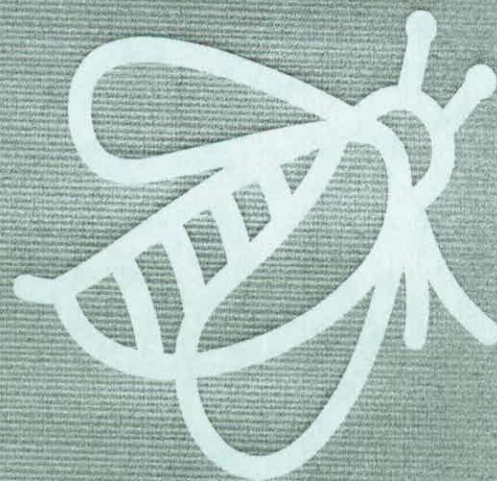
Today the bee decline has become exceedingly worrying in many regions of the world. In order to counteract such a worrying situation, significant measures are necessary by governments.

MODERATOR: Gilles RATIA, International Beekeeping Consultant, President of the 41st APIMONDIA Congress,

SPEAKERS (to be confirmed):

- **Monique L'HOSTIS**, National Veterinary School of Nantes
- **Francesco PANELLA**, President of UNAAPI (Italian Union of Beekeepers)
- **Etienne BRUNEAU**, President of the beekeeping department of COPA (Committee of Professional Farmer Organisations of the European Union), COGECA (General Committee of the Farmers' Cooperation of the European Union), Delegate Administrator of CARI (Belgian Beekeeping Centre for Research and Information),
- **Gaëlle LE JEUNE**, Institutionals and international relationships of Natureparif,
- **Henri CLEMENT**, President of the French beekeeping union, "Union Nationale de l'Apiculture Française"

Oral presentation abstracts



BEE BIOLOGY COMMISSION - PLENARY SESSION

01

The little brain of the bee is a master in navigation, communication and learning. How does it do it?

Randolf Menzel*

* Freie Universität Berlin, Institut für Biologie – Neurobiologie, Königin-Luise-Str. 28/30
14195 Berlin, Germany.

Honeybees have small brains, but their behavioural repertoire is impressive. They navigate over several kilometres using a geometric reference system of the environment, which they establish during observatory flights. They communicate about important places by a ritualized movement (the waggle dance) indicating distance and direction to the particular location from their nest site. They learn about the features of food sources (colour, odour, shape, relative position). Learning in honeybees initiates a sequence of neural processes that lead to long-lasting memory, and pass through multiple transient memory phases very much the same as in humans. Our studies of learning and memory dynamics are performed at the behavioural and brain levels. The lecture will present our top down strategy starting with behavioural observations under nature conditions, establishing an access to the processes in the brain underlying learning and memory processes. Our methods allow us to look into the brain of the bee when it learns and remembers. The results support the conclusion that learning related changes in the neurons of the brain are distributed over multiple locations.

02

Fighting bees: genomic basis of aggressiveness in honey bees

Cédric Alaux*, Saurabh Sinha, Linda Hasadsri, Greg J. Hunt, Ernesto Guzman-Novoa, Gloria Degrandi-Hoffman, José Luis Uribe-Rubio, Bruce R. Southey, Sandra Rodriguez-Zas, Gene E. Robinson

* INRA, UMR 406 Abeilles et Environnement, Site Agroparc, 84914 Avignon cedex 9, France,
cedric.alaux@avignon.inra.fr

Honey bee aggression, used to defend the colony against intruders, is a well-studied complex behavioural system, with known environmental and inherited components. Colony defence begins with the release of alarm pheromone by guards at the nest entrance, which alerts other bees to danger and provokes their movement to the entrance. The most famous example of inherited differences in honey bee aggression is the extremely aggressive propensity of the African honey bee (AHB), compared to European honey bee (EHB). AHB, which spread through most of the New World, are more likely to perceive a threat and attack in larger numbers and for a longer time. In order to decipher the genomic basis of aggressiveness in honey bees, we identified in the brain, genes regulated by alarm pheromone (environmental component) and differentially expressed between AHB and EHB (inherited component) in guards, soldiers and foragers. The number of genes differentially expressed between AHB and EHB increased with increased involvement in colony defence (forager < guard < soldier). Alarm pheromone induced, one hour after the exposure, the change in expression of hundreds of genes, which can explain another one of our findings that subsequent exposures to alarm pheromone increased colony arousal over time. About ten percent of the genes regulated by alarm pheromone are also differentially expressed between AHB and EHB, and these common environmental and inherited influences on gene expression involve some common biological functions, like visual perception and brain metabolism. These results demonstrate that the environmental and inherited components of aggressiveness in honey bees share similar molecular mechanisms and that the extreme aggressive behaviour of AHB might be partly due to a chronic increase in arousal for AHB, a chronic decrease in arousal for EHB, or both.

03

Pheromones: a key in honey bee social regulation, the case of worker ovary regulation.

Alban Maisonnasse*, Jean-Christophe Lenoir, Guy Costagliola, Dominique Beslay, Erika Plettner, Yves Le Conte

* UMR 406 Abeilles et Environnement Laboratoire Biologie et Protection de l'abeille Site Agroparc, Domaine Saint-Paul 84914, AVIGNON, France, alban.maisonnasse@avignon.inra.fr

The honey bee colony has a high degree of sociality. Part of the success of honey bee eusocial life relies on chemical communication. Studies of honeybee demonstrate that behavioral and physiological responses to pheromonal signals can request complexity and synergy, and depend on the context in which pheromones are produced. Moreover, pheromonal releases are mediated through both temporal and spatial distribution. An example of this complexity is worker ovary regulation. In the absence of any constraint, workers tend to become active reproductive individuals which can disturb colony stability. Queens and brood release queen mandibular pheromone and a blend of ten esters respectively; these compounds inhibit in concert worker ovary development. We have recently identified a new highly volatile molecule from larvae: E-_-ocimene, which also inhibits worker ovary maturation. By emitting E-_-ocimene, larvae may prevent workers (more precisely nurses) from allocating resources into egg production but rather take care of them. E-_-ocimene is also produced by the queen. This compound then play a role in queen ability to regulate worker ovary development, and thus, help her to monopolize egg-laying. To date, studies show that ovary regulation is controlled by three different pheromones, one highly volatile and two low-volatile, emitted by two colony actors. Pheromone signals in honey bees are deeper and richer than we thought.

04

Landscape factors liable to influence bee colonies development

Jean-François Odoux*, Aupinel P, Bretagnolle V, Toullet C, Peyrat E

* INRA, Le Magneraud - BP 52, 17700, Surgères, France, jean-francois.odoux@magneraud.inra.fr

The aim of these five years-study is to define the landscape factors liable to influence bee colonies development, and to validate the use of the honeybee as an indicator for sustainable management in natural resources. The different studied files are the impact of the land-use map, the pesticides practises, and the landscape structure on the bee colonies throughout indicators. A monitoring has been held on fifty hives randomly allocated in a wheat plain in France with varied landscape structures. The main measured indicators are about bee population, brood area, hive weight or pollen harvest, but also about farming use, semi-natural habitats, linear elements, and biodiversity. Palynological analyses are carried out on pellets harvested in pollen traps to assess the floral resources foraged by the bees. Our assumption is that blooming grasslands (i.e. alfalfa) could lessen the food shortage effect observed at the end of spring in this area, between the two main honeyflows which are rapeseed and sunflower. It would be necessary to quantify their effects on beekeeping activity, especially the quantity and the distances from the apiary. We will present here the most efficient indicators after two years measurements, and the new investigations with other wildlife observation nets. We will be mainly interested over the influence of metric components of the landscape on the dynamic and the demography of the bee colony, as well as over the structure of the wild pollinators' community. This work is carried out in cooperation between INRA, CNRS, and ADA Poitou-Charentes beekeeping development.

05

Biodiversity of the honeybee: evolutionary history and geographical races formation

Lionel Garnery*

* Laboratoire Evolution Génome Spéciation, CNRS, UPR9034, Gif-sur-Yvette France, garnery@legs.cnrs-gif.fr

Using classical morphometry, F. Ruttner and Coll. defined the basis of diversity and biogeography of the honey bee (*Apis mellifera* L.). These studies led to the definition of 24, and more recently 26 geographical subspecies (or morphological races) over the range of the species. According to multivariate analyses, these different subspecies are structured into four geographically structured groups: group M, covering the western European part of the natural range, group C, covering the north Mediterranean area, group A covering Africa and a group named O covering Turkey and Caucasus. During the last 15 years new markers, such as mtDNA and microsatellites loci were developed and used in order to reconstruct phylogenies and trace back the evolutionary history of the honey bee. These markers, confirms most of Ruttner's conclusions and extend the morphological studies to a better understanding of the evolution of the honey bee. We present here the results of 15 years of investigations covering a large part of the range of the species, and more than 15 000 colonies sampled. The combination of mtDNA and microsatellites loci, led us to give a better definition of what is an evolutionary lineage and also to build a new evolutionary scenario for the species. Particularly, we now have a better knowledge about the level of genetic diversity, and differentiation of the subspecies, and a better understanding of how they were differentiated.

06

Common effects of varroosis and nosemosis on learning abilities of honey bee foragers *Apis mellifera carnica*

Jasna Kralj*, Axel Brockmann, Jürgen Tautz

* Vecna pot 111, 1000, Ljubljana, Slovenia, jasna.kralj@nib.si

Negative impacts of the parasitic mite *Varroa destructor* and microsporidian *Nosema ceranae* on homing abilities of foragers were recently demonstrated. Impaired orientation to the nest entrance of diseased bees indicates the deficiency in sensory and/or neural processing that could affect learning. Here we present sensory responsiveness, non-associative and associative learning of artificially infested and infected foragers with *Varroa* and *Nosema*, respectively, by using a proboscis extension reaction paradigm (PER). Prior to learning tests each bee was tested for PER by applying a droplet of water and ascending sucrose solution (1% - 40% weight/volume) to the antenna as a measure of sensory responsiveness. Although infested/infected foragers were initially equally responsive to water and sugar concentrations compared to a control, there were evident differences in learning. Habituation to repeated sugar stimulations of the antennae, a non-associative learning, was faster in both, workers infested with *Varroa* and those infected with *Nosema*. In conditioning, where bees learn to associate the odor with sugar award, a significant reduction of PER response was found 1 min and 12 min after single conditioning in bees infected by *Nosema*, and 1 min in bees infested by *Varroa*. Both *Varroa* and *Nosema* affect learning and its underlying neural and molecular processes in similar way which could contribute to the deficit in homing and nest recognition observed in other studies.

07

No nepotism during colony fission in honeybees

Juliana Rangel*, Heather R. Mattila, Thomas D. Seeley

* Department of Neurobiology and Behavior, Cornell University, Ithaca, NY 14853, USA, jr369@cornell.edu

Extreme polyandry in honey bees (*Apis mellifera*) results in colonies composed of multiple subfamilies. Kin selection theory predicts that workers can increase their inclusive fitness by nepotistically preferring to raise full-sister

rather half-sister queens, though, studies to date, have shown little or no evidence of nepotism in queen-rearing. During swarming for colony reproduction, it remains unclear whether workers decide to leave in the swarm or to stay in the parental nest based on their genetic relatedness to immature queens. In this study, we examined three swarming colonies headed by naturally mated queens to determine whether workers segregate between the swarm and the parental nest based on their relatedness to immature queens. After each colony swarmed, we genotyped random worker subgroups from the swarm and parental nest, and all the immature queens, using seven highly variable microsatellite loci. We found no worker preference to stay if at least one of the immature queens was a full sister. The observed random distribution of workers during swarming probably occurs because (1) workers are not able to discriminate between full and half sister queens, or (2) the colony-level costs of discrimination outweigh the gains to workers to help raise a full-sister queen during swarming.

08

Spatial distribution of diseased workers in honeybee winter clusters revealed by diagnostic radioentomology

Benjamin Dainat*, Mark K Greco, Peter Neumann

* France, benjamin.dainat@alp.admin.ch

Honeybee winter clusters are 3D and non-transparent, rendering it impossible to study the spatial distribution of workers within them using conventional methods. Here we use non-invasive Diagnostic Radioentomology (DR), emerging as a new method for 3D computerised X-ray tomographic imaging of insects, to trace workers within natural clusters. Sealed worker brood combs from 4 colonies heavily infested with Varroa mite were incubated until adults emerged. Then, newly emerged workers (N=160) from cells containing 2 or more Varroa were cohort-specific labelled using Barium sulfate and introduced into 4 nucleus colonies on 3 combs. We excluded bees showing clinical symptoms of Deformed Wing Virus (DWV). A Siemens human body CT scanner was used for 3D computerised X-ray tomographic imaging to assess the winter cluster structure and the distribution of the labelled workers three times per week for three weeks. The data (N= 2 observations, preliminary analyses) show that younger bees (1 to 2 days old) congregate towards the centre of the winter cluster (N= 37 observations, 2.7 % away from the central core) and become more mobile as they age (15 days old, N=16 observations, 12.7 % away from the central core). This study showed that DR has particular advantages for non-invasively and non-destructively observing bees in winter clusters. We were able to visualize bee behaviour and general bee distributions inside clusters under normal winter conditions and the results suggest that young bees congregate towards the centre of the winter cluster and become more mobile as they age.

09

Mating isolation between subspecies of honeybees (*Apis mellifera*) on an island

Vincent Dietemann*, Micheal Ellis, Per Kryger

* Swiss Center for Bee Research, Agroscope Liebefeld-Posieux Research Station

ALP, Schwarzenburgstrasse 161, CH-3003 Bern, Switzerland, vincent.dietemann@alp.admin.ch

The island of Læsø was the centre of a long dispute between the Danish State and part of the local beekeepers. In 1993, the State declared the whole island a conservation area of *Apis mellifera mellifera*, but some beekeepers fought in court for their right to keep other subspecies of honey bees, which they regard as more productive. The State won the case in 2001, but found it challenging to enforce the rules. In order to end the stalemate, in 2005 two zones were established on the island of Læsø, as a means of separating *A. m. mellifera* from other honeybees. The Eastern part of Læsø, a 17 km² piece of land, was thus declared a conservation area for *A. m. mellifera*. This division was accepted by all beekeepers and the purity of the 116 colonies established in this conservation area was carefully monitored. In order to determine whether stray drones mating outside their allocated area were compromising the isolation, we caught flying drones with a pheromone-lured William trap at four locations spread across the island. A total of 480 drones were analysed at 26 microsatellite loci in order to determine the origin of the individuals caught at each site. Although *A. m. mellifera* drones could be found outside their conservation

area, drones of other strains were not found within this area. All drones caught within the conservation area for *A. m. mellifera* (n=238) were from this subspecies. Very few hybrid drones (n=14) were found outside this area. Our results indicate that the physical separation of the various strains of honey bees on Læsø is an efficient method to achieve mating isolation. These results are of interest for other cases where subspecies of honey bees need to be separated for conservation purposes and they fill a gap in our knowledge of honey bee mating biology.

BEE HEALTH COMMISSION - SYMPOSIUM N°1 "COLONY LOSSES"

10

Colony losses in China

Wei Shi*

* Apicultural Research Institute, Chinese Academy of Agricultural Sciences Xiang Shan Beijing 100093, China, shiweibri@yahoo.com.cn

China has six million bee colonies and about two hundred thousand beekeepers. Two *Apis* species (the western honeybees, *Apis mellifera*, and the eastern honeybees, *Apis cerana*) are raised in the country, both are bred for bee products (honey, royal jelly, propolis, beeswax) as well as for agricultural pollination. In recent years, beekeepers have been being confronted with several inexplicable and complex symptoms of colony losses on both *Apis* species. Although some of the losses are long known as a result of the damage of *Varroa* mites on *Apis mellifera*, sacbrood viruses on *Apis cerana* and *Tropilaelaps* mites on both species. Other less known factors and mechanisms need to be investigated: 1) Conservation of honeybees *Apis cerana*, *Apis cerana*, the native honeybees in China, now has become a threatened species in China for many reasons. 2) The common pathogens other than *V. destructor* harm for both species need to be understood, 3) the malnutrition, poisoning and inadequate management effect and bee vitality/diversity on both species request more deeply investment. 4) the mechanisms of *Apis cerana* tolerate the mite, *Varroa destructor*, and the microsporidian, *Nosema ceranae*, must to be contribute. To reach those ends, the Ministry of Agricultural and the Ministry of Sciences and Technology has granted several actions that are related to the colony losses issue, "Evaluating the negative impact in main honey production regions of China", "Conservation of honeybees *Apis cerana* in China" and the newly established action "Apiculture network on innovation". 20 scientists and 15 research centres have been involved. In 2004 special attention has given to Jilin, Liaoning, Shanxi, Sichuan, Zhejiang et al provinces.

11

A descriptive epidemiological study of honeybee colony

Dennis Van Engelsdorp*, Jay Evans, Claude Saegerman, Chris Mullin, Eric Haubruge, Jeff Pettis

* 2301 N Cameron st, 17011, Harrisburg, USA, dennis.vanengelsdorp@gmail.com

Background:

Over the last two winters, there have been large-scale, unexplained losses of managed honey bee (*Apis mellifera* L.) colonies in the United States. In the absence of a known cause, this syndrome was named Colony Collapse Disorder (CCD) because the main trait was a rapid loss of adult worker bees. We initiated a descriptive epidemiological study in order to better characterize CCD and compare risk factor exposure between populations afflicted by and not afflicted by CCD. Methods and Principle Findings: Of 61 quantified variables (including adult bee physiology, pathogen loads, and pesticide levels), no single measure emerged as a most-likely cause of CCD. Bees in CCD colonies had higher pathogen loads and were co-infected with a greater number of pathogens than control populations, suggesting either an increased exposure to pathogens or a reduced resistance of bees towards pathogens. Levels of the synthetic acaricide Coumaphos (used by beekeepers to control the parasitic mite *Varroa destructor*) were higher in control colonies than CCD-affected colonies, suggesting a potential role of pest management in the disorder. Conclusions/Significance: This is the first comprehensive survey of CCD-affected bee populations that suggests CCD involves an interaction between pathogens and other stress factors. We present evidence that this condition is contagious or the result of exposure to a common risk factor. Potentially important areas for future hypothesis-driven research, including the possible legacy effect of mite parasitism and role of honey bee resistance to pesticides, are highlighted.

APENET: Network for monitoring honeybee mortality and colony losses in Italy

Franco Mutinelli*, Anna Gloria Sabatini, Albino Gallina, Piotr Medrzycki, Fabio Sgolastra, Laura Bortolotti, Claudio, Porrini

* Italy, mutinelli@izsvenezie.it

Honeybee and colony mortality have been reported for several years in many countries as well as in Italy. In the last years this phenomenon has become increasingly serious, and several hypotheses have been proposed to explain honeybee and colony losses. These hypotheses relate to pests and diseases, pesticides, apicultural practices, climate change, electromagnetic fields, GMO crops, etc. Honeybee colony losses are being surveyed in several European countries, but these surveys are not sufficiently structured. Based on beekeepers' reports, honeybee losses in Italy follow a clear seasonal pattern: a) during spring and summer colonies loose many foragers due to agrochemicals (bee-losses); b) from late summer to winter, the impact of pests (including Varroa) and pathogens becomes more important (colony losses). To assess the extent and investigate the possible causes of honeybee and colony losses in Italy it is needed to establish a national monitoring network. Target apiaries will be distributed in selected sites (modules), ideally one per region, to cover the national territory. Each module, composed of five apiaries with ten non-migratory colonies each, will be chosen based on environmental characteristics with a distance to the centre of the module of about 50 km. Colonies will be visually inspected four times a year (right after winter, spring, summer and just before winter). In each inspection several parameters of each colony will be considered: health and nutritional condition, number of bees and brood, and queen's age. The person in charge of each module will input the information obtained in a real-time database available in the web. In addition, dead and live bees as well as several beehive matrices (brood, pollen, wax, honey) will be collected during each inspection for chemical, pollen and disease analyses. The information collected through this honeybee monitoring network will provide a broad database from which to explore patterns of disease, toxic exposure and management practices that may be linked to the occurrence of honeybee and colony losses. APENET aims at providing an accurate assessment of the overall health condition of honeybees at national level.

Status of colony losses in the Middle East

Nizar Hadda*, A. Bataeneh, I. Albaba, Dany Obeid, Shelan Abdulrahman

* National Center for Agriculture Research and Extension, Bee Research Unit. P.O. Box 639-Baq'a 19381. Jordan, drnizarh@yahoo.com

A survey to study the status of the colony losses were conducted in the winter of 2008 and the spring of the 2009, it was very clear that the level of the colony losses in this season is lesser than the levels in the season of the years 2007-2008. No clear reasons for this evident are available but it is clear that the weather had play a big role in this decrease of the colony losses in the area, since the temperatures during the previous season were unstable. Many of the colonies had multiple infections with IAPV, KBV, DWV, *Nosema* and *Varroa* mite. There is no clear correlation between any of these and the losses of the colonies, some of the colonies can be diagnosed as having the colony collapse disorder (CCD) symptoms but not all of them. This study had cover parts of the Jordan, Palestinian Authority, Lebanon, and Iraq.

Colony collapse disease in Brazil

David De Jong*

* Genetics Department Faculty of Medicine University of São Paulo Ribeirão Preto Campus Brazil, ddjong@fmrp.usp.br

Brazilian beekeepers are able to maintain Africanized honey bees without antibiotics, acaricides and other chemical controls. Among the benefits are reduced management costs and less risk of contaminating honey and wax. Unfortunately, we have not completely escaped the consequences of "Colony Collapse Disease" (CCD). Beekeepers have been complaining in recent years of partial or complete loss of apiaries. Since we noticed similarities in the symptoms between CCD in the USA and what we see in the bees here, several research groups have begun to concentrate on these problems. As a result of this research, we have already found Israeli Acute Paralysis Virus, *Nosema ceranae*, problems with nutrition and mortality due to a new class of pesticides, the neonicotinoids. The brood mite *Varroa destructor*, which is also associated with virus problems that appear to be characteristic of CCD, has become increasingly evident, apparently due to a changeover from the original Japanese/Thai mitotype originally introduced to Brazil to the more virulent Korean/Russian mitotype, which is now almost exclusively present throughout the country. Mite reproduction rates have greatly increased and infestation rates have also risen; treatment still remains unnecessary throughout most of the country, though there have been some reports of increased problems with *Varroa* in the cooler regions of the south. Some areas of research that are being pursued include the dynamics of infestation of the new *Varroa* mitotype in Africanized bees, variation in hygienic behavior, how management affects bee diseases, improved bee nutrition, bee viruses and their effects, morbidity and mortality due to insecticides, and the impact and epidemiology of *Nosema ceranae*. Research financed by CNPq and FAPESP.

Case studies on mortalities of honey bee colonies (*Apis mellifera*) in France during the 2005-2006 winter

Marie-Pierre Chauzat*, Sarah Zeggane, Patrick Drajnudel, Marie-Claude Clement, Anne-Claire Martel, Frank Schurr, Magali Ribere

* Agence Française de Sécurité Sanitaire des Aliments, Site de Sophia Antipolis, Unité Pathologie de l'Abeille, Les Templiers, 105, route des Chappes, BP 111, 06902 Sophia Antipolis, France, mp.chauzat@afssa.fr

Several cases of mortality in honey bee colonies (varying from 38 to 100%) were observed in France during the winter of 2005-2006. In order to explain the causes of these mortalities, two case studies were conducted: one case control in a limited area, and a larger survey in 13 French sites. They included the diagnosis of the main honey bee diseases, the preventive measures taken by beekeepers and the research of pesticide residues in honey bees. Pollen analysis was carried out in beebread to identify the floral species that were foraged before colony death. *VARROOSIS*, *nosema* disease and brood diseases, together with poor sanitary management of the apiaries were the common characteristics of all the studied mortality cases. These results did not support the toxic origin as the main explanation for the mortality of colonies.

Impacts of pesticides used in Quebec (Canada) corn fields on honeybee colonies

Madeleine Chagnon*, Monique Boily, Genevieve Beaunoyer

* Dept. sciences biologiques, C.P. 8888 succ. Centre-Ville, H3C 3P, Montréal (Québec), Canada, chagnon.madeleine@uqam.ca

In Quebec (Canada), the added yields attributed to pollination by insects are evaluated, for 11 key crops, at more than 170 million dollars. Honeybees provide the major part of these services. Unfortunately, colony losses are observed year after year, differentially, in various regions of the Province. Since 2003, most of these losses are

rightfully attributed to the *varroas* mite. Nonetheless, one of our latest research projects, aiming the use of honeybees as a bioindicator of environmental health, showed that colonies placed in locations where pesticides were used intensively had poorer performances (death of queen or interruption of egg deposition, brood loss, and increased mortality of foragers) than those placed in pesticide free environments. A complementary study was recently initiated to assess the current large scale use of new systemic pesticides (neonicotinoids) in corn as one of the multifactorial causes of observed honeybee losses. In 2008, approximately 99% of corn fields in Quebec were planted with seeds treated with clothianidin (neonicotinoid). Twenty four experimental hives were distributed in 6 sites selected to meet the objectives of our study. Dead bees were counted and collected, live bees were captured for enzyme analysis and brood development was followed during and after exposure of hives to treated fields. In 2008, high mortality of bees showing symptoms of the *Chronic Bee Paralysis Virus* was observed in exposed hives while control hives remained healthy. We are working on the development biological markers that could explain our observations. The dosage of vitamin A and enzymes involved in the immunity system are being prioritised. This study is being repeated with a higher number of hives in 2009 and results are presented.

17

Winter survival of honeybee colonies depends on the timing of *varroa* control

Tjeerd Blacquière*, Bram Cornelissen, Lonne Gerritsen, Jozef van der Stehen

* Plant Research International, Wageningen University & Research PO Box 69 6700 AB Wageningen, The Netherlands, tjeerd.blacquiere@wur.nl

Infestation by *varroa* mites of a cell with a pupa causes the developing bee to have a shorter life expectancy, which may be especially crucial in case of winter bees. In two consecutive experiments the effect of the timing of *varroa* control treatments (July, August, September or December) on the life span of individual bees and the survival of colonies during winter was examined.

Results:

- most winter bees hatched in September and October
- life span in late treated colonies was less than in early treated
- early treated colonies showed less infestation before and during hatching of winter bees
- late treated colonies had prolonged brood rearing in autumn
- many of the late treated colonies died during winter, no losses were recorded when colonies were early treated
- differences between season 2005-06 and 2006-07 reflected different climatic conditions

18

Honey bee colony collapse due to *Nosema ceranae* in professional apiaries

Mariano Higes*, Raquel Martin-Hernandez, Encarna Garrido-Bailon, Amelia V. Gonzalez-Porto, Pilar Garcia-Palencia, Aranzazu Meana, Maria J. del Nozal, Juan Jose Jimenez, Jose L. Bernal

* Bee Pathology laboratory, Centro Apícola Regional, JCCM, 19180 Marchamalo, Spain, mhiges@jccm.es

Honey bee colony collapse is a sanitary and ecological worldwide problem. The features of this syndrome are an unexplained disappearance of adult bees, a lack of brood attention, reduced colony strength, and heavy winter mortality without any previous evident pathological disturbances. To date it has not been a consensus about its origins. This report describes the clinical features of two professional beekeepers affecting by this syndrome. Anamnesis, clinical examination and analyses support that the depopulation in both cases was due to the infection by *Nosema ceranae* (Microsporidia) an emerging pathogen of *Apis mellifera*. No other significant pathogens or pesticides (neonicotinoids) were detected and the bees had not been foraging in corn or sunflower crops. The treatment with fumagillin avoided the loss of surviving weak colonies. This is the first case report of honey bee colony collapse due to *N. ceranae* in professional apiaries in field conditions reported worldwide.

Colony losses in Israel: incidence of viral infection and beehive populations

Victoria Soroker*, A. Hetzroni, B. Yacobson, H. Voet, S. Slabezki, H. Efrat, N. Chejanovsky

* Department of Entomology; Institute of Plant Protection Israel, sorokerv@agri.gov.il

Israel is one of the most dense beekeeping areas: about 100,000 hives per 7000 km², kept by 450 beekeepers, which produce 3200 metric tons of honey (a value of 12 million USD) and 60,000 cycles of pollination services to different crops, which produce an additional income of 250 million USD. With recent reports on colony losses world wide and local report on beehive decline (about 25%), we initiated a comprehensive study of the incidence and characteristics of colony losses in Israel. Our aims were to evaluate: a) symptoms and extent of colony decline and losses, by region; b) the role of pathogens, parasites and pesticides (both applied to field crops and to hives), c) the role of management practices: hive migration, colony nutrition, disease and varroa control. This was performed by: 1. Survey of honeybee colony losses and its potential causes via mail, phone and email; 2. Systematic sampling of healthy and problematic beehives after requeening, in the fall; at the end of winter before adding suppers; and after honey harvest in the summer. 3. Developing diagnostic tools for detection of pathogens including sensitive RT-PCR for viruses and *Nosema ceranae*, and dedicated computerized tools for data collection. At this time we collected data from about 46,000 colonies (58 beekeepers) for 2008. About 40% complained for extensive colony losses and the highest damage seems to be associated with workers loss. Some of them observed classical CCD symptoms, but the causes for most of them were reported as unknown. From 113 hives that were directly examined and sampled for pests and pathogens towards the end of the winter, 18.6 % of hives showed *Nosema ceranae* and 19.4 % *Varroa destructor* (following one hour of Amitraz fumigation). Qualitative analysis for viruses revealed the presence of Acute Bee Paralysis virus (ABPV), Black Queen Cell virus (BQCV), Chronic .../...

Cooperation of laboratories from different countries searching for factors stressing honeybees

Karl Crailsheim*, Ales Gregorc, Robert Brodschneider

* Department of Zoology, Karl-Franzens-University-Graz, Univ.Pl.2, 8010 Graz Austria, karl.crailsheim@uni-graz.at

Alarmed by the extensive colony losses in the US during the last seasons, the European Union initiated the COST network COLOSS. This fruitful cooperation resulted in new cooperations that bundle strengths of different laboratories. The main idea of these cooperations is the hypothesis that colony losses at this extent are caused not by just one factor but are the result of the combination of different stressors. Sublethal damages affecting different stages (larva, young or old adult) of bees are in the focus of the initiated cooperation. Research will be conducted on the effects of sub lethal doses of pesticides, malnutrition and low level infections with pathogens on individual bee and colony development. Hive management and nutrition are important research priorities in order to establish the influence on colony mortality. Inter-laboratory collaborations in performing different researches will contribute novel discovery in increasing individual bee or colony vitality and thus help in reducing the colony mortality.

POLLINATION AND BEE FLORA COMMISSION - PLENARY SESSION

21

Pollinator declines in Europe: overview of patterns and causes

Koos Biesmeijer*

* Earth and Biosphere Institute, Biological Sciences, University of Leeds, LS2 9JT, Leeds, UK,
J.C.Biesmeijer@leeds.ac.uk

Most people in Europe are now of the opinion that bees are declining. This is, however, largely a result of media reports and only partly supported by scientific data. Pollinator decline potentially affects pollination services in wild and crop plants. Indeed, more than 75% of the world's major vegetable, fruit and seed crops (Klein et al. 2007) and a large share of the flowering plants depend on animals for their pollination, which suggests that pollinator loss may have considerable economic and ecological impact. It is now clear that in Britain and the Netherlands bees are declining and with them the wild plants they pollinate (Biesmeijer et al. 2006), but our understanding of the patterns in other parts of Europe and the causes of these changes remains in its infancy. To assess the status of European bees and get an idea of the major pressures threatening them, we compiled national-level data on bee status from national red lists and expert opinion to provide an indication of the level of threat to wild bee populations. Next, we asked experts in all countries to give their opinion on the most important threats to bees. Many people across Europe have provided data and expertise for this work, they cannot be mentioned above, but will be acknowledged in the presentation.

22

Assessing the impact of declining pollinators on world agriculture

Bernard Vaissière*

* INRA UMR406 Abeilles et Environnement, Site Agroparc, Avignon cedex 9, France,
bernard.vaissiere@avignon.inra.fr

The decline of pollinator populations, especially bees including honey bees, has now been clearly documented in several areas of the world. Yet the actual and the potential impact of this decline on crop production and farming economy is only starting to be assessed in quantitative terms. Based on a weight output, a third of our food supply is dependent on the pollination service provided by animals, mainly insects and particularly bees. To go beyond this first estimate is difficult for several reasons. First of all, many of the past and current methods used to assess the dependence of crop yield and quality on pollinator activity give heavily biased results so that valid measurements of this dependence remain actually unknown for the majority of crops grown in the world. Also the link between the density and diversity of pollinators, on one hand, and the pollination service they perform, on the other hand, remains poorly known so that the impact of pollinator decline remains very difficult to assess unless one takes their complete disappearance as a working hypothesis. Indeed, this is what we did to calculate the monetary value of the pollination service provided by insects to the world crop production used for human food and found that it amounted to 153 billion in 2005. This figure represented 9.5% of the value of the world agricultural production. Vegetables and fruits were the leading crop categories in value of insect pollination followed by edible oil crops, stimulants, nuts and spices. Also the greater the dependency of a crop category on pollinators, the higher its unit production value.

Scale hive network and satellites reveal shifts in Nectar Flows due to climate and land cover.

Wayne Esaias*, Robert Wolfe, Joanne Nightingale, Jaime Nickeson, Peter Ma

* NASA Goddard Space Flight Center, Greenbelt, Maryland USA, wayne.esaias@nasa.gov

Monitoring change of hive weight is used to define the local nectar flow phenology and provide linkage to satellite data for understanding how climate and forage changes are impacting pollinator-plant interactions. The phenology of the honey bee nectar flow (HBNF) in many parts of North America is changing drastically due to climate and land cover changes. In the Mid-Atlantic region, scale hive data show that the HBNF is now about 25 days earlier than in 1970, a shift comparable to the inter-annual variation. The significant trend is closely correlated with an increase of winter minimum temperatures, and the trend is equivalent to the advance in spring 'green-up' observed with satellite sensors. The high degree of correlation between HBNF metrics and satellite derived vegetation phenology in Maryland suggests that the advancing trend due to warming extends throughout the northern Atlantic portion of the US. In Louisiana, delays in HBNF of about 40 days are consistent with both land cover changes (forage provided by invasive plants) and satellite derived green-up. The numbers of volunteer observers has increased geometrically in the past three years, and continued growth is expected to provide the basis for studying climate impacts on nectar flow phenology on a continental scale using satellite observations and ecosystem climate models.

Pollination in high bush blueberries and strawberries – who is the best pollinator?

Otto Boecking*, Ulrike Kubersky

* Laves Bee Institute Celle, Herzogin-Eleonore-Allee 5, 29221 Celle, Germany, otto.boecking@laves.niedersachsen.de

The aim of the project was to find adequate pollinators (Apoidea) in berry production to optimize the crop yield and quality assurance. Two different approaches were used to meet practical challenges:

- 1.) the introduction of solitary bees, bumble bees and honey bees from managed stock into the berry orchard (= pollinator-management),
- 2.) fostering the local indigenous population of wild bees by optimizing their needs (food and habitats) near the orchard fields (= landscape-management).

The results of the investigations in both topics (pollinator- and landscape management) can be summarized as follows.

In general: there is no "best" pollinator available if one compares honey bees, with bumble bees and solitary bees. In strawberry and high bush blueberries cultures the direct pollination service is essential. Honey bees are most appropriate. Bumble bees and European Mason Bee are additional options. Measures to foster the local indigenous population of wild bees are also necessary. Only a combination of both approaches will help to overcome a reduced number of honey bee colonies available during the blooming of the crop. It will also help to equalize fluctuations of natural pollinator populations - all in all to assure the pollination needs. In order to foster the local indigenous population of wild bees, it is essential to provide blooming of different plants and providing nesting habitats during the whole active season of these bees. In the project the berry farmers were sensitized for the necessity and the fundamental function of bees and their pollination service. It was obvious that existing steps towards a better landscape-management are expandable in most farms. Together with these berry farmers concrete improvement opportunities were discussed.

The win-win ecology of honeybee introductions

David W. Roubik*, Rogel Villanueva

* Smithsonian Tropical Research Institute, 34002-, APO-AA, USA, roubikd@si.edu

Introduction of pollinators into communities occurs worldwide, yet their impact is poorly understood. Reports clearly identify competition, and native flower visitors are displaced or decline in some manner. Studies on population levels of native bees and their floral resources have been scant, but long-term studies in the American tropics found no honey bee impact on solitary or social bees. We studied Africanized honey bee colonization in the Yucatan Peninsula of Mexico, in a large, species-rich, Biosphere Reserve. Our data were gathered from replicated trap-nesting and pollen analysis of two native bees, and from pollen taxonomy applied to Africanized bees. Four hurricanes and two droughts had more negative influence on native bee populations than did honey bees. Moreover, native bees tended to increase, beginning little more than a decade after honey bee arrival. Pollen analysis showed native bees used 136 plant species, also used by the honey bees. Remarkably, *Megachile zaplana*, *Centris analis* and *A. mellifera* all favored *Pouteria* (*Sapotaceae*) which matures to flowering in 8 years. Although competition with the honey bee apparently displaced native bees from other major resources, *Anacardiaceae* and *Euphorbiaceae*, bees compensated by using other native species, mostly legumes, malpighs and also *Pouteria*. Their populations used the local flora differently, and we propose honey bees fed their competitors by increasing reproduction of some major resources. In species-rich habitats, species of related plant taxa and flowering periods may be substituted for resources lost to honey bees. Our data cannot address honey bee impact on rare bees, but fit data obtained in other studies and provide a mechanism-flexible foraging choices of native, tropical bees.

26

Honeybee (*Apis mellifera*), sentinel of environmental pollution: study in Western France

Olivier Lambert, Suzanne Bastian, Isabelle Guilberteau, Monique l'Hostis*, Hervé Pouliquen

* Centre Vétérinaire de la Faune Sauvage et des Ecosystèmes – Ecole Nationale Vétérinaire de Nantes – BP40706 – 44307 Nantes cedex 03, lhostis@vet-nantes.fr

Modification of landscapes and housing environments and regular ecosystem pollution have contributed to the environmental imbalance and the worrying decline of biodiversity. In this context of essential ecological preoccupation, our objective is to assess the quality of the environment in Western France, using a tool for biological monitoring to estimate the presence of pollutants and their potential effects on the environmental health. Honey bee (*Apis mellifera*), the keystone species in the functioning of the ecosystems, is chosen as sentinel. The main objective is to characterize the exposure of the bees to pollutants from the environment in their area of foraging in Pays de la Loire. To obtain an image representative of this exposure, several parameters will be recut: 1/ toxicological analysis (pesticides, lead and HAP) on bee, honey and pollen, 2/ palynological analysis of pollen and honey to know plants visited by bees, 3/ landscape analysis at each study site to characterize environmental plant, 4/ survey of farmers and breeders, private individuals, companies and municipalities on their agricultural and gardening practices to get a detailed picture of the pesticides use in each study site, 5/ audits of health and animal husbandry, and reports of sanitary problems among beekeepers partners. All sampling, analysis and surveys concern sixteen apiaries volunteers distributed in four different landscaped structures (city, hedgerows, arable crops, gardening/orchards) over two years (2008-2009). The ultimate goal is to know if, in a specific landscape (plant profile and profile of use of pesticides), the bees are exposed to one or more pollutants, if the risk to bees and not-target fauna exists and if this risk is high or not.

27

International Measures to Conserve and Sustainably Use Pollinators in Sustainable Agriculture

Barbara Gemmill-Herren*, Colette Linda

* C717, UNFAO, Viale delle Terme di Caracalla, Roma Italy, BARBARA.HERREN@FAO.ORG

In recognition of a potential pollination crisis, the international community has identified the importance of pollinators through the establishment of the International Pollinators Initiative (IPI) of the United Nations Convention on Biological Diversity, facilitated and coordinated by the Food and Agriculture Organization of the United Nations (FAO). A Plan of Action for the initiative has been developed and adopted by the Conference of Parties, to address

the multiple aims of the initiative, which are:

To promote coordinated action worldwide to monitor pollinator decline, its causes and its impact on pollination services; address the lack of taxonomic information on pollinators; assess the economic value of pollination and the economic impact of the decline of pollination services; and promote the conservation, restoration and sustainable use of pollinator diversity in agriculture and related ecosystems.

FAO has established a "Global Action on Pollination Services for Sustainable Agriculture" which provides global coordination, technical guidance, relevant tools and policy guidance to use and conserve pollination services that sustain agroecosystem functions. Tools and protocols recently developed through collaborations of FAO's Global Action on Pollination Services with partners around the world and their application to the aims of the IPI will be addressed in this presentation. They include:

- A framework for monitoring pollinator declines
- Key to bee families
- Tools and procedures to assessing the value of pollination services (on national and local levels)
- A protocol to detect and assess pollination deficits
- A pollination information management system for delivering up-to-date information on crop pollination to end-users.

28

Bee-pollinated orchids in a changing European environment

Bertrand Schatz*

* CEFE, UMR 5175 CNRS, 1919 route de Mende, 34293, Montpellier, France, bertrand.schatz@cefe.cnrs.fr

European orchids are all terrestrial, and most of them are entomogamous and nectarless. They display various strategies to attract different kinds of insects. Honeybee (*Apis mellifera*) is one of the most frequent pollinators of orchids. Countless detailed observations performed by several orchidologists throughout the different regions of France have contributed to define a "honeybee-pollination syndrome" for orchids based on the following features: rewarding nectar species, nectar present in the labellum or within short spur, relatively large flowers, and purple or white color flowered. Honeybees have been reported as regular pollinators for 15 orchid species and as occasional pollinators for 18 other orchid species among the 170 French orchid species. In the orchid family, pollen is all merged in pollinia, which glue onto the insect body during its visits. Hybridization may then occur if pollinia that were incidentally taken away by the insect from one orchid species is deposited on another one. A major specificity of orchids is that hybridization is not only possible between species within the same genus; it sometimes occurs between distinct genera. In the Mediterranean region, when transhumant hives are placed in 'blooming' sites, hybridization is attested among the neighboring orchids immediately after the very first explorations by the newly settled bee foragers. Higher recorded rates of hybridization among orchids were recorded within a 30 m distance to transhumant hives than in more remote distances (100 m and 200 m respectively). Accordingly, maintaining a fairly long distance between transhumant hive settlements and spots of high density of orchids would greatly contribute to the conservation of these remarkable plants.

BEE BIOLOGY COMMISSION - SYMPOSIUM N°1 "HONEYBEE BIOLOGY"

29

Pheromones and social regulation in the honeybee

Yves Le Conte*

* Ecologie des Invertébrés, UMR 406 INRA/UAPV, Laboratoire Biologie et Protection de l'abeille, 84914 Avignon Cedex 9, France, leconte@avignon.inra.fr

Chemical communication is most interesting in social insects as they use two types of pheromones, releaser or primer. When many releaser pheromones were discovered in the animal kingdom, only a few primer pheromones, modulating physiology of the recipient, have been identified, most of them in the honeybee *Apis mellifera*. Recent

studies on honeybee pheromones suggest that chemical communication is richer than we thought. To support this idea, I will present our findings on pheromones produced by the colony, particularly ethyl oleate (EO). EO had been shown to be produced by the brood and to be implicated in the recognition of the larvae by adult bees. It has also primer effects on workers, elevating hypopharyngeal gland protein level (Mohammedi et al., 1996). OE is secreted by the salivary glands of the larvae (Le Conte et al., 2006) and was found to be biosynthesized and released by foragers to inhibit the behavioural development of nurses (Leoncini et al., 2004). OE is also produced in important amounts by the queen (Keeling et al., 2001), and transmitted via the queen retinue pheromone as a passenger pheromone. Then, the same pheromonal compound is produced by three different actors of the colony and trigger both releaser and primer effects. Then, honey bee pheromone signals can be enhanced by complexity, synergy, and context in which they are deployed, mediated through both temporal and spatial distribution.

30

Dynamic of bees population: an example in south of France on lavender nectar flow.

Julien Vallon*, Pascal Jourdan, Nicolas Cerrutti

* France, j.vallon.adapi@free.fr

Lavender honey is characteristic of Provence but nectar flow is known to weak honey bees colony. This study focus on colonies evolution (weight, activity, population and brood) and environment (flowering level and nectar flow) after the distribution of mountain apiary to 2 Valensole plateau areas (04) during the lavender nectar flow in 2007. The weight increase is coherent with flowering, nectar flow characteristic and colonies activity between the two lavender areas but not with hive population. As soon as the colonies arrived on lavender, the activity increases and laying decreases in comparison with mountain activity. This phenomenon varies from the lavandin flowering and leads to a progressive population decrease during the whole nectar flow. Evolution of colonies depends on the observed apiary and depopulation results on weak replacement of bees in this study. Some vitality indexes were employed to characterize apiaries: laying quantity, and mortality per day, global survival rate or aged bees survival rate and average life (Bühlmann method adapted for capped brood). The comparison of these different rates from mountain and the two lavender areas gives us unknown reference until now. It's proved that colonies are sensitive to nectar flow conditions for adaptation with the environment and for surviving. We propose measurement as a whole leading to global vision of colonies dynamic in time. These really original results are consistent with the literature about bees.

31

Assessing the usefulness of Diagnostic Radioentomology for Population Dynamics studies of managed *Apis mellifera* colonies

Mark K Greco*

* Gartenstadtstrasse 21, 3098, Koeniz, Switzerland, mark.greco@alp.admin.ch

The Liebefeld Method is a well established system for determining population dynamics in managed *Apis mellifera* colonies. Beekeepers and researchers can achieve an accuracy of around 90% once properly calibrated. Interest in Diagnostic Radioentomology (DR), the use of x-ray computerised tomography for the non-invasive study of insects, is increasing. DR has been used for structural, temporal and behavioural experiments in social insects and for tracking physiological changes and developmental growth of individual insects and for assessing insect morphology in taxonomic studies. We investigated the potential for improving on the accuracy of The Liebefeld Method using DR as an alternative approach. Monthly, non-invasive, whole beehive measurements for population size and pollen-wax-honey volumes were performed using DR on ten managed colonies of *A. mellifera* over a twelve month period. During the experiment, DR results were compared with results from The Liebefeld Method and with physical quantifications. Preliminary results show that DR can be used non-invasively to accurately track individual bees within a colony over time and for whole of colony dynamics. DR can produce reliable, reproducible results for image data analysis, for determining hive structure dynamics without modifying bee behaviour and for accurate volume measurements of hive components during behavioural and analytical experimentation, such as The Liebefeld Method. Further development of DR is required to produce a comprehensive methodology for entomologists requiring non-invasive experimental techniques.

Estimating honeybee colony size using digital photography

Bram Cornelissen*, Tjeerd Blacquière, Sijf van der Steen

* Netherlands Bram.Cornelissen@wur.nl

Estimating honey bee colony size is an important tool for researchers and beekeepers alike. It provides information on colony strength and growth, giving insight into population dynamics. Several methods are used and although most are quite accurate, there is room for improvement. In 2008 and 2009 we investigated the use of digital photography and image analyses for the quantification of brood, bees and stored food in honey bee colonies. Frames were photographed and analyzed using imaging software. There are several advantages using these techniques. The results are reproducible and comparable as images are stored and colony disturbance is minimized since less time is spending working in a colony. The accuracy and efficiency of the method will be discussed.

Non-invasive monitoring of honeybee hive activity using Principal Component Analysis.

Martin Bencsik*, Joseph Bencsik, Mathias Millet, Michael Baxter

* UK, martin.bencsik@ntu.ac.uk

Since Karl von Frisch's major discoveries a lot of research has focused on investigating the mechanical vibrations resulting from honey bee activities. In this work we have logged the time course of the global vibration coming from a bee hive and have separated the superimposed independent vibrations. We are presently trying to demonstrate that our method provides the user with an instantaneous biometric 'signature' of the honey bee hive. Method: A vibration sensor was secured in the wall of two separate hives, and the output was digitised with a computer. A MATLAB® code was developed to calculate and store the averaged frequency spectra of the vibration data. These were then analysed using Principal Component Analysis (PCA). Any instantaneous spectrum can then be expressed as a linear combination of 'eigenspectra', the weighting factors of which provides the instantaneous signature of the hive. Results: In this preliminary work only thirty hours of continuous recording was analysed. Spectra must be averaged for at least six minutes to provide a stable analysis. Five to six meaningful eigenspectra only are needed. Spectral bandwidth of 2000 Hz is enough. Conclusions and future work: Using PCA, a new non-invasive way of monitoring honey-bee hive activity is demonstrated, that extracts a simple signature. A lengthy recording was launched in late October 2008, and is still being logged by the computer. We will show the results of our PCA analysis applied to this recording, which will hopefully include one or two swarming processes. Our work might have a fundamental beneficial impact on the monitoring and understanding of honey bee health and activity.

Temporal changes in morphogenetic variability of Africanized bees in Panama after 24 years of Africanization

Tiago Mauricio Franco, David W. Roubik, Dieter Wittmann, Lionel Segui Gonçalves*

* Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto – Universidade de São Paulo – Brazil, lsgoncal@usp.br

After the release of the *Apis mellifera scutellata* in Brazil in 1956 and its spread throughout of the Americas, the apiculture in the continent suffered enormous changes, since the Africanized honey bees established themselves as feral populations, replacing the previously introduced European races. The first swarms found in Panama were reported in 1982, less than 30 years after the escape of the original swarms. Panama was rapidly occupied for these bees. The present work aimed to compare the morphological and the mitochondrial DNA (mtDNA) patterns of the populations of Africanized bees from Panama collected in 1982 and in 2006. Ten natural swarms were used in each

of the samples and they had the maternal origin of their mtDNA identified and the patterns of wing venation were characterized by standard and geometric morphometrics. The first swarms captured showed hybridization signs, evidenced by standard morphometrics measures of the wings, which had an intermediate size between the European races and the Africanized bees and also for mtDNA patterns. Eight out of ten colonies presented mtDNA of African origin and the other two presented typical patterns of the C lineage. In the current population, we did not find patterns of European origin. The patterns of wing venation were closer to the living Africanized bees. Our data indicates that the current living population of Africanized bees in Panama presents a greater concentration of African genes when compared to the population from the beginning of the Africanization process in that country.

35

Morphometric discrimination of honey bee races and ecotypes in Turkey

Aykut Kence*, Rahsan I. Tunca, Sinem Yigiter, Meral Kence

* Middle East Technical University, Department of Biology, Ankara, Turkey, aykut@metu.edu.tr

There is a very rich genetic and phenotypic diversity in honey bees in Turkey. There are five subspecies that are known, and many ecotypes within those races. We wanted to discriminate the ecotypes found in Anatolia using traditional and geometric morphometrics. In traditional morphometry 17 wing traits have been measured and 19 landmarks have been used from the wings of 370 honey bees. Five subspecies and three ecotypes of *A. mellifera anatoliaca* found in Anatolia have been compared using both morphometric methods. Discrimination of subspecies and ecotypes were pretty well in both. Traditional morphometry contains both shape and size elements, whereas geometric morphometrics discriminates the groups on the basis of shape only. Positions of the three ecotypes that are plotted resulting from both methods are compared. In the traditional morphometrics, ecotypes and races of honey bees were separated to a large extent on the basis of size on the first axis of the canonical variate analysis whereas geometric morphometric analysis discriminated the three ecotypes and five races on the basis of shape which reflects to a large extent genetic difference among the groups.

36

Ethanol disruption of social communication in honeybee colony

Janko Bozic*, Charles I. Abramson

* Department of Biology, Biotechnical Faculty, University of Ljubljana, Ve na pot 111, 1000 Ljubljana, Slovenia, janko.bozic@bf.uni-lj.si

Different social anomalies are observed related to ethanol consumption in human society. Although complex responses in human society to ethanol have foundation in physiological changes, especially in central nervous system. Honeybees have a complex social behavior, which can be experimentally manipulated. Different behavioral responses can be related to the physiological changes and that brings honeybee as interesting ethanol model for the studies of ethanol effects on social behavior. Behavior studies of ethanol effects on honeybees started with analysis of instinctive response as well in learning experiments. In recent years focus has been changed toward social behavior. It has been observed that higher levels (e.g. 5% ethanol in sugar solution) disrupted social food exchange, but lower (1% ethanol in sugar solution) can also facilitate food exchange. Similar effects can be observed in laboratory as well in hive experiments. Ethanol switched foragers from waggle dance to the trembling dance inside of the hive. Recent research is focused to the effects of ethanol on potential recruits' behavior. We observe following behavior and orientation flights outside of the hive. We've got new arguments to discuss transformation of received dance information to actual departure flight in recruits. Behavioral research has been backed up by studies of ethanol in hemolymph and recently also by other physiological analysis related to central nerve activity and whole body response to ethanol.

Tissue and Subcellular Distribution of Carboxylesterase in *Apis cerana* and *Apis mellifera* (Hymenoptera: Apidae)

Qingyun Diao*, Qiuling Jiang, Tang Fang, Xiwu Gao

* Beijing Xiangshan, 100093, Beijing, Daidian District, China, dqyun1@126.com

The tissue and subcellular distribution of acetylcholinesterase (AChE) and carboxylesterase (CarE) were comparatively investigated in two honeybee species—*Apis cerana cerana* Fabricius and *Apis mellifera* L.. The studies revealed that the percentage of AChE specific activity in the head was 55% and 51% in *A. cerana* and *A. mellifera* respectively, significant higher than that in the thorax and abdomen. The specific activity of AChE in *A. mellifera* was higher than ones in *A. cerana*. The CarE in the abdomen had the highest specific activity, which ranked 92.1% and 92.6% in *A. cerana*, 94.6% and 59% in *A. mellifera* used α -NA and β -NA as substrates, respectively. When α -NA as substrate, the activities of CarE in the head and thorax in *A. cerana* were similar to ones in *A. mellifera*, but the activity in abdomen in *A. mellifera* was significant higher than that in *A. cerana*. While β -NA as substrate, CarE levels in the head of *A. cerana* was significant lower than that of *A. mellifera*. The activity in the abdomen of *A. cerana* was much higher than that in *A. mellifera* although the activity of CarE in the thorax was similar. The comparison of Michaelis constants (K_m) of CarE in different tissues between *A. cerana* and *A. mellifera* showed the difference of the affinity to substrate. In *A. cerana*, the affinity to α -NA in the head approximated to β -NA. The affinity to α -NA in the thorax and abdomen were much stronger than that to β -NA. In *A. mellifera*, the affinity to α -NA in head and thorax were much stronger than that to β -NA. The affinity of abdomen to α -NA were much stronger than that to β -NA. The results from the differential centrifugation indicated that the major portion of AChE with 35.21%-52.04% of total activity located in the mitochondrial fraction, whereas only 3.69%-6.64% of CarE the distributed in the mitochondrial fraction, and about 63.79%-75.06% in the part of cytosol fraction. Finally the forms of CarE and AChE existed in the cell of *A. mellifera* and *A. cerana* were discussed.

Expression Differences in the Caste Development of Honeybee Using Solexa Sequencing Method

Songkun Su*, Xiangqian Guo, Aung Si, Fang Liu, Shenglu Chen, Shaowu Zhan, Runsheng Chen

* College of Animal Sciences, Zhejiang University, 310029, Hangzhou, China, susongkun@zju.edu.cn

Honeybee is becoming well-known model organism because of its' complex social behaviors and dramatic caste differences. Queens and workers arise from fertilized diploid eggs and the dramatic distinctions between queens and workers were mainly caused by nutrition input and gene expression. Here we use the new sequencing method of Solexa to determine the expression profiles of queen and worker larvae. We got 2.86 and 2.34 million distinct tags from work and queen larvae library respectively. Combining the genes from worker and queen larvae library detected by Solexa sequencing and analysis, we got 6322 unambiguous sequence tags which stood for 6322 different honey bee genes. Then we took out the upstream 2kb and downstream 2kb sequences of these unique mapped tags to predict their gene coding potency by genscan and got 9258 gene candidates, including 3566 gene candidates greater than 300 nt in length. Analysis of GO revealed that these gene candidates have potential to code genes responding to post-embryonic development, reproductive development process and sexual reproduction. We got 1278 genes and 1451 genes which were up-expressed and down-expressed in worker larvae by calculating the $p < 0.05$ level. There were 935 genes and 1116 genes which were up-expressed and down-expressed in worker larvae by calculating $p < 0.01$ level. We mapped these genes into KEGG database and find that all the 1451 down-expressed and 1278 up-expressed genes were mapped into 173 metabolism pathways and 168 metabolism pathways, respectively. Among these pathways, there were 28 pathways affected by up expression genes in queen larvae and 33 pathways related to down expression genes in queen larvae. The other 140 pathways were affected by both up expression and down expression genes in queen larvae.

A scientific note on a cDNA fragment of vitellogenin gene from *Bombus hypocrita*

Jilian Li*, Wenjun Peng, Jie Wu, Jiandong An, Jiaxing Huang, Shudong Luo

* Beijing xiangshan Beigou No.1, 100093, Beijing, China, bumblebeelj@126.com

Vitellogenin is generally considered as a female-specific protein, which is generally synthesized by the fat body. The cDNA fragment of *Bombus hypocrita* vitellogenin was cloned and sequenced in this paper. BLAST analysis of the cDNA fragment, 3110 nucleotides long, showed 92% homology at the nucleotide level with *Bombus ignitus* vitellogenin cDNA (GenBank accession number: FJ606797). The alignment with 19 insect vitellogenins shows a high number of conserved motifs; for example, close to the C-terminus there is a GL/ICG motif followed by nine cysteines, as occurs in all hymenopteran species, and, as in other insect vitellogenins, a DGXR motif is located 18 residues upstream the GL/ICG motif. Phylogenetic analysis of vitellogenin sequences available in insects gave a tree that is congruent with the currently accepted insect phylogenetic schemes. Further research on the structural analysis of a complete cDNA and expression studies should be conducted. Special attention should be directed to assess the developmental and sex specialty of vitellogenin expression or other biological events in *Bombus hypocrita*.

BEEKEEPING TECHNOLOGY AND QUALITY COMMISSION SYMPOSIUM N°1 "BEE PRODUCTS AND ANALYSIS"

Differentiation of Chilean endemic honeys in based of botanical origin and biological properties

Gloria Montenegro*

* Facultad de Agronomía e Ingeniería Forestal - Pontificia Universidad Católica de Chile
Avda. Vicuña Mackenna 4860, Macul - Santiago de Chile. gmonten@uc.cl

Chile has a very rich native flora that allows producing honeys with very special and different properties. All the characteristics are inherited from specific floral sources. Several compounds from metabolic pathways of melliferous plants are involved in those kinds of properties and biological activities. Among the main species from which Chilean honeys are produced it is possible to name *Calceolaria paniculata*; *Eucryphia cordifolia*; *Weinmannia trichosperma*; *Quillaja saponaria*; *Gevuina avellana*; *Retanilla trinervia*; *Aristotelia chilensis*; *Escallonia pulverulenta* and *Escallonia rubra*. Phenolic Extract from *E. cordifolia* honey has shown important antibacterial activity. Phenolic extract from *Q. saponaria* has shown significant antioxidant property. Forty endemic Chilean honeys were studied in order to determine the botanical origin and potential antibacterial and antioxidant properties. Also, certain compounds were isolated from honey ethanolic extracts and identified for discovering new molecules. The botanical origin of these honeys was determined by pollen melisopalinological analysis. Antibacterial activity of honeys and extracts was performed by microdilution of trypticase/soy broth technique (37° x 24 h) against *Pseudomonas aeruginosa* ATCC 2785; *Escherichia coli* ATCC 25922; *Staphylococcus aureus* ATCC 25923; *Salmonella typhi* STH 2370; *Enterobacter aerogenes*; *Streptococcus pneumoniae*. Chemical analyses of phenolic extracted compounds were made by HPLC-DAD. Antioxidant and antiradical activities were determined by FRAP and DPPH assays, respectively. All honeys showed different profiles depending on the botanical origin. Results are discussed from differentiation criteria after biological and chemical assays and compared with honeys from other regions of the world.

Analysis of French royal jelly for quality and authenticity controls

Gaëlle Daniele*, Hervé Casablanca

* Service Central d'Analyse CNRS – Echangeur de Solaize – Chemin du canal – 69360 Solaize – France, g.daniele@sca.cnrs.fr

The aim of our study is to characterize French Royal Jelly (RJ) in order to define a standard composition and evaluate the quality of commercial products. 200 RJs produced recently in France were analyzed. Due to the important heterogeneity of the materials depending on the environment of the hives, the climate, the soil etc, the samples were collected in different French regions during the course of the harvesting season representing various geographical and botanical origins. All the samples analyzed for creating our data base were provided by beekeepers belonging to the GPGR (Groupement des Producteurs de Gelée Royale), a French cooperative that respect a quality charter concerning the production, the sampling procedures and the storage of the RJ. We have developed and validated analytical methods to quantify various parameters: water, protein, 10-HDA, amino acid, sugar contents. Moreover stable isotope ratios ($^{13}\text{C}/^{12}\text{C}$ and $^{15}\text{N}/^{14}\text{N}$) were measured in RJ samples by isotope ratio mass spectrometry. In comparison, 35 commercially available RJ samples, as representative materials produced and traded worldwide, were analyzed by the same methods. In addition, some feeding experiments with artificial sugars were conducted by some apiarists in order to evaluate the impact of sugar feeding on the composition of RJ. This study has allowed to establish ranges of natural variation of different composition parameters in French RJ and to define criteria for genuine ones. Some parameters are essential to distinguish RJ produced in France from abroad RJ and/or from intensive feeding as it is shown on the representation of all the samples by PCA (Principal Component Analysis).

Advances in classification and differentiation of Colombian honeys by using an electronic nose and a physical-chemical analysis

Carlos Zuluaga-Domínguez*, Consuelo Díaz-Moreno, Carlos Fuenmayor-Bobadilla, Ariel Cadena-Sanchez

* Carrera 7 59A20 Apartamento 1201, Bogota, Colombia, cmzuluagad@unal.edu.co

The volatile and non-volatile fractions of fifty nine samples of Colombian honeys of the specie *Apis mellifera* from four different geographical and botanical origins (Cundinamarca, Magdalena, Santander and Boyacá) were analyzed with an electronic nose and by means of physical-chemical assays commonly associated with honey quality. The electronic nose, equipped with 10 Metal Oxide Semiconductor Field Effect Transistors (MOSFET) sensors was used to generate a pattern of the volatile compounds present in the honey samples; pH, free and total acidity, humidity, minerals, sugars, hydroxymethylfurfural, specific rotation, electrical conductivity and insoluble solids were assessed. Aroma profile analysis by electronic nose is a well-known technique of food characterization in industrialized countries but in Latin America is recently coming into force. The sensors responses and the results obtained from the physical-chemical analysis were evaluated by Principal Component Analysis (PCA). The results showed that it is possible to differentiate and classify honeys by this method, suggesting that the electronic nose is a useful tool for the characterization and quality control of honey when its responses are correlated with physical-chemical data. These results will allow the obtaining of an Origin Denomination label for honeys from these regions.

Pesticide-analysis in honey by means of LC-MS/MS and GC-MS/MS – Investigation of the most appropriate technique

Melanie Vogel*, Reinhard Michel

* Olof-Palme-Str. 8, 28719, Bremen, Germany, yvonne.gamradt@intertek.com

Trace-analysis of pesticide residues in honey is challenging due to its difficult matrix containing high levels of sugars. Legal regulations provide the benchmarks for residues in honey. For example, the European Regulation (EC) 396/2005 for pesticides in food defines a default maximum residue level (MRL) of 0.01 mg/kg in case of active substances for which no specific MRL is listed for honey and for active substance which are not listed at all, respectively. Liquid and gas chromatography coupled with triple quadrupole mass spectrometry (LC-MS/MS and GC-MS/MS) were compared as separation and detection techniques during the method development for the determination of pesticide residues in honey using the QuEChERS-method for sample preparation. The aim of the study was to investigate which is the most appropriate technique for certain pesticides. In this presentation we will give a comparison of the results obtained with both techniques and point out recommendations for the accurate and sensitive analysis of relevant pesticide residues in honey.

44

Prediction of some physicochemical measurands of honey using FT-IR ATR

Ligia Bicudo de Almeida-Muradian*, Werner Luginbühl, Peter Gallmann, René Badertscher

* Faculdade de Ciências Farmacêuticas da USP, Av. Prof. Lineu Prestes 580, bloco 14, 05508-900, São Paulo, SP, Brazil ligiabic@gmail.com

Fourier Transform Infrared spectroscopy with an attenuated total reflection accessory (FT-IR ATR) was used to predict 16 measurements in honey. 416 different honey samples obtained from the Swiss National Honey Quality Program of the years 2006 and 2007 were analyzed by classical physicochemical methods and FT-IR ATR. Partial least squares regression (PLS) was used to develop the calibration models for the measurements studied (electrical conductivity, erlose, free acidity, fructose, fructose/glucose ratio, glucose, glucose/moisture ratio, HMF, isomaltose, melezitose, moisture, pH, sum of fructose + glucose, total nitrogen, trehalose and turanose) They were validated using independent samples and proved satisfying accuracies for the determination of electrical conductivity, melezitose, and moisture. Poor predictive quality was found for erlose, fructose, HMF, isomaltose, total nitrogen, trehalose, and turanose while the calibrations for the remaining measurements can be applied for rough screening purposes. The results showed that mid-infrared spectrometry can be used as a screening method for the routine analysis of some quality characteristics of honey with the advantages of being rapid and non-destructive.

45

Geographical origin of Slovenian multifloral and forest honey

Urška Kropf*, Jasna Bertoncelj, Mojca Jamnik, Marijan Ne_emer, Nives Ogrinc, Terezija Golob

* Jamnikarjeva 101, SI-100, Ljubljana, Slovenia, urska.kropf@bf.uni-lj.si

Data on elemental and isotopic content as well as physico-chemical parameters together with chemometrics were applied for classification of 43 samples of multifloral honey and 40 samples of forest honey according to their geographical origin i.e. Slovenian regions. Slovenia is divided into four natural-geographic macroregions and to nine submacroregions. Elemental contents were determined with a total reflection X-ray fluorescence spectroscopy (TXRF). Isotopic parameters, such as $\delta^{13}\text{C}$ value in honey and $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values in protein fraction isolated from honey, were determined with an isotopic ratio mass spectroscopy (IRMS). Along this, physico-chemical parameters: content of water, ash, free and total acids, lactones, praline and protein and also electrical conductivity, pH value, specific rotation and colour (L^* , a^* , b^*) were determined. Various statistical methods were used to examine differences among honey samples of the same honey type but from different geographical regions. The ANOVA pointed out some statistically significant differences, Kruskal-Wallis test showed even more differences, since it is less sensible. Multivariate tests showed different results. No differences among regions were detected with the principle component analysis (PCA) and the hierarchical classification with dendrograms. On the other hand, with the linear discriminant analysis (LDA) differences among regions were found for both honey types. It was concluded that analysed parameters are applicable for characterization of the honey type from certain region. The research proved that it would be possible to determine and verify geographical origin of multifloral and forest honey from Slovenia by use of elemental and isotopic composition of honey in combination with chemometrics.

Classification of Indian unifloral honey on the basis of physio-chemical characteristics and mineral composition by Pattern recognition methods

Vikas Nanda*, Dr Bahadur singh, Dr. A.S.Bawa, V.K.Kukreja

* Deptt. of Food Engg. and Tech. 148106 Longowal India, vik164@yahoo.co.in

The characterization of four types of honeys from different fruit plant sources viz., *Litche chinensis* (litchi), *Citrus sinensis* (sweet orange), *Ziziphus mauritiana* (ber), *Prunus persica* (peach) honeys (Acacia, Multifloral, Honeydew) was carried out on the basis of their quality parameters (moisture, pH, free acidity, reducing sugars, sucrose, fructose glucose ratio, ash content, proline content, invertase activity, diastase activity, hydroxymethylfurfural (HMF) content) and mineral content (sodium, potassium, iron, calcium, zinc, and copper). Pattern recognition methods such as principal component analysis (PCA) and linear discriminate analysis (LDA) were performed to classify honeys according to their type on the basis of physicochemical parameters and mineral content. The variables with higher discrimination power according to multivariate statistical procedure were proline, potassium and free acidity.

A Glucosidase Activity in Propolis

Fu-Liang Hu*, Cui-Ping Zhang, Huo-Qing Zheng

* 268 Kaixuan Rd. 310029 Hangzhou China, flhu@zju.edu.cn

The presence of α -glucosidase was shown in new propolis. A method is described for the rapid and simple assay of α -glucosidase activity in propolis. It involves colorimetric estimation of p-nitrophenol released by α -glucosidase activity. A number of parameters affecting α -glucosidase activity were evaluated, the optimal conditions were using 30 mM p-nitrophenyl- α -D-glucoside (α -PNPG) as substrate, pH 6.0 phosphate-citrate buffer and temperature 57°C, over 0.5 h. Results of tests performed on fresh propolis were obviously higher than those obtained in old propolis. That may be indicated that the enzyme activity may be an indicator for the freshness of propolis. The class of α -Glucosidase from the propolis was determined, it was capable of hydrolysing p-nitrophenyl- α -D-mono-glycosides but lacked activity towards the p-nitrophenyl- α -D-diglycosides, and other α -linked disaccharides.

Gas chromatography with mass detector technique (GC-MS) used for detection of beeswax adulteration with paraffin

Ewa Was*, Helena Rybak-Chmielewska, Teresa Szczęsna

* Kazimierska 2 24-100 PUŁAWY Poland, ewa.was@man.pulawy.pl

The aim of the study was to use the GS-MS technique for detection of beeswax adulteration with paraffin. The experiment material was composed of samples of: natural beeswax, commercial paraffin (product most frequently used to adulterate beeswax), hydrocarbon-adulterated beeswax and samples of marketed comb foundation. Hydrocarbon assays were made on a Shimadzu gas chromatograph with mass detector (Gas Chromatograph Mass Spectrometer, GC-MS-QP 2010 Plus). Based on the electron spectra of the NIST 05 library a homologous series of saturated hydrocarbons with unbranched carbon chains occurring in natural beeswax was identified (from C₁₉H₄₀ to C₃₅H₇₂). Some unsaturated hydrocarbons with a single double bond (C₂₃H₄₆, C₂₅H₅₀, C₂₇H₅₄, C₂₉H₅₈, C₃₁H₆₂, C₃₃H₆₆, C₃₅H₇₀) and some unsaturated hydrocarbons with two double bonds (C₃₁H₆₀, C₃₃H₆₄, C₃₅H₆₈) occurring in natural beeswax were also identified. Hydrocarbons with an odd number of carbon atoms in the molecule occur in much greater amounts than do hydrocarbons with an even number of carbon atoms. In

49

50

59

BEEKEEPING TECHNOLOGY AND QUALITY COMMISSION PLENARY SESSION

51

The important points of a good beekeeping practice guide

Etienne Bruneau*

* Place Croix du Sud, 4, 1348, Louvain-la-Neuve, Belgique, qualite@cari.be

Belgium just accept a good beekeeping practice guide for honey, pollen and royal jelly. This guide allows for the specificities of small and medium sized beekeepers. It highlights the importance of contamination risk related to activity in the apiary (treatment feed, locations...) compared to the honey processing risks (honey house...). It takes into account the specificity of honey (product with low- bacteriological risk) to limit the constraints to allow for small beekeepers to continue their activity without imposing significant investment. Based on this approach and with some adjustments (taking into account specificity of professional beekeeping), we are studying the possibilities of using this guide for other countries or at European level.

52

Integrated Beekeeping Development Project in Indonesia

Bambang Soekartiko*

* Jl Pertanian III/84 Pasar Minggu 12520 Jakarta Indonesia, bambangsoekartiko@yahoo.com

Indonesia is a tropical country located between Asia and Australia. The tropical forest has about 1,200,000 ha and the population is 243 millions. There are two types of beekeeping in Indonesia. First, honey hunting with *Apis dorsata*, second is beekeeping with *Apis cerana* and *Apis mellifera*. Honey production is about 4,000 tons/year, 70% comes from *Apis dorsata*, 25% from *Apis mellifera* and 5% from *Apis cerana*. The nectar resource to produce honey in Indonesia is very big but the most problem is scares of pollen for development of bee colonies all the year round. The project consider sorghum as the pollen source for bees, because of some reasons: sorghum is fast growing, the flower is good resource of pollen for bees, seeds for food, feed for cattle and bio ethanol, stalk for bio ethanol, waste and leaf for cattle feeding. Sorghum can be planted as intercropping with forest and estate plantation, so it doesn't need a special land to plant sorghum. With this project Indonesia will solve partly the crisis of energy with the development of bio ethanol and bio diesel industries, the crisis of food because the flour of sorghum can be used as food industry, the crisis of milk and meat because sorghum can provide a huge stuff for cattle feeds, and the crisis of health because bee products will maintain health and cure the sickness of people of Indonesia. This project will stop the destruction of Indonesian forest by illegal loggers, forest fire and illegal agriculture practices because the people will get more crops and incomes by this Integrated Farming System. This project will support the Reforestation program in Indonesia and can contribute to reduce the global warming of our planet.

53

Geographical Information System applied to modern apiary industry

Fabrice Lartigou*

* Hôtel d'entreprise NTIC, 1 rue Fleming 63 019 La Rochelle, France, fabrice_lartigou@2d3d-gis.com

Geographical Information Systems (GIS) associate all the IT applications, the methods and organizations which raise human activities on the earth surface. Since the first aerial imagery in black and white taken from airships up

to the last satellite images in colours capable of revealing the slightest details of an agricultural plot of land, the IT revolution of the end of the XX century and the more and more precise topographic survey upset modern mapping and the geographical localization of the themes which surround us (town and country planning, transport, environment). The GIS approach for the apiary industry seems indispensable to the beekeepers and the scientists combined in the problem of the decline of the bee livestock. Indeed, at the moment, we miss reliable statistics putting in correlation the mortality of bee's colonies, ground survey, climate conditions and technical routes of the apiaries companies. An approach and visibility of the multi-factors of the apiary industries' problems would largely be facilitated.

54

A valuable tool for new product development: consumer acceptance of creamed honey

Asli Elif Sunay*, Dilek Boyacioglu, Günay Akdoğan

* Cekmekoy Cavusbasi Cad. no:70 ümranyye 34782 Istanbul Turkey, asli@balparmak.com.tr

Creamed honey is a new product for Turkish consumers. The current research focused on developing an attractive creamed honey product by optimizing the mixing step. 1800 kg of pasteurized citrus honey obtained from Western Mediterranean region in Turkey was added 200 kg of starter produced from the same honey and was mixed for 20 min at 12 rpm in industrial scale mixer where the temperature was controlled at 14°C. The honey batch was remixed for 100 min at 12 rpm after 2nd and 6th hour of incubation. Exactly 1/3 of the batch was divided into 32 g and packed in jars. The rest of the batch was subjected to mixing again for 160 min and 200 min at 12 rpm following 6h of incubation intervals. Each subsample set was divided into two groups, of which one was kept 14°C for 3 days and the other for 4 days. Therefore, a total of 6 treatments were designed in pairs (corresponding to a total of 15 pairs) and equal number of combinations (AB or BA, etc.) were prepared and presented at random among subjects. After providing a brief information about new product, a total of 540 untrained panelists assessed their preference of liking for one sample pair using 2-Alternative Forced-Choice test. In addition, the panelists were asked to assess their purchase intents of sample pair using a 5-point scale. Friedman test of rank sums of each batch (chi-square values) revealed that the samples mixed for 160 min and kept for 3 days were liked over other treatments ($p < 0.05$). On the other hand, univariate ANOVA of purchase intent of consumers showed no differences between treatments ($p > 0.05$). These findings were utilized to choose the optimum mixing parameters for the production of creamed honey.

55

New biosecurity strategies for migratory beekeepers

Jonathan Arundel*

* The University of Melbourne, Department of Geomatics, Parkville, Australia, j.arundel@pgrad.unimelb.edu.au

In many countries the practice of migratory beekeeping creates significant biosecurity challenges. Movement dramatically increases the geographical extent of a disease or incursion. Furthermore, as the movement is not random but instead correlated to particular flowering events, this increases the likelihood of contact between infected and uninfected hives. Interactions between migratory colonies and comparatively stationary managed or feral colonies also influence the pattern of spread. In responding to an incident, biosecurity strategies typically seek to restrict all movement within a nominal zone of infection. The effectiveness of such a strategy is highly dependent on other factors including adequate sampling and surveillance programs. A movement lockdown may also be costly to implement and have significant economic impacts. The aim of this research is to identify alternative general control strategies designed specifically for a mixed migratory and stationary population of honeybee colonies. These strategies will be tested against conventional strategies using computer simulation models. Geographic Information Systems (GIS) provide the capability to create models that incorporate the physical and environmental characteristics of different areas. Each alternative strategy needs to demonstrate improved performance across a wide range of possible scenarios. This is particularly significant for Australia where irregular flowering of the main honey producing species necessitates different patterns of hive movements from year to year. The target application of the model will be controls for the spread of *Varroa destructor* in Australia.

m2m beehive monitoring platform

David Atauri*

* Lepanto 176 28200 san lorenzo escorial spain, david.atauri@uem.es

A beehive monitoring system based on the analysis of the sound produced by the swarm is presented. A m2m platform has been built by a mesh of sensors to collect data which is sent to a web server where can be viewed and analyzed. Sensors obtain indicators such as the sound intensity as well as its frequency spectrum. Many patterns and tendency lines has been found in the sound. Some of them has been related to important behaviours such as swarm growth, nectar intake, queen replacement and swarming; while some other patterns are pending to be associated to particular behaviours. The system is currently running and daily activity of hives is being stored in a database. We discuss how this kind of technology should help the study of current and future diseases such as CCD, global warming and environment surveillance as well as the creation of management tools for beekeepers

The effects of the shook swarm technique on honey bee (*Apis mellifera* L.) colony productivity and honey quality

Ahmet Güler*

* University of Ondokuzmayis, Faculty of Agriculture, Department of Animal Science. 55139 Kurupelit, Samsun, Turkey, aguler@omu.edu.tr

The productivity of honey bee colonies and the quality of hive products may be greatly influenced by colony management. In beekeeping, shaking of the worker bees together with the queen into a clean empty hive is known as the shook swarm technique. In this study, the shook swarm technique was compared to standard beekeeping methods in relation to colony productivity and honey quality, including adult worker bee population, wax production, comb area, brood area and honey yield. In addition, the honey was examined to determine the content of water, proline, hydroxymethylfurfural, glucose, fructose, sucrose, diastase, electrical conductivity, invert sugar, fructose/glucose ratio, maltose, vitamin C and potassium. The naphthalene and pesticide contents were also measured. Shook swarm group colonies were smaller than those of the control group in terms of worker bee population, brood area and honey yield ($P < 0.01$), were similar in built comb area ($P > 0.05$) and greater in terms of wax production ($P < 0.01$). Ninety five per cent of the comb needed by the colonies was built within 45 – 50 days, at an average cost of 19 – 20 kg of honey. Control colonies used an average of 79g of wax to build comb on each frame of foundation, compared to 183g in the shaken colonies. Honey production to comply with pure blossom and organic standards may be possible using the shook swarm technique, but the productivity level is 55 – 60% lower than with standard beekeeping methods.

Advanced beekeeping techniques for higher honey productions

Spyros Skareas*

* M.Sc. Entomology Attiki Beekeeping SA 18, Arkadias Str, Athens, Greece, s.skareas@attiki-pittas.gr

Most beekeepers use simple techniques to develop their colonies until the nectar flow and harvest. Such techniques are usually based on the beekeepers' experience and are summed up in the basic 3 manipulations: stimulating spring feeding, adding foundation and combs, and adding supers. For professional beekeepers, much effort,

money (in terms of fuel and bee feeding) and time are wasted each year in finding the optimal site with the best honey flow, to establish each moving beeyard. In this presentation we will analyze some more advanced, yet easy-to-follow methods that aim to bring colonies to maximum strength and subsequently maximum honey production. All of them benefit the advantage of colonies uniting, in such way that the strength of the formed hive is higher than having the hives unaltered. We will analyze step by step, the route of each hive through a full beekeeping year, from overwintering to maximum growth and honey harvest. In order to follow the suggested beekeeping handlings more efficiently, basic knowledge of nuclei making, colonies uniting, and application of moving boards are required. It is the beekeepers choice to decide whether to stay with the traditional methods or involve some more effective ones. The overall goal is to fully understand that it is better to have less and stronger hives, than numerous weaker ones.

59

E-ruche

Laurence Josserand, Cyril Novales, Jean-Pierre Martin*

* 63 avenue DeLattre de Tassigny 18000 Bourges France, jmartin@bourges.univ-orleans.fr

For 15 years occurred a massive worldwide disappearance of bees, due to different environmental and human factors: the «Colony Collapse Disorder» (CCD) affects thousands of beehives and had a strong impact on the environment. Indeed, 65% of production of fruits and vegetables and 35% of cereals are directly linked to bee pollination. Recognizing the importance of the phenomenon and its implications in our society, the National Union of Beekeepers of France leads the project «Bee, Sentinel of the Environment» to aware public and to unite different scientific works. In this context, since 2 years, the Department of Physics Measurement of IUT of Bourges has conducted researches on instrumentation of hives to perform a daily online monitoring of various environmental bees factors. With this "E-Beehive" project, we design a practical system for automatic real-time measures in a beehive, with data transfer via Internet. The parameters measured are the meteorological data, the mass of the beehive, its thermal mapping, the humidity, the ratio of carbon dioxide, and the evolution of its population during the day. The data collected are available in real time via the Internet and are stored in dedicated databases for each beehive. This remote monitoring has the advantages of having a daily monitoring of vital parameters, and allows a reliable traceability. Moreover, with the beehive network, we will have a vision of the CCD phenomenon locally, regionally, nationally and internationally. We present in this paper, the progress of the project and the short and medium term.

BEE BIOLOGY COMMISSION SYMPOSIUM N°2 "PERCEPTION, LEARNING AND COGNITION IN HONEYBEES"

60

Taking time to see the 'roses', speed accuracy tradeoffs for difficult tasks in honeybees and bumblebees

Adrian Dyer*, T.L. Smith

* Department of Physiology, Monash University, VIC 3800, Australia, Adrian.Dyer@med.monash.edu.au

The ability to make fine visual discriminations is a task that honeybees and bumblebees only learn following extended experience with both target and distractor stimuli. For fine colour discrimination tasks there is a trade-off between individual bees where some bees are accurate but sacrifice more time to solve a difficult task, whilst other bees are fast and inaccurate. Interestingly, bumblebees are capable of modulating decision making time to slow down to maintain accuracy as a visual task becomes more difficult. Here we report that there are significant differences between the capacity of honeybees and bumblebees to modulate their response times to solve tasks, and we discuss the likely ecological circumstances that may have led the bees to evolve different cognitive strategies for difficult problem solving.

Honeybee search strategies in flight

Juliet Osborne*, Alan Smith, Andy Reynolds

* Rothamsted Research, Harpenden, Herts, AL5 2JQ, United Kingdom, juliet.osborne@bbsrc.ac.uk

The availability of food resources changes over time and space, and foraging animals are constantly faced with choices about how to respond when a resource becomes depleted. We hypothesise that flying insects like bees discover new food sources using an optimal Lévy flight searching strategy, responding to odour cues over distances of many metres as well as visual cues. To study these searching patterns, foraging honeybees were trained to a scented feeder which was then removed. Two new unrewarding feeders, or "targets", were then positioned upwind and downwind of the original location of the training feeder. The subsequent flight patterns of the bees were recorded over several hundred metres using harmonic radar. We show that the flight patterns constitute an optimal Lévy flight searching strategy for the location of the training feeder; a strategy that is also optimal for the location of alternative food sources when patchily distributed. Scented targets that were positioned upwind of the original training feeder were investigated most with the number of investigations declining with increasing distance from the original feeder. Scented targets in downwind locations were rarely investigated and unscented targets were largely ignored, despite having the same visual appearance as the rewarding training feeder.

Studying visual cognitive abilities of the honeybee by using free-flying bees: example of spatial relational rules learning

Aurore Avargues-Weber*, M Giurfa

* Research Center for Animal Cognition, University Paul Sabatier, CNRS UMR 5169, Toulouse, France, avargues@cict.fr

Despite its relative simple and small nervous system, the honeybee possesses developed learning capacities allowing the recognition of exploited flowers and of the nesting site. Besides simple associations between specific stimuli and their outcome, the honeybee can solve complex tasks that were considered so far as the cognitive prerogative of some vertebrates such as primates, dolphins or pigeons. For instance, bees categorize visual stimuli (Giurfa et al. *Nature* 1996; Zhang et al. *J exp Biol* 2004; Stach et al. *Nature* 2004) and learn sameness relationships in a delayed-matching-to-sample protocol (Giurfa et al. *Nature* 2001). The latter constitutes a unique example of rule learning in an invertebrate. Here we further studied the capacity of free-flying bees to solve a rule-based problem. In particular, we asked whether bees can be trained to learn a spatial relationship rule between two unconnected visual stimuli. We analyzed whether bees learn two different rules related to the spatial position of objects in space: 1) 'verticality' vs. 'horizontality' (Problem 1), and 2) 'above' vs. 'below' (Problem 2). Rule learning implies, in both cases, choosing the appropriate relationship independently of the stimuli used. Free-flying bees were trained to collect sucrose solution in a Y-maze where each of the two back walls presented two distinct, spatially separated visual targets. In Problem 1, one back wall of the maze displayed stimuli aligned vertically; the other back wall displayed them aligned horizontally. For one group of bees 'verticality' was rewarded while 'horizontality' led to no reward. For another group, the contingencies were inverted. During training, stimuli changed constantly while preserving the appropriate relationship. They were also moved up- and downwards ('horizontality') and left- and rightwards ('verticality') to force bees to focus on the spatial rule irrespective of the position occupied by the stimuli in the visual field. After training, bees were presented with novel stimuli to determine whether they could transfer the rule to the novel situation. In Problem 2, two vertically aligned patterns were presented; in one back wall one was above the other, while in the opposite wall the relationship was inverted. One group was rewarded on the upper pattern ('above' group) which remained rewarded during training if presented above. The other group was rewarded on the same pattern but only if presented below ('below' group). After training, we subjected bees to a transfer test in which they faced a novel situation. In this test bees faced the rewarded stimulus above (or below) a novel one. .../...

63

Queen mandibular pheromone influences honeybee perception and learning

Alison Mercer*, HJ McQuillan, V Vergoz, LH Geddes, KT Beggs

* Department of Zoology, University of Otago, Dunedin New Zealand, New Zealand,
alison.mercer@stonebow.otago.ac.nz

Among its many functions, queen mandibular pheromone (QMP) entices young worker bees to feed and groom the queen. Retinue behaviour is important for queen survival and may be enhanced by QMP's ability to block aversive learning in young worker bees. We have shown that QMP's effects on aversive learning are mediated by homovanillyl alcohol (HVA), an aromatic compound that interferes with dopamine signalling in the brain. Our recent studies suggest in addition, that QMP alters worker bee perceptions of this pheromone. Implications for queen survival and division of labour within the honey bee colony will be discussed.

64

Modulation of learning by a social signal in an insect brain: a new role for allatostatin, a neuropeptide acting through an opioid-like pathway

Elodie Urlacher*, JM Devaud, B Francés and M Giurfa

* Research Center for Animal Cognition, University Paul Sabatier, CNRS UMR 5169, Toulouse, France,
elodie.urlacher@cict.fr

Cognitive processes can be modulated by many factors, including social signals from conspecifics. In social insects, pheromones are such signals that contribute to organize the life of the colony by modulating the behaviour and physiology of individuals. Using the honeybee as a model organism to study the neural bases of learning, we show that olfactory learning is modulated by a particular social experience, exposure to the sting alarm pheromone. After exposure to this signal (released by other bees to signal life-threatening situations), bees perform less well in a pavlovian conditioning assay, compared to unexposed bees. The same results can be obtained after exposure to the main component of the pheromone, isopentyl acetate (IPA). Thus, exposure to IPA may trigger some neuromodulator(s) that modify the function of the brain centers known to be involved in this learning task. Pharmacological treatments combined with the exposure to IPA prior to conditioning show that an agonist (fentanyl) and an antagonist (naloxone) of mammalian opioid receptors can mimic or reverse, respectively, the modulation of learning. This suggests the existence of an opioid-like pathway, never clearly demonstrated in Invertebrates. We searched the honeybee genome for possible homologues of mammalian opioid receptors and found one. It is most likely a receptor for the neuropeptide allatostatin. Allatostatin is mostly known for its hormonal control of some crucial steps of development. Thus, we tested if it could also act on adults and found that it modulated learning similarly to IPA exposure. Thus, our results suggest a new role of this neurohormone, that of a neuromodulator acting on the brain circuits underlying appetitive learning, through the activation of the putative receptor we have identified. Taken together, our results and those of some previous studies provide evidence for the existence of an Insect signaling pathway sharing several features with the opioid pathway of Mammals.

65

Cellular physiology of honeybee olfactory learning

Bernd Grünewald*

* Institut für Bienenkunde, Polytechnische Gesellschaft Frankfurt am Main, Goethe-Universität Frankfurt am Main, Germany, b.gruenewald@bio.uni-frankfurt.de

Odors are important for foraging honeybees, *Apis mellifera*. They learn to associate an olfactory stimulus, e. g. a flower scent with a reward, e. g., the nectar flow. This learning requires that the bee detects the temporal coincidence of the conditioned (CS, odor) and unconditioned stimulus (US, reward). The mushroom bodies (mb) in the brain are important for olfactory learning and memory and mb intrinsic Kenyon cells are candidates for cellular coincidence detectors. In the bee brain they receive CS information from projection neurons from the antennal lobe and reward (US) information from octopaminergic VUM neurons. We have shown that the mb are required for complex learning tasks and for memory retrieval. Now, we investigate mechanisms of how Kenyon cells detect the coincident activation of cholinergic and octopaminergic pathways using a combination of physiological and behavioral experiments. We used honeybee Kenyon cells as a cellular substrate of learning-dependent plasticity. They receive cholinergic synaptic inputs from odor-processing neurons. Kenyon cells express nicotinic acetylcholine receptors (nAChR). Their activation induces membrane depolarization and Ca^{2+} influx in Kenyon cells. Kenyon cells also express octopamine receptors which are coupled to the cAMP/PKA pathway and in addition induce an intracellular Ca^{2+} signal. Octopamine applications modulate the nAChR currents. We propose a working hypothesis of the cellular interaction of nAChR and octopamine receptors to produce learning-dependent plasticity in identified Kenyon cells. At the same time, our experiments open the field to study the actions of insecticides on the behavioral and molecular level.

66

Modification of olfactory learning and memory induced by RNA interference targeting $\alpha 7$ nicotinic acetylcholine subunit in the honeybee

Thierry Louis, A Ahier, V Raymond-Delpech, M Gauthier*

* CRCA UMR 5169 Université Paul Sabatier 118 route de Narbonne 31062 Toulouse France, gauthier@cict.fr

Acetylcholine is the major excitatory neurotransmitter in the central nervous system of insects and targets the numerous nicotinic acetylcholine receptors (nAChRs). The recent honeybee genome sequencing has described 11 α and non- α nicotinic subunits, but the molecular composition of the nAChRs remains unknown, in honeybees as in other invertebrates. Many studies have already demonstrated the involvement of nAChRs in olfactory learning and memory using nicotinic antagonists injection into the honeybee brain (Gauthier et al., 2006). Two nAChR subtypes have been described: α -Bungarotoxin (α -Bgt)-sensitive nAChRs necessary for long-term memory and α -Bgt-insensitive nAChRs needed for retrieval processes. In vertebrate, it is well known that α -Bgt-sensitive nAChRs are homomeric and made of $\alpha 7$ subunits that are phylogenetically conserved. The role of $\alpha 7$ nicotinic subunits was studied in the honeybee learning using siRNA to block $\alpha 7$ subunit expression. Quantitative PCR analysis revealed that siRNA reduced $\alpha 7$ expression from 3 h to 18 h after injection. Honeybees injected with siRNA 18 h before multiple-trial olfactory conditioning had poor learning and memory performance compared to controls. siRNA injected 18 h before the 24 h-retrieval test had no effect on performance, excluding an effect on retrieval processes. This result also indicates that olfactory perception was not depending on the presence of $\alpha 7$ subunit. In conclusion, deletion of $\alpha 7$ nicotinic subunit specifically impairs olfactory conditioning leading to low performances during retrieval test. As a consequence, nicotinic acetylcholine receptors including $\alpha 7$ subunit seem to be necessary for olfactory learning but not for retrieval processes. Participat

67

Neuronal representations of olfactory and visual associative learning in the honeybee (*Apis mellifera*)

Ina Klinke*, R Menzel

* für Neurobiologie, Freie Universität Berlin, Germany, Ina.Klinke@gmx.de

The mushroom body (MB) is a central neuropil structure in the protocerebrum of the honeybee brain and plays a crucial role in sensory integration and memory formation. In order to elucidate the role of MB extrinsic neurons in olfactory and visual associative learning and memory formation, we perform extracellular long-term recordings of

single neurons in the output region of the MB for up to 3 days, while the bee performs a classical conditioning task on each day. The extrinsic neurons from which we record, the Protocerebral Tract (PCT) neurons, have recurrent connections from the output to the main input region of the MB. We ask, whether single PCT neurons are responsive to either or both sensory modalities, olfactory and /or visual, and whether they change their spiking patterns to one or both modalities in the course of learning. First, we presented a set of odors and colors before training to get the baseline neuronal activity of the neurons. Then we pretrained the bee differentially with two colors, one rewarded, the other not rewarded. Afterwards, the same colors were simultaneously presented with two different odors (compound training). Again, one set of pairs was rewarded, the other is not rewarded. Thirty minutes after training, all odors and colors, were tested separately and pairwise. Responses were defined as a rate increase or decrease during stimulation. A rate change is considered to be statistically significant if it deviated by more than two standard deviations from spontaneous activity. We could separate the recorded neurons in two groups based on their physiology. One group responded before training to odors and / or colors, the other group did not respond without training to odors and colors. If the PCT neurons responded to odors and colors before training, they typically reduced their firing rate to these stimuli 30 minutes after training, and specifically increased their firing rate to the rewarded stimuli 48 hours after training. There might thus be a short and mid term memory trace for up to 24 h for all stimuli, and a long term memory trace that establishes 48 hours specifically for the rewarded stimuli. .../...

68

Glomerular plasticity associated with olfactory long-term memory in the honeybee antennal lobe

Benoît Hourcade*, E Perisse, JM Devaud, JC Sandoz

* Research Center for Animal Cognition, University Paul Sabatier, CNRS UMR 5169, Toulouse, France, hourcade@cict.fr

The storage of stable memories is generally considered to rely on changes in the functional properties and/or the synaptic connectivity of neural networks. However these changes are not easily tractable given the complexity of most brain circuits. Such a search can be narrowed by studying memories of specific stimuli in a given sensory modality, and by working on networks with a modular and relatively simple organization. We have therefore focused on associative memories of individual odors and the possible related changes in the honeybee primary olfactory center, the antennal lobe. As this brain structure is organized, like its vertebrate counterpart, the olfactory bulb, in well-identified morpho-functional units (the glomeruli), we looked for evidence of structural and functional plasticity in these units in relation with the bees' ability to store long-term memories of specific odors. Bees were trained to form an odor-specific long-term memory in an appetitive Pavlovian conditioning protocol. The stability and specificity of this memory was tested behaviorally three days after conditioning. At that time, we performed both a structural and a functional analysis on a subset of 17 identified glomeruli: We thus measured i) glomerular volume under confocal microscopy, and ii) odor-induced activity, using *in vivo* calcium imaging. Identical measurements were done in control animals unable to form such a stable memory of the odors. This experiment was carried out with two different learned odors, to relate possible changes to the glomeruli coding these odors in the antennal lobe. We show that long-term olfactory memory for a given odor is associated with volume increases in a subset of glomeruli. However, we did not find any functional change in odor-evoked responses of these glomeruli. This lack of correlation between structural and functional plasticity, as well as the fact that structural changes are not especially localized in glomeruli activated during conditioning, suggests a particular class of synapses (involving local interneurons) as putative substrates for plasticity in the glomerular network during long-term memory formation.

69

The honeybee as a model for the plasticity of aging

Ricarda Scheiner*

* Technische Universität Berlin, Institut für Ökologie, Franklinstr. 28/29, D-10587 Berlin, Germany
Ricarda.Scheiner-Pietsch@TU-Berlin.de

Honey bee aging is tightly linked to division of labour. Young bees work in the centre of the hive, older bees work in the periphery. The oldest bees in a colony are foragers, which leave the hive to collect pollen or nectar. Division

of labour is highly plastic in a honey bee colony. 1) Even individuals of the same chronological age display division of labour, for example in single-cohort colonies. These colonies only consist of same-aged bees. 2) Foragers can be reverted to nursing behavior by simple manipulations of the hive structure. 3) Nurse bees can be induced to forage precociously. These advantages of the honey bee system allow us to study various aspects of aging in this organism. We show that in some life stages, higher age correlates with better learning performance, whereas in other life stages, age per se has no influence on learning performance but social role has. These changes in learning performance correlate with changes in brain structure and gustatory responsiveness. Honey bees also show a great diversity of life span. Whereas summer bees only become approximately 6 weeks old, winter bees live up to 8 month. We show that the associative learning performance of these groups with different life spans is very similar, although expression of amine receptors changes significantly with age. These results support the role of the honey bee as a new model for the biology and plasticity of aging.

70

How can robots learn from honeybees?

Karl Crailsheim*, R Thenius and T Schmickl

* Austria karl.crailsheim@uni-graz.at

Honeybees are social insects with a sophisticated communication system. Their efficiency in exploiting food sources and in regulating their workforce are prominent features of an intelligent swarm (colony). Even without extensive communication - just by exploiting local cues - they show also other impressive abilities. E.g., their allocation of certain temperature zones inside the colony is achieved collectively by 'swarm intelligence'. Young bees find warm areas, which are necessary for their proper development, better in groups than individually (Szopek et al. and Hahshold et al., posters at this conference). Such biological findings can be useful sources of inspiration in technical applications, such as robotic swarms, where communication has to be limited and sensors are often poor. Therefore, we have investigated such strategies of bees and transferred those algorithms to robot swarms. Our algorithm enables robots to find light spots and to aggregate there to perform special tasks. A common task is often autonomous goal finding, where the robot swarm has to find targets, e.g., light spots. In our robotic swarm algorithm, the robots move and turn randomly. After they encounter a collision with another robot, they measure local luminance and rest nearby the other robot. The higher the local luminance, the longer they wait. This leads to preferred aggregation at the brightest spot in the environment, also when several suboptimal light spots are available in parallel. The robustness of this strategy was demonstrated by robotic experiments in which the robots were able to alter their swarm-decision after the environment showed significant fluctuations. In simulation experiments we were able to show that our algorithm can be performed by several swarms in parallel, even if these swarms pursue different goals.

APITHERAPY COMMISSION - SYMPOSIUM N°1 "RESEARCH"

71

Bee venom stimulates the regeneration of rats skin nerve after its alteration by crushing

Vasily N. Krylov*

* The Nizhny Novgorod state university N. I. Lobachevsky, Russia kfg@bio.unn.ru

At present is an actual question on the treatment of peripheral nerves after traumas, under which the wholeness of nervous stem is saved (sprain, squeeze, bruise). In given work, in experiments on rats researched efficiency of bee venom for recovering the functions of conductivity of nerve after its crushing. Material and Methods. Skin nerve of rats was crushed by the surgical styptic aught at a rate of average part of hips on the area by the length 2mm. On 10-e day after operations from skin nerve of the rats of checking group were recorded caused potentials (CP). Irritate electrodes were located on 20 mm proximately the place of trauma, conducting electrodes - on 10 mm

distally). The velocity of conduction and amplitude of CP were determined on neurograms. Experienced group of rats within 7 days following traumas daily entered dissolve bee venom (0,5 mg/kg, 0,5 ml, intraperitoneal). Results and Discussion. According to tin data, the velocity of conduction of the CP on 10 day after the trauma in the checking group was 30-35 % from the level of velocity of conduction on the nerve of intact rats, but amplitude - 17-20 % from this level. Unlike checking, velocity of conduction of the CP in altered skin rate nerve after entering of bee poison decreased less significant and formed 90-92 % from the level of intact rats. The reliable differences in the values of amplitude of the CD in checking and experience are not discovered. It is known the velocity of the conduction of CP is defined by the degree of the nervous mielinization, thus it is possible to make the conclusion that using of bee venom had stimulated the fiber mielinization of the traumatizing nerve.

72

Experimental study on the anti-inflammatory and immune effect of different soluble fractions from bee collected rap pollen and GC-MS analysis

Liping Sun*, Xu X., Liao L., Liu K.

* Bee Research Institute, Chinese Academy of Agricultural Sciences, Beijing 100093, China, caasun@126.com

objective: to study the anti-inflammatory and immune effects of BCRP and its different soluble fraction. Method: The method of xylene-induced ear swelling and the delayed-type hypersensitivity (DTH) reactions reduced by DNCB in mice was used to determine the anti-inflammatory and immune effects of different soluble fractions of BCRP. Results: Compared with the positive control, the chloroform soluble fraction and the water soluble fraction showed not only the anti-inflammatory effect but also inhibited-immediate effect in experiments. Moreover, there were significant difference between both two soluble fractions and the model group $p < 0.01$. The content of dibutyl phthalate in the chloroform soluble fraction was 17.45%. Conclusion: the chloroform soluble fraction and the water soluble fraction from BCRP produced obvious anti-inflammatory and inhibited-immune effects. Acyl phthalate derivatives in the chloroform soluble fraction may be the active components for its anti-inflammatory activity.

73

Probiotic effect of Lactic Acid Bacteria from fresh bee pollen

Patrice Percie du Sert*, Offant P.

* La Grabère 47450 St Hilaire de Lusignan France, patperciusedusert@gmail.com

In 1966 Pain and Maugenet discovered that bees collecting pollen leave the hive with nectar in their honey stomachs that contains Lactic Acid Bacteria (LAB). On their return, the pellets of pollen contain the same number of LAB as the nectar that was in their honey stomachs when they set out. The bees inoculate the pollen with the bacteria as they harvest it. Olofsson T.C. and Vasquez A. (2008) have identified the LAB in the honey stomachs of foraging bees.

Our presentation aims to demonstrate that these LAB inhibit the growth in vitro of potentially pathogenic bacteria in the human intestinal flora such as salmonella and *Proteus vulgaris*. This effect was compared to several commercial probiotics and the results show that due to these LAB fresh or frozen pollen has probiotic effects which suggest possible benefits for human health and well-being. An animal experiment has confirmed this hypothesis.

Royal jelly proteins as a new class of physiologically active proteins

Katarina Bilikova*, Jozef Simuth, Hans Lehrach

* Dubravska cesta 21 SK-845 Bratislava Slovakia, katarina.bilikova@savba.sk

Royal jelly (RJ) proteins are one of the determining therapeutic effectors of honey and royal jelly. We have found that honey and bee pollen contain RJ proteins with dominance of apalbumin1 - the major protein of RJ. The recent discovery that RJ proteins may have physiological functions as suppressors of allergic reactions, their anti-hypertensive and proliferation stimulatory properties confirmed scientifically the justness of applications of honeybee products in apitherapy. We have found that apalbumin1 and apalbumin2 stimulate production of TNF- α cytokine in mouse macrophages. This immunostimulatory effect is significantly increased even after a limited proteolytic digestion and the N-terminal region of apalbumin1 molecule markedly elicits release of TNF. Moreover, the data from our ongoing experiments show that the stimulatory effect of honey with regard to the production of cytokines is based on its RJ protein content, primarily on apalbumin1. We have purified a novel minority protein from RJ, named as apalbumin2a, differ from maternal apalbumin2 in M_r (48,6 kDa), N-terminal amino acids sequences, N-linked glycans and for first time it was found that apalbumin2a inhibit growth of *Paenibacillus larvae*, the primary honeybee pathogen of American foulbrood disease (Biliková et al. Proteomics, in press). The obtained data call attention to functional plasticity of RJ proteins with potential impact on apidological research, as well as in the field of drugs development, namely therapeutic application of RJ proteins.

Effect of honey and its major royal jelly protein 1 in activation of human epidermal keratinocytes

Juraj Majtan*, Pawan Kumar, Tomas Majtan, Andrew F. Walls, Jaroslav Klaudiny

* Institute of Zoology, Slovak Academy of Sciences, Dubravska cesta 9, 845 06 Bratislava, Slovakia

Juraj.Majtan@savba.sk

Honey has been used since ancient times as a remedy in wound healing. It is considered that the high viscosity, acidic pH and hydrogen peroxide present in honey, as well as its high osmolarity and nutrient content, promote wound healing. However, even though the results from randomized clinical trials document that honey accelerates wound healing, no study dealing with its influence on human skin cells (epidermal keratinocytes and dermal fibroblast) has been performed. However, further mechanisms of action associated with the effects of honey in wound healing remain enigmatic. We demonstrate that keratinocytes, which are known to be involved in wound healing, are responsible for elevated production of mediators including cytokines (TNF- α , IL-1 and TGF- β) and matrix metalloproteinase 9 (MMP-9) after incubation with 1 % (w/v) acacia honey. Real time PCR was performed for the quantification of mRNA level of selected cytokines and MMP-9. Furthermore, we show that the increased level of MMP-9 in the epidermis following incubation with honey leads to degradation of type IV collagen in the basement membrane. One of the potential candidates, which may take part in wound healing, is the dominant immunomodulatory honeybee protein, major royal jelly protein 1 (MRJP1), occurring in honey. During the purification of honeybee MRJP1 from royal jelly, several columns were employed to obtain protein at high purity. We reveal that it has not statistical significant stimulatory effects on the induction of cytokine mRNA (excluding TNF- α) and MMP-9 in keratinocytes but an upward trend in mRNA expression was observed. These data indisputably demonstrate that honey activates keratinocytes and support the findings that honey may accelerate wound healing process.

76

Lyme Borreliosis and Apitherapy

Eberhardt Bengsch*

* Germany

Lyme Borreliosis transmitted by ticks and other haematophagic vectors is a problematic and complex disease, which generally becomes systemic, finally infecting all organs of the host. The infectious agents are pleomorphic microorganisms (spirochaetae, cystes, spheroblasts, granula) which escape from immune control and often from the antibiotic treatment. Coinfections are frequent: *Babesia*, *Ehrlichia*, *Bartonella*, *Mycoplasma*, *Coxiella*. The disease affects also apiary people through their intensive contact with the insects. In this case it is not evident to distinguish bee stings from tick bites. Nevertheless, apiary people are partially protected by mellitin of bee stings. Generally the pathologies develop distinctly from one to the other patients, going from spontaneous remission to lethal issue. Successful treatment of Lyme borreliosis is possible by cooperation of allopathic medicine, by using specific antibiotics and by apitherapy, which increases the immunologic state and decreases adverse side effects of intensive antibiotic treatments.

77

Effect of chrysin detected in honey on melanoma cells

Elena Pichichero, Rosella Ciccone, Antonella Canini*

* Italy canini@uniroma2.it

Chrysin is a secondary metabolite of the class of flavones. This molecule is characteristic of melliferous plants and so on is present in high levels in honey and propolis. We test the anti-proliferation efficacy of chrysin by MTT assay and Trypan blue exclusion test, melanoma cells were treated with various concentration of chrysin (10 – 150 μ M) at different exposure times. The results show that there is reduction in metabolic activity and cell growth of treated cells compared to controls, the reduction is time and dose dependent in both cell lines. After 72 hs of incubation the cell number of 10, 50 and 150 μ M chrysin-treated cultures decrease approximately 50%, 70% and 90% respectively in both the cell lines. After 48 hs of exposure B16 cells cultured with chrysin alters their morphology into the shape of neural-type cells. This morphological change is assumed as an induction of cellular differentiation by chrysin. Cell cycle progression was determined by propidium iodide incorporation in permeabilized cells and flowcytometry analysis. The results show an accumulation of cells in G_1 phase compared to control, and a significant increase in the number of cells in Sub- G_0 phase, which manifests itself in a time and dose dependent manner respect to control. To understand if the increased number of cells in Sub- G_0 was linked with the activation of apoptotic pathway we decide to investigate the state of activation of p38, ERK, caspase-3 and the cellular distribution of Bax in cells treated with chrysin for 24 hs. In presence of chrysin there is an activation of p38 kinase, and a reduction in the phospho-ERK signal. We observed an increase 10 times higher in caspase-3 activity after 24 h exposure in melanoma cells exposed to 50 μ M chrysin. After treatment we observed a redistribution of Bax from cytosol to mitochondria in the treated cell respect to control, but chrysin did not alter the expression level of Bax in total fraction. We can assume that chrysin is able to reduce cellular proliferation through the induction of the apoptotic pathway, and also to promote cellular differentiation in B16-F1 cell.

78

Analysis of flavonoid from bee propolis which sources in Indonesia as anti-plasmodium medicine

James S Hutagalung*

* Puri Airlangga Blok O 17 Sidoarjo 062 Sidoarjo Indonesia, james_hctv@yahoo.com

Malaria is including of infection disease which still become a problem in a medical world.. Its spreading to the whole world from tropical climate, sub tropical climate to cold climate area. Malaria is caused by Protozoa parasitic

from Plasmodium genus which infected by female Anopheles mosquito. The resistance of *P. falciparum* among the cloroquin, in the first time informed to the public in the end of 1950 in South America and Southeast Asia. After that time, the parasite which resistance to go on with fast and wide, almost spreading in the whole world. The natural ingredients is as the recently sources of anti malaria medicine which potentially to extend further and can be explored continuously. Bee propolis as the honey bees product is as mixed complex ingredients between bee wax, a little sugar and plant-sap which collected by honey bees. The propolis shape it looks like a resin substantial which come from plant-sap branch or from a trunk of tree or a trunk of a plant which collected and using by bees. In a result of Mahardika research, et al., (2002) it also informed if total addition of flavanoid, propolis may worked as a positive modulation and its function as immunomodulator to pursue a development *P. berghei*. As immunomodulator propolis can improve humoral dan seluler cell passing stimulus thymus glands, T cell and B cell, propolis memacu macrophages cell to destroyed parasite which that process happen with killing parasites merozoid cell. So this research will showed that propolis can use for medicine of malaria disease. Test its acted using with culture *P. falciparum* FCR-3 which already synchronized with sorbitol 5%. Inside to 24 micro plat which already filled with 100 μ L test substances in every grade doses, and added 100 μ L *P. falciparum* FCR-3 with parasitemia 2%, hematokrit 3%. Test is acted with two times replication. In vitro test acted using with two methods. Micro radioactive acted with incubation the microplate 24 in 48 hours inside the candle jar. Added 0,25 μ Chi 3H-Hipoxantin in volume 50 μ L inside the candle jar. Incubation continued in 18 hours. .../...

79

Novel Bioactive Prenylated Phenolics from Kangaroo Island Propolis

Colin C Duke*, Duke R., Tran V., Abu-Melial A., Koolaji N.

* Australia colind@pharm.usyd.edu.au

Introduction: A major aim of this study is to determine the chemical constituents contributing to the biological properties of Australian propolis, and identify biologically active components that may be used to define medicinal propolis products of consistent quality. A further aim of the research is to identify the flora from which the propolis is produced to enable a reliable source to be established for propolis effective for complementary medicinal topical use to treat and/or prevent damage to skin by sunlight. **Methods:** About 30 propolis samples from Kangaroo Island, South Australia, have been analysed to pinpoint the localities yielding the 'best' medicinal propolis. In vitro cytotoxicity and other biological activities were tested against a bank of human cell lines to identify key substances to be used as chemical markers for Kangaroo Island propolis of high medicinal quality. **Results:** From propolis collected by honeybees on Kangaroo Island, South Australia, we have isolated and characterized several pure key compounds within the two novel classes of biologically active constituents found in the propolis. This propolis contains a rather unusual high content (~70%) of prenylated hydroxystilbenes and smaller content (3%) of a prenylated methyl coumarate derivatives. The prenylated hydroxystilbenes were identified as mainly O-prenyl and C-prenyl tetrahydroxystilbenes, which have core structures similar to resveratrol. Resveratrol is a known naturally occurring trihydroxystilbene found in various foods, including mulberries, peanuts, grapes and the red wines and has a reputation as an active principle of the "French paradox medicine".

80

Comparative efficacy of apiphytotherapy towards chemotherapy in chicken eimeriosis

Adrian Siceanu*

* Ficusului 42, sector 1 Bucharest Romania, beeswoborders@yahoo.com

Prophylactic and therapeutic effects of an apiphytotherapeutic product based on propolis alcoholic solution and grapes seed extract in a specific patented formula comparatively with synthesis products based on robenidine active substance in chicken eimeriosis (polyspecific infestation) were tested. The products were prophylactic administered, starting with 5 days before the experimental infection and therapeutic -after clinical signs starting. The

study was carried out using 420 broilers 10 days old, divided in 6 groups (2 prophylactic, 2 therapeutically and 2 control groups – positive and negative control). The growth rate in the prevented groups (487.9-489.1 g = individual average rate) was superior to the treated groups, in which the products were administered after the clinical signs starting (409.7-475.0 g) and especially compared with the positive control group – infected and untreated (331.6 g – individual average). The food conversion rate was also favourable for prevented batches compared with the treated ones and the positive control. The level of *Eimeria* spp. oocysts shedding in faeces for prevented groups (28170-51100 EPG) was lower than in treated groups (38700-114000 EPG) and positive control (312430 EPG). The lowest level of infected groups had been registered in the group treated with robenidine (28170 EPG – in prophylactic administration and 38700 EPG – for curative administration). The average of faeces and the lesions scores were also favourable to the prevented groups. Our data showed clearly that the apiphytoterapeutic product had better results especially in the prophylactic administration in chicken eimeriosis and it could be an unconventional method in the parasite control program of the disease.

81

Propolis increases the total antioxidant activity (TAA) of human saliva in vitro and in vivo

Sonia Miranda*, Vit, P., Rodriguez-Malaver A.

*Venezuela anrod@ula.ve

Propolis has been used in the dental practice, however, it is not clear its effect on the antioxidant status of human saliva. Therefore, the aim of this study was to determine the effect of *Apis mellifera* propolis on the TAA of human saliva. Human saliva was incubated for 10 min at 37°C in the presence of 95% ethanol, propolis extract dilutions, and propolis extract (20%). After the incubation, the salivary TAA was assayed by the ABTS method. It was found that propolis extract increased the salivary TAA. When a drop (25 µL) of propolis extract was put directly on the tongue and saliva sample was collected during 3 min and the salivary TAA was determined, it was found that propolis also increased salivary TAA in vivo. In conclusion, propolis could be used to improve the antioxidant status of oral environment.

82

Plant origin and anti-bacterial activity of Taiwanese green propolis

Yue-Wen Chen*, Show-Ru Yeh, James Kwei An, Chia-Nan Chen

* 1 Sec. 1, Shen-Lung Road 260 I-Lan I-Lan chenyw@niu.edu.tw

Propolis is a resinous material that collected and processed by honey bees. Wide spectrum biological functions of propolis are varied with different composition, seasons, and plant origin of propolis. Taiwanese green propolis (TW IV I) exists potent bioactivities, though the plant origin is unclear. In this present study, surface substance from fruits of *Macaranga tanarius* was extracted with methanol. After analysis, the HPLC profiles of the extracts of *M. tanarius* were correspondence with the TW IV I propolis and demonstrated that plant origin of Taiwanese green propolis is the sticky material from fruit of *M. tanarius*. Propolin C, D, F, and G are the most important compounds of TW IV I propolis, survey for the antibacterial activities of the propolins against 6 Gram-positive strains and 2 Gram-negative strains, efficacy of extracts of surface substance from fruits of *M. tanarius* and synergy of the propolins were tested. It was effective for four propolins against Gram-positive strains. Propolin C was especially the most effective, the MIC and MBC were only 2.5 mg/mL and 5.0 mg/mL respectively against *P. larvae*. While the antibacterial efficacy of the propolins against Gram-negative strains were weaker (MIC→640 mg/mL). The similar activities were found in *M. tanarius* extracts and it showed better efficacy than propolis extracts. In addition, propolin 2C+D mixture showed the most synergistic effect with minimum bacteriostatic and bactericidal concentrations were respectively 0.3125 mg/mL and 0.625mg/mL. Efficacy of the mixture could be up to 8 times stronger than propolin C, but it also showed no efficiency against Gram-negative bacteria. It demonstrated that propolins isolated from Taiwanese propolis possess an excellent antibacterial activity and mainly against Gram-positive strains.

Evaluate honey effects on Immune system in animal model

Saleh Saleh Nezhad*, H. Kermanshahi

* Number 192, Emam Reza Str. corner of Mehr Drugstore, Shahde Golha Co. corner of Mehr Drugstore, Shahde Golha Co. 0098 Mashhad Iran, salehhoney@hotmail.com

This study was conducted to elucidate the influence of Iranian poly floral honey in drinking water on Immune system of Broiler chickens. Different species of *Astragallus*, Thyme and Thistle were the most abundant floral origins of the honey sample. In a completely randomized design with 6 treatments and 4 replicates, 240 male broiler chicks were divided into 24 groups, 10 chicks each. 6 water treatments were given to day-old chickens for 3 days as follow: 1) water only (control); 2) water + 5% honey; 3) water + 10% honey; 4) water + 5% sucrose; 5) water + 10% sucrose; 6) water + 1% AD3E. All groups were fed a practical corn-soybean meal based diet. Feed and water were supplied adlibitum. During the experiment, chickens were not fed any antibiotics or coccidiostats. To indicate the differences affect of honey on 4 Avian antigens (IBV, Newcastle, IBD, Influenza) used ELISA and HA test. Our results indicate that the differences among treatments in ELISA and HA test were not significant ($p > 0.05$). Under the conditions of this study, it was conducted that addition of honey during early ages of the chickens may improve Immune System, possibly decrease the need of other veterinary medicines and can use as feed ingredients. More research is needed to evaluate effects of honey as Phytobiotic on broiler chickens.

Preliminary study of active fractions and chemical compositions in bee collected rape pollen for liver protection

Liping Sun*, Lie Liao, Kueying Liu, Wenjun Peng

* Bee Research Institute, Chinese Academy of Agricultural Sciences, Beijing 100093, China, caasun@126.com

Object: To select active fractions in bee collected rape pollen on protecting liver. Methods: Alcoholism-caused animal hepatic injury models were used in this experiment. One month consecutive liquor stomach-filling of rats were done, then pharmacodynamics of different extracts of BCRP were studied. The active fractions in bee collected rape pollen on protecting liver were selected by the protective effect of different groups on liver injury due to alcohol. The contents of total polyphenols were determined by colorimetry. Results: Compared with that in the control group, the level of serum TG was significantly increased, the content of GST were significantly decreased because of alcohol in the model group. The structure of liver of model group rat disappeared, and hepatic cell showed obvious hydropic and fatty change, focus necrosis, and lymphocyte and lymphomonocyte infiltrated. Serum biochemical index measurement data and pathologic results of the contrast of liver slices proved that the n-butanol soluble extract of BCRP could significantly increase the levels of GST ($P < 0.01$) and GSH ($P < 0.01$) in the blood serum, and decrease the levels of TG ($P < 0.01$) in the blood serum. The liver damage in groups of n-butanol soluble extract showed significant extenuation, and the structure of liver tissue cleared and had no obvious pathological change. The content of total polyphenol from the n-butanol soluble extract was higher than other different extracts. Conclusion: The n-butanol soluble extract had protective effects on the alcoholic liver injury in rat. It was the active fraction for protecting the liver. It had the highest content of total polyphenol in all kinds of extracts. It showed that polyphenol compounds may be the effective compounds for protecting liver, but the effective monomer in n-butanol soluble extract did not as certain and remained to be proved in the further experiment

Advances in Scientific Research and Application of Propolis in China

Lihong Chen*, Zhang Fuxing

* Xiangshan 100093 Beijing China, clhb@hotmail.com

Propolis has become one of the most important honeybee products of the ten years in China. The production and consumption of propolis is also one of the fastest growing honeybee products with demand far outstripping supply. With increasing consumption of propolis products, propolis research has also seen significant expansion in China. We present here an overview of different methods of producing, collecting, extracting and analysis of Chinese propolis, along with contemporary research on the functions of propolis, such as anti-bacterium, anti-inflammatory, anti-oxidation, anti-tumor and cell toxin, softening blood vessels, improving blood microcirculation, enhancing immunity, anaesthetization and promoting tissue regeneration. The past decade has witnessed a tremendous boom in the use of propolis in health care products and folk medicine for treating diabetes, cardiovascular diseases, neurodegenerative diseases, and some cancers in China. It is also widely applied in animal husbandry, plant protection, food industry. The new Chinese Pharmacopoeia has included propolis in its descriptions of Apitherapy medical applications. The Safety and Standardization Production Bases of Propolis of ASAC. The propolis market and a variety of propolis products in China are also introduced in this paper.

BEEKEEPING ECONOMY COMMISSION - PLENARY SESSION

International honey market challenges and opportunities

Ronald Phipps*

* USA, pphipps@cpnaglobal.com

I will discuss:

- 1) Status of the international honey market at the conclusion of the major honey crops in the Northern Hemisphere;
- 2) Consequences to the honey market of a) the vulnerability of bees to various diseases and disorders, b) the global economic crisis, and c) global warming;
- 3) The need for the honey industry to follow the lead of other industries marketing agricultural products and establish realistic, reasonable international residue tolerance levels and reproducible testing parameters that allow the industry to both protect bees and the health of consumers;
- 4) The opportunity for more creative marketing of honey, including using honey's health benefits as a marketing tool.

Recruitment in the Nordic Countries and the Norwegian Recruitment Project.

Eli Åsen*

* Dyrskuevegen 20 2040 Kløfta Norway, eli.aasen@norbi.no

The last few years there has been a decline in the numbers of beekeepers in Denmark, Finland, Sweden and Norway. This is a trend that we also see in other organisations and especially in the agricultural sector. The decline

in members affects the beekeepers organizations negatively. Fewer members mean lower income for the organization, reducing the work they are able to do. Fewer members also mean that the organizations influence with the authorities decreases. The Nordic countries have different strategies when it comes to recruitment. In all the countries it has been said that the honey-price is too low, and that this has some influence on the recruitment. In Finland there has been little focus on recruitment because of the low honey-price. Instead there has been focus on increasing consumers' use of honey, and improving the market for honey. In Sweden there has been different programs focusing on recruitment. This includes the "female network" focusing on increasing the number of female beekeepers, "project beekeeping southeast" focusing on beekeeping as an agricultural line of business, "bees in the countryside", and the more recent "Kick Off more beekeepers - more honey". In Denmark most of the recruitment is done through the local associations. Many of the local associations have a school bee yard; this increases the local activity and the recruitment. In Denmark they have been successful in their recruitment; they have many new members each year. This has led to a new problem; many beekeepers drop out after only a short time and there is a big turnover in the member mass. In Norway there has been little focus on recruitment because of the low honey-price. But because of the decreasing membership-number and the aging of the member-group, it was decided to start a two year long project focusing on recruitment and renewing the organisation in 2007. During the project the Norwegian Beekeepers Association has made recruitment its number one focus. The project started giving results and the member count was almost in balance in the year 2008 compared to a drop of about 200 members annually the last few years. Because of this it was decided to prolong the project for one more year.

88

Mode of the safety and standardization production bases of bee products promote bee products quality safety and beekeeping healthy development in China

Lihong Chen*, Zhang Fuxing

* Xiangshan 100093 Beijing China, clhb@hotmail.com

China has the world's largest apiculture productivity, as well as the highest consumption of bee products. China possesses approximately 7,000,000 honeybee hives, 200,000 beekeepers, over one thousand bee products enterprises, many scientific researches and teachings institutions and management departments in the whole country. The output of honey is averagely 250,000 tons, royal jelly 3,000 tons, bee pollen 2500 tons, beeswax 6000 tons, propolis 300 tons and some drone pupae and larvae per year in China. And the 50% of the all bee products are exported to Japan, EU, American, Canada, and Saudi Arabia etc. According to foundation of the reciprocity and mutual benefit between members, Apicultural Science Association of China (ASAC) set up Bases of Bee Products Safety and Standardization Production (BASES) by used a model Enterprises + beekeepers / apiaries in the difference main provinces. The Bases modes require the apiaries with a good environment, producing standardization; using veterinary drug criterion and making the log of beekeeping. The result shows that the bee products qualities of the bases are higher without the residual chloramphenicol. The ASAC has also made active efforts in commending high-quality bee products of the Bases to the international importer. There are over 10,000 tons higher quality honey, 1000 tons royal jelly, 1000 tons beeswax; 20 tons drone pupae and some propolis etc export to Poland, EU, Japan, America and China Taiwan. The enterprises and beekeepers/ apiaries both get profits. A lively atmosphere has prevailed throughout the whole country apiculture of China.

89

Status of Beekeeping in Kerala, India

K. Prathapan, S. Devanesan*, K.K. Shailaja, K.S. Premila, O.P. Reji Rani, K.M. Sankarankutty

* AICRP on Honeybees and Pollinators, Department of Entomology, College of Agriculture, Vellayani 695 52 Trivandrum India, devanesans@yahoo.co.uk

Kerala State was contributing a major share of honey produced in India till 1990s. The Indian honey bee *Apis cerana indica* was used for commercial beekeeping in the State. The catastrophic outbreak of a dreadful disease to

Indian honeybees wiped out 95 per cent of the then existed bee colonies leading to near decimation of commercial beekeeping in the State. The All India Co-ordinated Research Project (AICRP) on Honeybees and Pollinators has developed TSBV tolerant nucleus colonies of Indian honeybee *A. cerana indica* by selective breeding, multiplied and distributed to the beekeepers through the selected bee breeders. The advanced high tech method standardized by the centre has been disseminated to the beginners in beekeeping, beekeepers, bee breeders, women self-help groups and unemployed youth through various field oriented training programmes. The centre is offering beekeepers orientation training to the beginners in beekeeping and refresher training on beekeeping to the stakeholders. Earnest efforts are being made to rejuvenate the beekeeping industry through technical guidance to the beekeepers and bee breeders and also by handling classes to the public. It is estimated that there are about 6 lakh bee colonies at present in the State. The State Horticulture Mission- Kerala is implementing various projects under yield enhancement through bee pollination in horticultural crops through Kerala Agricultural University, HortiCorp and Khadi Board. The role of honeybees in pollination to ensure food safety is also conveyed to the public through trainings and various mass media programmes. The advanced technologies developed by the University on bee management imparted to beekeepers helped to enhance the average yield of honey from 2-3 Kg to 20-25 Kg per colony making the industry a profitable one in Kerala. Hence large numbers of new farmers are taking up this industry. The concerted efforts of all those who involved in the industry helped to provide employment potential to the unemployed rural youth and women and thus explored the potential of beekeeping in the State and for the sweet come back.

90

Approaches to successful integration of bees into the urban environment as part of local food initiatives.

Liam Devany*

* 18b Highbury New Park N5 2DB London UK, manitou@blueyonder.co.uk

There is currently a growing movement in high density urban centres to localise food production to promote food sovereignty, reduce CO₂ emissions and introduce the population to the general health benefits of local organic food growing and consumption. An obvious cornerstone of such initiatives is the presence of bees to ensure high levels of pollination of urban food crops. Although there are significant benefits for bees in an urban environment - such as lack of pesticide spraying, plentiful elemental shelter, absence of GM crops and a wide array of plant and tree varieties - there are also significant problems in successfully integrating bees into areas where high density human populations exist. Very obvious barriers to successful integration - such as vandalism, human fear and a wide scale negative perception of bees by the young - require innovative solutions if local food production is to be successful in cities. This paper details several methods that have tackled these problems successfully using social approaches and technical innovations that have helped millions of bees to be safely integrated into urban centres and resulted in productive urban food schemes. Several common threads run through each scheme and the concluding findings will provide a template for others to follow who have the same objectives with regards to local food sovereignty.

91

To treat or not to treat, that is the question

Francisco Rey, John Kefuss*, Jacques Vanpoucke

* France jkefussbees@wanadoo.fr

Beekeepers should ask themselves two questions before beginning a program of selection for resistance to varroa mites. The first is what are the different reasons why you don't wish to stop chemical treatments against varroa mites? The second is under what conditions would you stop these treatments in all your hives? Answers to these questions are not that evident but once you have them (or try to get them) you will be able to decide if under your specific conditions a selection program is possible. Selection for varroa resistance is a long term solution but the beekeepers short-term problem is economic survival. Business survival is the first reality that your breeding program must take into account if it is to succeed. This means that you must be able to calculate how much it will cost

you to produce the genetic material for breeder queens and if these efforts are justified. Pacific Queens in Chile runs over 4000+ hives for avocado pollination and queen rearing. Chemicals are still used to treat for varroa but we are in the process of phasing them out. Since 1994 we have tested from time to time groups of 400 to 900 colonies for pollen production, hygienic behavior and varroa resistance. We measured how much time it took to run each test to select breeder queens. To select 20 breeders queens from 430 hives only for high pollen production costs us 3:44 hours of labor per queen. After the pollen test is finished we test the best 100 hives for hygienic behaviour and varroa infestations. It takes 10 minutes per hive to count the frames of bees, brood and honey, collect a bee and brood sample plus insert frozen brood for the hygienic test. This includes driving and lunch times. On the second and third days of the hygienic test it also takes 10 minutes per hive because we must count at the same time of day that the frozen brood sample was put in to maintain a 24-hour interval between counts.

92

Official signs of quality and origin (SIQO): an innovative example of participation in the structuring of the honey market in France

Philippe Picard*, Magali Ruello, Jennifer Mejean

* CNDA, 149 rue de Bercy 75595 Paris cedex 12, p.picard.adapi@free.fr

The world honey market leaves little room for honey differentiation according to geographical or floral origin. Confronted with this generic vision of the product "honey", beekeepers get organized at local level to identify and enhance the value of their production, with a strong will to maintain market segmentation. In France, they have official tools of protection and enhancement through signs of identification of quality and origin (SIQO). Defending the reputation of a honey with an IGP (Protected Geographical Indication), protecting expertise or a distinctive terroir of product with an AOP (Protected Label of Origin) or offering consumers a superior-quality honey with a Red Label, are all objectives which can be pursued through a quality-driven approach. French producers' organizations who have made a commitment to implement a SIQO follow similar logics: The protection of geographical indications to avoid their misuse, The precise definition of honeys in specifications approved by the authorities, The organization of checks on honey production conditions and honey characteristics, under the supervision of independent and impartial product certification bodies, Participation in the structuring of the supply-side of clearly identified regional honeys, facilitating marketing at sufficiently profitable prices, The implementation of relevant collective tools for consumer promotion and communication, Four registered geographical indications or designations of origin are already in place in Provence, Corsica, Alsace and Vosges, covering more than 300 beekeepers and the main merchants-packaging companies. This represents approximately 5 % of national honey production. There are also projects involving honeys from the Cevennes and Landes of Gascony. The aim of this presentation is to present the characteristics of these initiatives and to present the current state of the ones that are already in place in France.

93

Asian Hive Bee *Apis cerana* as Potential Global Genetic Resource

Laig Ram Verma*

* India, dr.lrverma@gmail.com

Asia is the richest region in the world in honey bee species diversity. The native Asian hive bee, *Apis cerana* is counter part of *Apis mellifera* in this region. Our research group has successfully identify three sub-species, namely; *Apis cerana cerana*, *Apis cerana himalaya*, and *Apis cerana indica* and these correspond to geographic distribution in the north-west, north-east Himalayas and sub-tropical Asia respectively. Amongst these, some geographic ecotypes of *Apis cerana cerana* match *Apis mellifera* in commercial value and have spectacular potentials for further genetic improvement by selective breeding and molecular research. Extensive research by our group reveals that *Apis cerana* offers several comparative advantages over *Apis mellifera* as pollinator. These include initiation of

early foraging at lower temperatures, longer foraging hours, shorter flight range, no competition for food and nesting sites with other bee species, co-evolution with native crops, more suitable for glass house pollination, better searching ability for sparse floral resources. Moreover this bee species is more docile and industrious in nature, less prone to attacks of wasps, and a high level of resistance to nosema disease and parasitic mites. *Apis cerana* can coexist with other native bee species and require little chemical treatment of colonies to control epidemics. However, as yet, this native bee species has not become popular amongst beekeepers because of several behavioral characteristics. These include their frequent swarming and absconding, their tendency to rob, their production of a large number of laying workers, and their lower honey yields. These negative traits show eco-geographical variations depending upon the sub-species/geo-ecotypes and management efficiency of the beekeepers and are amenable through basic and action research.

94

Diversity of propolis: production, preparation, and consumption

Mitsuo Matsuka (Nippon Apitherapy Society)*

* mmat@agr.tamagawa.ac.jp

Propolis is quite popular these days as a nutritional supplement and attract many researchers also due to its physiological activities. Through Pub Med system, one could find more than 1000 scientific articles in 2008. Diversity of propolis: Eastern European people have been familiar to propolis which is mainly produced from poplar tree bud. After the 1985 Apimondia congress in Japan (Nagoya), propolis attracted Japanese people as a useful healing bee products especially as anti-tumor active materials. Brazilian products are popular now after Dr. Matsuno reported several components from Alecrim propolis (original plant was identified as *Baccharis dracunculifolia* later). Although these propolis are 2 main streams, other types have been found recently, and researchers were attracted to find new substances and physiological activities. Nests of stingless bees are also constructed being used some glue substances from plants, and some people present them also as propolis confusingly. Diversity of preparation: Since flavonoids have been known as main active components of (poplar) propolis as well as caffeic and cinnamic acid derivatives, 80 % to pure ethanol is used for extracting these substances. Hydrophilic solvents and even water have been used to show some physiological activity on the one hand, and on the other hand other groups were extracted by the super-critical carbon dioxide. These materials may be mixed to produce various preparations. Diversity of products: Being used traditionally as home aids, ethanol tincture or propolis mixed ointment or cream are available. Medicinal uses are done through tincture, syrup, powder, granule, tablet, capsule, etc. Liquid preparations are also popular for oral or nasal treatments. Toiletries such as toothpaste, shampoo, soap, etc. are also on the market. Japanese cases will be mainly reported.

BEEKEEPING FOR RURAL DEVELOPMENT COMMISSION SYMPOSIUM N°1 "Honey trade by small producer groups"

95

Introduction to the Standing Commission

Nicola Bradbear*

* Bees for Development, PO Box 105, Monmouth, NP25 9AA, UK, nicolabradbear@beesfordevelopment.org

This *Standing Commission* addresses the important subject of beekeeping as a tool for achieving for rural development. Beekeeping contributes to rural livelihoods, and beekeeping projects provide a range of opportunities for entirely sustainable development: from the use and conservation of natural resources to priorities such as ethical trade, organic and ecological production. This presentation will introduce the main areas for consideration, and the themes to be addressed during this Congress.

Developing markets through people and produce

Pratim Roy*, Robert Leo, Snehlata Nath, Anita Varghese, Sumin George Thomas, Shiny Mariam Rehel, Mathew Johnstone

* India pratim@keystone-foundation.org

Production Centre Development (PCD) is a key to develop the backward linkages at the village level for value addition, processing and packaging of natural resources especially Non Timber Forest Produce. Keystone Foundation www.keystone-foundation.org has in the past 2 years restructured itself to decentralize action and decision-making on the ground. The PCD is a concept of empowering villagers to manage their resources and institutions better. This not only includes marketing channels and strategies for improving the value chain but also community-based ecological monitoring – which are crucial to ensure long term sustainability and practices of gathering. PCD is part of the Livelihoods Group which works closely with other 6 thematic groups – Conservation, Culture & People, Enterprise, Training & Information, Environmental Governance and Administration & Finance. The PCDs are independent and have their bank accounts and decision-making systems and processes. These are groups are mainly women-run and their networks are the gatherers who bring produce of honey, bees wax, gooseberry and other NTFPs.

From the bee hive to the breakfast table: marketing forest honey in Indonesia

Heri Valentinus*, Johnny Utama

* Indonesia, crissyg33@yahoo.com

The Jaringan Madu Hutan Indonesia (JMHI) or the Indonesian Network on Forest Honey is a network of forest gathering communities and their NGO partners. The network spans 9 provinces in 4 islands of the archipelago. JMHI was established in 2005 as a way to improve the sustainable production and marketing efforts of forest honey gatherers (primarily *Apis dorsata* honey). Since then the network has grown from a membership of several hundred honey gatherers, to over 700 members. The secretariat is managed by the NGO Riak Bumi based in West Kalimantan. With the strong emphasis on quality control, JMHI, along with the Indonesian certification agency, Biocert, are assisting members to install internal control systems (ICS) with its members to guarantee quality at different stages of harvest, processing, delivery and marketing. Organic Certification was already granted to Asosiasi Periau di Danau Sentarum (APDS) or the Honey Gatherers Association of Danau Sentarum. JMHI Marketing division, Dian Niaga, with a cutting edge marketing scheme has been able to penetrate various market segments through a diversified marketing mix. The multi-level marketing giant, Amway, is also marketing honey produced by JMHI. They have purchased over 20 tons of honey in the last 2 years and in 2008 alone were able to register sales for *Apis dorsata* honey of over USD 68,000. The paper will reflect on the process to organize gatherers into more effective forest stewards as well as reliable market players. It will also present the market strategies employed to increase incomes to producers as well as to provide products demanded by the market.

Value chain promotion of honey in Nepal

Surendra Raj Joshi*

* Narayani Complex Pulchowk Nepal, surendra.joshi@gtz.org.np

Nepal has a unique topography and is blessed with great diversity of honeybees and floral resources, which offers good potential for development of beekeeping. The floral resources in the country can support over 500,000 colonies of hive bees as against the existing 125,000 colonies. The total honey production in Nepal is about 850 to 1000

metric tons, out of which 400 tons is marketed commercially and rest is consumed locally. There is strong potential for the development of organic beekeeping, as use of agro chemical is very low in the country. Only a few *Apis mellifera* beekeepers use sulphur dust, formic acid and fluvalinate to control the mites but majority of beekeepers do not use any medicines in their bee colonies. Hence, the most honey produced in Nepal has very little possibility of having residues of pesticides and harmful drugs. There is a good demand for specific type of honey in local, regional and international markets. But honey entrepreneurs in Nepal cannot harness that market due to quality issues, inadequate knowledge and marketing skills. Furthermore, the domestic market is very limited. As honey is generally used as medicine or 'something special' rather than dietary supplement, so the per capita consumption of honey in Nepal is very low. GTZ/Inclusive Development of the Economy Programme has identified honey as one of the sub-sectors that has potential to generate income and employment opportunities in the country. The Programme has adopted the value chain approach to identify appropriate areas of intervention and form strategic alliances to enhance the competitiveness of Nepali honey. This paper presents the current situation of beekeeping and honey production in Nepal and describes the approach adopted by GTZ to promote honey value chain.

99

A revolving loan fund (RLF) providing small loans

Nizar Haddad*

* Bee Research Unit - NCARE 19381 Baqa' Jordan, drnizarh@yahoo.com

A revolving loan fund (RLF) provides small loans to people to start or improve businesses but who have no credit history or access to commercial bank loans. People who receive the funds (borrower) have to return the loan directly to the fund, which is used to make new loans hence, the term *revolving* loan fund. Our experience and experience of others showed that grants and loans are not always effective tools for poverty eradication, as poor people can't meet the condition of providing collateral for a loan and prove good credit history or cash flow. Also, we believe that the idea of using the RLF to provide assistance in terms of cash to poor farmers, especially, the category of very poor ones wouldn't succeed, due to absence of the appropriate enabling environment that would require fund seekers to meet the same conditions such as those mentioned above and limit the fund use to specified purpose. The Beekeeping program at the National Centre for Agricultural Research and Extension (NCARE) Jordan believes that the concept of RLF can be effective poverty eradication in developing countries. We developed a new revolving loan fund approach/concept that fit the situation of the poor people and would contribute to poverty alleviation in general. The new approach is based on the in-kind loan concept, which doesn't give the qualified persons cash for the proposed project to pay for the needed project-related service and equipments. Instead, qualified persons for the available loan are given what they need by a fund administering agency for starting and managing their proposed projects/businesses in terms of technical assistance. After an agreed upon period of time the borrowers return the loan in swarms that are going to be used to support another loan qualified persons.

100

Overcoming constraints of beekeeping for income generation in Malawi

William Mitembe*

* Ministry of Energy, Mines and Natural Resources Lilongwe Malawi, williammitembe@yahoo.com

The paper outlines the problems facing beekeepers in remote areas of Malawi and some methods used to ameliorate them. The problems were identified using rapid rural appraisal techniques among specific village groups. Problems included limited access to reliable markets. Because beekeeping is seen as a part time activity, beekeeping organisation is weak, production is fragmented and there are few trained people. Unpredictable markets impact on the price received for honey, leaving beekeepers disinclined to invest in improvements in production. Trading from a position of weakness leaves producers vulnerable to opportunistic buyers who may not pay or return precious containers. Enabling producers to move honey from isolated rural locations to city markets helps to provide more consistent prices and therefore higher incomes. Supporting the development of a participatory organisational infrastructure helps beekeepers address their own problems. This requires capacity building for key project per-

sonnel as well as developing the economic viability of the organisation. As well as providing predictable prices for producers, profitable honey sales can finance organisational costs and potentially fund training and other benefits to beekeeper members. Linking producers to the market includes developing key personnel capacity, proper business planning and organisation, group run collecting and processing facilities and seed corn donor funding to purchase honey, retail containers and labels. Affordable transport solutions must also be addressed. The paper describes how simple market analysis and market testing can be carried out, considers different market perceptions and the practical problems arising for producers selling honey onto the retail market.

101

Honey Value Chain Development in Zambia

Kenneth Chisenga*

* P.O Box 1 Mpongwe Zambia, kcmam2000@yahoo.com

This paper seeks to give an overview of what the Zambian honey sector (Mpongwe Bee keeping Enterprise in particular) is doing in bridging the performance gap that has negatively affected the honey industry since time in memorial. The document also reviews the efforts that have been employed by various players that include government ministries, non governmental organization (NGO), the private sector and community based organizations (CBOs) to address this poor performance. It is worthy noting that the sector through external support has identified this problem to primarily do with production and market access. Poor quality and low production is making it imperatively difficult for the producers to market their products easily. On the other hand, lack of access to market information is robbing these hardworking producers the much needed income making them the poorest members of their communities. However in retrospect, a number of players have come on board. These include capacity builders, processors, packers, manufacturers and exporters. All these players are battling it out in an attempt to developing and establishing a working honey value chain which would be able to contribute positively towards the development of the economy of this blessed nation Zambia.

102

Supporting collective action and poverty reduction in the Zambian honey sector

Fiona Paumgarten*

* Center for International Forestry Research P.O. Box 50977, Lusaka, Zambia, f.paumgarten@cgiar.org

Miombo woodlands cover a large proportion of Zambia's land area. Certain species, including preferred nectar species for bees dominate making beekeeping an important livelihood activity for thousands of rural households. For some households, honey constitutes as much as 25% of household income. In a country where the majority of people, particularly in the rural areas, subsist on less than a US\$ 1 a day, the contribution of beekeeping cannot be overlooked. Given the potential of the beekeeping sector to contribute to poverty alleviation and sustainable forest management, the sector receives considerable support from government, the private sector and donors/NGOs have. A common feature of this support has been the promotion of beekeeping groups for collective production and marketing. Beekeeping groups are also a means to disseminate information, to distribute inputs and to provide training. In recent years, collective action has been increasingly recognised as mechanism for achieving rural development however it is not without challenges. There is the need for research into how successful collective action can be initiated and maintained beyond project interventions. Excessive external interventions may weaken collective action arrangements, raising questions on what levels of intervention are appropriate and likely to ensure sustainability. This study considered the formation beekeeping groups in three areas in Zambia, the nature and levels of support they have and continue to receive, and the sustainability of the groups in question. Focus group discussions were conducted which addressed a number of themes including the objectives and activities of the groups, how they share benefits, the nature and levels of support they have received and the challenges they face. Based on the results, lessons are drawn on how external interventions can contribute towards the sustainability of beekeeping groups.

Alleviating poverty through beekeeping: lessons from Zambia

Madeleen Husselman*

* 21 Ngulube Road, Lusaka, Zambia, m.husselman@cgiar.org

In Zambia, beekeeping extension has been part of development agencies' portfolio since colonial times, and perceived to have a positive influence on both rural household incomes and forest management. In this paper we present findings of a 3 year research project, aiming to assess how beekeeping fits into rural livelihoods, the pros and cons of different production technologies and marketing strategies and the impact of external support. The study combines quantitative and qualitative data, comprising of a series of surveys, key informant interviews and action research with individual beekeepers in four rural and three urban areas of Zambia. Statistical analysis is performed to test for significant relationships. The production and trade of honey is seasonal and supplements the incomes of households, also involved in other activities. Large variations in total incomes from beekeeping were found both within and between areas: ranging from a few US dollars per season, to more than USD700. Overall, total incomes were strongly related to volumes sold. Neither the type of hive used nor the amount of training a beekeeper had received influenced incomes earned. In areas well connected to urban markets, producer prices were significantly higher than elsewhere. Recently, service providers have started to support the private sector, through soft loans and capacity building. This has resulted in increased prices for beekeepers. However, poverty remains rampant in the invisible urban sections of the value chains, such as amongst beer brewers and informal traders. The paper concludes with some practical recommendations for policy makers and NGOs on the possibilities to increase incomes for the poor through beekeeping.

MAPWA - a medicinal Apipark in West Africa

Yves Rondelet, Céline Mondet*

* France, celine.mondet@yahoo.fr

Apis mellifera adansonii, one of the least domestic of bee species, covers the whole West African territory. It gathers pollen on flowers of various acacias, baobab, cashew, tamarind, mangrove, and néré trees. For a long time this species has resisted to traditional beekeeping methods, even if these methods caused the death of many colonies. Yet, since the last decades, bee populations have been in a constant reduction mostly owing to deforestation and the over-tapping of the honey resources which are considered as a luxurious food and as a therapeutic product. Furthermore, many medicinal plants are close to disappearance because these are also over-tapped by local people for their therapeutic value. To offset these two problematic situations, we have designed a huge programme of reforestation of a 6000 hectares rural area in the southwest of Burkina Faso. Our project is mostly to plant the endangered local medicinal plants allowing a large honey production at the same time. This botanic park will have a particular circular topography with a central apiary exploited according to the modernised beekeeping methods. These methods are known to contribute to safeguard bee populations and also to provide a cleaner honey in many other West African territories. We have organized this park in order to have only one species of medicinal trees in blossom to product single-flower honeys. Thus, besides building the landscape, bees could also keep on supporting human health, could create prosperity and save many species of medicinal plants at the same time. Through this long-term and multi-faceted project around beekeeping, we hope to take part in the economical and social development of a whole village and its rural area. The planting of the first medicinal plant species started at the beginning of this year.

Secure village Beekeeping: fixed-comb Bell-Hives and appropriate Methods

Wolfgang Edrich *

* Breslauerstraße 40 91058 Erlangen Germany, wolfgang@edrich.de

In Africa south of the Sahara and in Latin America there is a case for keeping bees in low cost baskets, made of locally available materials other than wood. Over years experts in tropical beekeeping (F.G. Smith, B.&C.Clauss, P.Paterson, N.Koeniger, N.Bradbear) had made no secret of fixed-comb beekeeping, in a sustainable way, to fit the African situation better than movable-comb management in box hives. In 2008/09, under the "Karatu village wellness project" I started a fixed-comb "stinging-bee program" in northern Tanzania for the local poor; with 16 liter self made "bellhives" to be hung up at shoulder height near their home. Of 80 hives distributed, a quarter was occupied by wild honey bee swarms within weeks. The bellhives, light in weight and almost unbreakable can be made with a knife from papyrus enforced by an inverted plastic bucket. At the crown of the bellhive an inverted bowl serves as a honey super. With combs first built inside and then filled with honey it can be replaced safely within minutes in the dark by an empty one. Thus, the main nest is not interfered with, in contrast to plundering bees far from home, usually fatal for the colony, dangerous and time consuming for the beekeeper. A bellhive kept at home, with a wind mobile in its neighbourhood, to life at the farm. Only the surplus honey is cropped several times a year. It provides an extra income for subsistence farmers / farm wives when they sell the bowls filled with quality honey in clean white combs

BEE HEALTH COMMISSION SYMPOSIUM N°2 "BREEDING PROGRAMS FOR A BETTER BEE HEALTH"

Honey bees surviving *Varroa destructor* infestations in France

Yves Le Conte*

*INRA, Institut National de la Recherche Agronomique, UMR INRA/UAPV Abeilles et Environnement, Laboratoire Biologie et Protection de l'abeille, Site Agroparc, Domaine Saint-Paul, 84914 AVIGNON Cedex 9, France, leconte@avignon.inra.fr

Since *Varroa destructor* invaded France in 1982, the feral colonies disappeared completely destroyed by the mite. In 1994, few feral colonies could be observed back in different places with untreated surviving colonies. An experiment was designed to look at natural selection and survival of those untreated colonies. Since those colonies were still alive in 1999, we evaluated the surviving of other varroa untreated honey bee colonies. From different places in France, we collected about 70 colonies which were varroa untreated since at least 2 years. Since, we have shown the ability of honey bee colonies to survive to the mite, some of them being untreated for 13 years. In Avignon, we could study the population dynamics of those bees compared to untreated hybrid control susceptible bees and showed a significantly lower number of mites in the tolerant colonies. Different hypothesis can explain this phenomenon. Honey bees could have become resistant to the mite. The mite could have evolved toward a less virulence to the bees. The bees could be more resistant to virus associated to the presence of the mite. Or a co-evolution between those actors could have been favoured. Beekeeping management could also explain it. The search of varroa resistance traits associated to this survival would be helpful for selecting honey bee against the mite. To do so, we have developed an innovative approach looking at gene expression of those bees in comparison to sensitive ones to find a specific pattern of gene expression, which would be use to select bees. The interest of those bees in beekeeping will be discussed.

107

Comparison of the reproductive ability of *Varroa* mites in worker and drone brood of Africanized Honey Bees

Rafael Calderon*

* Heredia 475-30 Heredia Costa Rica, rcalder@una.ac.cr

The mite *Varroa destructor* is a worldwide ectoparasite of honey bees with serious economic importance for bee-keeping. The problem is most acute in regions with a temperate climate, which have bees of European origin. At present, this mite is considered as a contributing factor for the recent decline of honey bee colonies (bee losses or bee mortality) in North America and Europe. The sudden unexplained losses have not only been a financial detriment to many beekeepers but could threaten billions of dollars worth of crops that depend on the bees for pollination. In Costa Rica, the beekeepers have reported loss of Africanized honey bee (AHB) colonies and reduced production of honey as a consequence of *V. destructor* introduction. In addition, newly emerged bees with damaged wings, bees crawling in front of the hive and unusually severe adult bee mortality was observed in AHB colonies. A large proportion of the adult bee population in most of these colonies was infested with *V. destructor*. In order to reproduce varroa females enter worker or drone brood shortly before the cell is sealed. Reduced reproduction of varroa is regarded as the most important factor in tolerance of honey bees toward this parasite. The reproductive ability of *V. destructor* varies according to the type of honey bee brood (worker or drone) being parasitized. It is reported that drone brood is more frequently infested and preferred by mites. To test the hypothesis that, due to the preference of mites to invade drone brood to reproduce, a high proportion of the mite reproduction should occur in drone cells, a comparative study of mite reproductive rate in worker and drone brood of Africanized bees was done. The study was carried out in Heredia in the Central Valley of Costa Rica, from February to July. The area has a tropical climate; February through April are dry months, and May through July are rainy months. .../...

108

Colony survival in untreated apiary of *Apis mellifera iberiensis*

Jose Manuel Flores*, Padilla F.

* Departamento de Zoolgía 14071 Cordoba España, ba1flsej@uco.es

Since 2007 we kept a apiary whit *Apis mellifera iberiensis* without varroa treatment. Along this time we evaluated the bee and Varroa populations, using natural mite fallen on the bottom board. In 2007 autumn we lost an important number of colonies. In 2008 February nine colonies survived. We valued in these colonies the infestation degree within the worker bee brood, and the reproductive success of Varroa. Some colonies survived whit high Varroa populations versus colonies with low Varroa populations. Low reproductive success of the mite was showed in some colonies. In 2009 four colonies survive with original queens and without treatment.

109

Fight *Varroa*: genomic characterization of honeybees selectively bred for *Varroa*-Sensitive Hygienic behaviour

Cédric Alaux*, John Harbo, Yves le Conte, Jean-Francois Martin, Sandrine Cros-Arteil, Christelle Dantec, Maria Navajas

* France cedric.alaux@avignon.inra.fr

Due to the negative impact of *Varroa destructor* on honey bee health, uncovering the potential basis of varroa resistance has biological and economic implications. Honey bee resistance to varroa can occur naturally but at

low frequencies. These resistant bees display an effective removal of varroa-infested pupae from capped brood, which limit varroa infestation rate and reproduction. This behavioural trait called Varroa-Sensitive Hygiene (VSH) has a genetic basis and so over the past several years, honey bee colonies have been successfully selected for their resistance to varroa. In order to find genes that are potential markers of this resistance and thus could be used to screen natural populations, we compared brain-specific gene expression profiles of bees selected for their high rate of hygienic behaviour (VSH+) to control bees displaying a normal hygienic behaviour (VSH-). For that purpose, we used the new honey bee oligonucleotide microarray, based on the recently sequenced honey bee genome which contains all the genes of the bee genome. 37 genes were significantly differentially expressed between VSH+ and VSH- bees. A relatively high proportion of them are involved in olfaction, which can be linked to the higher olfactory sensitivity of VSH+ bees. These genes are potential candidates for the behavioural tolerance and give clues about what makes these bees resistant to destructive mites.

110

Practical varroa resistance selection for beekeepers

John Kefuss*, Jacques Vanpoucke, Maria Bolt, Cyril Kefuss

* France jkefussbees@wanadoo.fr

The "Live and Let Die" testing program has been modified to reduce the financial impact of the "Bond" test. Essentially through a process of elimination we do the final more expensive testing on a restricted number of colonies. This sharply limits the financial impact of the test program. First colonies are selected for economic characteristics such as honey, pollen and royal jelly production. Then the best colonies are tested for hygienic behavior using frozen brood inserts. During this test the piece of brood cut out to make room for the insert is recovered and the number of adult, daughter and immature varroa mites counted. At the same time a sample of bees is taken to count mites on the adult bees. The best colonies with the least amount of varroa are not treated and are used for breeder queens. Daughters from these queens will produce drones to mate with the beekeepers virgins the following year. It is important to use as many different grafting mothers as possible to avoid inbreeding. Selection can be done using only natural mating and does not require expensive testing equipment. At the present time we cannot economically justify using chemicals to kill varroa mites because our varroa infestation and reproduction rates are less than 5%.

111

Establishment of the national beekeeping breeding program in Republic of Macedonia

Aleksandar Uzunov*, Hrisula Kiprijanovska, Sasho Gjurovski

* bul.Aleksandar Makedonski b.b. 1000 Skopje Republic of Macedonia, uzunov@zf.ukim.edu.mk

The extend morphometrical analysis of the honey bee population in Republic of Macedonia confirmed the earlier reports for presence of *Apis mellifera macedonica* as a native honey bee population. These results are recently also confirmed by the initial molecular analysis of the sufficient number of the honey bee sampling from the whole territory of Republic of Macedonia. However, beside the dominate honey bee population there are also regions in the country with presence of the *Apis mellifera carnica* population and consequently the introgression lines and regions. These smaller populations are possible consequence of the traditional long term importation of the honey bee queens from the Carnica regions such as: Serbia, Croatia, Slovenia etc. In order to genetically consolidate *Apis mellifera macedonica* population in Republic of Macedonia and to establish standardized breeding protocols for most important honey bee characteristics, we have developed a National Beekeeping Breeding Program. This initial National beekeeping breeding program was developed with technical and financial support from German Technical Cooperation project (GTZ) in Republic of Macedonia. The essential support to the Macedonian team of experts was provided by the Kirchhain Bieneninstitut from Germany. The main aim of the mentioned program is to act as a fundamental and official basis for development of several technical (breeding and mating stations) and institutional units for implementation of the selection and breeding protocols for improvement of the honey bee genetic basis in Republic of Macedonia. The program is focused on selection and improvement of 4 characteristics, such as: Defensive behavior, Swarming behavior, Disease resistance and Honey production.

112

Natural selection on disease resistance implemented in a selective breeding program

Ralph Büchler*, Marina Meixner, Ina Heidinger

* Erlenstrasse 9 35274 Kirchhain Germany, ralph.buechler@lh.hessen.de

Differences in the resistance to Varroosis, virus infections and Nosema have strong impacts on the wintering ability and the survival of untreated colonies, as well as on the drone production and individual fitness in an open mating competition. These may be the main selection factors to guarantee a continuous and effective genetic adaptation of natural honey bee populations to diseases and parasites. On the basis of large field performance tests including thousands of colonies we developed a concept to identify breeder colonies that can successfully be wintered without treatment against Varroa. Regular checks of the Varroa, virus and Nosema infection rates are performed. The results are evaluated with regard to develop threshold values to minimize colony losses. The bee population development during winter (from October to March) shows differences of the health status and physiological quality of bees. Colonies with the best wintering ability are selected for further breeding. A management concept for drone colonies was developed which allows to minimize chemical treatments against Varroa. Thus, the drone production and mating process is strongly influenced, with the presence of the parasite granting higher reproductive success to the most resistant genotypes. Up to now the "tolerance mating station concept" has been realized in 6 isolated mating areas with a total of more than 4500 queens per year.

113

Cooperative stock maintenance and development of protocol for international exchange of honeybee germplasm

Susan Cobey*, John Pollard, Claire Plante, Michelle Flenniken, Walter Sheppard

* Dept. of Entomology, 367 Briggs Hall 95616 Davis, CA, USA, swcobey@ucdavis.edu

To facilitate the development of a standardized protocol for the international exchange of honey bee germplasm we developed methods to minimize the risk of spreading pathogens, which are often non-symptomatic, difficult to detect and exclude. The increasing worldwide loss of colonies threatens specific geographical ecotypes of honey bees and narrows the gene pools of breeding stocks used to repopulate commercial hives. Importation of stocks provides increased genetic diversity, known to increase colony fitness. We will present an introduction on emerging technologies used to detect and eliminate pathogens in semen and embryos, designed to replace or augment the current polymerase chain reaction (PCR) testing of imported stocks. A more efficient and safer importation protocol of honey bee germplasm will expedite the importation process and the critical need to increase the genetic diversity of commercial stocks in the United States. We will further describe the development of a collaborative University and industry honey bee stock improvement program to evaluate and maintain commercially viable honey bee stocks demonstrating increased resistance to parasites and diseases, established from the imported and domestic crosses.

114

Conserving Genetic Variability: A Global Concern

Malcolm T. Sanford*

* 5002 NW 64th Lane 32653 Gainesville USA, beeactor@apisenterprises.com

Large-scale honey bee colony losses of managed honey bees continue to be experienced worldwide. The causes

appear to be varied and complex, and a new name has been coined for one of the most reported conditions by beekeepers, now called colony collapse disorder (CCD). However, another less celebrated, but perhaps more significant, cause of honey bee losses has been *Varroa destructor*. By most calculations, this mite has killed over 90 percent of wild or feral colonies where ever it has been introduced. This has converted the managed honey bee into a much more domestic creature, far more dependent on the human beekeeper. Both of the phenomena described above have been responsible for an increasingly narrowing of the honey bee's genetic base. For an insect that has a biology dependent on genetic variability, this is not a good basis for continued prosperity. This article will look at some of the reasons for this and possibilities in the future to conserve the broad genetic base the honey bee will require for its future well being. As part of this, the author will explain the rationale behind a brand new organization, the Global Bee Breeders Association. The theory and rationale leading to this is explained along with efforts so far toward defining goals that will guide the association.

115

Can the brood rearing temperature affect adult bee fitness? A hypothesis explaining the time interval between bee loss and its primary causal factor

Piotr Medrzycki*, Fabio Sgolastra, Laura Bortolotti, Gherardo Bogo, Simone Tosi, Claudio Porrini, Anna Gloria Sabatini

* Italy piotr@inapicoltura.org

The exact temperature at which brood is reared is an important parameter for colony health. To investigate the effects of the brood rearing temperature, a laboratory study was carried out. The larvae were reared *in vitro* at two different temperatures: 35°C (optimal) and 33°C (suboptimal). Larval mortality, adult emergence and adult longevity were measured, as well as the susceptibility to intoxication by Dimethoate. The reduction of brood rearing temperature by 2°C had no effects either on larval mortality, or on adult emergence rate, while adult longevity was strongly affected. Moreover, adult bees emerged from brood reared at the suboptimal temperature responded quicker to intoxication by Dimethoate. Surprisingly the larval LD₅₀ (48h) was much higher at the lower temperature and the response of the larvae to the intoxication was delayed. In fact, after 24 hours, the mortality rate was quite stable at 35°C, while it was still rising at 33°C. This may be explained by the slower larval metabolism at the lower temperature, with the consequent slower active ingredient absorption.

With this study we can conclude that adult honey bees deriving from brood reared at suboptimal temperature have lower fitness and are more susceptible to pesticide intoxication. We hypothesise that a slight poisoning in early spring, having apparently no important negative effects on the colony, can lead to suboptimal brood temperature, due to insufficient number of bees, and could affect the fitness of the adults that will emerge. Consequently, the next brood, reared by these adults, may be neglected. Therefore, the low-temperature-brood-rearing should be considered an important stress factor, the effects of which on the entire colony are delayed in time.

BEEKEEPING FOR RURAL DEVELOPMENT COMMISSION PLENARY SESSION

116

Conservation of Asian honey bees

Benjamin Oldroyd*

* School of Biological Sciences 2006 Sydney Australia, BOLDROYD@BIO.USYD.EDU.AU

Asia is home to at least 9 species of honey bee. These bees are extremely valuable because they are key pollinators of about 1/3 of tropical fruit species, provide significant income to some of the world's poorest people, and are prey items for some endemic vertebrates. As importantly, Southeast Asian Dipterocarp forests appear to be adapted to pollination by honey bees. Thus long-term decline in honey bee populations may lead to significant changes

in the pollinator ecology of these forests, exasperating the more direct effects of deforestation and wood harvesting on forest health. Although complete extinction of any honey bee species is seen as unlikely, local extinction is likely to occur across extensive areas. The most significant threats to local honey bee populations are excessive hunting pressure and deforestation. Conservation of Asian honey bees requires immediate action to determine the rates of harvesting by honey hunters that are sustainable. This requires information on the demography of hunted populations, particularly the intrinsic growth rates and the rates of harvest.

117

Using remote sensing and GIS in locations prediction to establish rafter beekeeping (Tingku) Technique in Marang district, Malaysia

Makhdzir Mardan*, Mohammadmehdi Saberioon, Nordin Laili, Mohd Sood Alias

* Department of Agrotechnology, Faculty of Agriculture, University Putra Malaysia, 43400, UPM, Serdang Selangor, Malaysia, makhdzir@gmail.com

The Asiatic Giant honeybees (*Apis dorsata*) are seasonally abundant throughout the upland and lowland rainforests in south East Asia. The colonies of *A. dorsata* are found to nest in aggregates on tall bee trees (tree emergent) in the open, as well as, nesting singly in concealed locations when nesting low, especially in the submerged forest of *Melaleuca cajuputi* as in the vast hectare (→ 200 000 hectares) of *Melaleuca* forest along the coastal areas of Terengganu. The trunk and branches of the *Melaleuca* trees are almost upright and the bark are papery and loose that it is unsuitable to serve as nesting support for *A. dorsata*. Therefore, other trees with sloping branches in the vicinity of the *Melaleuca* forest are chosen as nesting supports for the *A. dorsata* colonies. *Melaleuca* and *Acacia* trees are major sources of nectar and pollen for *A. dorsata* and the colonies are a major source of honey to the rural poor, honeyhunters. Honey is a supplementary income to many rural poor (including school children) in the district of Marang, Terengganu. *A. dorsata* colonies are hunted during the honey season during the flowering period between the periods of May until October.

A pilot study was conducted to determine the vegetation distribution area of *Melaleuca Cajuputi* & *Acacia Mangium*, colony distribution & density (*A. dorsata* colonies), and logistics of honeyhunting (honeyhunters) using the remote-sensing technique of using SPOT-5 satellite imagery and Radarsat-1 determines the forest distribution area and vegetation density of *Melaleuca cajuputi*, *Acacia mangium*, palm trees and others in the submerged *Melaleuca* forest around the village of Gong Beris, Marang, Terengganu (upper left 5°19.223"N, 103°10'4.092"E and lower down 4°53'42.31"N, 103°22'37.90"E). The outcome on the distribution area, feral colonies nesting sites and the villagers will be used to propose the locating of nesting support (Tikung) and determination of zonal ownership of colonies for the improvement of colony management for better honey yield.

118

Beekeeping training utilizing participatory methodology in Vietnam

Gard Otis*, Leo Smits, Huyen Pham, Steffanie Scott

* Dept. of Environmental Biology N1G 2W Guelph, Ontario Canada, gotis@uoguelph.ca

The Bee Research and Development Centre (BRDC) delivers most of the beekeeping training in Vietnam. In 2006, the Canadian International Development Agency funded a project of BRDC and the University of Guelph designed to improve training programs by making them more participatory. We began in March, 2007, with training in techniques used to obtain information on daily/seasonal activities and villager desires/concerns. Trainers obtained immediate practice with the techniques in two communes. In November, 2008, we conducted introductory beekeeping training and background socioeconomic surveys in those communes; advanced beekeeping training and reassessment of participant activities followed in November, 2008. In the past, BRDC beekeeping training courses consisted of 6 days of instruction, most of it in a classroom. We transformed that into 5 days of training with ~80% of instruction involving bee hives. What enabled this change was the delivery of 30+ hives before the

training rather than afterwards. There was initial reluctance by BRDC trainers to the hands-on approach, largely because it was unfamiliar but also because they lacked skills in leading group discussions and had less control over course content. However, at the end of the course both trainers and beekeeping trainees were enthusiastic with the outcome. This approach to training has been integrated into other training programs VBRD has taught. One drawback is that it is slightly more expensive because hives must be guarded for several days before the trainees take them home. In the first year, 90% of the new beekeepers made a profit from beekeeping. Trainers continue to refine their techniques as they initiate activities in two additional communes in 2008 and two in 2009.

119

Potential of meliponiculture in rural homesteads of Kerala, India

Stephen Devanesan*, K.K. Shailaja, K.S. Premila, O.P. Reji Rani

* AICRP on Honeybees and Pollinators, Department of Entomology, College of Agriculture, Vellayani 695 52 Trivandrum India, devanesans@yahoo.co.uk

Stingless bees are a class of hymenopteran insects under Sub-family *Meliponinae*. These small sized insects have a wide distribution in India with their natural domicile crevices in walls, hollow blocks and tree trunks. *Trigona iridipennis* is the common stingless bee found in India. In Kerala it is reared as backyard beekeeping practice mainly for honey production. They are domesticated in mud pots, bamboo bits, wooden boxes or coconut shells. A large number of colonies are being destroyed due to the unscientific method of honey harvest. Concerted attempts are being made by AICRP on Honeybees and Pollinators, Vellayani Centre to improve the hiving, domestication, conservation and management of stingless bee with a view to enhance the number of colonies and thereby meeting the current demand of stingless bee honey. The potentialities of Meliponiculture results to rural employment, nutrition and supplementary income generation, especially to women who can easily handle it. Augmentation, conservation and management of *T. iridipennis* should be intensified for ensuring sustainable agriculture and the conservation of biological diversity resulting in food safety. Despite the small amount of honey produced per hive, is of great demand and fetches comparatively higher price due to its medicinal value. It is more acidic than commercial honey but it has unique taste and medicinal properties. This may be due to the fact that the stingless bee collect nectar and pollen from many medicinal plants with small flowers which are not visited by *Apis* spp. These bees are looked at for their efficiency in pollination of those plants having very small flowers that cannot be accessed by larger bees such as honeybees and others.

120

Beekeeping in Laos: various strategic choices

Jérôme Vandame*, Anna Schooffs, Bounpheng Sengngam

* 29 allée de la Cheyre 63830 France, jerome.vandame@wanadoo.fr

In a favourable agro-ecological context, the development of beekeeping in Lao PDR faces an important strategic choice: the introduction of the exogenous specie *Apis mellifera* or the slow development of the actual beekeeping with endogeneous species *Apis cerana* and *Trigona laeviceps*. Should Laos favour the development of a beekeeping activity with 'modern' technology and the introduction of *Apis mellifera*, in the image of what has been done in Thailand and other neighbouring countries that have a competitive beekeeping, the beekeepers will have to bear numerous risks. Economical risks linked to important investment charges; pathological risks due to the high sensitivity of *Apis mellifera* to pests and bacteria; genetic risks engendered by the introduction of new genetic material and marketing risks resulting in the necessity to feed colonies. Those farming systems specialized in beekeeping would face competitive beekeeping systems in neighbouring countries. These new actors would be economically weak. However, should Laos favour the development of a beekeeping based on the endogenous species, *Apis cerana* and *Trigona laeviceps*, this will give the farmers the possibility to diversify their activities and to strengthen their farming systems. This policy would involve a strong support regarding:

- the extension of beekeeping practices suitable to the context of each province;
- the research and the improvement of the local breed.

Moreover this policy would permit the Laotian provinces to highlight their comparative advantage whether it is the importance of the primary forest, the richness of the melliferous flora and fauna and to take advantage of interesting niches in the country (forest honey, medicinal honey) and outside (organic honey).

121

Perspectives of revitalisation of high nature area through organic apiculture

Danijela Brankovic*, Nebojsa Nedic, Suzana Djordjevic Milosevic

* Prizrenska 4 11000 Belgrade Serbia, BIO_EUROPE@yahoo.com

Migration of the inhabitants toward cities, led to depopulation of the cross border mountainous region of Serbia, especially in the east and south regions of the country. Those regions have been decreed as marginal. In this, now high nature areas, programs for revitalization of the production, are focused, besides livestock farming, to organic apiculture. Wild vegetation, not contaminated nature, no influence of men destruction in these areas represent good base for the development of organic apiculture. That area has remarkable value regarding the acacia graze, although acacia is well spread all over the country. Honey has extra quality, crystallizes slowly (stays liquid unto 3 years), with pleasant aroma, yellow-green colour, with few kernels which offers possibility of consumption even by people allergic to pollen. Beside this area have also value as linden meadow and honeydew pasture. Serbian organic apiculture has a significant support in the new legislation which is complied with EU law. Also, Ministry of Agriculture, Forestry and Water management has been giving great support through subsidiaries for certification of this part of agriculture, as well as for gear acquisition. Good perspective makes also a fact that 6,59% of the territory of Serbia is under protection, and till 2010 it is expected protection of yet 3,41% of the territory. Nature protected areas, nature reserves and national parks are excellent sources as honey graze land. However, inability of the market guaranteeing and sale of these products, as well as underdevelopment of associated cooperation with recognizable trade mark, are parameters which prevent organization of this kind of agriculture.

122

Bee keeping, an integrated approach in shea tree conservation in Uganda

Simon Peter Ochola*

* Kitgum women bee keeper p.o box 200, kitgum-uganda +256 kitgum Uganda, kitwobee@gmail.com

In Uganda, bee keeping has been a tradition by most local farmers. It is practices mostly as a hobby though of recent there are growing number of commercial bee keepers and bee keeping cooperatives. Uganda has rich varieties of bee species, eg. *Apis mellifera scutellatta*, *Apis mellifera adansonii* and *Apis mellifera monticola*. Beekeeping is a sustainable, cost-effective model for community development. Locally available materials are used for the construction of the hives. There is a local, regional and national demand for apiculture products, not just honey. It is environmentally sustainable in that it offers a good way for people to create income from natural resources without destroying them – beekeeping has a key role in maintaining local biodiversity and conservation of the environment by pollination and increases crop yields. Nationally bee keepers are well verse with the plants and places favoured by bees. Honey, a bee product is a highly nutritious and its market is available locally, nationally and internationally. However, the demand of honey is highly dictated by its colour and flavour (quality). An amber colour honey is most ideal for urban and export market. Shea nut tree *Vitellaria paradoxa* is well known for its capability to produce nectar that produces an amber colour of honey. Unfortunately these Shea nut trees is on the International Union for Conservation of Nature and Natural Resources (IUCN's) red list of threatened species that needs to be conserved.

123

From bee hunting to beekeeping: stingless bees in Kenya

Macharia Joseph K*, L M Gitonga, S K Raina, J C Biesmejer

* P. O Box 6000 00200 +254 Nairobi Kenya, jmacharia86@gmail.com

The number of people living in poverty is ever increasing and the rate of poverty growth continues to rise. Poor people often have no option but use the environment in non-sustainable ways. A degraded environment cannot sustain continued use of its natural resources and hence cannot sustain food production, wild animals or natural pollinators. It's against this background of non-sustainable use of environment and alternative strategy to develop linkages between diversity of resources and sustainable livelihood through income generation options that this project of converting destructive honey hunters to beekeepers was initiated. Deforestation and poor management are the main problems faced by stingless bees. In Kakamega forest, stingless bee honey is mostly obtained by harvesting from feral colonies, an activity which kills or destroys the colonies. Replacing destructive harvesting of stingless bees with well designed management practices would provide honey for food, income, medicine, and enhance pollination of both commercial and indigenous plants. The objective of this project was to demonstrate that the biodiversity of forest protected area system can be maintained through collaborative management systems using incentives based on stingless bees. The research and initiatives of involving the destructive honey hunters in domestication of stingless bees to increase the management, efficiency and impact of stingless bees is outlined.

124

Promoting beekeeping in the Sudan, A review

Elamin, E.M*, Ahmed, M.A., Elsarag, M.S., Salah, F.E.

* Sudan faizaruba@yahoo.com

Since the 1920s there have been attempts to handle honey bees in Sudan in a more scientific and economic ways. For several seasons the success was insignificant. The agriculturists are quite aware of the potentialities of honey bees as producers of well rewarded honey, wax and as pollinators. *Apis mellifera* was originally reported in whole Africa. There are a lot of strains and bee races. Today 80% of bee honey is obtained from tree cavities and caves in the mountains. As a way of advancement some of the natives constructed holed tree trunks, sorghum stalks and bamboo splits for the bees to occupy naturally. In 1930 the government entomologist imported European honeybee race in Langstroth hives from England which failed to adapt. In 1965, successful apiary for *Apis mellifera* race in Langstroth hives was established at Kenana Research Station. The 1976 a survey for bees resulted in yellow, black and mixed strains. Bee culture should be promoted at southern Darfur, southern Nuba mountains, the Blue Nile and Central Sudan. In addition to *Apis mellifera*, in 1985 the dwarf Asian bee *Apis florea* was discovered in Khar-toum. The future of beekeeping in the Sudan depends on the local strain of *Apis mellifera*. Honeybee swarms can build up strong colonies if kept in appropriate hives and managed adequately. Only knowledgeable and interested people will succeed in promoting bee culture in the Sudan.

125

Linkages between beekeeping for rural development and issues of human development and food security issues

Riccardo Jannoni-Sebastianini,

Corso V. Emanuele II, 101 00186 Rome Italy, riccardo.jannoni@fao.org

This paper relates on the linkages that can be drawn between beekeeping for rural development and issues of human development and food security in countries that are facing environmental, economic and social hardship. The underlying perspective is based on Amartya Sen's view of development as freedom and in particular the expansion of freedoms and set of capabilities available to individuals and in turn to their relevant communities in developing countries to enhance their possibilities of leading worthy and rich lives achieving progress that is not only economic, but also social, political and involves personal growth. Beekeeping in this scenario fits as a potentially very powerful tool that lends itself to several applications and provides a vast array of diverse options to rural communities towards their sustainable development. The final report will also illustrate study cases applied to real instances of implementation either in Africa or Latin America that are currently being negotiated and investigated for their impact. In essence the final objective is to identify communities that present the required characteristics for implementing a preliminary set of initiatives and focused interventions aimed at securing development and also food security with particular reference to the role that beekeeping practice can play in addressing satisfactorily these issues. As an add-on there is the likelihood of exploring and assessing the feasibility of considering fair trade as a terminal of the developmental process to complete the circle. This entire exercise falls into the academic experience of a master course on human development and food security that is being currently attended by the author and is aimed at providing factual evidence of the potentiality of beekeeping in addressing these issues.

BEE HEALTH COMMISSION SYMPOSIUM N°3 "HORNETS PRESSURE ON HONEYBEES"

126

Talk dedicated to the memory of Jacob S. Ishay

J. David Bergman*, Plotkin Marian

* Raymond and Beverly Sackler School of Physics and Astronomy, Tel-Aviv University, 69978, Tel-Aviv, Ramat-Aviv, Israel, bergman@post.tau.ac.il

Jacob S. Ishay was a truly self made man and had an amazing life story. His work on the oriental hornet spanned more than 45 years of research and discoveries that gave rise to more than 300 published papers. This talk will summarize his life story and discuss some of his key discoveries on the subjects of acoustical communication, temperature regulation, hornet silk, gravity orientation and the effects of micro-gravity on hornet's nest building and other activities as performed on the Space Shuttle Endeavor.

127

Biophysical properties of yellow pigment granules in the Oriental hornet

Marian Plotkin*

* Department of Physiology and Pharmacology, Sackler Faculty of Medicine, Tel-Aviv University, 69978, Tel-Aviv, Ramat-Aviv, Israel, physio7@post.tau.ac.il

The Oriental hornet *Vespa orientalis* (Hymenoptera, Vespinae) correlates its flight activity with the level of incident solar radiation. The Oriental hornet cuticle exhibits yellow-coloured stripes on its head and gaster. The stripes are composed of densely packed layers of yellow granules, with each granule about 500nm in diameter. The yellow granule contains xanthopterin. Xanthopterin is an extensively conjugated molecule. This array of yellow granules increases the effective surface area available for absorption of solar radiation and this maximizes the ability of the xanthopterin to absorb a wide range of visible light extending into the UV. Some liver functions are performed in the layer that includes the pigment granules, thus exposure to UV light influences these activities. This suggests that the Oriental hornet may utilize solar radiation for fulfilling its energy requirements.

Do social hornets and honeybees exploit ultrasonic acoustic resonance in constructing their brood combs and honeycombs

J. David Bergman*, Jonathan Kadmon, Jacob S. Ishay

* Raymond and Beverly Sackler School of Physics and Astronomy, Tel-Aviv University, 69978, Tel-Aviv, Ramat-Aviv, Israel, bergman@post.tau.ac.il

How social hornets and honeybees manage to construct their brood combs and honeycombs with such great symmetry and precision is a question that has never been answered satisfactorily. A few years ago two of the authors (DJB and JSI) suggested that this is achieved by exploiting ultrasonic acoustic resonances of the air-filled comb cells. We now present some new physical considerations and observational facts in support of that suggestion. In particular, we identify which of the different resonances is best suited for the above mentioned goal. Also, previously recorded ultrasonic data on social hornets and honeybees is cited which agrees with some of our predictions and thus provides further support for the above mentioned suggestion.

Potential Influence of Habitat Type and Seasonal Variations on Prey Spectrum of the Invasive Alien Species *Vespa velutina* var. *nigrothorax* Du Buysson, 1905 (Hym.: Vespidae), the Asian Hornet, in Europe

Franck Muller*, Quentin Rome, Adrien Perrard, Claire Villemant

* 45 rue Buffon / CP50 Entomologie 75005 Paris France, fmuller@mnhn.fr

Invasive alien species impose an enormous cost on human activities (Wittenberg & Cock, 2001) and are a leading threat to biodiversity. In France, the high abundance and impact on honeybees of the Asian hornet *Vespa velutina* var. *nigrothorax* have caused great concern among public authorities and beekeepers. The species was reported for the first time in 2005 (Haxaire et al. 2006; Villemant et al. 2006) and spread out across 25 French departments within 4 years (INPN, 2009). Its eradication is now impossible and its wider expansion in Europe is soon to be expected. *Vespa velutina* preys on various arthropods, but mostly on insect pollinators such as honeybees, bumblebees and solitary bees (William, 1988; Abrol, 1994; Perrard et al., 2009). We assumed that its impact on the biodiversity of the entomofauna, and more specifically of pollinators, is important. We also hypothesized that such an impact may vary in time (through the season) and space (in relation to habitat types), in relation to the insect biology, its ecological requirements, and the resources available in the environment. A total of 12 nests selected in various habitat types was studied from August to November 2008. Hornets were caught using insect nets while returning to the colony and prey and wood pellets kept using Perrard et al. (2009) technique. From 5150 hornets captured, 811 prey pellets and 595 wood pellets were obtained. As far as possible, insect prey pellets have been identified to the family, and when achievable, to the genus level. Composition of the prey spectrum was then analysed. Preliminary results on the potential influence of the season and/or habitat type on the prey spectrum of the Asian hornet in its area of introduction is presented and discussed here.

130

Heat balling for attacking hornets

Ken Tan*, H. Li, M.X. Yang, H.R. Hepburn, S.E. Radloff

* Xishuangbanna Tropical Botanical Garden, Chinese Academy of Science, Kunming, Yunnan Province, 650223, People's Republic of China

Heat balling is a mechanism used by worker honey bees (*Apis cerana*) to thwart predators, when the wasps *Vespa velutina* are hawking by the entrance of bee hive, *A. cerana* guard bees appear at the entrance to form a shimmering wave, reared their body temperature as $5.4 \pm 1.9^\circ\text{C}$ as they shaking their body for a warning and ready to attacking, but *A. mellifera* guard bee seemed innocent and ignored the presenting of wasp in such case, they didn't reared their body as *Apis cerana* guard bee did. When the guard bee are going to lunch the strike to wasp for heat balling, the body temperature reached to $31.4 \pm 0.91^\circ\text{C}$, $1.7 \pm 1.8^\circ\text{C}$ higher than the guard bee' average temperature, higher body temperature is a strong signal for launching the strike.

131

Comparison of trap designs against the Yellow-legged hornet (*Vespa velutina nigrithorax*), a honeybee predator recently introduced in South-West France

Nevile Maher*, Denis Thiery

* UMR 1065, Institut National de Recherche Agronomique de Bordeaux-Aquitaine, Villenave d'Ornon, France, maher@bordeaux.inra.fr

The hornet *Vespa velutina* (Hymenoptera: Vespidae), native to South-East Asia, has been introduced in France presumably shortly before 2004, and has to now largely invaded the South-West of France. It preys on honeybees in front of hives progressively weakening and finally destroying all bees and brood of unprotected colonies. In order to eradicate or at least protect apiaries, attractive traps are needed. These traps must also be selective, avoiding the capture of honeybees or beneficial insects. As a preliminary step in characterizing species specific semiochemical attractants for *V. velutina*, we compared the efficiency of various trap structures (glue, water-pan, tubed plastic bottle, funnel and commercial wasp traps) differentially baited. For that, multiple choice field tests between trap designs were performed in two apiaries located in and near Bordeaux city. Asian and European hornets, honeybees and non-target insects were monitored and baits replaced three times per week. The most effective trap model captured up to 400 hornets per week and this number increased with the concentration of the bait. We currently test if this trap could be used to monitor spring nest funding queens.

132

Review on *Vespa orientalis* research in Jordan

Nizar Haddad*, A. Bataeneh, S. Fuchs

* Bee Research Unit - NCARE 19381 Baqa' Jordan, drnizarh@yahoo.com

The oriental hornet, *Vespa orientalis* F., is distributed throughout most areas of Jordan (Haddad 2001). It is also found in southern Europe, northeast Africa, and southwestern Asia including India (Bodenheimer F.S. 1951). The hornet wasps are known to prey on various insect species, but show a marked preference for honeybees and are thus considered an apicultural pest. It causes damage by destroying beehives and by reducing or even inhibiting the flight of the bees (Blum 1956). We investigated the influence of wasp predation on the bees' flight activity. We could show a clear reduction of flight activity in the presence of a tethered *Vespa orientalis* at the flight entrance in both *A. m. syriaca* and in imported *A. m. ligustica* (?) honey bees. However, this predation avoiding behaviour

was much stronger expressed in the local honey bee of Jordan. During a study on the control of the oriental hornet wasps, we noticed the presence of small larvae and pupae within the cells and small wasps throughout the nest of the oriental hornet. Specimens of these were sent for identification to Oberursel, Germany where they were identified as an ichneumoid wasp *Sphecophaga vesparum* Curtis. Possibly, this Parasitoid could be helpful in the natural control of *V. orientalis*. In a study on the reduction of wasp predation by trapping or poisoning we investigated different baits. *Vespa orientalis* showed a very clear preference for the beef meat in comparison to chicken meat or conserved fish. We thus recommend the use of beef meat as a bait to control the *Vespa orientalis*. Further work need to be done on the pesticides and the there mixing with the meat.

133

Defending the nest against its archenemy: The Cyprian honeybee *Apis mellifera cypria* confronting the Oriental hornet *Vespa orientalis*

Alexandros Papachristoforou*, A. Rortais, J. Sueur, G. Arnold

* Laboratoire Evolution, Génomes, Spéciation, CNRS UPR 9034, 91198 Gif-sur-Yvette, France,
Université Paris-Sud 11, Orsay, France, Alexandros.Papachristoforou@legs.cnrs-gif.fr

In the present study, we examined several characteristics of the defensive behaviour of the Cyprian honeybee *Apis mellifera cypria* during natural or simulated attacks by its main enemy, the oriental hornet *Vespa orientalis*. To monitor the defensive behaviour of numerous individual colonies against hornets, we recorded and analysed the movement of defending honeybees at the entrances of the beehives, their defensive patterns and the sounds they emit during conflict with hornets. We conducted experiments for four years and we analysed both year and season effects on hornets' predation and on honeybees' defensive behaviour. Results showed that Cyprus honeybees adopt original strategies that can be explained by the co-evolution between the prey and its predator in Cyprus, an isolated island with unique and hard environmental conditions.

134

Defence behaviour of *Apis mellifera* against the invasive Asian Hornet (*Vespa velutina*) in south-west of France

Mariangela Arca*, A. Papachristoforou, G. Arnold, A. Rortais.

* Laboratoire Evolution, Génomes, Spéciation, CNRS UPR9034, Gif-sur-Yvette, France, mariangela.arca@legs.cnrs-gif.fr

The recent, accidental introduction of the Asian hornet, *Vespa velutina* (Hymenoptera, Vespidae) in France has provided an excellent opportunity for studying the local honeybees (*Apis mellifera*) defence behaviour and its effectiveness against predation. In this work, field observations under natural and controlled conditions will be presented and discussed. The main objective is to describe precisely the honeybees' activity when exposed to the Asian hornet's attacks and determine their impacts on the colony. Digital image techniques have been used to acquire and analyse the data, allowing a quantitative description of the colony's activity, during the absence or presence of predation by hornets. The honeybees' responses and trends over time were analysed. These analyses were performed in different areas and apiaries including different races determined by morphometric analyses. These data will allow us to determine if some colonies and races are more efficient than others to survive from the hornet predation. The defensive mechanisms already observed in other areas where the pressure of honeybees' predation is high, e.g. in Cyprian honeybees (*A. m. cypria* confronting *V. orientalis*), may shed light on the patterns found in France.

135

APIBURG® - II. A mechanical protection of honeybee colonies from hornets and other intruders

Michael Ifantidis, Alexandros Papachristoforou*, Sebastian Spiewok, Spyridon Skareas
* Greece, Alexandros.Papachristoforou@legs.cnrs-gif.fr

The structure and function of the new type of APIBURG® II is described in this article. Preliminary experimental results from 2004 to 2008 using APIBURG® I demonstrated significant reduction of the invasion in the honeybee colony of wasps. Recent results were carried out during 2008 and 2009 to assess the efficacy of APIBURG® II, against *Vespa velutina* in France and *Vespa orientalis* in Greece. In addition, results from experiments during the last five years, demonstrated a high trapping efficacy against the small hive beetle *Aethina tumida*, (SHB) and against the mite *Varroa destructor*. Since the device requires no extra bait than the natural permanent-emitted scent of the colony, its application could become very advantageous for the control of *V. velutina*, *V. orientalis*. Trapping of other invaders of a lesser or of no significance for the "prosperity" of the honeybee colony are also mentioned. Possible adverse effect of APIBURG® (in general) on the honeybee colony is discussed and the proper manipulations to avoid them effectively are suggested.

136

Genetic characterization of the invasive populations of *Vespa velutina* in France

Mariangela Arca*, C. Capdevielle-Dulac, C. Nadeau, C. Villemant, G. Arnold, J.F. Silvain
* Laboratoire Evolution, Génomes, Spéciation, CNRS UPR9034, Gif-sur-Yvette, France
mariangela.arca@legs.cnrs-gif.fr

The Asian hornet, *Vespa velutina* (Hymenoptera, Vespidae), is a dominant predator of honeybees *Apis mellifera* and its accidental introduction in France from Asia is causing important damages on the local honeybees population. The study of the genetic variability between individuals of *V. velutina* from France and Asia is necessary in order to describe accurately the history of the invasion of *V. velutina* and estimate its potential geographic expansion in the future. To achieve this aim, three mitochondrial markers (one that allows a specific characterization of the invasive population) and seven nuclear microsatellite loci have been used. Mitochondrial homogeneity observed in French samples (only one haplotype for each marker) supports the hypothesis of a single introduction event. The haplotypes present in France for each marker were searched in the area of origin. The first analysis highlighted that specimens from Indonesia and Vietnam possess haplotypes different from the French population. The analysis of the microsatellite allelic frequencies has evidenced a strong consanguinity among the invasive population, which may indicate a single introduction of one or more queens. The sampling of specimens in France and in the area of origin will be extended to confirm this hypothesis. Further studies will focus on samples coming from China with the aim of determining the exact origin of the Asian hornet.

SYMPOSIUM BEE SHOP

137

Bee shop - A European research network

Robin F.A. Moritz*
* Hoher weg 4 D 0609 Halle Saale Germany, robin.moritz@zoologie.uni-halle.de

Honey is among the oldest food products of mankind and beekeeping is deeply rooted in every European culture.

Numerous European and national regulations control honey quality. Yet in an environment with increasing pollutants, honey runs high risks of becoming chemically polluted. In addition a broad spectrum of chemicals is used to treat honeybee diseases, further contaminating honey with sometimes highly toxic compounds. BEE SHOP is a European research network funded by the European Commission, composed of research groups in Bologna (Italy), Dol (Czech Republic), Gif-sur-Yvette (France), Halle/Saale (Germany), Hohenheim (Germany), Murcia (Spain), Uppsala (Sweden) and Belfast (UK). To reach the goal BEE SHOP's focus is on:

- Disease resistance in various European honeybee races to pests and pathogens to avoid chemotherapy.
- Differences in foraging behaviour and its underlying mechanisms among European honeybees to identify behavioural traits reducing contamination.
- Analysis of antimicrobial properties of plant and bee derived compounds in bee products to evaluate the impact of honey quality on disease prevention.
- Inspections of honey according to the current EC directives on honey quality and organic beekeeping based on the new honey analysis methods.
- Genetics of disease susceptibility analysed by QTL mapping based on honeybee genome to find causative loci.
- Selection of specific target genes through the development of SNPs to establish swiftly resistant but efficient stock.

The presentation will introduce to the actual scientific products of the network showing how the concerted effort of the partners achieved more than any individual partner could have achieved on his own.

138

Phytochemicals as markers of the floral origin of honey

Katarina Tomas-Barberan*, P. Truchado, A. Allende, L. Bortolotti, A.G. Sabatini, J. Simuth

* fatomas@cebas.csic.es

Phytochemical analysis has been proposed as a potentially useful objective method to help other classical methods in the determination of the floral origin of honeys and in the detection of frauds regarding the labelling of unifloral honeys. In the BEESHOP project we have combined the use of advanced analytical methods, such as HPLC-MS-MS, and classical methods for the determination of the floral origin (sensory, physicochemical and pollen analyses), with the analysis of floral nectar phytochemicals in order to advance in the development of new methodologies for the quality control of unifloral honeys. Samples from unifloral honeys produced in different European countries were extracted and analysed using the classical methods for flavonoid extraction using Amberlite XAD-2 filtration and ethyl ether recovery. All these samples contained the characteristic flavonoid aglycones present in propolis from temperate areas (chrysin, galangin, pinocembrin, pinobanksin, and methyl and dimethyl ethers of quercetin, kaempferol, luteolin and apigenin) as well as the caffeoyl derivatives (phenyl-ethyl caffeate, dimethyl-allyl-caffeate, etc.). In addition, some specific compounds related to the floral origin had been detected (hesperetin, abscisic acid, ellagic acid, kaempferol, tricetin, luteolin, myricetin, etc.). All these potential markers were phenolic compound aglycones with rather lipophilic nature. In previous studies it has been suggested that these markers differed from the compounds present in nectar, in which the nectar glycosides were hydrolyzed by the bee saliva enzymes to yield the corresponding aglycones. During the course of the present project, the analysis using HPLC-MS-MS, has shown that honey also contain glycosidic combinations of flavonoids, similar to those found in the floral nectar. This finding enlarges considerably the number of potential markers for the determination of the floral origin of honey. In fact, in Robinia honey, a number of different kaempferol rhamnosides was detected and they also were detected in Robinia floral nectar. In citrus honey, the presence of hesperetin and naringenin rutinosides (rhamnosyl-glucosides) was also detected, in addition of the previously reported hesperetin. A number of different glycosidic combinations of flavonoids had been detected in honeys of different floral origins. Some of the nectars that contain mainly flavonoid glucosides, as is the case of Eucalyptus nectar, only render flavonoid aglycones in honey. Thus Eucalyptus honey only contains methyl-myricetin, tricetin, quercetin, kaempferol, luteolin and apigenin, showing that all the floral nectar glycosides had been hydrolyzed by the enzymes present in bee saliva. This is consistent with the presence of glucosidases in the bee saliva, and the lack of other glycosidases activity such as rhamnosidases, galactosidases, etc. .../...

Royal jelly proteins as a new class of physiologically active proteins with immunostimulatory and antimicrobial properties

Katarína Biliková*, Hans Lehrach, Jozef Šimúth

* Dubravská cesta 21 SK-845 Bratislava Slovakia, katarina.bilikova@savba.sk

Royal jelly (RJ) proteins are one of the determining therapeutic effectors of honey and royal jelly. We have found that honey and bee pollen contain RJ proteins with dominance of apalbumin1 - the major protein of RJ. The recent discovery that RJ proteins may have physiological functions as suppressors of allergic reactions, their anti-hypertensive and proliferation stimulatory properties confirmed scientifically the justness of applications of honeybee products in apitherapy. We have found that apalbumin1 and apalbumin2 stimulate production of TNF- α cytokine in mouse macrophages. This immunostimulatory effect is significantly increased even after a limited proteolytic digestion and the N-terminal region of apalbumin1 molecule markedly elicits release of TNF. Moreover, the data from our ongoing experiments show that the stimulatory effect of honey with regard to the production of cytokines is based on its RJ protein content, primarily on apalbumin1. We have purified a novel minority protein from RJ, named as apalbumin2a, differ from maternal apalbumin2 in M_r (48,6 kDa), N-terminal amino acids sequences, N-linked glycans and for first time it was found that apalbumin2a inhibit growth of *Paenibacillus larvae*, the primary honeybee pathogen of American foulbrood disease (Biliková et al. Proteomics, in press). The obtained data call attention to functional plasticity of RJ proteins with potential impact on apidological research, as well as in the field of drugs development, namely therapeutic application of RJ proteins.

A new view on honeybee defence system based on own proteinous antibiotics and phytochemicals

Jozef Šimúth, Katarína Biliková*, Hans Lehrach

* Institute for Molecular Biology, Slovak Academy of Sciences, Dúbravská cesta 9, SK-84238 Bratislava, Slovakia, katarina.bilikova@savba.sk

We present experimental data showing that honeybee colony is armed against pathogens with effective exogenous defence system (EDS) based on multifunctionality of royal jelly (RJ) proteins and physiologically active phytochemicals (plant antimicrobials) present in nectar, pollen and propolis. Our investigations showed that the RJ proteins have direct antifoulbrood and antifungal effects. At the same time, before the onset of bacterial infection, RJ proteins induce cytokines responsible for activation of the genes of antibiotic peptides. We have found that propolis contains substances with antiviral activity and ability to inhibit a key enzyme of gene expression, the DNA-dependent RNA polymerase, through blocking its binding to the promotor of a given gene. The EDS is a unique defensive mechanism of honeybee colony against pathogens and multiplied the innate and adaptive immune response of honeybees and could be explain why the honeybee genome encodes only one third of antibiotic proteins implicated in insect immune pathways when compared to other insect genomes. The knowledge on the molecular and the biological properties of antibiotic peptides in larval nutrition is significant for beekeeping. Since, even today, we do not yet know all details about the genes of resistance or tolerance of diseases in honeybees to the extent required by practical beekeeping, we have to work with the facts so far revealed by research: the more own immunostimulators and antibiotics will be produced by honeybees, the less chemotherapeutics will be required for beekeeping and the less chemical residues will be found in honey.

Variance of the reproduction of the parasitic mite *Varroa destructor* and its significant for host resistance at the individual level

Peter Rosenkranz*, Eva Frey, Richard Odemer, Florence Mougél, Michel Solignac, Barbara Locke, Ingemar Fries

* University of Hohenheim, Apicultural State Institute, 70599 Stuttgart, Germany, peter.rosenkranz@uni-hohenheim.de

Varroa destructor is still the most dangerous threat for beekeeping in Europe and responsible for a substantial part of colony winter losses. Therefore, the evaluation of resistant factors of the host is a major challenge for research projects. Within the EU project "BEESHOP" we focused on *Varroa* reproduction as one of the few host traits acting on the individual level. Three major aspects were analyzed:

- Variance in mite reproduction within the major honey bee subspecies in Europe.
- Activation of *Varroa* reproduction by volatile host factors.
- A comparative genetical analysis of drone larvae with and without *Varroa* reproduction. Thereby we took advantage of the specific sex determination system in honey bees where the haploid drones are genetically easy to study.

Only 10 -20 % of *Varroa* females in single infested brood cells were infertile (= do not lay eggs). There are some variations between individual colonies and observation dates but no significant differences related to subspecies or to the sex of the larvae. Similar results were obtained for the fecundity of *Varroa* females. By the use of a new bioassay we could prove that extracts of freshly capped larvae are essential for the initiation of the *Varroa* reproduction. 24 hours later the larvae could not activate reproduction anymore. Significant differences in the pattern of cuticular compounds could be verified for the polar and non-polar fraction of larval extracts. The extreme dependence of the *Varroa* reproduction on a specific pattern of the larvae may be a trait which can be used by the host for the suppression of mite fertility. The drone larvae with and without reproduction were mapped with microsatellite markers using bulked segregant analysis. The first results of this screening are presented and discussed.

Prevalence and seasonal variations of four more bee viruses in *Apis mellifera* and *Varroa destructor* mite populations in France

Joachim de Miranda*, Magali Tournaire, Robert J. Paxton, Laurent Gauthier

* PO Box 7044 750 07 Uppsala Sweden, joachim.de.miranda@ekol.slu.se

This study continues the survey of bee viruses in adult bees, pupae and mites of colonies in 36 French apiaries, sampled in spring, summer and autumn of 2002. These samples were previously assayed for DWV, SBV, BQCV, ABPV, KBV and CBPV. We added new assays for SPV, VaDV, VdMLV, IAPV and a more discriminating assay for KBV. SPV was not detected in any of the samples. VaDV was present only in a few samples, showing a distinct distribution from DWV. VdMLV was present in all mite samples and many bee samples, with an increased prevalence in autumn, confirming it as a significant new virus in bees and mites. IAPV is distinctly more prevalent in the adult samples than in the pupal or mite samples, in all seasons, suggesting that it is primarily an adult pathogen. The IAPV distribution coincided with the KBV distribution of the first survey while the new KBV assay produced a far sparser distribution. Phylogenetic analysis confirmed that the original KBV assay had amplified what is now known as IAPV. This analysis also re-classified a number of historic and recent KBV isolates as IAPV, and several recent IAPV isolates as KBV. These re-classifications underscore the importance of accurate primer design for specific diagnosis, and the need for prudence in assigning names to viruses. In particular, the primers designed by Stoltz et al. in 1995 for KBV diagnosis should no longer be used, since they cannot distinguish between KBV and IAPV.

143

Mapping Genes for honeybee disease resistance: American Foulbrood and *Varroa destructor*

Dieter Behrens*, Florence Mougel, Eva Frey, Conny Geßner, F. Bernhard Kraus, Ingemar Fries, Peter Rosenkranz, Robin F.A. Moritz, Michel Solignac

* Martin-Luther-Universität Halle-Wittenberg, 06099 Halle/Saale, Germany, dieter.behrens@zoologie.uni-halle.de

The sequencing of the honeybee genome (*Apis mellifera*) has revealed a reduction of immunity related genes compared to other insects (e.g. *Drosophila melanogaster*, *Anopheles gambiae*), which is surprising since highly social insects are especially prone to pathogens and diseases. It is yet unclear, whether new genes have evolved in honeybees or whether other genes have shifted their function to replace those found in other insects, or whether behavioural defences of the colony replace individual immune defences. In order to identify immunity related genes, both expression and mapping studies are necessary to find target and regulatory genes of immunity pathways. Within the BeeShop we aim to identify genes involved in individual larval resistance against two important honeybee pests, namely the bacterium *Paenibacillus larvae*, causing the brood disease American Foulbrood (AFB), and the parasitic mite *Varroa destructor*, which is an important vector for many viral diseases in honeybees. Therefore we conducted bio-exposure assays on drone larvae of single genetic origins, followed by QTL mapping approaches on the observed resistance phenotypes. By using haploid drones we obtain a tight linkage between the genotype and the phenotype of an individual, resulting in a clear segregation of individuals carrying alternative alleles of the mother queen at major resistance loci. By comparing offspring of a single queen we reduce the variation within our sampling populations. For both diseases regions of interest have been found containing possible resistance genes. Candidate genes will be discussed.

144

European honeybees: A deep red species on the list

Rodolfo Jaffé*, Ingemar Fries, Robert J. Paxton, Anna-Gloria Sabatini, Robin F.A. Moritz

* rodolfo.jaffe@zoologie.uni-halle.de

The demography of the western honeybee (*Apis mellifera*) has not been considered by conservationists, since it is biased by the activity of beekeepers. Aiming to provide a broad picture of the current status of European honeybees, we employed genetic markers to estimate colony densities and genetic diversity in locations with varying patterns of land use. Genetic diversity and colony densities were positively associated with mean annual temperature, being lowest in Northern Europe. Honeybees sampled in nature reserves showed similar genetic diversity and colony densities as those sampled in agricultural landscapes. Moreover, putative wild bees were rare in our samples, and the mean estimated density of honeybee colonies in the continent closely resembled the reported mean number of managed hives, suggesting that European honeybee populations are mainly composed of managed bees. Our findings highlight the importance of reconsidering the conservation status of honeybees in Europe, and of regarding responsible beekeeping as an essential component of biodiversity conservation.

145

10,000 years in isolation: The DESERT honeybees of Al Kufrah

Taher Shaibi*, Robin F.A. Moritz

* Martin-Luther-Universität Halle-Wittenberg, 06099 Halle/Saale Germany, taher.shaibi@zoologie.uni-halle.de

After the transition from a savannah to a desert about 10,000 years ago, the isolated Saharan oases offer a unique case for studying the effect of population fragmentation and isolation in honeybees, *Apis mellifera*, over a period of many thousand years. Honeybees are particularly sensitive to drift and bottlenecks due to loss of sex alleles

and the genetic load associated with the sex determination system. We compared the non-fragmented coastal population with the oases of Brak and Kufra using 15 polymorphic microsatellite loci assessing the mating frequency, colony density, gene diversity, and population differentiation. The results showed that although the honeybee populations of Kufra represents a well isolated populations, it suffers no inbreeding and the levels of heterozygosity H_e were not smaller than those observed at the coastal regions. We also show how migratory beekeeping interferes with the honeybee population in Brak.

146

Beekeeping management for Sustainable Apiculture

Dalibor Titera*

* BRI Dol, Czech Republic, beedol@beedol.cz

Basic beekeeping technologies have been shown to reduce pathogen load without the application of chemicals. They were however usually inefficient as a sole therapy, and were primarily employed to assist medication but could not cure colonies from pest and pathogens. Typically the bee-keeper only intervenes after a disease has been clinically diagnosed, often too late to save the colony. The BEE SHOP Extension Department developed preventive management steps to reduce the risk of infections before they occur. Some basic methods of apiary hygiene are well known but still not routine in many countries. There are two approaches: measures to increase the individual robustness of colonies, and the prevention of pathogen distribution between colonies and apiaries. BEESHOP's Extension Department evaluated the significance of such hygienic concepts for their feasibility in practical and commercial beekeeping and traced the spread of infections in collaboration with the Pathology Department. A close collaboration with the selected beekeeping operations, which provided their apiaries for the evaluations of practical feasibility proved essential for this study. The possible links between management and incidence of diseases have been evaluated in field assays.

POLLINATION AND BEE FLORA COMMISSION - SYMPOSIUM N°1 "CAUSES AND IMPACTS OF THE DECLINE OF THE HONEYBEE AND OTHER POLLINATORS AND RECOMMENDED MEASUREMENTS"

147

Survey on the regional bee population

Gottfried Lackner*

* Siedlerweg 8a 9800 Spittal Austria, dr_lackner@hotmail.com

Survey on the regional bee population:

- Why? (Pollination achievement by bees is substantially for the ecological system);
- How? (Collection of the data from the reports of the beekeepers to beekeeping associations and municipalities - comparison of the actual conditions with data starting from 1947 to today - cartographic representation by means of GPS coordinates);
- Consequence: Inquiry on the connection between more or less pollination of flowering plants (anthophyta) and their effects on the ecological system (agriculture and forestry - firmness of the soils [slope slips, mudslides] - climate).

148

The Brazilian Pollinators Initiative ten years after the S. Paulo Declaration on Pollinators

Vera Lucia Imperatriz Fonseca*

* Ecology Department - R. do Matão Trav. 14 321 05508- São Paulo Brazil, vlifonse@ib.usp.br

The Brazilian Pollinators Initiative (BPI) followed the framework established by the International Pollinators Initiative (IPI) in 2002. The Brazilian Government, through the Ministry of Environment, considered this program as a part of the activities developed in an Interministerial scale and provided some financial support for a preliminary research on the pollinators of certain crops. Brazil also participated actively in the effort for a global GEF project, recently approved, Conservation & Management of Pollinators for Sustainable Agriculture through an Ecosystem Approach. Brazilian Pollinators Initiative is characterized by actions of different stakeholders that activate and develop parts of the framework defined by the International Pollinator Initiative. Of course people are encouraged to perform these activities by the focal point of the BPI and other leaderships of the program, as well as a result of increased awareness of the role of pollinators as ecosystem services providers. The Brazilian Pollinators Initiative is formed by several actors of civilian society, which construct the bases of the activities to allow the sustainable use and conservation of Pollinators and Pollination. A new synthesis of the knowledge on pollinators is under preparation, supported by the National Council for Scientific and Technological Development, and guidelines for future research priorities defined by local scientists. The main achievements will be presented.

149

Impact of climate change on European pollinators

Stuart Roberts*, SG Potts

* Centre for Agri-Environmental Research (CAER), School of Agriculture, Policy and Development, University of Reading, RG6 6AR, UK, s.p.m.roberts@reading.ac.uk

Published information on the possible effects of climate change on bees is currently limited to just a few species. The EU-funded ALARM project has developed cross-cutting links between pollination and climate change experts to provide a quantitative assessment of the projected shifts in bees under several possible future climate change scenarios. One study has looked at the potential risk for a group of bees with highly specialised pollen-foraging strategies in the genus *Colletes*, to become spatially uncoupled from their sources of forage. Another study has looked at a much larger suite of species for which detailed pan-European distribution and range data are available. Range reconstructions using Bayesian techniques have been made and climate change scenarios applied. By using aggregated data it has been possible to predict the extent of biome shifts and also identify which groups of species are more likely to become threatened or endangered as a result. Future land use strategies for species conservation will increasingly rely on such modelling approaches in order to ensure bees and their habitat requirements are protected under climate change.

150

Invasive plants affecting native pollinators

Nacho Bartomeus*

* Spain, nacho.bartomeus@gmail.com

Invasive species are those species transported and introduced by humans outside their natural range that are established and dispersed widely in the new habitats with potential alteration of the new ecosystems. Pollination is an ecosystem service of especial value due to its economic and ecological importance. Thus, the understanding of how invasive species could disrupt this process is crucial for conservation biology. Invasive plants are able to

compete with other plant species for natural resources, change the soil properties or the disturbance regimes. Moreover, as most invasive plants are highly attractive and offer good rewards to pollinators, they can monopolize the available pollinators, reducing native plants visits. However, an alternative hypothesis could be that the invasive plants could attract more pollinators to the area, facilitating somehow native plants' pollination. We tested this hypothesis by studying two invasive plants in the Cap de Creus Natural park, in north-east Spain, and we found that the competition for pollinators with native plants depends on the context. We found competition for pollinators in the case of *Opuntia stricta*, whereas facilitation for *Carpobrotus affine acinaciformis*. In the case of *C. aff. acinaciformis* we checked that the invasive pollen has very little chance of interfering with the reproduction of native plants and was deposited in very low frequency in the stigmas of native species. From the pollinators point of view, we can observe that invasive plant species has the potential to attract pollinators to an area, increasing its local densities. We tested this in riparian areas invaded by *Impatiens glandulifera* in central Germany. We compared the relative importance of the invasion and the agricultural mass-flowering crops on the bumblebee densities. We found that the invasion could modulate the agricultural context effects, enhancing the bumblebee densities in the area. Plant-pollinator networks are complex and involve large numbers of interactions, so it is difficult to predict the impact of invasive species. However, the fact that the three studied plants produced different changes in the communities raises the importance of understanding the whole invasion process.

151

Bee pollen loads to study climatic change: melissopalynol. and aerobiol. Data, emphasis *Olea europea*

Maria Dimou*

* Agroklima Panepistimiou 57001 Thessaloniki Greece, mmmsj@hotmail.com

The timing of phenological events and especially flowering is strongly affected by meteorological factors and consequently climatic changes. In the last few years, many studies have used airborne pollen as an indicator of climatic change. However, the airborne pollen found in the traps does not always originate the taxa or reflect the flowering period of the taxa from the studied surroundings. In this research project we studied the use of melissopalynological analysis of honeybee pollen loads to record the flowering period of *Olea europea* by comparing the results to those from an airborne pollen trap located the same area. The results demonstrated that the study of honeybee pollen loads could be used as an alternative and more accurate method to airborne pollen traps in order to record the phenological flowering phases of the plants and consequently climatic changes.

152

The strange case of *Phacelia tanacetifolia* Bentham (*Hydrophyllaceae*)

Andrea Mengassini*, Monika Marta Grygielewicz

* Via delle Betulle 118 00171 Rome Italy, info@dnapiab.it

Phacelia tanacetifolia is a nectar-providing plant largely used in beekeeping and it is recognized as one of the best melliferous plants in nature. It offers prolonged flowerings for 4-8 weeks after the seeding and it is appreciated for its melliferous potential and the high nutritional quality in pollen. The present work aims at underlining some connected agronomic problems with this plant organism and with its intensive use in the field, such as the apiary. Particularly, our study conducted in two different areas (site A, site B) allowed us to sample several entomopopulations attracted by the action of colours and the secondary metabolites of the plant in bloom (during April). Out of the diagnosed entomological species, we collected several samples, having a typical role as infesting agent. These species were not detectable in the areas previous to *Phacelia* cultivation, suggesting a possible notable impact on crops and spontaneous floras or a possible increase of agronomic and forest damages. Besides, the *Phacelia* is a host of two phytopathogen fungi, *Sclerotinia minor* (Leotiomyces) and *Phytophthora infestans* (Oomycetes), agents of the crown rot and the black root rot, respectively. We detected sclerotia of *Sclerotinia* and we found them

on bristles and hairs of the sampled insects in site B; it suggests a possible ecologically successful mechanism of entomological dispersal and therefore of horizontal mycosis transmission spread from insects to plants on the territory. These data collected in the period of flowering of *Phacelia tanacetifolia* underline the necessity of an extreme caution in its use in the apiaries, for the possible damages caused to the surrounding agro-ecosystem.

153

Does open-nesting honeybee species exhibit differential pollen collection?

Narayanappa Nagaraja*

* UGC Academic Staff College 560 00 Bangalore India, nagaraja@bub.ernet.in

Studies on performance of *Apis dorsata* and *Apis florea* in respect of area of pollen stock, number of pollen collectors and pollen load carrying capacity were carried out from January to December 2008. The experiments were conducted in the colonies of *A. florea* and *A. dorsata* located at Central College Campus of Bangalore University and Government Polytechnic building at Krishna Rajendra Circle, Bangalore respectively. The observations revealed that, comparatively, *A. dorsata* colonies stored significantly greater quantity of pollen stores than *A. florea* colonies ($P < 0.01$). Similarly, greater pollen stores were recorded during March and April followed by October and November of the study period. The foragers of *A. dorsata* and *A. florea* gathered pollen throughout the day but the former showed peak pollen collection at 9.00 hrs. and the latter at 11.00 hrs. of the day. However, the foragers of *A. dorsata* carried heavier pollen loads than those of *A. florea*. The results explore that, the open-nesting honeybee species show differential pollen collection and *A. dorsata* is a better pollen collector than *A. florea* under similar floral conditions.

154

Melissopalynology and chemical analyses of *Robinia pseudo-acacia* honeys from Hungary

Zsófia Medzihradszky*, Zoltán Herpai; Ágnes Korbonski

* Hungary, medzi@bot.nhmus.hu

During the last two years more than 5000 black locust honey samples – according to the definition of the beekeepers – were analysed by melissopalynological method. The aims of the palynological study were: 1) to determine the *Robinia* pollen content in the samples; 2) to identify the most significant secondary pollen type(s) depending on the geographical origin, on the natural or artificial plant communities and on the annual weather conditions; 3) to find some special but maybe sporadic pollen taxa which are characteristic to the certain areas and/or communities. The percentage of *Robinia* pollen moved from 8 to about 50%, but in some cases higher (68%) values were detectable. The most important secondary pollen type was the rape (*Brassica napus* L.), tree of Heaven (*Ailanthus altissima* (Miller) Swingle), and fruit trees (*Prunus* spp.). From the huge amount of studied honey types samples were selected for chemical analyses from the whole sequence of the *Robinia* pollen data set based on the results of the pollen investigations. The water content was between 17.5–23.5%, the saccharose between 7–15%. The diastase activity was relatively low, 6–12 DN. The average of the fructose/glucose ratio was about 1.53. The area of Hungary despite the size of the country is very diversified both climatic and botanical point of view. Placed our data on a map we try to follow the features of honey samples against the geographical origin and the annual weather of the region.

Characterisation of Species and Population of Bumblebees (*Bombus*, Latreille And *Psithyrus*, Lepeletier) in Slovenia based on Morphological and Molecular Markers

Peter Kozmus*, Vladimir Meglic, Meta Virant-Doberlet

* Agricultural Institut of Slovenia, Hacquetova 17, 1000 Ljubljana, Slovenia, peter.kozmus@kis.si

Bumblebees (Hymenoptera: *Bombus*) are an indispensable part of natural environments, especially because of their role in the pollination. In the last decades many bumblebee species have declined, especially in the area with intensive farming. We try to analyze the bumblebee population in Slovenia and characterize all species by conducting investigations. Samples for analysis were collected over entire Slovenia. According to our results *B. pascuorum*, *B. lapidarius*, *B. hortorum*, *B. lucorum* and *B. humilis* are the most widely spread species in Slovenia. Morphological characterization based on identification keys is not an appropriate method for determination of all species; therefore we used a novel approach based on wing venation analysis. We found that the species statistically differed in wing venation structure by which it is possible to distinguish and determine them. Specimens which were not characterized into right species were defined using sequence analysis of region COI of mtDNA and the presence of 20 species was confirmed. In some species we also found more than one haplotype (6 in *B. terrestris*, 4 in *B. lucorum*, 2 in *B. pascuorum*, 2 in *B. lapidarius* and 2 in *B. sylvarum*). Species which are present all over Slovenia are included in microsatellite analysis investigated within species genetic variation. Species *B. humilis* were the least variable, *B. hortorum* and *B. lapidarius* were the most. Wing venation analysis, analysis of COI sequence and microsatellite analysis indicate that imported colonies are different from native populations of *B. terrestris*.

Melliferous and polliniferous resources in an urban area: Saint-Denis (Surburban area of Paris)

Yves Loublier *, Monique Morlot, Agnès Rortais, Gérard Arnold, Patricia Beaune, Régine Lurdos, Florence Britis

* CNRS LEGS, BP1, Bât 5 avenue de la Terrasse, 91198, Gif-sur-Yvette, France, yves.loublier@legs.cnrs-gif.fr

This project, supported by the Departemental Council of Seine-Saint-Denis and by the Region Ile-de-France within the network R2DS (Réseau de Recherche sur le Développement Soutenable) is carried over three years (2007-2009). We describe the results of the first two years. For pollen loads, Brassicaceae, *Reseda* and *Hedera* were found both two years with comparable data for quantities and time period foraging. *Buddleja*, Rosaceae and *Plantago*, foraged both two years, show a longer exploitation during the end of 2008 summer. *Parthenocissus* was foraged only in 2008, *Begonia*, *Castanea* and *Sophora* only in 2007. For honey, no differences between the two years : polyfloral honey with Brassicaceae and *Castanea* as predominant pollen, *Aesculus*, Rosaceae, Rhamnaceae, *Ailanthus*, and *Buddleja* belongs to accompanying pollen or important isolated pollen. Floral diversity, twelve taxa were found with a very high abundance : Brassicaceae, *Sophora*, Rosaceae, *Castanea*, *Buddleja*, t. *Sinapis*, *Hedera*, *Parthenocissus*, *Echium*, *Reseda*, t. *Brassica* and *Plantago* t. *lanceolata*; two taxa with a high abundance: *Plantago* t. *coronopus* and *Begonia*. A larger number of taxa were found as a medium abundance among the forty-nine we have: *Sambucus*, *Chelidonium*, Rosaceae, Papaveraceae, *Echium* ... and with a low abundance for 46 taxa : *Solanum*, t. *Deutzia*, t. *Gazania*, t. *Ceratostigma*, Scrophulariaceae, *Bryonia*. Besides urban species as *Sophora*, *Ailanthus*, *Magnolia*, *Liriodendron* and *Buddleja*, introduced plants such as *Begonia*, *Gazania*, *Petunia*, *Ceratostigma* for the most common are urban markers.

Food sources of *Tetragonisca angustula* in fragments of Atlantic Rain Forest in Southeastern

Maria Cristina Lorenzon*, Juliana Almeida Braga, João Soares Neto, Marilena Silva Conde, Érika Sales, Monika Barth

* R Senador Vergueiro, 93, ap 810, Flamengo 22.230 Rio de Janeiro Brasil, lorenzon_ufrj@yahoo.com.br

Regarding the development of strategies for rational exploitation of stingless bee species and such relations on their forager behaviour it becomes necessary to know what plant species are used as resources by these bees in a specific area. The aim of this survey was to identify the plant species most visited by *Tetragonisca angustula* (Jataí bee) and their pollen types. The study was carried out in the ocean-side Atlantic coast, south-eastern Brazil. The vegetation of the study sites lies in the Atlantic Rain Forest and largely supports a closed-canopy forest. Over nine months bee sampling was haphazard monthly whenever flowering plants in the understory (about 7 meters) were encountered, considering as far as possible the overall abundance. In the study of pollen grains for the reference material the acetolysis method was used. There were 25 plants visited by Jataí bee. Among them stand out *Allophilus* species, *Schinus molle*, *Tradescantia zebrin*, *Reisbeckia smilacina*, *Myrsine coriacea*, *Psidium guajava*, *Solanum aculeatissimum*, *Wedelia paludosa*, *Tapirira guianensis*, *Baccharis dracunculifolia*, *Schilozobium parahyba*, *Inga edulis* and *Solanum asperolanatum*. Asteraceae was the plant family that showed greater diversity, among them *Albertina brasiliensis* presented the highest bee abundance. There were no marked differences between pollinic types, the particular differences are only present on the surface of pollen grains. This survey suggests a high value of the trophic niche width of Jataí bee in the understory of Atlantic Rain Forest.

BEE HEALTH COMMISSION - PLENARY SESSION

Veterinarians and honey bees industry in France: vets advisor, teaching working group

Monique L'Hostis*, Jean-Marie Barbançon, Nicolas Vidal-Naquet, Marc Edouard Colin

* Atlanpole - la Chantrerie - BP 40706 44300 Nantes France, lhostis@vet-nantes.fr

In the critical state of the bee today, we think that vets are few concerned actually and have to get more involved by using their training and skills towards this insect producer and collector, pollinator and environment's bio-indicator. Some vets are trying to act on different levels:

-Teaching: A post graduate education has been set up in the French vet schools. It is a 4 weeks course (biology, knowledge of the whole field, environment, pathology, sanitation police, chemistry regulations, consultancy report, and practice spans) allowing vets to become part of the sanitary management.

This training consists in:

- learning biological and technical fundamentals in production, including the organisation and economy of the apiarian channels,
- being able to analyse the technical and sanitary results of bee rearing specially by the professional beekeepers and to consider the relations with the agrosystem quality.

Such graduated vets can get involved on the job (advice and prescription) as part of the control of the apiarian livestock as well as in starting up and following research tracks through. The training could also be highly regarded by administrative management colleagues (assessment of medicine and fertilizers or herbicides). A working group has been set up by specialists in bee pathology who can exchange ideas about current events and to react on sanitary field situations in the frame of a dedicated blog "Apivet.eu". This group could become "a suggesting driving force" attached to our health services and to the structures already existing (trade unions, development departments...). Therefore, the recurrent theme of this group is to bring their experience together by means of a national network able to face any problem of bee health and environment immediately.

EU animal health requirements for the import (into the EU) and trade (within the EU) of bees

Pierangelo Bernaro*

* Italy

The small hive beetle is an exotic pest affecting honey bees that has spread from various African countries to a number of other third countries, thereby creating serious problems for the apiculture industry. An effective and safe treatment against this pest is at present not available. If introduced, the small hive beetle poses a risk to the sustainability of the apiculture industry in the Community, and hence to agriculture and the environment, owing to the resultant disruption of pollination. The *Tropilaelaps* mite (*Tropilaelaps spp.*) is an exotic pest of honey bees which is spreading in various third countries, thereby creating serious problems for the apiculture industry. If introduced, it could also have similar severe consequences for the sustainability of the apiculture industry in the Community. Pursuant to Regulation (EC) No 1398/2003, the presence of the small hive beetle and the *Tropilaelaps* mite in the Community is subject to compulsory notification through their listing under Directive 92/65/EEC. At present there have been no reports that either has been found in the Community. Apart from making the presence of these pests notifiable within the Community, it was necessary to lay down additional requirements for the importation of bees from certain third countries to limit the risk of introducing the small hive beetle and the *Tropilaelaps* mite into the Community, in the interest of protecting the Community's status as regards apiculture health. These requirements were laid down in Commission Decision 2003/881/EC of 11 December 2003 concerning the animal health and certification conditions for imports of bees (*Apis mellifera* and *Bombus spp.*) from certain third countries (see Annex I and II). .../...

Climate change: impact on honey bee populations and diseases

Yves Le Conte*

* 84914 Avignon France, leconte@avignon.inra.fr

The European honey bee, *Apis mellifera*, is the most economically valuable pollinator of agricultural crops worldwide and is crucial in maintaining biodiversity by pollinating numerous plant species whose fertilisation requires an obligatory pollinator. *Apis mellifera* is a species that has shown great adaptive potential, as it is found almost everywhere in the world and in highly diverse climates. In a context of climate change, the variability of the honey bee's life history traits as regards temperature and the environment shows that the species possesses such plasticity and genetic variability that this could give rise to the selection of development cycles suited to new environmental conditions. Although we do not know the precise impact of potential environmental changes on honey bees as a result of climate change, there is a large body of data at our disposal indicating that environmental changes have a direct influence on honey bee development. The potential impact of climate change on honey bee behaviour, physiology and distribution, as well as on the evolution of the honey bee's interaction with diseases will be discussed. Conservation measures will be needed to prevent the loss of this rich genetic diversity of honey bees and to preserve ecotypes that are so valuable for world biodiversity.

Colony losses: a global problem

Peter Neumann*

* Swiss Bee Research Centre, Agroscope Liebefeld-Posieux Research Station ALP, Schwarzenburgstrasse 161, CH-3003 Bern, Switzerland, peter.neumann@alp.admin.ch

In many countries, beekeepers are being regularly confronted with severe colony losses, showing a wide range of symptoms, including CCD (= Colony Collapse Disorder). Although such losses are long known, it seems as if they occur more frequently and with a higher magnitude in the past years. The ectoparasitic mite *Varroa destructor* certainly plays a key role but cannot explain the current major losses alone. Other less known factors and mechanisms must contribute. Since apiculturists and veterinary authorities are not aware of the underlying factors, they cannot apply efficient control measures. Moreover, the lack of hard field data on losses limits a better understanding of the causative factors. Common pathogens other than *V. destructor* (e.g. bacteria, fungi and viruses), environmental aspects (e.g. malnutrition, poisoning and inadequate management) and bee vitality/diversity constitute major suspects. Due to the ubiquitous mite *V. destructor*, interactions between pathogens as well as interactions between pathogens and other factors are inevitable and are most likely mechanisms contributing to the massive recent losses. However, these mechanisms are poorly understood. Moreover, novel factors such as *Nosema ceranae* further complicate the picture. Therefore, any attempts to adequately address the problem of recent major colony losses should include both novel factors as well as interactions between individual factors. The global COST supported COLOSS network will standardize approaches (e.g. for monitoring) and identify the factors at the individual honeybee and colony levels causing severe colony losses and investigate synergistic effects between them. This will enable the development and dissemination of emergency measures and sustainable management strategies to prevent large scale losses. For this purpose, leading scientists, beekeepers and industry from 35 countries will collaborate with complementary approaches. This worldwide approach will mitigate the detrimental impact of colony losses for beekeepers, agriculture and natural biodiversity.

Estimation of honeybee colony losses within professional beekeepers in France during winter 2007/2008

Fabrice Allier*, L. Bournez, A. De Boyer, V. Britten, P. Jourdan, I. leoncini, J. Vallon

*149 rue de Paris 75595 cedex 12 France, fabrice.allier@cnda.asso.fr

In recent years, professional French beekeepers have found an increase in winter honeybee colony losses (mortality, weakness, diseased or queenless). At the moment in France, neither monitoring nor survey was released in order to assess bee losses. That is why the Health Committee of the CNDP (Centre National du Développement Apicole) has undertaken an investigation into this issue during the winter 2007-2008 with a sampling of professional beekeepers. 168 professional French beekeepers (more than 150 hives) were randomly selected out of 782 beekeeping farms. Therefore, this survey includes 1358 apiaries and 62400 colonies. A questionnaire was sent to beekeepers. An average of 29.3% (IC95% = [26% - 32%]) of losses was recorded, ranging from 21 to 62%. The beekeepers estimated the mortality rates of colony during the winter 2005-2006 and 2006-2007 being 16.8% and 17.3% respectively. Some regions (North-East of France) were more affected than others. Dead colonies represented 50% of the losses, when queenless and diseased colonies were 14% and 8% respectively. The rest (28%) was weak colonies. Preliminary results for possible causes show that availability of food, strength of the colonies and Varroa pressure could explain partly the losses. A further analysis will give us results about the correlation between bee colony losses and the different variables studied, in which we find beekeeping practices for wintering preparation (Varroa treatment), colony background during the season, environment of apiary and colony poisoning due to pesticides (acute poisoning or depopulation). We intend to extend this national survey over several years to get a close monitoring of loss rate. We will be able, next September 2009, to show the first figures on bee colony losses during winter 2008/2009.

163

Small hive beetles and *Tropilaelaps* mites, real problems for beekeepers

Jeff Pettis*, Dennis Van Engelsdorp

* USDA-ARS Bee Research Laboratory, Beltsville, MD and Penn State University, State College, PA, USA,
jeff.pettis@ars.usda.gov

The European honey bee *Apis mellifera* has been moved around the globe as a commercial pollinator and for honey and wax production. Many pest and diseases of *A. mellifera* have been moved worldwide as well. Several exotic pests, e.g. *Varroa*, have jumped host becoming serious threats. The parasitic mite *Tropilaelaps* spp. has the potential to be a significant threat to European beekeeping. This mite has, until recently, been confined to South East Asia, the range of its natural host the *Apis dorsata* species complex. Similarly, the small hive beetle, *Aethina tumida*, has been confined to Africa but recently has made its way to the United States, Australia and limited reports from other areas. Why these pests have begun to broaden their range is unknown. Is it purely due to increased trade and movement by humans? Sampling methods for both species can be problematic and thus they may go undetected at low levels. We will explore the biology, behaviour and likely modes of introduction to assess the threat that these two pests pose to areas where *A. mellifera* are managed. Additionally, we will suggest sampling protocols for regulatory agencies that may help intercept these pests at ports of entry. Lastly, examples of pest invasion and negative impacts on beekeeping for both pests will be discussed.

164

Nosema ceranae, a new bee disease in Europe

Mariano Pascual Higes*, Raquel Martín-Hernández, Aránzazu Meana

* Apicultural Research Center. Honey Bee Pathology laboratory. Marchamalo, Spain, mhiges@jccm.es

Nosema ceranae was first detected in May 2005 in field samples from several geographical areas of Spain while developing molecular diagnosis for *N. apis*. Once detected, pathogenicity was also confirmed to *Apis mellifera* in experimental infections and studies focussed on different fields. Spanish beekeepers had been suffering unusual high colony losses in previous years and research on it was being carried out by Beekeeping Centre of Marchamalo in collaboration with public organisms (universities or other research centres). A retrospective analysis of data from beekeepers samples indicated a loss of seasonality in *Nosema* spore detection and a six-fold higher risk to suffer colony losses in those infected by *N. ceranae*. This microsporidium showed to be an emergent agent that colonized and spread in Spain, so its role on colony losses was included in a National Survey as well as others factors. Monitoring naturally infected colonies as well as data collected from professional apiaries showed that *N. ceranae* cause the collapse of infected colonies after more than one year. A long incubation period is characteristic in which no clear signs of disease are easily detected until loss of bees is evident and colony death happens. The presence of brood in winter, or a false recovery previous to death, are some of them. Experimental infection of bees after empirical observations confirmed the infectivity of corvicular pollen or regurgitated pellets of bee-eaters playing a role on the spreading of infection. The reliable molecular tools developed have also let us to confirm the wide spread of *N. ceranae* either in different countries as in different hosts as bumblebees.

165

The impact of Deformed Wing Virus on the queen honeybee fitness

Laurent Gauthier*

* France, gauthiel@supagro.inra.fr

Among the many RNA viruses which infect *Apis mellifera* L. colonies, the deformed wing virus (DWV) is one of the most prevalent. The wide distribution of this virus all around the world is linked to its close association with the

ectoparasitic mite *Varroa destructor* which is considered now as the major vector for DWV transmission. Besides, it was recently shown that DWV may be vertically transmitted from queen to workers. By using histological techniques we have shown that DWV is present in many tissues of the honey bee, not only in workers but also in drones and in queens. Specially, the detection of DWV RNA in queen fat body, which is an important tissue for the queen physiology, may contribute to impair the function of the queen in the colony. A survey was undertaken in France to address the question whether viruses may be responsible of the loss of queen quality that beekeepers regularly report. Among the 10 different bee viruses we screened by RT-PCR, 6 were detected in mated queen samples: the DWV, the *Varroa destructor* virus (VdV), the Black queen cell virus (BQCV), the Sacbrood virus (SBV), the Israeli acute paralysis virus (IAPV), and the Kashmir bee virus (KBV). DWV and VdV were found in most of the samples while BQCV and SBV were variable according to the origin of the samples. IAPV and KBV were scarcely detected. In parallel, honey bee queens were dissected and we identified tissue lesions in the germinal part of the ovaries. Viral particles were found in these tissues as well as typical patterns of cellular injuries caused by viral infections. Both DWV and VdV were identified in the queen ovaries.

166

The effects of imidacloprid and amitraz on immature honeybees (*Apis mellifera*)

James Ellis*, Tricia Toth, Mike Scharf

* Bldg 970 Natural Area Dr., PO Box 110620 32611 Gainesville, FL USA, jdellis@ufl.edu

The population of feral and managed honey bee colonies in the U.S. has declined steadily since the mid 1950's. These declines have been attributed to a number of causes including, but not limited to, pesticide exposure, parasite vectored pathogens, arthropod bee pests, and various stressors. Investigators agree that bee declines more likely are due to a mixture of two or more of these causes, but few investigations have been conducted on interactions between these factors. Researchers have focused on testing the effects of various pesticides on honey bee adult workers, queens, and drones. Effects of these chemicals on honey bee brood have not been investigated in detail. To that end, we explored how sublethal doses of imidacloprid and amitraz affect bee larval and pupal development. The data showed that larvae fed brood food laced with 5, 10, 40, and 80 ppb imidacloprid or 25, 50, 100, 200, and 400 ppb amitraz were significantly less likely to survive to adulthood. Larvae fed 25 and 400 ppb of amitraz were less likely to survive to defecate. In general, treated bee mortality was greater during pupal development than during larval development. We found no effects of imidacloprid or amitraz on larval time to defecation, larval weight at defecation, time to adult emergence, adult bee weight, or adult bee head weight. The understanding of sublethal effects of chemicals on developing honey bee brood can lead to better honey bee management and agricultural practices important for sustainable

167

Imidacloprid contaminates the pollen of seed-coated crops: A high risk for bees

Jean-Marc Bonmatin*, P.A. Marchand, M. Decoville, D. Locker, M.E. Colin, L.P. Belzunces

* rue Charles Sadron 45071 Orleans France, bonmatin@cnrs-orleans.fr

The systemic insecticide imidacloprid is used worldwide, especially for seed coating of crops. It is toxic by blocking nicotinic receptors of the central nervous system of insects. Concomitantly to its introduction in France, bee troubles have been extensively observed. Thus, a real risk assessment was required for this new class of insecticides: nicotinoïds. Consequently, the bio-availability of imidacloprid needed to be determined in fields sowed with treated seeds (sunflower and maize, particularly). We developed a very sensitive HPLC/MS/MS method to measure the contamination in soils, plants and in pollen. The method was fully validated, with a limit of detection of 0.3 ng/g and a limit of quantification of 1 ng/g. In soils, imidacloprid level have decreased with a DT₅₀ close to 9 months, leading the chemical to be still detectable during 2-3 years after sowing treated seeds. In crops, we have depicted the uptake of imidacloprid, from treated seeds to leaves and into flowers. The averaged

contamination is at 7 ng/g in flowers of both maize and sunflower. An extensive study of pollen has demonstrated that mean levels are at 2 ng/g in maize pollen and at 3 ng/g in sunflower pollen. Our data have also shown that such residue levels induce sub-lethal effects on bee feeding, in semi-field experiments. Moreover, when compared to the lowest level causing a significant increase of bee mortality after 10 days of chronic intoxication in laboratory experiments (0.1 ng/g imidacloprid in the food), the risk is high and severe. Thus, our results can be discussed in terms of direct impact on bee health and in terms of weakening of colonies. Obviously, such chronic intoxication of the beehive favours the development and effects of many pathogens or parasites (virus, nosema, varroa...).

168

Diseases and heavy metals in honeybees in the Netherlands, results of a national monitoring in June 2008

Jozef van der Steen*, T. Blacquiére, B. Cornelissen

* Netherlands, sjef.vandersteen@wur.nl

In June 2008 bee samples were taken from 170 apiaries randomly distributed over the country. Of each apiary five colonies were sampled by taking bees from the outer frame. Per apiary all samples were pooled and from this pool, bees were taken for the prevalence of *Varroa destructor* (n mites per 100 bees), *Nosema apis* (10%), *Nosema ceranae* (93%), *Melissococcus plutonius* (37%), *Paenibacillus larvae* (1%), *Ascosphaera apis* (73%), *Aspergillus flavus* (0%), *Acarapis woodii* (5%) and the viruses KBV (0%), DWV (16%), BQCV (92%), SBV (40%), CPBV (0%), IV (0%), IAPV (0%). An apiary sample was analyzed for heavy metals as a function of bio-indication of pollution by honey bee colonies. The metal results are not yet available. All results obtained, refer to the apiary and not to individual colonies. The elaborated data: combinations of prevalence, regions beekeeping practice and winter mortality 2008-2009, to be established in April 2009 will be presented.

169

Bee Surveillance Programmes, Bee Mortality and Risk Assessment

Jane Richardson*, Karin Nienstedt, Sergio Potier Rodeia, Didier Verloo, EFSA focal point network

* European Food Safety Authority – EFSA, Assessment Methodology Unit, Largo Natale Palli 5/A, I-43100 Parma, Italy, jane.richardson@efsa.europa.eu

Since 2003 there have been reports in Europe and America of serious losses of bees from beehives. In order to assess the current situation with regard to bee surveillance in Europe a short questionnaire was distributed to member states through the EFSA focal point network.

Responses were received from the EFSA Focal Point Network from twenty-three member states plus Norway and Switzerland. This identified eighteen bee surveillance programmes in seventeen member states. Additionally member state organizations are collaborating with COLOSS, an international COST Network. Mortality rates ranged between 7-50%, the highest rates was reported for Italy in 2007. The European bee population is estimated to be greater than 10 million beehives. Subsequently EFSA awarded a grant of 100,000 to a consortium of European scientific institutes to study "Bee Mortality and Bee Surveillance in Europe". The objectives of this project are threefold; description and critical analysis of surveillance programmes, collation and analysis of an epidemiological dataset on colony collapse, weakening and mortality and a critical review of relevant literature on the possible causes of honey bee colony collapse, mortality and weakening. Additionally, it is under EFSA's remit to develop guidance for risk assessment of pesticides. In this context, the Plant Protection products and their Residues Panel of EFSA has started work on a revision of the Guidance Document on Terrestrial Ecotoxicology under Council Directive 91/414/EEC (SANCO/10329/2002 rev 2 final 17 October 2002) and an opinion on the revision of Annexes II and III of the Council Directive 91/414/EEC. The outputs from these projects will include a revision of the risk assessment of the effects of pesticides on bees.

POLLINATION AND BEE FLORA COMMISSION - SYMPOSIUM Nº2 "CROP POLLINATION: ITS VALUE AND SOME NEW DEVELOPMENTS"

170

Evaluating the role of pollinating honeybees in UK Apple Orchards

Gay Marris*, Giles Budge, Tom Breeze, Simon Potts, Mike Brown, Alan MacLeod

* Sand Hutton YO41 1 York Yorkshire, UK, g.marris@csf.gov.uk

Honey bees (*Apis mellifera*) make vital contributions to agriculture and the environment through the pollination of cultivated crops and wild plants. The value of agricultural and horticultural crops grown in the UK that benefits from bee pollination is £200m per annum, and their contribution to the global economy runs into many billions of dollars. Apple orchards form a major part of the UK horticultural industry, covering 15,500 ha. Well-pollinated apples are the best quality. Commercial apple growers in the UK employ managed colonies of *A. mellifera* to ensure reliable pollination. The value of insect pollination to the UK apple market is in region of £82 million, a figure equivalent to 90% of the total market value of the apple crop. We present a model that evaluates the role of pollinating bees in UK apple dessert apple orchards, using the "Replacement Cost" (RC) method. The RC method focuses on the financial cost of providing man-made substitutes for any particular ecosystem service. It is based on the premise that since society would not have to pay such costs if the ecosystem service is available, then such cost savings provide a measure of the economic value of the service in question.

171

Pollination and honey production in castor bean (*Ricinus communis* L.) plantation for biofuel

Breno Freitas*, Rômulo A. G. Rizzardo, Marcelo O. Milfont

* Departamento de Zootecnia-CCA, C.P. 12168, Fortaleza, Brazil, freitas@ufc.br

Plantations of castor bean (*Ricinus communis* L.) for biodiesel production are expanding throughout NE Brazil at the expense of native vegetation used by beekeepers for honey production. The present study was carried out in a castor bean commercial plantation to assess the possibility of aggregating value to castor bean plantations by placing honey bee (*Apis mellifera*) colonies in the area for both pollination and honey production. The introduction of honey bee colonies resulted in the production of marginally ($p = 0.08$) more fruits than when no colony was brought. But colony introduction did lead to significantly ($p < 0.05$) more fruits per raceme (22.4), heavier seeds (0.54 g), greater oil content (54.5 %), and greater gross energy content (9006.8 kcal/kg) than those produced in areas without honey bee colonies (15.8, 0.47 g, 49.9 % and 8843.3 kcal/kg, respectively). The castor bean plantations also provided pollen and nectar which was readily gathered by honeybees leading in 49 days to an average production between 18.8 kg (apiary in area of castor bean clean cultivation) and 23.5 kg honey (apiary in area of castor bean with wild weeds). We concluded that beekeeping in castor bean plantations can constitute an extra source of income to farmers and contribute to increase crop productivity reducing the need to enlarge fields to ensure profitability. This would help to conserve the native vegetation and prevent potential conflicts between beekeepers and farmers.

Field Application of *Trichoderma* spp. on Strawberry Flowers Using Honeybees

Lita Molitas-Colting*, Dan Saclangan, Luciana Villanueva

* sayotefries@hotmail.com

The study was conducted to establish the efficiency of delivering *Trichoderma* spp. to strawberry flowers using honey bees, *Apis mellifera*, and to observe any detrimental effect of the biological control agent (BCA) on the bee colony. A BCA introduction box was designed and attached to a bee colony containing eight frames. The colony was situated on a strawberry farm of about 450 m² area. Two plots were covered with a white net to prevent the bees to forage on the flowers. Trial and observation were done for the first few days. The commercial *Trichoderma* spp. "Bio Con" in powder form was placed in the BCA introduction box. After three days, strawberry flowers from different distances away from the bee colony and in the netted area were collected and isolated. The isolated samples collected from the farm were positive of *Trichoderma* growth while samples from the netted area had other fungal and bacterial growths. The bees from the colony were able to disseminate *Trichoderma* to the strawberry farm as far as 30 meters away. Although the amount of food on the frames was reduced, bee population increase was noted during hive inspections on subsequent weeks after the experiment. Using the BCA introduction box, the commercial *Trichoderma* "Bio Con" was successfully delivered to strawberry flowers using honeybees. Thus, adding to the benefit of better pollination the *A. mellifera*, honeybees, were able to disseminate the good fungi *Trichoderma* to strawberry flowers for disease prevention. The BCA that the bees were exposed to had no adverse effect on the colony.

Pollination and Fruit Set in Pumpkin (*Cucurbita moschata*)

Maria Vidal*, Franco Vallejo

* Universidade Federal do Recôncavo da Bahia, Cruz das Almas, Bahia, Brasil mgvidal@ufba.br

Species of cucurbitaceae are cultivated all over the world and are dependent on pollination to produce fruit and seeds. In Colombia, *Cucurbita moschata* is important from different points of view (agriculture, ornamental, medicine and industry) as an alternative to traditional crop industries. With purpose to evaluate the pollination in pumpkin variety Unapal-Boloverde, experiments were conducted in 2004 at Palmira (Valle del Cauca-Colombia). Working with flowers at anthesis, the following parameters were evaluated: 1) nectar production; 2) total sugar concentration in the nectar; 3) production of pollen and flowers during the crop cycle; 4) pollen deposition on the stigma by bees; 5) fruit set after bee pollination; and 6) the insects observed in the flowers of pumpkin. The average of nectar production and sugar concentration measured at 11h was 129 μ L and 40%, respectively. The number of pollen grains per flower was 47.715. The peak rate of male and female flowers occurred from 44 days after planting, with 69.4 male flowers and 2.8 female flowers per plant, respectively. The amount of pollen deposited on the stigma by the bees varied according to the number of visits, from 33 grains with two visits, to 648 grains with 12 visits. The percentage of established fruit was higher (50 and 83.3 %) when the flowers received 8 and 12 visits of *Apis mellifera*, corresponding to a load of 446 and 648 pollen grains. The most frequent and main pollinator of *Cucurbita moschata* in the studied area was honey bees *Apis mellifera* (100%), visiting the flowers from 8:00 to 11:00h.

A commercial strawberry crop (*Fragaria chiloensis*) being directly pollinated by bees (*Apis mellifera*)

Yair Edilson Ortégón Sierra*, Uriel Armando Castro, Rodrigo Vásquez, Rodrigo Martines, Hugo Ballesteros

* Cra 8H N. 165-31 int2 apto 301 Bogotá Colombia, informaciongeneral@apiarioelrefugio.com

This work was aimed at estimating increased in production in a commercial strawberry crop, *Fragaria Chiloensis*, production before and after introducing bees, classifying fruit, total per plant production and cost/benefit ratio were evaluated. The research was carried out with 360 plants divided in three treatments: (T0) control group (free insect entry), (T1) partial exclusion group (limited access for insects) and (T2) total exclusion group (no visits by insects), each consisting of 120 plants. Four hives containing *Apis mellifera* were used, located 10 m from the crop. Complementary feeding was employed to promote predilection of bees for strawberry flowers. Directed pollination with *Apis mellifera* led to increased production, rising from 74.5 ± 20.2 Kg once the colonies had adapted themselves to the crop. This, in turn, led to an increased in the number of fruit per plant (61.1%) which also represented increased economic benefit. The production curve improved three weeks after introducing the hives, this being reflected in increased production, quality and fruit size (fruit classed as extra and increased production of first class strawberries).

Oilseed rape pollen dispersal by insects in agricultural landscape

Rémy Chifflet*, Bernard Vaissière, Agnès Richroch, Etienne Klein, Claire Lavigne, Jane Lecomte

* UMR 406 Abeilles et Environnement, Site Agroparc, Avignon cedex 9, France, chifflet@avignon.inra.fr

Landscape-scale pollen flow from genetically modified (GM) plants is of significance to manage the coexistence between GM and non-GM crops. The cultivation of GM plants could also have significant ecological impacts that result from pollen-borne gene dispersal. Recent modeling and estimation of pollen movement in oilseed rape (OSR) (*Brassica napus* L.) at landscape scale did not differentiate between dispersal by wind and by insects, nor did they explain the cause of the occurrence of long distance dispersal events. Our objective was to quantify pollen dispersal by insect pollinators, especially focusing on its spatial scale, in an intensive agricultural landscape in central France. Small plots of 4 flowering male-sterile (MS) plants were located at 6 distances from fields of flowering OSR (10 to 1100 m). Flower-visiting insects were caught by net on the MS plants. The pollen present on the body of each insect was then used to hand-pollinate MS flowers of an OSR cultivar not grown in France in a pollenproof greenhouse. We caught 71 insects belonging to 3 orders and 15 genera. Among these, only 28 insects carried pollen that led to the production of 228 pods with a total of 4238 seeds. A logistic regression on success of fructification gave a good fit to the data and indicated that the distance to the nearest OSR field, the insect size, and the sampling date affected pollen dispersal by insects. Based on the model, effective pollen dispersal was reduced by 50% at a distance of 600 m from the nearest OSR field. Seed set, observed and predicted by the model, was still not nil for insects caught at more than 1100 m from the nearest field. We conclude that insect pollinators contribute to long distance pollen dispersal for OSR in France in intensive agricultural landscape.

Floral diversity around *Vaccinium* fields and the health of *A. mellifera* introduced for pollination in Quebec

Mélissa Girard*, Valérie Fournier, Madeleine Chagnon

* 7134 rue du Daim G1G5H4 Quebec Canada, miscouti@hotmail.com

Insect pollination is essential for the fruit set of lowbush blueberries (*Vaccinium angustifolium* Ait.) and cranberries (*V. macrocarpon* Ait.). Therefore, numerous growers rent honeybee hives (*Apis mellifera*) during the blooming period of blueberries and cranberries to insure yields. Pollination of large *Vaccinium* monocultures can cause nutritional stress on honeybees. This 2-year project aimed to study the influence of the floral diversity found in the vicinity of blueberry and cranberry fields on the performance of honeybees colonies introduced for pollination services. Four treatments were compared: 1) great floral diversity without *Vaccinium* crops in the surrounding, 2) great floral diversity in the proximity of *Vaccinium* field, 3) poor floral diversity in the proximity of *Vaccinium* fields and 4) poor floral diversity without *Vaccinium* crops in the surrounding. Treatments were replicated four times and a total of three hives were introduced at each experimental site. We measured the weight gain of the hives, brood development, fruit yield and the diversity and abundance of pollen grains carried by foragers. Pollen grains were identified to the family, gender or species of plant. Results are currently in the process of being analyzed.

Alternative orchard pollinators

Iryna Shumakova*, Oleksandr Komisar

* Ukraine plazmist@i.ua

The nature of the 'colony collapse disorder' and the way to avoid it are really unknown now. Therefore theoretical possibility exists of unpredictable large scale losses of honey bee colonies with catastrophic decreasing of pollination, especially orchards pollination. Osmia bees can substitute honey bees as alternative orchard pollinators, but we haven't got nice technologies of their rearing now. Existing technologies don't permit to obtain the same labour productivity of beekeeper as we have now at the honeybee breeding, when one beekeeper is able to manage several hundred of honeybee colonies with 20-50 thousand of bees in every hive. The narrow place in osmia bee breeding is necessity to clean the osmia cocoons from different parasitical flies and mites and this operation needs much time. One worker is able to manage maximum 0.5 million of osmia bees at the same time when one beekeeper is able to manage up to 10 million of honeybees (25,000 bees in every of 500 colonies). We elaborated, tested at European osmia bees (namely *Osmia rufa* and *O. cornuta*) and currently use three new kinds of the osmia nests, which permit to avoid extraction of cocoons from nests. Not cocoons in boxes can be sold to the consumer, but cocoons in metal or plastic collapsible tubes after visual control of their contents. The use of these elaborations permits to increase essentially labour productivity of osmia bee breeder almost to the level of honey bee keeper. Our elaborations are: slot nests, collapsible metal tubes and transparent plastic tubes. They are really cheaper than traditional natural expendable reed tubes and are supposed for multiple uses. Now we manage experimental population of near 150,000 cocoons and half of it is in the new nesting materials. Conclusion: Osmia bees can become alternative to honeybees orchard pollinator at the prerequisite of essential increasing of the productivity of the osmia breeder labour and our elaborations are the possible way to such increasing.

178

Management of stingless bee, *Melipona fasciculata*, for pollination of solanaceous crops in greenhouses

Giorgio Venturieri*, Nercy Pires, Felipe Contrera

* Travessa Enéas Pinheiro, S/N 660951 Belém Brazil, giorgio@cpatu.embrapa.br

The use of bees for pollination of Solanacea, mainly the tomato, is based on the management of *Bombus terrestris*, a species from Europe. However, the introduction of this bee in many regions has generated problems of hybridization and competition with local species. The alternative solution to this problem is the use of native bee species. Among the stingless bees, *Melipona spp* promote buzz pollination. In Eastern Amazon, the cultivation of vegetables in protected environments is favoured, among other factors, mainly by the control of excessive rain, which between February to May reach very high levels of rainfall, thwarting the cultivation of vegetables. In this study *M. fasciculata* was tested as pollinator of *Lycopersicon esculentum*, *Solanum melongena*, *Capsicum frutescens* and *C. annuum*, and excellent results were obtained in both the fertilization of flowers (larger amount of fruits formed in comparison with the open environment), as well as in the adaptation of the colonies to protected conditions. Initially there was a great mortality of forager bees, but five days after the nest opening the workers were adapted to forage inside the greenhouse. *Melipona fasciculata* was efficient both in the pollination of solanaceous with poricide anthers, which needs buzz pollination (tomato and eggplant), and also in the anthers of longitudinal dehiscence (red and sweet pepper). A management plan for *M. fasciculata* as a pollinator of solanaceous in greenhouses is proposed.

179

Pollination ecology of Katy apricot *Prunus armeniaca* L. in greenhouse

Jiaxing Huang*, Jiandong AN, Jilian LI, Shudong LUO, Jie WU

* Institute of Apiculture, Chinese Academy of Agricultural Sciences, Beijing 100093, China bombuscn@gmail.com

Flower biology and pollinator foraging activity on Katy apricot (*Prunus armeniaca* L.) in Beijing was investigated to understand the preliminary information of the introduced apricot in the greenhouse cultivation. Honeybee *Apis mellifera* L. and bumblebee *Bombus hypocrita* P. were used as the primary pollinators. The results showed that nectar secretion lasted for 6 days from the flower full open. Nectar production/flower in 24 h is 8.05±2.94 µl. Pollen collected from anther, honeybee and bumblebee was determined the viability by TTC (Triphenyl Tetrazolium Chloride) method. There was significant difference among the three collection methods pollen ($P < 0.05$). The pistil receptivity lasting 5 days through the Peroxtestmo Ko paper indicator by converting it into a solution. The receptivity was the highest in the third day after the flower full open. The visitation frequency of honeybee and bumblebee is 7.23±0.85 flowers/min and 8.85±0.32 flowers/min respectively. Pollen deposition in the stigma by a single visit to virgin flowers were significant different in the two bees pollination. Bumblebee deposited more pollen in the stigma than honeybee. We suggested that *B. hypocrita* was more efficient pollinator for Katy apricot according to comparison the amount of the pollen deposition on stigmas and visitation frequency.

180

Foraging and pollination behaviour of the African honeybee (*Apis mellifera adansonii*)

Fernand Tschuenguem*, Dorothea Brueckner

* University of Ngaoundéré, Faculty of Science, Department of Biological Sciences, PO Box 454 Ngaoundéré, Cameroon, tschuenguem2001@yahoo.fr

In Cameroon, the demand for hive products is growing. Honey and pollen yields are low in the country, partly because of the poor knowledge of the apicultural value of the flora. To determine the apicultural value 37 plant species (12 cultivated and 25 wild), *Apis mellifera adansonii* activity was observed on the flowers of these plants in the area of Ngaoundéré. Results show that *A. m. adansonii* harvest nectar and pollen of 24 plants species. The flowers of *Bixa orellana*, *Dicrostachys cinerea* and *Piliostigma thonningii* were visited for pollen only. Ten plant species were visited for nectar only. The greatest number of workers foraging simultaneously on a plant varied from 6 (*Piliostigma thonningii*) to 4200 (*Bombax pentandrum* and *Vernonia amygdalina*). *A. m. adansonii* workers were faithful to each plant species. Thirty-two plant species (22 wild and 10 cultivated) could be cultivated and protected to increase honey production. Seventeen plant species (11 wild and 6 cultivated) could enable beekeepers to increase their pollen production as a hive product. During foraging, *A. m. adansonii* workers increased pollination possibilities of each of the plant species.

APITHERAPY COMMISSION - SYMPOSIUM N°2 "TREATMENT"

181

The possibility of normalization of alcohol with usage of Apitoxins

Igor Krivopalov-Moskvin*, Fateeva E., Krivopalov, A., Krivopalov D.

* 86, Svoboda str. 454091 Chelyabinsk Russia, api-center@chel.surnet.ru

The possibility of normalization of alcohol with usage of apitoxins. In 1995 the programme was worked out that let people with the alcohol abuse and alcoholism not to refuse from alcohol completely but to rehabilitate destroyed functions. As a complete compensation of the alcohol for the organism we use apitoxins (components of bee venom), which influence the main mechanism of the disease development – catecholamines exchange by means of activation of the hypophysis-epinephros system; moreover influencing the opioid peptides production apitoxins remove primary and secondary longing to alcohol, normalize alcoholdehydrogenase exchange, improve trophic process. The new reflex for the alcohol usage is conducting. Our objectives are: changing of the organism' needs for the alcohol, creation the new psychological attitude towards alcohol, formation of the self control during the alcohol usage, addiction to the alcohol use causing a more frequent absorption of alcohol into the blood. The effectiveness of the treatment was estimated by the absence of alcohol excesses during 6 months, 1 year and 3 years after the end of the programme. 4300 patients were treated during 10 years, and 679 of them were observed. They were divided into 2 groups: 412 men with alcohol abuse, 267 men with the alcoholism. The effectiveness of the programme of the dozed usage of alcohol:

At the stage of the alcohol abuse and already formed alcoholism the normalization of the alcohol usage is possible; Usage of apitoxins increases the possibility of the normalization process.

Normalization without apitoxins would be rather difficult because of the absence of compensation.

Normalization at the stage of the alcohol abuse is the most effective prophylaxis of alcoholism.

182

Functional and Biological Properties of Bee Products

Stefan Bogdanov*, Karsten Muenstedt

* Switzerland, bogi@gmx.ch

In this presentation the functional and biological properties of bee products as tested in cell and animal studies are reviewed. In early times there was no separation between food and medicine, but according to the food and medical laws in advanced industrial countries these two are now regarded as separate. In this logic honey (H) pollen (P) and royal jelly (RJ) are regarded as food while the other bee products are considered as medicine. Medicinal claims for food products are not allowed, however specific health claims are possible. H, RJ and P have following functional properties: antibacterial, antifungal, antiviral, antioxidative, anticancerogenetic and antiinflammatory. RJ and P have effects against radiation, anaemia, atherosclerosis, diarrhoea and osteoporosis. H is probiotic, RJ

shows activity against fatigue, stress, hypoxia, high blood pressure and protects the central nervous system. Although the different propolis types have varying composition their biological and pharmacological effects are similar: antimicrobial, antioxidant, immunomodulating, anticarcinogenic, local anaesthetic, liverprotecting, improving blood circulation, inhibition of blood coagulation. Bee venom is antibacterial, antiinflammatory, immunoactivating, immunosuppressive, analgesic, radioprotective, anticarcinogenic, membrane active, positively chronotropic, influences hormone levels, increases blood circulation, lowers blood pressure and cholesterol levels, improves haemoglobin synthesis, anticoagulant, antiarhythmic antihypertonia and antiatherosclerosis. All bee products have relatively few side effects: with the exception of BV they have a low incidence of allergy. The next step is testing the bee products in clinical trials for new applications in modern medicine.

183

The Efficacy of Honey Dressing on Wound Healing: A Clinical Observation Study

Kamaruddin Mohd.Yusoff*, Suhaimi A., Akka Z., Mohd.Yusoff M.Y.

* Department of Molecular Medicine, Faculty of Medicine, University of Malaya 50603 Kuala Lumpur Malaysia, kamaruddin77@um.edu.my

Honey dressings were performed on 102 patients with wounds and ulcers that had failed to heal with conventional treatment. The conventional treatments include oral antibiotic (tablets or intravenous), cleaning the wounds with saline and dressing with povidine-iodine. Wounds were defined as having failed to heal after being exposed to conventional treatment for up to one month. All 102 cases showed recovery at remarkable pace. All wounds were infected before honey treatment starts. Wound sterility was achieved by the third week of treatment. Honey promoted wound healing by causing rapid debridement, clearance of sloughs and absorption of oedema. Honey also promoted rapid production of granulation tissue. Honey dressing is highly recommended for wounds and ulcers that are difficult to heal. The healing time is much reduced and some patients were saved from amputations. It is high time for this natural remedy be given due recognition by conventional medicine.

184

Api-Phyto-Therapy in demyelization condition - results analysis on a sample of 33 patients

Cristina Aosan*

* Nr. 120 307194 Semlacu Mare Romania, draosan@gmail.com

Analised criteria:

1. Symptoms evolution after 1 year of treatment;
2. MRI Images evolution after 1 year up to 2 years.

Accepted the patients who:

- respected the complete treatment, continuously
- had MRI diagnose before the treatment

Structure of sample:

- on age, sex, length of the symptoms, investigations for diagnose
- associated affections, treatments before

Natural therapy:

- preparation part (Apitherapy including bee venom ointment, Phytotherapy)
- main part (bee venom injections together with oral Apitherapy and Phytotherapy)
- associated treatments

Analysis:

1. clinical evolution for: movement disorders, asthenia, paresthesias, visual symptoms, urinary symptoms;
- for each are used criteria: age, length of symptoms before the treatment, psycho-emotional disorders
2. symptoms recovered 80 – 100 %, on groups of age and of length of symptoms

3. symptoms recovered 0 – 20 % are analysed on groups of age and of length of symptoms
 4. MRI evolution on criteria: age, length of symptoms before the treatment, psycho-emotional disorders. (pictures with MRI images)

Conclusions:

Patients between 20 – 40 years age:

- 67,69 % of the total symptoms - recovered in proportion of 80 -100 %
- Only 8,57 % of the total symptoms - recovered in proportion of 0 - 20 %
- 11 of 18 patients - improvements of MRI images

Patients in the first 2 years after the clinical start:

- 60,97 % of the total symptoms have - recovered in proportion of 80 -100 %
- Only 4,67 % of the total symptoms - recovered in proportion of 0 - 20 %

10 of 14 patients had improvements of MRI images

Psycho-emotional disorders:

- lower the good results of the treatment
- psycho-emotional therapy: necessary!

185

Apitherapy in Benin

Euloge Sossa*, Dengler-Mahé, E.

* Abomey-Calavi Cotonou Benin apiserv2004@hotmail.com

Since 2004, Euloge Sossa, apitherapist and physiotherapist in Benin (West Africa), has been developing treatments based on the combination of beekeeping products (honey, pollen, propolis, royal jelly), essential oils and African medicinal plants. In order to treat the patients who ask him for medical advice and buy his products, he uses the knowledge that he has gathered "on site" and through different theoretical and practical trainings. Presently, he is participating in a training (via Internet) of apitherapy directed by Stefan Stangaciu. His company, Besa Nature, is established in Porto-Novo, Cotonou, and Bohicon near Abomey. The firm is also represented in Côte d'Ivoire. Euloge Sossa tirelessly travels around the countries of West Africa (Togo, Ghana, Nigeria, Burkina Faso...) in his research for new medical plants, beekeeping products and packaging. During the last four years, he has himself trained 1500 beekeepers, who can now provide him with very high quality honey. Among the illnesses that he most frequently treats with his composed products, we particularly note skin, vascular and infectious diseases, as well as urinary tract and gynaecological infections. Many persons also ask him for medical advice in the case of anaemia and of deterioration of the immunitary defences, related to the lack of minerals and vitamins, and of sterility or impotence. Euloge Sossa's main products:

Capital Défense. (honey, propolis tincture, essential oil of thyme, *Crateva religiosa*, *Jatropha multifida*)

Complexe G2 (honey, propolis, pollen, essential oil *Ocimum basilicum*, root of *Cesalpinia bunduc*)

Spermato Stimuline (*Cissus populnea*, Assankan, red wine)

His projects: creation of a botanical garden, training of a further thousand beekeepers all over Benin, purchase of tools and machines that will allow him to product alimentary complements, as well as antiseptic products and cosmetics.

186

Treatment of multiple sclerosis

Mindrescu Dorin*, Orodan Mihaela

* Romania, policlinica.solaris@gmail.com

A slowly progressive disease characterized by disseminated patches of demyelination in the brain and spinal cord, resulting in multiple and varied neurological symptoms and signs, usually with remissions and exacerbation. The most affected persons are the 20-40 years, especially female. Objectives: amelioration of the clinical signs (especially the motor coordination, and other neurological symptoms) but also improvement of IRM in different stages after treatment. TCM diagnosis considers that the disease is part of the Wei symptoms of atrophy; it can be

considered that the disease is caused by a lot of factors: humidity, wind, cold, emotional factors, disharmony between spleen and stomach, deficiency of yang kidney, deficiency of liver, excess of humidity and /or heat. When the yang kidney is in deficiency, the "fire" began to decrease, and the brain considered to be the "sea of the marrow" can not function anymore. Methods: the patients made 10 days of treatment, everyday after a pause of 6-9 weeks they repeated the treatment so that they made every 3-6 month another 10 days treatment. Particularity of treatment: association of body acupuncture especially with scalp acupuncture and mezotherapy (Apitoxina, cerebrum NM, Acetoglutamida). Venex-20(apitoxina) has some important effects:

- regulates the immune system
- neurotrophical effect on the brain and marrow, through the action of melitin, apaminand phospholipase
- improvement of motor coordination by acting on the neuronal synapses
- improvement of psycho-emotional statement by producing endogenous opioid

Results: improvement of clinical signs especially motor coordination, but also we observed modification of IRM.

Conclusion: This treatment gives a certain possibility for the amelioration of this invalidant disease, the main important step is the regulation of the immune system.

187

Pre-clinical and clinical research of a thermoreversible gel formulation... to reduce healing time of lesions in burn victims

Andresa A. Berretta-Silva*, Bastos, J. K., Marchesan W. G., Marchetti J. M.

* Rua Afonso Valera, 250 Casa 24 140985 Ribeirao Preto/Sp Brazil, andresaberretta@hotmail.com

The present paper examines the pre-clinical and clinical evaluation of a pharmaceutical form that provides sustained delivery of a formulation containing standardized propolis extract – EPP – AF to the treatment of burn wounds. There has been used a polymer with thermoreversible characteristics which made possible the obtainment of a product that maintains its liquid state in low temperatures and provides in situ gelling property. The proposed pharmaceutical form intends to enhance patient's comfort and acceptance, to obtain a histological well-organized skin tissue and to reduce wound healing time. This study evaluated in vitro the antimicrobial activity of propolis extract and obtained gels using the agar-diffusion method and also a broth microdilution method with microdilution in microplates containing serially diluted antimicrobial and triphenylthetrazolium agent, against microorganisms *S. aureus*, *M. luteus* and *P. aeruginosa*. The results show that propolis extract has activity against the listed microorganisms and that the gels did not spread into agar medium plate. In the microdilution method, the used model for the antimicrobial activity study is not adequate to the microorganism *M. luteus*, but it was possible for the obtainment of CIM to *S. aureus* and *P. aeruginosa*, which were, respectively, 50 ug/mL and 200 ug/mL. The clinical research show that the thermoreversible gel formulation containing standardized propolis extract 3,6%p/v presented wound healing time similar to the reference treatment used in the Burn Victims Unity witch is nitrofurazone cream (furacin®) The final pharmaceutical forms are protected by patent process number PI 018080070102. (Supported by *Apis Flora* and CNPq).

188

Synergistic effectiveness of the consumption of bee products infused with medicinal herbs and berries to promote proper function of the immune system

Galina Adzhigirey*, Darya Adzhigirey

* 102 Morgan County Dr 65348 Otterville USA, galina@beetechllc.com

Biologist Galina Adzhigirey, author of "Bee and Man", based her book on forty years of experience starting with the time she was diagnosed with a fatal kidney disease. After her recovery through the use of medicinal herbs, Galina, after marrying Bronislav Adzhigirey at age 36, became a mother of five perfectly healthy kids. Over the course of many years, Galina recognized the pathological processes of common diseases and the practically endless possi-

bilities of disease elimination and prevention through the use of apitherapy combined with herbs and berries. This powerful combination can be used to cure various diseases by rejuvenating a person's immune system. Diseases are primarily a consequence of an immune system dysfunction. When the immune system fails to carry out its function appropriately, the organism loses its vast ability to heal itself. This conclusion is in direct opposition to Western medicine, which identifies thousands of diseases and supplies individual drugs for each. Almost all prescribed drugs facilitate glitches in the immune system. Since drugs are essentially designed to conceal symptoms, consumption of these drugs eventually forces the disease to become chronic. In contrast to modern allopathic medicine, traditional Russian medicine always attempted to treat the whole body, beginning with correct nutrition, where bee products have always played a crucial role. It is not a coincidence that the Russian word for medicine comes from the word for honey. Every person has a chance to restore their health through proper nutrition. Proper nutrition can be greatly facilitated by the consumption of bee products, medicinal herbs and berries. The synergistic effect of these products is made available by natural, unprocessed honey, which unifies them into a powerful force. The secret of this unity of products is helping the body heal any disease by boosting the immune system, thus eliminating any obstacles in its proper function. Years of practice show that the highest level of effectiveness can be reached by using bee products at all "fronts" simultaneously: orally, rectally, through the skin, and via the mucus membrane in the mouth.

189

Apiphytotherapy with honey in Cameroon

Roland Nnomo Douania*, Douania N., Yves P. J., Roger T.

* 67 Faculté des Sciences, Dschang 237 Dschang Cameroun, nomorolly@yahoo.fr

Apiphytotherapy is a form of traditional medicine involving the use of medicinal plants and bee products (honey, bee wax, pollen grains, royal jelly, propolis and bee venom). An ethnobotanical inquiry carried among 326 persons about apiphytotherapy using honey in the Cameroon western highlands led to 127 therapeutic recipes used for the treatment of about 113 illnesses. 60 medicinal plants belonging to 36 botanical families are involved in the treatments. The more frequent being: *Elaeis guineense* (19), *Citrus sinensis* (18), *Zingiber officinale* (16), *Aloe barbadensis* (15), *Allium sativum* (14), *Carica papaya* (12) and *Cymbopogon citratus* (12). Leaves (32 %) and fruits (19 %) are the parts commonly used for the preparation of the medicines. The preparation method of nearly all the recipes is a concoction to which honey is added. The treatments are especially administered orally to cure acute diseases such as bronchitis, high blood pressure, throat infection (angina), palpitations, wounds and sinusitis. Nearly all the plants identified in the recipes have self pharmacological properties similar to that of the combined honey, but not always with the same efficiency according to the case. Such associations could be aimed at seeking the effectiveness of the final product through the synergy between the various components of the mixture. Such mixtures deserve to be advertised and incorporated into the range of useful common natural treatments, since they are simple, effective, cheap and have no adverse effect. Nevertheless, it should be ideal to have honey directly from beekeepers, avoid a prolonged self medication and rush directly to specialized health centres if symptoms become persistent.

190

Apiphyto compositions with *Salvia officinalis* L. essential oil

Oleksiy Pashchenko, Violeta Todorova, Olena Golembiovskaya*

* Kiev Ukraine golembiki@yahoo.com

The combination of biologically active substances found in medical plants and beekeeping products improves pharmacological activity of each component and lets create new drugs and biologically active additives. The apiphyto composition, that was developed in a rectal suppositories form, consists of drone honeycombs homogenate (drone milk), propolis extract and sage essential oil stimulates hormones production, helps treating barrenness problems and others dysfunctions of urino-genital system. In addition to these useful properties, the essential sage oil is a strong antiseptic and is an effective remedy for a sore and inflamed throat, tonsillitis and

laryngitis. That is why it was also proposed to be included to the internally used Balsam, which treats throat and mouth diseases, alimentary system diseases of different aetiology and enhances immunity. Except for the essential sage oil, Balsam composition also includes honey, rose hip oil, *Sylibum marianum* oil and cedar oil, active substances of which have reparative, antiseptic, anti-inflammatory, stimulating properties etc.

The important index of drug and preventive quality is the quantity of substance content. Therefore, the apiphytocompositions was standardized by sage oil content. The thin-layer chromatography on plates with silica gel in the solvents system (acetone + ethylacetate+di-chloromethane) method and the ISO:9909-2002 standardized GC and GC/MS method were used. - and -thujone or 1,8-cineole can be used as the comparison standards.

APITHERAPY COMMISSION - PLENARY SESSION

191

My clinical experiences on use of propolis to cancer patients

Osamu Mizukami*

* Japan

It is well-known that propolis has lots of anti-cancer properties like direct anti-cancer effects, immunity-enhancement effects, and anti-oxidant effects. As a physician, I have been using propolis from Brazil to hundreds of cancer patients for 15 years, and I have noticed that propolis is very effective for them. Most of them have had standard treatments such as surgical operation, chemotherapy and radiation. Many advanced cancer patients have shown slow growth of tumors and no change of tumors. Some patients have shown shrinkage and disappearance of tumors. Many patients after operation with stage II and III had no recurrence nor metastasis. Almost all patients have suggested improved quality of life, and they have been very satisfied with propolis. Cancer patients have showed no side effects except for mild skin rash. I believe that propolis is a very useful tool to cancer patients.

192

Involvement of non-protein thiols, mitochondrial dysfunction, and reactive oxygen species in the honey-induced apoptosis

Saravana Kumar Jaganathan*, Dr. Mahitosh Mandal

* School of Medical Science and Technology, Indian Institute of Technology, Kharagpur
721 302, West Bengal, India, jaganathaniitkgp@gmail.com

Honey is a complex mixture of different biologically active constituents. Honey possesses anti-inflammatory, anti-oxidant and anti-tumor properties. Our chief investigation was to assess the crude-honey induced apoptosis and its molecular mechanism in the colon cancer cell proliferation. Honey exerted anti-proliferative potential against the two tested colon cancer cell lines (HCT 15 and HT 29 cells) as assessed by 3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyl tetrazolium bromide (MTT) assay. Flow cytometry analysis indicated the increasing accumulation of hypodiploid nuclei in the sub-G1 phase of cell cycle indicating apoptosis. Honey transduced the apoptotic signal via initial depletion of intracellular non protein thiols, consequently reducing the mitochondrial membrane potential (Rh123 staining) and increasing the reactive oxygen species generation as detected by dichlorodihydrofluorescein diacetate (DCFDA). Further apoptosis induction in the HCT 15 cells was confirmed using DNA fragmentation assay.

193

Complex treatment for psoriasis by api-reflexotherapy and beekeeping products

Nailya Khismatullina*, I.P. Khismatullina

* 37 Vstrechnaya 614000 Perm Russia, kate@tentorium.ru

Psoriasis is one of the most common skin diseases. It is known as a kind of systemic disease which affects skin, nervous system and internals. A complex treatment even with up-to-date methods may not help to control acute periods of psoriasis. A maximum extension of the period between acute attacks with some preparations for long term use was the main goal of the present study. An effective addition to common drug therapy may appear a complex treatment with beekeeping products and api-reflexotherapy. Probably it may become an original method. Bee venom, bee bread, pollen load, royal jelly, propolis, beeswax and apizan (khitozan - substance extracted from chitin of bees) are that unique products which may be useful for treating psoriasis. Beekeeping products don't become addictive and they are compatible with medicinal preparations. The group of 12 patients has undergone a course of complex treatment of bee stinging, some api-products and peloids, some kind of balneological treatments, music- and psychotherapy. This experiment took place in Api-center of Perm City, Russia in autumn 2008 and spring 2009. The biologically active spots were used for api-reflexotherapy. On the 2-3d day of the first treatment course in autumn all the patients remarked the clearing of plaques affected skin, better sleep and appetite and gastrointestinal tract functioning as well. The group of the patients had the second course of api-reflexotherapy in the beginning of spring i.e. the usual time of acute attack. 83% of the patients didn't have acute condition of psoriasis. They had only common plaques. No one patient was treated by medications! Thus the complex of api-reflexotherapy and beekeeping products have been used effectively to treat psoriasis.

194

Basic clinical concepts in green medicine

Roch Domerego*

* Belgium, rochdomerego@baroch.be

This presentation will address the major axes defining the scientific principles used by research and by the pharmaceutical and medical industries and then compare them to the basic rules governing natural medicine. With this approach, we will be able to compare and highlight the differences, both expressed as principles and as concrete applications. We will also set natural medicine in its context and its functional principles; as we understand these differences we will come to appreciate the strength and the weaknesses of the two ways, mono- or multi-molecular. This conceptualization proposes the bases on which one can construct a future that is less conflictual and therefore more geared to serve patients.

195

Production of Amnion Grafts for Wound Covering Using Local Honey as a Preservative Agent

Nagi M. Marsit*, Ermithi O., Saad I., Abdalia A. Albahri A.

* Tripoli Libya, Nagi15@yahoo.com

The use of skin substitutes (biological dressing) in the treatment of burns, open wounds and post-operations wounds is applicable many decades ago, many factors affecting the acceptance of a specified tissue graft intended to be used as wound covering material whether it was biological (allografts, xenografts) or synthetic (artificial skin, hydrogels and etc.). The wound cover may involve practical and scientific properties which may include:

availability, inexpensive, not inflammatory to the wound, not antigenic, prevent bacterial access to the wound, decrease evaporation of body fluids and loss of electrolytes of burn sites, adhere well to the wound and encouraging granulation (epithelialization), and accelerating wound healing as well. Certainly, there is no single graft can provide all the above properties. Tissue banks in developing countries become aware about the processing and production 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 sterilization sources due to high cost or because of technical problems is a strong reason to use honey impregnated amnion grafts as an alternative to the gamma sterilized ones for the clinical purposes mentioned above and this could achieve two goals at once, preservation of the amnion grafts and accelerating wound healing at the time of application. In this paper, honey impregnated amnion grafts produced for the first time in our centre, kept at room temperature without further irradiation for more than four years, the bacteriological quality control tests show obvious pasteurization effect and significant reduction of the bacterial counts in the processed HAM. From the results, it can be concluded that honey can not substitute the radiation sterilization but may serve as pasteurizing agent.

196

Royal jelly and propolis prevent development of insulin resistance in type 2 diabetic animal models

Hiromu Kawasaki*, Zamami Y., Koyama T., Fujiwara H., Takaki-Doi S., Tatefuji T., Hashimoto K.

* Japan, ay0518@yamada-bee.com

Honeybee products such as royal jelly (RJ) and propolis (PPL) are known to contain excellent nutrition and have a variety of biological activities. The present study was designed to investigate the effects of RJ and PPL on insulin resistance (hyperinsulinemia) in fructose-drinking rats (FDR; insulin resistance and type 2 diabetic animal model) and Otsuka Long-Evans Tokushima Fatty (OLETF; type 2 diabetic animal model) rats. Male Wistar rats (6 week-old) received 15% fructose solution in drinking water for 8 weeks. FDR showed significant increases in plasma levels of insulin and triglyceride, Homeostasis Model Assessment ratio (HOMA-R, an index of insulin resistance), and systolic blood pressure, but not blood glucose levels, when compared with control rats. RJ (100 and 300 mg/kg/day, p.o.) or PPL (Brazilian propolis extract; 100 and 300 mg/kg/day, p.o.) treatment for 8 weeks significantly decreased the plasma levels of insulin and triglyceride, HOMA-R, without affecting blood glucose or total cholesterol levels and tended to lower systolic blood pressure. In another insulin resistance model OLETF rats, RJ (30 and 300 mg/kg/day, p.o.) or PPL (100 and 300 mg/kg/day, p.o.) treatment for 4 weeks tended to decrease systolic blood pressure and significantly decreased serum level of insulin and HOMA-R. These results suggest that RJ and PPL could be an effective functional food to prevent insulin resistance associated with the development of hypertension.

197

Propolis and honey syrup as prophylaxis of oro-pharyngeal mucositis in irradiated head and neck cancer patients: ongoing results

Barbara Boyd*, Federico Bianciardi, M.D., Ugo de Paula, M.D.

* Italy, bjboyd@libero.it

Introduction: The most frequent side effects in patients receiving radiotherapy for head and neck cancer are oral and pharyngeal mucositis. These side effects often lead to interruptions in the course of treatment. To prevent them, various empirical remedies are administered in different, and unregulated, combinations of steroids, indirect and direct cytoprotectants, and antimicrobials with varying results. Results of scientific studies on the efficacy of these remedies are conflicting and inconclusive. **Material & Methods:** To verify the efficacy of propolis and honey in alleviating and/or preventing the side effects of oral and pharyngeal mucositis, a syrup containing propolis and honey is administered to head-neck cancer patients undergoing radiotherapy. To date, 10 patients, divided into 2 groups, have participated in the study: 5 patients were given the syrup in a dose of 5 ml 4 times per day along with

the normal supplementary support, and 5 patients received only the normal supplementary support.

Specifically, the following was evaluated:

- 1 the effectiveness of propolis and honey syrup in preventing the appearance of symptoms of oral-pharyngeal mucosa (odynophagia, dysphagia)
- 2 the effectiveness of propolis and honey syrup as a factor in protecting the grade 3 mucositis (G3), in terms of reducing the interruptions of treatment.

The appearance of mucositis is evaluated weekly according to the CTCAE scale (Common Terminology Criteria for Adverse Events, version 3.0)

Results:

- 1 no patient in the study group developed mucositis G3
- 2 symptoms associated with mucositis G2 were reduced
- 3 all patients completed the programmed radiotherapy treatment without interruption.

Conclusions: A propolis and honey-based syrup is effective in reducing the oral and pharyngeal mucositis.

198

Hive Products: from folklore to pharmacopoeia

Richard Jones*, Rose Cooper

* 16 North Road CF103D Cardiff Wales UK, joneshr@ibra.org.uk

The need for therapeutic claims for hive products to be established through proven scientific method to achieve standardised international acceptance. Recent years have seen renewed interest in the therapeutic properties of hive products. With the emergence of antibiotic resistance in micro-organisms there is a need to find alternative treatments and so the curative claims made for these products need to be examined with due scientific rigour. Acceptance of any product that is perceived as a medicine requires lengthy laboratory and clinical trials. No claims should be made unless they are based on wide ranging and reviewed scientific data. One off case studies and folklore tales do not help to establish recognition of these potentially very important natural healing products as a treatment of first rather than last resort within the field of conventional medicine. The regulation of "therapeutic goods" varies by jurisdiction but the purpose is the same: to protect the health and safety of the population so that most products need to be registered before they can be marketed. In a world that has become a global village such information now needs to be standardised and internationally available. There are EU and US pharmacopoeias but these are not international and the law supporting them is limited to mutual territories.

199

Bee products in Human health and in Science: linking empirism of apitherapy with modern Molecular Medecine

Eberhardt Bengsch*

* Germany

Apitherapy naturally overlapping with Phytotherapy is one of the most powerful, successful and ancient healing methods. Apitherapy should be an essential part of a future natural integrative medicine as a complementary partner of the official medical methods. In scientific research bee products and derivatives are also basic raw materials to develop a new generation of promising innovative therapeutics. Considering exclusively conventional medical treatments, the main heavy pathologies of mankind remain still unsolved:

- Tumors (Carcinoma, Sarcoma, Lymphoma, Myeloma, Teratoma) are developed by one out of three patients during his/her life time whereby one out of four dies.
- Cardio-vascular and associated diseases are lethal for 50% of the population.
- Infections caused by viruses, classic and / or multi resistant bacteria are the origin of more than 300 mio victims per year.
- Neurodegenerative diseases and dementias (Alzheimer's, Parkinson's diseases, Multiple Sclerosis, Polyglutamine disorders, Spongiform Encephalitis, etc.) become more and more frequent.

- Psychiatric Disorders (Depression, Psychosis, Schizophrenia) become an increasing individual and social problem all over the world.
- Allergies and autoimmune disorders affect many people starting already at young age.
- Diabetes mellitus / Insulin resistance already affects more than 200 mio people worldwide.

These and other examples suggest the necessity to look for new strategies and alternative therapeutic systems. Biomolecular medicine has developed large knowledge about origin, evolution and metabolic details of such diseases. The medical paradigm is that diagnostics are perfect, healing possibilities however are poor or often not available. Apitherapy by application of classical bee products (honey, royal jelly, propolis, pollen, venom, waxes) and new preparations (e.g. larvae extracts, bee bread) are able to prevent, heal or at least positively influence such pathologies in many cases. The effective treatment of more than 800 current illnesses is described in the literature respectively reported in individual communications. Any medical discipline shows a high number of self-therapies. .../...

BEEKEEPING FOR RURAL DEVELOPMENT COMMISSION SYMPOSIUM N°2 "Cooperatives and networks"

200

Commercialisation of small scale beekeeping through association and collective action

Harun Baiya*

* 2nd Flr Jumuia Place, Lenana RD; 10618 -00100 Nairobi Kenya, harun_baiya@sitenet.org

Beekeeping in Africa is highly dominated by small scale, rural traditional beekeeping. Increasingly, there have been demonstrated potential for success in commercialising this activity without compromising the 'traditional' feel to beekeeping while resulting in rapid increases in productivity. The resulting commercial and environmental impacts are very encouraging and transformational to rural poverty. The presentation will focus on the key drivers to this commercialisation, sharing lessons while raising issues for continued learning and future work as beekeeping in Africa moves to the next level both in terms of production, quality and competitiveness of the value Chain. The paper is based on work in 3 countries in Africa where successful work by producers, small scale processors/markets have made some promising progress.

201

Establishing a small cooperative in Chile

Harriet Eeles*

* Chile

Objectives

Background information on beekeeping in Chile: • Origins and development • N° of beekeepers, their characteristics (data from the last 2 national census) • Principal markets • Structure of the activity: beekeepers' network, National Beekeeping Board, National Centre for Beekeeping Development, Exporters' Association, Queen Rearing Cooperative, Beekeeping Partnership • Dialogue between public and private sectors • Governmental support to the activity • National Strategy • National system for training and certification of competence • Clean Production Agreement.

Beekeeping in the south of Chile: • Characteristics of the Rivers and Lakes Regions: potential and limiting factors • Native flora and its special qualities • The network "APIX": association of beekeepers' organizations: objectives and activities • Governmental support.

The Cooperative "Mieles del Sur": • Genesis, Objectives and its role in local development • Members • Commercial policy • Support through subsidized projects.

The trial run: good and bad experiences: • Definition of products • Corporative symbol • Labelling • Traceability • Buying honey • Botanical origins • Commercial decisions.

Finance: the main limitation.

Infrastructure: what is needed.

Marketing: • Main markets and opportunities • Competitors • First results.

Quality Control: • Implementation of the Clean Production Agreement • Internal Quality Control System • Quality Seal • Participation in other programmes for quality certification • Projections and dreams.

202

Honey from the Mantiqueira's Paulista hills: a proposal for a designation of origin

Juliana do Nascimento Bendini*, Ricardo de Oliveira Orsi, Lídia Maria Ruv Carelli Barreto, Ana Paula da Silva Dib, Hugo do Nascimento Bendini, Sílvia Helena Modenese Gorla da Silva

* Alameda Central, 40. Eldorado. 12120- Tremembé Brazil, jbendini@yahoo.com.br

This study aimed to see the implementation of a Designation of Origin to the honey from the Mantiqueira's Paulista hills. The region is an important area for conservation in Brazil southeast, including vegetation types and ecosystems associated with the Mata Atlantica area influenced by very particular variations of environmental factors. Thus, we first performed the mapping, representing all beekeepers from this region, through the Geographic Information System, creating a database related to the characteristics of regional beekeepers (socioeconomic, technical, historical and cultural), as with a thematic map, related to the classes of vegetation, including urban areas, grassland and exposed soil. Finally, for the characterization of honey, the study was made by physical-chemical composition of samples of all provided by beekeepers, according to the main blossom of the region. This present study has, through the mapping of the beekeepers, delineate the territory of the region of beekeeping in Mantiqueira's Paulista hills area, and prove an important tool for monitoring the origin of regional product. It was observed that, historically, beekeeping was introduced in this area at the beginning of twentieth century and that the Trapistas monks who settled on the slopes of the Mantiqueira's hills, fleeing from political persecution in France, had great influence on the consolidation of this activity. Currently, the beekeepers of the region are in keeping with the typology of farmers and market their products directly and informally to the consumer, using mainly the tourist season. Finally, the physical-chemical analysis associated with the system of neural networks allowed the description of the product, listing its own characteristics to environmental factors of the ecosystem.

203

The role of the Center of Apicultural Studies Cea-Unitau-SP-Brazil, in 20 years as agent of research and extention regional program

Lidia Barreto*, A.P.S. Dib, L.E.V. Pasin, C. Carvalho, G.F.R. Peão, J.N. Bendini

* Rua Vicente Torres, 5002 120851 Taubaté Sao Paulo, Brazil, barretolidia@yahoo.com.br

In the Paraíba Valley-Sao Paulo, Brazil the apiculture began there is more than one century (1860). In 1988 the Center of Apicultural Studies of the University of Taubate-CEA/UNITAU is created, aiming the integrated and maintainable local development, for generation of family income. In the 20 years of existence it promoted several actions, motivating the formation of beekeepers' groups, improvement of technical quality, the increase in the number of apiaries in the area, and increment of the production, being considered the number of beehives now superior to 9,000. The CEA-UNITAU, make possible the diversification and the enlargement of the activities, having in the multidisciplinary the main growth axis. In the scientific production, it were possible to develop 04 doctorate, 04 master's degree, can be counted 23 monographs of specialization course, 25 monographs of graduation course, being published 32 scientific papers, 02 books, 01 video class, 150 summaries in national and international annals. It is counted 610 organized events, it also enrolls the 320 trainees passage and 8717 services. Today with area of

2,000 m² built, it has a warehouse School; a Laboratory of Quality Control of Bee Products; a Section of Processing of bee wax; training programs for beekeepers and entrepreneurs, to national level and Latin America, with the Specialization Course in Beekeeping by education at distance. In 2008 and 2009 it conquered 2 national prizes accomplished by the Solidary University, where the axis of the action is the promotion of the maintainable development in lacking community, reiterating all the reason of existence of the project CEA-UNITAU, as well as the capacity of change of the attended communities' reality.

204

Use of bees in Colombia for narcotics control and preservation

Telmo Martínez-Anzola*, Laura Bermúdez-Wilches, Eliécer Marín

* Calle 64A # 38-25 110010 Bogotá Colombia, abejita33@hotmail.com

During a period of six years, nearly 25000 beehives of Africanized *Apis mellifera* will be installed within the natural reserve area Parque Nacional Natural Sierra de la Macarena, in Colombia, with an approximate production of 1000 tons of honey per year. From a population of around 1300 families living nearby the village of Puerto Toledo (town of Puerto Rico, state of Meta), located in the vicinity of this natural reserve area [280 meters above sea level, longitude: W 73° 21' 21,82" E, latitude: N 2° 49' 36,23" S], that were dedicated to coca cultivation, 450 have voluntarily eradicated 1000 hectares of this crop, with capacity to product 32 tons of coca, joined to the association AGRO-GÜÉJAR and signed a commitment with the National Government not to cultivate coca in the future, in exchange of the supply of food, seeds and implements to for the development of alternative agricultural projects, included Apiculture, supported by the Natural Reserve Areas National Bureau. 875 new beehives have been installed so far; the beneficiaries have received stainless steel equipment for honey harvesting and exploitation of beeswax, as well as equipment for hives manufactory, all of them for communitarian purpose. Three apiaries, each one with 25 beehives, were assembled in order to evaluate the technical viability and to set the apiculture activities calendar. 75 beneficiaries have been trained on *Apis mellifera* and stingless bees breeding, apiculture carpentry and Good Manufacturing Practices (GMP). A training center, called Apiario-Escuela, with 140 beehives that belong to the local company Apiario los Cítricos, was established in order to provide support and train the new potential beekeepers. Currently, a processing and packaging plant is being built.

205

Small scale beekeeping economy in Mexico and Guatemala

Rémy Vandame*

* El Colegio de la Frontera Sur, Línea de Investigación "Abejas de Chiapas", Chiapas, Mexico

In the frame of the revision of the minimum price in the standards of FLO (Fairtrade Labelling Organizations) to be promoted by CLAC (Latin-American Coordination of Fairtrade Organizations), we studied the economy of small scale beekeeping for 120 beekeepers of Mexico and Guatemala, as well as of the organizations they belong to. At producer level, we show that the daily income derived from beekeeping is rather low and very sensitive to scale effect. For beekeepers owning less than 30 colonies, the net income varies between 3 and 6 USD per day of work, depending of the selling price, which is lower or equal to the local minimum salary. The scale should be higher than 50 colonies per producer to generate a net income of 18 to 20 USD per day of work, susceptible to support a familiar economy. In organic beekeeping, the trend is similar, though it is clear that the differential of price between conventional and organic honey generally does not worth the economic and human investment necessary for the conversion. At organization level, we show that organizations involved in honey exportation present higher costs due to administrative and personal costs incurred. Moreover, the costs of organizations in USD per kg of honey exported are directly linked to the number of containers exported. This shows that a single organization should not export less than 3 containers of honey. Overall, these data show minimum scales of production and exportation that should reach beekeepers and their organizations respectively, in order to consider beekeeping as a true development tool.

El desarrollo apícola Venezolano por la vía de las redes de innovación

Raúl Alberto Casanova Ostos*

* POBox 02 Ipostel UNET 5001 San Cristobal, Venezuela, RCASANOV@GMAIL.COM

Las Redes de Innovación Productiva son un conjunto de unidades de producción de bienes o servicios organizadas por el Ministerio del Poder Popular para Ciencia y Tecnología con el fin de impulsar el aprovechamiento de las potencialidades locales. Básicamente se organiza a los campesinos, articulándose con los organismos gubernamentales y no gubernamentales, entes privados y comerciantes en pro del desarrollo de la producción y mejoramiento del rubro apícola. El trabajo se ha desarrollado en seis redes con el objetivo general de iniciar desarrollar y mantener un programa de selección, mejoramiento genético de abejas y la propuesta de capacitación técnica que permitan obtener herramientas para que sus apicultores aumenten la productividad de las colmenas, así como herramientas para diversificar la producción y la disminución de los costos de producción. El método contempla identificar, cuantificar y seleccionar dos aspectos que impactan significativamente el desempeño de la colonia de abejas melíferas; producción de miel y comportamiento higiénico. Además esta acompañado de formación básica y técnica del manejo de colmenas, biología de abejas y manejo genético. Para ello se han desarrollado 16 cursos de capacitación teórico práctico en el sitio de sus comunidades. El resultado parcial obtenido es: 60 apicultores formados, tecnificación de 500 colmenas. La primera etapa fue la estandarización e identificación de colmenas; la segunda se ha iniciado con la selección de colonias con miras a conformar el programa de selección genética hacia resistencia a enfermedades y plagas de la colonia; y la tercera etapa será la selección de colonias para implementar el programa de mejora para la producción de miel.

Organic honey production and marketing studies of TEMA foundation in Turkey (A successful beekeeping cooperative)

Murat Gigin, A. Nihat Gokyigit, Ahmet Inci*

Chairman of TEMARI, Istanbul, Turkey*, ahmetinci_@hotmail.com

In this study, a successful beekeeping cooperation between TEMA and beekeepers of Turkey will be presented. TEMA, the Turkish Foundation for Combating Soil Erosion for Reforestation and for Protection of Natural Habitats. This cooperation was formed after the work was started by TEMA in Artvin to isolate, protect and select the Caucasus indigenous honey bee of the region and organic honey production. The starting point of the organic honey production was the fundings obtained from the EU for rural development Project in Artvin. For this specific purpose TEMARI firm was established to support the producers with all necessary equipment. Starting by training the beekeepers, all inputs like foundation comb, hives, suitable medicine, stainless steel extractors, stainless steel containers and beekeeping tools were provided to beekeepers. TEMARI also provided IMO certification to organic honey producers and also arranged visits to apiaries, provided colony records, feeding without sugar, estimation of honey yield and laboratory analysis. In 2008, a total of 55 apiaries with 3910 colonies produced organic honey and in addition 89 apiaries with 3410 colonies were in transition period to organic beekeeping. After the harvest TEMARI purchased 37 tons of organic honey produced by the beekeepers. The price paid to the beekeepers by TEMARI for chestnut honey was 10 € per kg and highlander flower honey was 7 € per kg. TEMARI also purchased 20 tons of honey from the beekeepers in transition period and paid 7 € per kg for chestnut and 4.50 € per kg for highlander flower honey. All of these honey produced by the beekeepers were packaged under IMO certification by TEMARI and marketed under the brand name TEMA and Hidden Paradise. Average income of the beekeepers were raised from 2000 € to 8000 € per year in 2008 and there is a great tendency by beekeepers to join this profitable system.

Structure of beekeeping in Turkey

Asli Elyf Sunay*, Taylan Samanci

* Cekmekoy Cavusbasi Cad. NO:70 Ümranyye 34782 Istanbul Turkey, asli@balparmak.com.tr

Turkey is one of the important producers of honey in the world with approximately 50.000 tons of annual production and 4.000.000 beehives. With its rich range of flora and different types of honey, Turkey is particularly, the biggest producer and exporter of pine honey in the world. There are 40.000 beekeeper families and about 240.000 people live on beekeeping. This study was run between 2005-2007, under the project called "Determination of residues, adulteration and origin of honey according to geographical regions" which was also supported by Technology and Innovation Funding Programs Directorate (TEYDEB) and Foreign Trade Department. The aim of this project was to determine the problems about honey and beekeeping in Turkey and organize training courses for beekeepers locally as seminars and field workshops to solve these problems. For this purpose training courses were organized in 7 regions and 57 different provinces of Turkey where beekeeping and honey production is an important living source. A total of 4045 beekeepers attended those courses and they were also asked to fill in a questionnaire to get information about the structure of beekeeping in their region. Main problems are determined as; quality of queen bee, low yield of honey per hive, varroa, European foul brood, bee losses during winter time, marketing and insufficient places for migratory beekeepers to stay overnight. Results showed that, 76,3% of beekeepers own more than 50 colonies and 88,9% are experienced more than 5 years, whereas 54,7% have an education degree of primary school. 42,5% of beekeepers mentioned that they prefer cold storage to keep their honeycombs and 19,6% declared that they are using natural plants. For feeding bees during spring time, 62,5% of beekeepers preferred both sugar syrups and honey supplement. .../...

Beekeeping and development in emerging countries: an urgent need for networking

Alain du Chaxel*, Nathalie Carazzai, Benoit Olivier

* 38 rue Saint Placide 75006 Paris France, alainduchaxel@apiflordev.org

Bee-keeping contributions to development are largely demonstrated by facts: money, nutrition, health, crops increase, environment, etc. AFOCO (Belgium), Apiflordev (France) and Miel Maya Honing (Belgique) has a large experience of beekeeping development projects, in sub-Saharan Africa for the two first ones and mainly in Central America for the third one. A demonstrative example is the village people beekeeping project in Central African Republic supported by one of them. These three above associations are quite convinced there is an urgent need to provide all numerous actors in this area, in the North as well in the South, with right information how to undertake beekeeping development projects. In their views, the only way is networking. The lastly target of the network is to coordinate, between them and by them, efforts and initiatives from all private persons or NGO, from the North and from the South, acting in development via beekeeping. For being realistic, the proposal is to build up a web site providing all development via beekeeping actors with any kind of information and contacts for optimizing their actions at the benefit of village people asking their support. At the first stage, it is envisaged to focus on sub-Saharan Africa, one among the poorest areas in the world, and afterwards to enlarge to the entire world. The British association Bees for Development being very active in English speaking world, the web site will concern mainly francophone Africa at the beginning with links to the Bees for Development web site. The three above mentioned associations already work together on that concept and would be keen to welcome interested persons, associations and organisms.

210

Elements of franchising for development of beekeeping in Russia

Rail Khismatullin*, E.V. Zhenokhova, V.L.Makarov

* 37 Vstrechnaya 614000 Perm Russia, kate@tentorium.ru

During the centuries export of honey was one of the most profitable income items for the country. A number of apiaries of farm businesses all over Russia were closed during the last decade. The quantity of honey-bee colonies became reduced as well. The Tentorium Apicompany started the project of agrarian franchise "Beekeeping development in Russia" in 2008. The purpose of the project is to increase in number the amateur and large-scale industrial apiaries therefore to increase the quantity of honey-bee colonies and to preserve bees. The business model with the elements of franchising was chosen by the experts of the Company for effective introduction of beekeeping technologies. Beekeeping against poverty is the social mission the Company presents in the framework of the project. Organizer of apiary who gets the farmer franchise business model "Beekeeping development in Russia" is fully supported by the Company during the first year. The farmer franchise started in 2009 is designed for small-scale amateur beekeeping. However amateurs become experts those develop industrial beekeeping. The farmer franchise model for industrial beekeeping designed by the Tentorium Apicompany is the next step for developing beekeeping in Russia. This year the farmer franchise was launched in the Urals (Perm territory and Sverdlovsk oblast) and in the South of the country – in Krasnodar territory. Under the conditions of increasing unemployment and poverty the farmer franchise can be successfully applied as a social program. People with low income have a chance to start up small apiaries thanks to government support and farmer franchise. Experienced beekeepers could reorganize their apiaries for more effective production and use of honey-bee colonies. The farmer franchise business model designed by the Tentorium Apicompany is a kind of contribution to the matter of bee preservation.

BEE BIOLOGY COMMISSION - SYMPOSIUM N°3 "CONSERVATION"

211

Multivariate morphometric analysis of *Apis mellifera* in Yili river valley of Xinjiang

Liu Zhiguang*, Wei Shi, Guiling Ding, Liping Lv

* Bee Research Institute, Caas, Beigou no.1 Xiangshan, Haidian, Beijing, China, liuzhiguang186@yahoo.com.cn

Morphological characters of 81 honeybee colonies from 4 locations in Yili River Valley of Xinjiang province of China were analyzed. Variance analysis, principal component analysis, discriminant analysis and cluster analysis were performed using SAS 6.12. Multivariate statistical analysis revealed two distinct morphoclusters of bees: (1) the bees of Gouxiongou and Xinyuan, and (2) the bees of Nileke and Tangbula. Cluster analysis grouped the bees of Gouxiongou and Xinyuan with the newly discovered subspecies *Apis mellifera pomonella*, the bees of Nileke and Tangbula with *Apis mellifera mellifera*. This is the first time for *Apis mellifera* to be reported as native in China.

212

Genetic variability in honey bee populations from Bulgaria

Evgeniya Ivanova*, Maria Bouga

* 24, Tzar Assen Str. 4000 Plovdiv Bulgaria, geneiv@uni-plovdiv.bg

The genetic variability of honey bee populations from six different regions of Bulgaria were studied using isoen-

zymic analysis of four enzymic systems (MDH, ME, EST and ALP) corresponding to 4 loci and PCR-RFLP analysis of three mtDNA gene segments (16srDNA, COI and ND5). All loci, according to isoenzymic analysis, were found to be polymorphic in most of the populations studied. Two alleles were detected at Mdh-1 locus (Mdh 65 and Mdh 100), two alleles at Me locus (Me 100 and Me 106), four alleles - at Est-3 locus (Est 80, Est 88, Est 100 and Est 118) and two alleles - at Alp locus (Alp 80 and Alp 100). There was found that Est 100 allele was fixed in three of the populations studied. The observed and expected heterozygosities (H_o and H_e) ranged from 0.146 to 0.267 and 0.276 to 0.308, respectively. Allele frequencies of all loci were used to estimate Nei's (1972) genetic distance, which was found to range between 0.002 and to 0.040 among the populations studied. Neighbor-Joining and UPGMA phylogenetic trees were obtained by genetic distance matrix methods. The estimated F_{ST} mean value of 0.027 shows that 2.7% of the overall genetic diversity observed was among populations, as opposed to 97.3% within populations. For mtDNA analysis, the restriction enzymes used for the 16s rDNA gene segment were Sau3A I, Ssp I, Hinc II, Dra I, EcoR I, for the CO I gene segment were Sau3A I, Ssp I, Fok I, Bcl I, Sty I, Nco I, BstU I, and Xho I and for ND5 Dra I, Taq I, Nla III, Hinc II, Fok I and Ssp I. No variability was detected among honey bee populations studied, based on the results from mtDNA analysis. Comparing the results with these of analogous studies, it seems that Bulgarian honey bees maintain their pure origin. Further research is necessary and the results would be useful for conservation reasons.

213

Genetic analyses of Syrian honeybee populations (*Apis mellifera syriaca*)

Mohamed Alburaki*, Ali Alburaki, Lionel Garnery

* CNRS, UPR9034, Avenue de la Terrasse 91198 Gif-sur-Yvette France, alburaki@gmail.com

One thousand six hundred DNA samples of Syrian honeybee populations *Apis mellifera syriaca* were collected from twelve different regions in Syria. These were analyzed by PCR-RFLP (CAPS) techniques by using two different molecular markers: mtDNA (Garnery et al., 1992) and microsatellite loci. PCR amplified intergenic region COI-COII (500-950 bp) from each sample was subjected to restriction analyses by DraI enzyme. The restriction profiles were analyzed and compared with the already existing mtDNA markers on poly-acrylamide gels, leading to the determination of nineteen haplotypes which were subsequently sequenced. Secondly, phylogenetic trees constructed by studying fourteen microsatellite loci on the genomic DNA (involving SSR technique) allowed determining the genetic diversity and relationship among Syrian honeybee populations *Apis mellifera syriaca* and other honeybee subspecies. The results of this study will lead to set up genetic conservatories in specific areas of Syria in order to maintain and protect the diversity of this local honeybee.

214

Genetic diversity of honeybee (*Apis mellifera* L.) populations in Turkey revealed by Randomly Amplified Polymorphic DNA (RAPD) analysis

Rahsan Ivgin Tunca*, Gun Koleoglu, Yusuf Atagan, Meral Kence

* Department of Biology, Middle East Technical University, 06531 Ankara, Turkey, mkenca@metu.edu.tr

The honey bee (*Apis mellifera* L.) is an ecologically and economically important insect species. Five of 26 identified subspecies are distributed in Turkey. It is essential to determine and preserve the genetic variation which is especially a valuable resource at this time of global honey bee losses. RAPD markers were used to assess the genetic diversity in 360 colonies from 25 provinces. In a total of 720 worker bees, ten RAPD primers amplified 105 bands, all of which were polymorphic. Mean gene diversity values (H_e) ranged between 0.035 and 0.175, GST values 0.060-0.395, and the private band patterns reflected a high level of genetic variation. AMOVA analysis partitioned the genetic variation as 60% within populations, 40% among populations. The Mantel test did not reveal significant correlation between the genetic and geographic distances. Neighbour-joining analysis showed that the bees of Thrace region of Turkey and an island relatively close clustered together. The other two populations that belong to A lineage were separated from the ones of C lineage. The results showed that the RAPD markers successfully discriminated the honey bee populations and provide appropriate information for conservation plans.

215

Genetic variability in Turkish honeybee populations using geometric morphometrics analysis

Meral Kekeçoglu*, Maria Bouga

* Duzce University Faculty of Science Department of Biology, Duzce, 81620, Turkey meralkekecoglu@gmail.com

The genetic variability of 14 honey bee populations from Turkey (Thrace area) was studied, using geometric morphometrics analysis, on a sample of 795 honey bees collected from 53 different apiaries. Data acquisition was done using tps-UTIL1.28 and tps-DIG packages. The geometric morphometrics analysis was based on using the coordinates of 18 landmarks located at vein intersections of the fore right wing. Statistical analysis was performed using MS Excel, Mathematica 4.1 and Origin 7.5 packages. Our results show that no considerable intrapopulation variability was detected. It is very interesting that K rklareli honey bee population is discriminated from the rest ones. This result is in coincidence with analogous studies, using microsatellite, isoenzymic and classical morphometrics approaches and it is very useful for conservation reasons. Geometric morphometrics analysis can be very powerful in exploring intra-specific variation at the population level and it is largely employed in evolutionary studies, combined with other approaches such as classical morphometrics and molecular markers.

216

The potential impact of *Apis mellifera caucasica* after selection, breeding, and rearing of Caucasian queen bees in Artvin and Ardahan

Irfan Kandemir*, Ahmet Inci

* Department of Biology, Faculty of Science, Ankara University, Ankara ikandemir@gmail.com

Apis mellifera caucasica is one of the most suitable subspecies in the cold climates and this favorable subspecies has a distribution on the North east corner of Turkey bordering to Georgia. Honeybee genetic resources are under the threat genetic pollution due to high degrees of hybridization. The preservation of the subspecies diversity within its geographic boundaries are extremely important. *Apis mellifera caucasica* in Camili after scientific work proven to be keeping its original status due to geographic restriction to the the inaccessible geography. There is one other ecotype as well in close proximity (Ardahan-Posof) and this ecotype was also under consideration for similar purposes like rearing queens, selection of better stocks and production of favorable hybrids for different beekeeping purposes. These two honey bee ecotypes of Caucasus subspecies are favorable for their high productivity and thus scientific research have been continued since 1998. Different techniques such as morphometry, allozymes, mtDNA and microsatellites were applied to the mountain ecotype and will be applied to the high plain ecotype as well. Current research is composed of geometric morphometrics in order to find out the similarities and differences of both caucasus ecotypes. Subsequently the colonies will be selected for breeding purposes during queen production. This project has different steps and the first one is going to be the education of the local beekeepers in Ardahan-Posof and following the selection of other favorable charactersitics of the Ardahan-Posof ecotype such as hygienic behavior, aggressiveness, disease resistance, and high honey yield and also compare the results with the Artvin-Camili ecotype.

Analysis of the French livestock of the honeybee *Apis mellifera* using molecular markers: implication in conservation programs

Lionel Garnery*, Agnès Rortais, Isabelle Giraud, Hélène Legout, Gérard Arnold

* CNRS, UPR9034, avenue de la terrasse, 91198 Gif-sur-Yvette France, garnery@legs.cnrs-gif.fr

The honey bee (*Apis mellifera* L.) exhibit a natural biodiversity very well structured into four evolutionary lineages and 26 geographical subspecies. Its interest in agronomy, and use as a producing species lead the beekeeper to exchange subspecies and strains all over the world. These artificial migrations events tend to blot out the natural structure of the species, and if it is too important, can endanger the survival of some of the natural subspecies. In order to understand the impact of queen importations in France, we studied a total of 5247 colonies, belonging to 52 French populations covering most of the French administrative regions. Using mitochondrial DNA, our study shows that 73 % of the colonies belong to the local western Mediterranean lineage. The level of introgression due to queen importations is very irregular and range from 0.5% to 96% according to the location. Observations of local haplotypes seem to point out that France is divided into three different areas: Corsica, Southern and Northern populations. The use of microsatellite markers shows that the level of population differentiation is very low. When differentiated, this is mostly due to the level of within population introgressions. Mapping our results lead us to define putative areas where conservation protocols can be considered.

Conserving an ecotype of *Apis mellifera mellifera* through the application of morphological and genetic data

James Strange*, Lionel Garnery, Gérard Arnold, Walter S. Sheppard

* 255 BNR, Utah State University 84322- Logan, UT USA, James.Strange@usda.ars.gov

An ecotype of *Apis mellifera mellifera* is the target of conservation efforts in the Landes region of southwest France. The Landes ecotype has an annual brood cycle that is adapted to the late season blooming of ling heather, *Calluna vulgaris* L. We demonstrated the persistence of the Landes ecotype, through a reevaluation of the colony annual brood cycle. Because annual brood cycle measurements are difficult and time consuming and present a major hurdle for resource managers who wish to establish an in situ genetic conservatory, the reducing the need to perform this test is desirable. A more feasible approach would involve using molecular and morphological characters to screen a large number of candidate colonies prior to the annual brood cycle analysis for the Landes ecotype. To this end, we characterized the morphology, mtDNA and microsatellites of the ecotype and found significant differences in morphology, mtDNA and microsatellite alleles frequencies among the ecotype and other French *A. m. mellifera* indicating the potential usefulness of these data for ecotype selection. The ideal situation would be to find one or a few morphological or molecular markers that are highly correlated with the ecotypic brood cycle, thus reducing the need for the difficult evaluation of colony population cycle. While a definitive morphological or molecular marker has not been forthcoming, a powerful suite of characters for identifying ecotypic colonies is available to resource managers. Here we present a multi-tiered screening process using morphology, mtDNA and microsatellite data to provide a quantitative means of selecting stock to target for conservation in the Landes.

219

Laeso, a case study in the conservation of a honey bee population

Per Kryger*

* Research Centre Flakkebjerg 4200 Slagelse Denmark, per.kryger@agrsci.dk

Læsø beekeepers in the 1980ies decided to conserve their local population of dark bees (*Apis mellifera mellifera*). In 1993 the law on beekeeping was amended, and the whole Island of 114 km² became a conservation area for dark bees. Yet, not all beekeepers on Læsø wanted to give up their productive hybrid bees. One beekeeper claimed that the rules would impair on his right of free trade. In 2001, a ruling from EU court stated that the purpose of conservation does stand over the general rule of free trade. Pending the Court decision, proper conservation measures lacked. It remained difficult to implement the rules without local consent. The Ministry of Agriculture tried to mediate, with the aim to reach an agreement to assure both the interest of conservation and of commercial beekeepers. As a result the eastern end of Læsø was set aside for the dark bee, while the remaining part of the Island was given free for commercial beekeeping without restrictions on the subspecies of bees. The long period without secure mating areas, resulted in introgression of the dark bees from commercial hybrid stock. Some beekeepers doubted the statement that the population was indeed *Apis mellifera mellifera* bees. In order to justify the conservation effort, a clarification was needed.

More than 8000 bees were sampled from Læsø and analysed with 24 DNA microsatellite loci. The results were analysed to determine which colonies showed most potential for breeding bees with minimal introgression. Most of the 583 bee colonies on Læsø in 2005 were relative hybridised, only 50 colonies contained less than 10 % non-mellifera genes. However, by 2007 a population of 123 colonies with less than 1% introgression had emerged, and 273 colonies were below 10 %.

220

Temporal mitochondrial variation in honeybee populations from Tenerife (Canary Island, Spain)

Jesús Madrid-Jiménez, Irene Muñoz, Pilar De la Rúa*

* pdelarua@um.es

Present biodiversity of honeybee populations from Tenerife (Canary Islands, Spain) has been assessed by mitochondrial analysis, and compared with data from 1998 to evaluate the evolution of the biodiversity in these ten years. Six haplotypes have been detected, two of them (A1 and A8) common in the North African honeybee populations, three (A11, A14 and A15) characteristic of the Atlantic African sublineage spread in the Macaronesia and the Atlantic Iberian coast and one typical of Eastern Europe subspecies as the Carniolan and the yellow Italian honeybees. Four of them (A1, A14, A15 and C1) were also detected in 1998. The level of introduction of imported honeybee queens in the local populations has been reduced suggesting a successful management of the beekeepers to maintain their local black Canarian honeybee.

221

Molecular markers discriminating Greek from Serbian honeybees

Maria Bouga*, Mica Bladenovic, Leonidas Charistos, Sladjan Rasic, Fani Hatjina

* 75 Iera odos str. 11855 Athens Greece, mbouga@aau.gr

Preliminary sequence data from three mtDNA segments of honey bee populations from two locations from N.

Greece and two locations from Serbia (3 colonies / location) were used to find out molecular markers discriminating Greek from Serbian honey bees. The mtDNA segments analyzed was a portion of COI, 16srDNA and ND5, amplified using PCR after the extraction of total DNA. A total of about 940 bp, 780 bp and 630 bp respectively were obtained by sequencing the above mentioned segments. CLUSTAL package was used for the alignment of these sequences. Nucleotide divergence was calculated using MEGA package and cladogram was constructed with various phylogenetic packages. The results of this preliminary investigation show that Greek from Serbian honey bees are discriminating as concerning the 16srDNA gene segment.

BEEKEEPING TECHNOLOGY AND QUALITY COMMISSION SYMPOSIUM N°2 "QUEEN REARING AND INSTRUMENTAL INSEMINATION"

222

Breeding *Nosema* free colonies in Denmark

Poul Erik Soerensen*

* Vestermarken 12 8660 Skanderborg Denmark, Bakkegaarden@biavlscenter.dk

In Denmark we have app. 4000 beekeepers with a total of 80.000 colonies. Over the last 20 years mating of breeder queens has been done on mating islands. Denmark has plenty of small islands suitable for mating queens. Breeder colonies are being selected after the traditional criteria's, swarming, temper, comb behaviour and honey yield. Tolerance towards diseases is a very important parameter. Hygienic behaviour is tested by the freeze method due to selection for tolerance towards American foulbrood and chalk brood. Since the late 80ies a small beekeeping lab has analysed our breeder bees for *Nosema apis*. All potential breeder queens have been tested. Only breeder queens without nosema have passed the breeding programme for further selection. In former times nosema was the largest economic threat to beekeepers. After many years of hard breeding work, nosema no longer has any practical impact on Danish beekeeping. We do not and have never been using any kind of drugs against nosema. *Nosema ceranae* has been in Denmark at least since 2004 and is expected to be widespread. In my presentation I will present how we take out the nosema samples and how we analyse for nosema. I will also present practical results from our breeding work.

223

Breeding survivors bees in organic and Nordic Canadian condition

Anicet DesRochers*

* 111 R.G.2 Gravel jow 1c Ferme-Neuve Canada, miels@api-culture.com

Description of the beehive :

1000 hives: - certified organic honey production (average yield / hive: 130 pounds)
- nucs production : 400 / year

1500 mating nucs :

- production: 5 000 - 7 000 queen / year

Geographic situation:

250 km away from other commercial beekeepers and big cities:

Isolated breeding area

Isolated land for organic honey production

Survivors selected stock over a 10 years period (part 1)

1 Background

- Introduction of selected mite tolerant stock

- Carniolan, Primorsky Russian, V.S.H., Italian Minnesota Hygienic.

- 2 Objectives of the Survivors bee project
 - Conducting a selection program in close and open population breeding to maintain the purity of different stocks such as Primorsky Russian.
 - Selection of best characteristics over years of the stocks.
 - Starting producing Russian and hybrids queens for the North American bee industry
 - 3 Characteristics of the main survivors selected stock and adaptation.
 - 4 Selection program of the Survivors Bee Project by Api Culture Hautes Laurentides inc.
 - 1st Step : Pre-selection
 - Over wintering
 - Spring population
 - Food consumption
 - Swarm tendency
 - Prolificity
 - Gentleness
 - Calmness on frame
 - Inbreeding
 - Honey production
 - 2nd Step : Test
 - Taking the best pre-selected colonies of each stock and doing further tests. After selecting breeders raising daughters queens and send them to a team of bee technicians at the Quebec research Centre de Recherche en Santé Animale de Deschambeault (CRSAD), Québec.
- CRSAD work based on specific criteria's:
- Honey production per apiaries
 - Growth of varroa population
 - Hygienic behaviour test : 3 times (July, September and following Mai with the survivors)
 - Inbreeding test : 3 times (July, September and Mai)
 - Measurement of bee population and brood : 4 times (July, September, April and Mai)
 - Evaluation of aggressiveness: 5 times
 - Level of infestation by *Acarapis Woodi* (tracheal mite)
- 5 Result: Performance of Api-Culture Hautes-Laurentides stocks .../...

224

Queen rearing in different conditions

Lucija Žvokelj*, Aleš Gregorc

* Slovenia lucija.zvokelj@kis.si

These experiments were performed in order to answer the following questions: Which technological factors have influence on queen's morphological characters during queen rearing? Which characters demonstrate queen's fecundity? Do morphological characteristics demonstrate queen's potential egg production? In the first part of our experiment we examined the influence of the age of grafting larvae on the morphological characters of the queen bee and the impact of the age of the queen at the time of mating (in case of delay in mating due to, for instance, bad weather conditions) on queen fertility. With the examined queens new colonies were established and then the colony strength was measured. We did not find any differences in weight, weight of ovaries and volume of spermathecae among queens when using larvae which were up to 36 hours old. Similarly we did not find any difference in morphological characters and performance of queens in colonies among queens which mated during the period of 8 days after hatching and queens which mated 17 days after hatching. In order to check the influence of workers on colony development we swapped tested queens among colonies and followed the colony strength for one season. In the last part of our experiment we demonstrated 3 different bee pastures: rape, chestnut and conditions without pollen supply. We reared queens in 3 groups of nurse and nucleus colonies. The first group of queens was reared by adding rape honey and pollen, the second group by adding chestnut honey and pollen and the third one by adding sugar cake only. During the experiment, larvae, pupae, newly emerged queens and mated queens from all 3 groups were collected and their morphological characters were measured. With the above measurements we try to show the influence of pollen source and pollen amount on the development of queen.

Ten years of beekeeping with multiple-queen colonies in China

Huo-Qing Zheng, Shui-Hua Jin, Christian W. W. Pirk, Vincent Dietemann, Robin Crewe, Fu-Liang Hu*

* College of Animal Sciences, Zhejiang University, Hangzhou 310029, China flhu@zju.edu.cn

Honeybee multiple-queen colonies composed of several mated queens under freely moving conditions can be obtained by ablating the queens' mandibles to side-step queen-queen rivalry and by using young workers to avoid the balling of the supernumerary reproductives. Since 1999, this technique is successfully applied in beekeeping operations in several regions of China. In the last five years, we collected data from 18 apiaries and evaluated that 75% of the multiple queens colonies establish successfully. Given proper care, including sufficient feeding, avoiding robbing and drifting, destroying newly built queen cells and abandoning foragers before migration, the majority of these colonies survived over-wintering without queen loss and were sustainable enough for long-term beekeeping. Due to their greatly increased brood production, multiple queen colonies can contribute to commercial beekeeping by providing larvae to be grafted for royal jelly production, by providing brood for the rapid buildup of production colonies in spring and by providing workers for package bees. In addition to the practical applications, multiple-queen colonies have been used as a model system to understand the pheromonal communication between queens and the decision-making during their fights. In addition, we used this experimental setup to investigate cooperation and kin recognition between individuals originating from different matriline.

Weight of honeybee queens and its effect on the quality of instrumentally inseminated queens

Malgorzata Bienkowska, Beata Panasiuk*, Dariusz Gerula, Pawel Wegrzynowicz

* Research Institute of Pomology and Floriculture, Apiculture Division, Pulawy, Poland, beata.panasiuk@man.pulawy.pl

One of the quality criteria of honey bee queens is their weight at emergence. It depends on the age of larvae used for queens' rearing, season, strength and condition of rearing colony. The younger larvae used for queen rearing the heavier queens emerge. The aim of the research was to verify the influence of weight of queens at emergence and at insemination day on oviducts condition and a number of spermatozoa in spermatheca. The research was carried out in the Department of Bee Breeding, Apiculture Division in Pulawy, Poland. Carniolan bee queens were reared from 1-day-old larvae. They were inseminated at the age of 7 days with single dose of 8 µl semen. Queens were kept in Zander cages before insemination in queenless colonies. After the insemination queens with 25 attendant workers were put into mailing cages and moved into queenless colonies. Queens were weight at emergence and at insemination day. The dead queens were counted 48 hrs after insemination. Surviving ones were killed and dissected to examine their oviducts for residue of semen. The volume of spermatheca was measured and the number of spermatozoa in spermatheca was counted. Altogether of 358 queens were inseminated. The average body weight at emergence was 199,5 mg. To the insemination they lost about 30 mg of their initial weight reaching on average 170 mg. Among examined queens, 79.1% cleared oviducts, 18.7% had some semen residue and 2.2% were dead. The higher percentage of queens with some semen in oviducts was observed among light ones. Significant correlations were found between the weight at emergence and at insemination day and other factors: volume of spermatheca and number of spermatozoa.

The French national bee breeders association and the breeding practise in France in 2009

Olivier Verjus, Fedon T., Beder-Bresson E., Odoux JF.*, Bocquet M.

* Domaine du Magneraud - BP 52-17700 - Surgères - France jean-francois.odoux@magneraud.inra.fr

The French national bee breeders association ANERCA was created in 1979 to promote breeding and selection of all kind of bees in order to ameliorate the apicultural yields. Around 250 members are individual beekeepers, or regional, technical beekeeping groups. The association is founded by members' fee, but also by agricultural training funds, and by the external vacations to regional groups. Since 2004, we have been benefiting from public founding to afford a salaried technician. The meetings take place twice a year with scientists or beekeepers from France (2/3) and abroad (1/3), who accept to meet breeders during one or two days. "Info-Reines" is our journal, reporting the ANERCA conferences. Training periods in queen breeding or in breeding management are attended each year by around 200 people, with the support of regional beekeeping associations. Main actions in these last years have brought some knowledge for a revival of the breeding activity in France: Breeding practises report on state, training methods, directory and participation in a governmental reflexion. From the results of the survey in 2008 of 100 beekeepers, we will show here the evolution of the breeding practices in France for a 4 years period. The annual requeening concerns 43% of the colonies, by dividing and introducing cells. Their livestock is mostly black bee, Buckfast, Carnolian and Caucasian which are now the main races. Most of the breeders sell between 100 to 200 "queen-equivalent", or more than 1000 per year. The queens and swarms market continues to increase, and breeders wish to go on to develop their activity, even if the turnover does not secure a return of their working time. Furthermore, they are not satisfied with the research programs carried out on queen's quality.

The temperament traits and the hygienic behavior of honey bee (*Apis mellifera carnica* Poll.) from Serbia

Goran Jevtic*, Mica Mladenovic, Nebojsa Nedic, Bojan Andjelkovic

* Institut for Forage Crops, Serbia, goran.jevtic@ikbks.com

The aim of this study was to determine the temperament and the hygienic behavior of the six honey bee (*Apis mellifera carnica* Poll.) ecotypes from Serbia. Three of these ecotypes were derived from valley area (rasinski, moravski, banatski), and three were derived from mountain area (sjeni ki, timo ki, kopaoni ki). The observed traits were swarming impulse, aggressiveness, honey robbing and the number of cleaned cells in the 24 and 48 hours after damaging (pin-killed method). All of the studied traits were observed during the period of two generations. Each generation was tested for both years. In the first generation (mother colonies) the swarming impulse was more pronounced in the colonies of valley ecotypes. The colonies of sjeni ki ecotype were very aggressive during the inspection (rated 2,5), and it was hard to handle the colonies of this ecotype. The honey robbing was especially pronounced in the colonies of moravski and timo ki ecotype. The highest number of cleaned damaged cells was determined in the colonies of timo ki ecotype in the both inspections. The differences in the aggressiveness and the number of cleaned cells after the 48 hours between ecotypes were statistically very significant. In the second generation, in the offspring, all of the traits were somewhat highly rated. The aggressiveness in the sjeni ki ecotype was rated 3,17, and is still restrictive factor for colony handling. In total, the colonies of this generation were susceptible to honey robbing (average grade was 3,61). The differences between rates of honey robbing, and the differences between the numbers of the cleaned cells after 48 hours were statistically very significant. The differences between rates of swarming impulse were statistically significant.

The distributed honeybee stocks in Armenia and their propagation

Norak Hakobyan, Roza Tsarukyan, Karen Avetisyan*

* karen_avetisyan@inbox.ru

Caucasian grey mountain and Armenian yellow aboriginal honeybees of Meghri population are distributed in Armenia. The length of beak of Caucasian grey mountain bees is 6,6-7,2 mm, the weight of an one-day-old worker bee-90 mg, the weight of an one-day-old queen-180 mg for a fertilized queen-200 mg, which can lay 1100-1500 eggs a day. The length of beak of Armenian yellow bees of Meghri population is 6,6-7mm, the weight of an one-day-old worker bee is 103 mg, the weight of an one-day-old queen-182 mg, for a fertilized queen-240 mg, which can lay 1500-2000 eggs a day, in record colonies-up to 3000 eggs. Covering a hive with huge quantity of propolis is a typical feature of these bees. The low quantity entrance of nectar (100-200 g daily) to a colony makes bees peace-loving, the instinct of aggression disappears. It is often observed jointly living of old and new fertilized queens in the period of changing the old by bees. Observations showed that both queens lay eggs and don't tend to meet each other, they aren't mistreated by worker bees. In this way they can live up to a month or longer. Meeting by chance queens fight and the young defeats. It is found out that in conditions of Armenia queens, depend on region and weather, may be reared since at the end of March. The experiments showed that 3 types of micronuclei may be used for fertilizing queens-two-part, four-part and eight-part. The more desirable type of micronucleus is the two-part, three-frame. In each part of this small box 3 frames are embedded that are in 1/3 435x230 mm size. The frames construction gives opportunity to get one 435x230 mm size frame by joining 3 smalls (1/3 435x230 mm size). It was obtained up to 4 fertilized queens from each part of the two-part micronuclei during one apiarian season.

Development of embryo transfer technologies in the honeybee for specific pathogen-free queen production and international genetic movement

John Pollard*, Claire Plante, Susan Cobey

* RR5 (7666 8th Line Nichol Twp) N1H 6J Guelph Canada, jpollard@genesafe.ca

The development of embryo transfer technologies was undertaken to create new pathways for the safe and well regulated international exchange of honey bee genetics. Reproductive technologies were developed for the manipulation of honey bee embryos to allow for their isolation, pathogen testing, long distance transport, in vitro hatching and subsequent grafting for specific-pathogen-free queen production. New methodologies were developed for the manipulation of embryos using micro-forceps modified by the application of micro-bore tubing to the forceps distal pincers. The extreme apical end of individual embryos were grasped between apposing segments of tubing and then lifted to separate their glued basal end from the brood cell. Embryos (50-54h post-oviposition) obtained from individual donors (n=10) were transferred in groups (n=100) to sterile culture dishes (glued in a standing position to the dishes bottom surface) and thereafter placed into 35 °C incubators (95% humidity, air atmosphere) for 32 hours. Selected in vitro-hatched larva, demonstrating spiracle movement, were grafted to queen cell cups and transferred to cell builder colonies to rear queens. Grafted larvae were assessed for acceptance at 48h and 120 h post-grafting and for emergence following transfer to emergence cages. Results demonstrated that 94% (941/998) of transferred honey bee embryos hatched in vitro within 32h of culture. Of the 570 larvae grafted for queen production, 239 grafted larvae (42%) were accepted and emerged as morphologically normal queens. Subsequent instrumental insemination and colony introduction of 107 selected embryo transfer derived queens demonstrated normal acceptance rates (86%), initiation of oviposition (mean day 5.5), brood production and survival overall.

The evaluation of honeybee colonies by using a database software with application in honeybee breeding programs

Eliza Cauia*

* Ficusului 42, sector 1, Bucharest 011321 Bucharest Romania, elizacauia@yahoo.com

It is well known that breeding is based on phenotypic and behavioural performance assessed at the level of each honeybee colony. By selection, the genes responsible for the desired characters have to be favoured, by evaluation and classification of all colonies involved in a breeding program. This evaluation often is a very labour and time consuming process, depending on number of measured characters, methods of evaluation, time, repetitions, registration and processing of the obtained data for colonies differentiation. To make this process easier it was created by a research project funded by National Research Program (CEEX), a breeding data base (Access software) for data registration, identification and classification, following the assessment of each colony. This software was conceived to work on 100 bee colonies and can process data for the main characters grouped as follow: honey production from the main flows, population, brood viability, brood quality and quantity, gentleness, way of capping, swarming tendency, disease resistance, pollen production, morphometric measurements and genetic analyses. A series of collected and processed data, from a breeding apiary belonging to Beekeeping Research and Development Institute from Bucharest, using this software will be also presented in this paper.

Selection of Carniolan honeybee colonies (*Apis mellifera carnica*) for queen rearing

Aleš Gregorc*, Vesna Lokar

* Agricultural Institute of Slovenia, Hacquetova 17, 1000 Ljubljana, Slovenia, ales.gregorc@kis.si

Carniolan (*Apis mellifera carnica*) honey bee colonies were tested for gentleness, swarming behaviour, colony strength, racial characteristics, cubital index (Ci), honey production, area of capped brood, hygienic behaviour and the presence of *Nosema* spp. Spores. Colonies with Ci within the standard (2.4 – 3.0) received the score 1, and colonies with a Ci lower than the standard received the score 0. The average value of Ci of all measures was 2.69 ± 0.40 . An additional criterion used was that less than 15 % measured Ci in a sample were lower than 2.40 (Ruttner, 1983). Colonies where worker bees were found to have yellow coloured abdominal segment or with a non typical cubital index were not considered for further queen rearing. The average honey production was 9.52 ± 6.64 kg and the area of capped brood ranged from 1810 cm² to 11925 cm² with an average of 7060.92 ± 2813.10 cm². Colonies were tested for hygienic behaviour using the "pin-kill test". Colonies were scored according to the proportion of cleaned brood comb cells 24 hours after killing the pupae on the following five point scale: 5 = → 95 %; 4 = 90 – 95 %; 3 = 80 – 89 %; 2 = 70 – 79 %; and 1 = ← 70 %. Colonies expressed hygienic behaviour at the level of 83.4 ± 11.2 %. Twelve colonies uncapped and removed more than 90 % of killed pupae, and of these, eight colonies cleaned more than 96 % of killed pupae. A sample of 50 worker bees was examined for the presence of *Nosema* spores using a microscope and PCR molecular method for *Nosema ceranae* determination. The highest *Nosema ceranae* spore load was found during September. The scores for each colony were summarised and the 20 % of colonies with the lowest spore load were selected for further queen rearing. Colonies with undesirable characteristics were discarded. The colony performance factors conducted through selection in an apiary is a suitable tool for ranking the colonies for queen rearing. The possibilities of performing observations and evaluation of different colony characteristics within apiaries as a selection method are discussed.

BEEKEEPING TECHNOLOGY AND QUALITY COMMISSION SYMPOSIUM N°3 "BEE PRODUCTS AND QUALITY"

233

Clean Honey - An obligation to producers and trade alike

Thomas Heck*, Kari Koivulehto

* Große Bäckerstrasse 4 20095 Hamburg, info@waren-verein.de

FEEDM, the European Federation of Honey Packers and Distributors (importers and wholesalers), has been established since 1989. It is composed of national honey associations, or individual companies from 16 different European countries. FEEDM aims to co-ordinate the interests of the European honey business and to obtain relevant information with regard to honey. FEEDM supports free international trade and tries to prevent any kind of discrimination against imported honey in relation to honey produced in the European Union. FEEDM participates in the development of the harmonization of international sampling and analytical methods in order to secure the integrity of the product and the quality of the honey.

At the same time it is our declared goal and the basis of our work to ensure that all imported and EU produced honey meets the quality standard required by the European honey directive and various EU Regulations. With a healthy growth of honey consumption we need good quality product to satisfy this increased demand. We need to continue to focus on the quality of our product and work hard with producers in Europe and around the world to give the consumer what they expect: Pure and clean honey of the highest standard

234

From nectar to honey: Studies on changes of quality parameters during the ripening process

Birgit Lichtenberg-Kraag*, Einar Etzold

* Friedrich-Engels-Str. 32 D-1654 HohenNeuendorf Germany, lichtenberg.kraag@rz.hu-berlin.de

Enzymes, moisture, proline and concentration of sucrose are important parameters during conversion of nectar to honey. Limits are given by the legislation. Especially concerning the enzyme activities obvious differences depending on the botanical origin can be observed, even though the enzymes are added by the bees. Honey from *Robinia pseudoacacia* is one example for having a natural low enzyme activity. Since we have observed a high variation of invertase activity of these honeys the floral source might not be the only explanation. Therefore nectar and honey samples were collected during the ripening process directly from the bee hive. From the bees the enzyme activities of the honey sac and hypopharyngeal gland were determined. All samples have been investigated in respect to their floral source. In spite of similar plants flowering during the time of investigation, confirmed by pollen analysis, the invertase activity of honey and nectar from honey sac was different depending on the location of the bee hives. This implies that not only the floral source causes a honey with natural low enzyme content but additional factors.

Floral origin and honey quality from packing beehive

Maria Cristina Lorenzon*, Rodrigo Nunes, Valmir Carneiro, Carlos Vianna, Érika Salles, Sérgio Cataño, Monika Barth

* R Senador Vergueiro, 93, ap 810, Flamengo 22.230 Rio de Janeiro Brasil. lorenzonzon_ufrj@yahoo.com.br

The Brazilian beekeeping is a sideline activity of family farming, formed by small producers with low number of beehives. The extracted honey is the most traded, but in this system honey may be contaminated if not obeyed the rules for good practice; it can still suffer adulteration and forging, which affect the credibility of the product in trade. The packing system is independent of machinery and releasing all the processing that the industrial system requires. The final product, honeycomb attached to the jars by bees, allows the direct marketing, with greater consumer acceptance. To demonstrate the value of honey from packing beehive, this study evaluated the microbiological profile. The study was carried out in a Brazilian tropical region. Twelve Africanized beehives were monitored, following *Langstroth* model; 12 hives were prepared in the packing system (PS) and in the extracted system (ES). To fill up the super in the PS, hexagonal glass jars were used with a content of 450 ml. The microbiological profile of the honeys samples were determined by pollen analysis, physico-chemical parameters and antibacterial activities. In the PS, the amount of pollen grains was five times smaller than the ES, showing the real pollen sources, but the nectariferous source was partially identified in both systems. Nineteen pollen types were identified, 15 for PS honeys and 14 for ES honeys. The bioassay of bacterial activity shows UFCg⁻¹ low (1.5) for both systems, with higher variation for the PS honeys; this result is below the standard required by legislation, which maximum limit (100 CFUg⁻¹). There no differences in physico-chemical parameters of the both systems, but PS honeys with more than six months showed lower acidity and pH; is necessary to determine the shelf life.

Setting Venezuelan quality standards of *Melipona favosa* honey

Patricia Vit*, Maria Mutone, Soneida Peña, Javier Ruiz, Arelys Mejias, Leandra Rial, Maria Gabriela Gutierrez, Carla Gutierrez, Meylin Arraez, Maria Teresa Sancho, Miguel Fernandez-Muñoz, Ana Carolina Gonzalez, Ortrud Monika Barth, Antonio Jesus Rodriguez-Malaver

* Bioactividad, Departamento Ciencia de Los Alimentos, Facultad de Farmacia y Bioanálisis, Universidad de Los Andes, Mérida, Venezuela, vit@ula.ve

Stingless bee honey (Meliponini) is a tropical honey represented by almost 400 species in the New World. *Melipona favosa* Fabricius 1798 is known as "erica" or "maba" in Venezuela. Besides other *Melipona* species and other genera of Meliponini, *M. favosa* honey has a local interest. Venezuelan regulations of *Apis mellifera* honey were created in 1984 but have not been reviewed. Meliponini honey regulations were solicited in 2004, but no further progress was made by local authorities. In this work, we review published data of *M. favosa* honey and current research to support honey composition standards. Pollen and sensory analysis are included. Natural low diastase activity values suggest this is not a quality indicator for *M. favosa* honey. Acidity, ash, reducing sugars, sucrose, water contents, besides bioactive indicators such as antioxidant activity, antibacterial activity, flavonoid and polyphenol contents are suggested. Compared to *A. mellifera* honey standards, reference values may be adopted considering: 1. No variations for ash, HMF, reducing sugars and sucrose. 2. Increased maximum values for water content and acidity.

237

Water determination in bee products by Karl Fischer titration

Teresa Szczesna*, Helena Rybak-Chmielewska, Ewa Wað

* Kazimierska 2 24-100 PUŁAWY Poland, teresa.szczesna@man.pulawy.pl

The main parameter determined storage stability of bee products is moisture content. There are many methods for water determination in these products: drying at 90°C, at 105°C, at 65°C under reduced pressure, refractometric and Karl Fischer titration. All of these methods have been specified by the different error sources derived from kind of product and from applied methodology. The aim of our study was development and validation of Karl Fischer method for moisture determination in pollen loads, royal jelly, propolis and bee venom. Moisture analyses were conducted using Mettler Toledo Karl Fischer Titrator DL38 integrated with IKA Homogenizer. The received results show that sample weight and time of sample homogenization were significant influence on the results of water content in bee pollen, royal jelly, propolis and bee venom. Elaborated procedures for water content in bee products (pollen, bee venom, royal jelly and propolis) were characterized by satisfactory repeatability and reproducibility. Coefficient of variation for series analysis of pollen samples (with water content from 2.7 to 21.4%) conducted in repeatability conditions was 2.5%, and in reproducibility conditions – 8.3%. For series analysis of royal jelly (water content 60-65%) coefficient of variation received values - 1,6 and 5,0% respectively, for bee venom (water content 6-9%) – 3,5 and 8,6% respectively, and for propolis (water content 2,6%) 5 and 20% respectively.

238

How to quantify the firmness of honey?

Hélène Dailly, Etienne Bruneau*, Viviane Planchon, Izabela Freytag

* CARI, place Croix du Sud, 4, 1348, Louvain-la-Neuve, Belgique, qualite@cari.be

Wallonia has a temperate flora, producing honeys which have a high proportion of sugars which favours a rapid crystallization of the honey. Faced with excessive firmness of some of their honey, beekeepers have developed techniques for conditioning leading to a smooth spreadable consistency. Such consistency is sought after by consumers and can therefore be enhanced through quality and Wallonia or a Protected Geographical Indication (PGI) «honey Wallonia» (under certification). To do this, we need to quantify this consistency and set limits. This has been carried out using a penetrometer. This device measures the depth of penetration of a cone in the honey in a given time. The operational conditions were defined and the impact of several factors (temperature, position of the measure...). The various parameters of measuring the consistency of honey were also validated for the accreditation of the measure. The penetration data were compared with assessments by a panel of tasters to establish a limit of firmness. The smooth, spreadable or honey farm is now clearly defined and quantifiable.

239

Effect of Gamma Radiation in Multifloral honey

Alexandre Bera*, Ligia Bicudo de Almeida-Muradian, Susy Frey Sabato

* Radiation Technology Center, IPEN-CNEN/SP, Av. Prof. Lineu Prestes, 2242, 05508-000, São Paulo, SP, Brazil berale@usp.br

The multifloral honey is made by various species from different flowers nectar. These are much appreciated in Brazil and by other countries and in many places as sweet substance produced by bees, and consequently its consumption has been increased either as raw material. Its use as food by the consumer, or even for exportation, implies in safety inherent to its quality and processing control. Gamma radiation can be applied in food or ingredients to get many objectives like pathogens microorganisms' reduction, disinfestations, and sterilization. The aim

of this work was to verify some physicochemical modifications in honey submitted to five irradiation doses (5, 10, 15, 20 and 25 kGy). The physicochemical parameters analyzed were: moisture, hydroxymethylfurfural, free acidity, pH, apparent reducing sugars, apparent sucrose, ash, insoluble matter and diastase activity. These parameters are controlled by governmental agencies through Brazilian regulation. The current results indicated that few changes occurred and no significant physicochemical alteration.

240

The Nutritional Assessment of four kinds of Royal Jelly Protein

Jing Zhao*, Xiaofeng Xue, Xiao Zhou, Liming Wu

* xiangshan, beigou No.1, Beijing 100093 Beijing China, zhaojingjun@sina.com

The international adopted nutrient value assessment method was applied to the overall assessment of the protein nutrient value of Royal Jelly (RJ) secreted by RJ-high-yield bees, Chinese bees, Italian bees and Carnica bees. The total essential amino acid contents of the four kinds of RJ were 41.39£¥£~42.88£¥£~40.98£¥ and 42.72 £¥ accounting for their corresponding total amino acid contents, and sulphur-containing amino acid was the first limiting amino acid. The results of chemical score (CS)£~amino acid score (AAS)£~essential amino acid index (EAAI)£~biological value (BV)£~nutritional index (NI) and score of ratio coefficient of amino acid (SRCAA) of protein showed that the four kinds of RJ could all be considered as good resources of protein, and the protein nutrient value of RJ secreted by RJ-high-yield bees was higher than that of Chinese bees, Italian bees and Carnica bees. The results existed big differences to the order of the 10-HDA content of four kinds of RJ.

241

Are pyrrolizidinalcaloids in bee products a health hazard?

Peter Gallmann*, Zoller

* Schwarzenburgstr. 161 CH 300 Bern Switzerland, peter.gallmann@alp.admin.ch

Pyrrolizidine alkaloids are important plant toxins associated with disease in humans and animals. Metabolic activation in liver converts such alkaloids into highly reactive electrophiles, capable of reacting with cellular macromolecules. Thus forming adducts which may initiate acute or chronic toxicity. The pyrrolizidine alkaloids in honey and other bee products are reviewed and health risk of acute and chronic intoxication with respect to bee products is evaluated for Switzerland.

242

Characterization of tropical honeys as a strategy for rural development in Mexico and Central America: data and threats

Angélica Zavala, Idalia Colomo, Lucia Piana, Benoît Olivier, Rémy Vandame*

* Ecosur, Línea de Investigación "Abejas de Chiapas", Chiapas, Mexico, remy@ecosur.mx

The characterization of a honey is the development of a set of standards based on three complementary analyses at sensory, physico-chemical, and palynological levels (Persano and Bogdanov, 2004). It has been applied nearly

exclusively for European honeys, during the last 50 years. Therefore very few is known from exotic honeys, even from countries that mainly export their production to Europe, like Mexico or Argentina. This means that producers from such countries export their honey as a generic one, getting few added value from it. In a rural development perspective, we have worked for 3 years on the characterization of 4 tropical honeys produced in Mexico and Central America: *Campanilla*, a Convolvulaceae; *Acahual*, a mix of Asteraceae; *Hule*, a honeydew of *Hevea brasiliensis*; *Laurel*, a Boraginaceae tree. Additionally, we are working on a 5th honey, *Cafetal*, from coffee plantations, which will bear a strong environmental value, since its production will be possible only in coffee plantations where the shadow stratum presents a high biodiversity. After presenting the standards developed and the first experiences of trading such honeys within fairtrade market, we discuss the legal perspective. Since the EU regulation defines only vaguely what are unifloral honeys, it leaves much latitude to national control agencies for deciding if declared botanical origins are permissible. This is in itself a strong threat for newly characterized honeys. We finally conduct a reflection, together with a laboratory of analyses (CETAM, France), analyzing advantages and disadvantages of a possible reform of the EU legislation.

243

Brazilian bee pollen: quality and challenges

Lidia Barreto*, Gomes S.M.A., Orsi R.O., Brito J.S.A., Souza M.M.B., Peão G.F.R., Dib A.P.S.

* Rua Vicente Torres, 5002 120851 Taubate Sao Paulo, barretolidia@yahoo.com.br

In Brazil there are two grate regions of production of bee pollen, states of Bahia and Sergipe in the northeast, and Santa Catarina State in the South. Brazilian bee pollen shows a grate diversity ranging from the monofloral as the coconut bee pollen and the ones produced by providing pollen forests, keeping special color, texture, taste and flavor. There are no secrets in the production, existing the necessity to establish the particular procedures and handling actions for each region. The pollen collectors are excellent in its function of to retain and to collect the pollen acorns, and each area demonstrates its preference for certain equipment. The innovation is the beginning of the tests of a Brazilian pollen collector in injected plastic, offering excellent hygiene conditions and durability, and another model to be used at the same time of honey production without productive incompatibility. Relating to the processing they already exist communitary centers of processing, that has been making possible the quality of the final product. The internal market has been increasing establishing excellent relationship with consumers. The industry of equipments is with important challenges, such as the construction of equipment to dehydrate the pollen and automation of stages of the processing. Educational campaigns for pollen consumption are being programmed in a regional way. The pollen is being consumed in the classes of larger purchasing power, fact that results from honey final price. Important subjects as for the legislation should be updated as, for instance: dirtiness, present pollutants and the shelflife of the product. The scientific community has been moving forward in a lot in the knowledge of the production and of the product, being the very promising chain next years in the national beekeeping.

BEE HEALTH COMMISSION SYMPOSIUM N°4 "DIAGNOSIS AND CONTROL OF BEE DISEASES"

244

Tracheal mite infested colonies: management options

John Mc Mullan*

* Department of Zoology, School of Natural Sciences, Trinity College Dublin, Dublin, Ireland, jmcmullan@eircom.net

Tracheal mites (acarine, acarapisosis) exist worldwide and are a major pest to honeybee colonies. The mites have been associated with deaths in honeybees for over 100 years, and even today the prevalence in colonies in Ireland is estimated at 10% and in the US, 24%. Recent research has established that colonies with only tracheal-mite

infestation can die in the late winter/early spring period. The mechanism causing death is the inability of the colonies to regulate brood nest temperature. These colonies, which have no signs of disease in the autumn, die-out in the following winter/spring with most of the bees having left the hives. Only when the infestations are at an advanced stage are there any signs and these usually occur a short time before the death of the colony. Typically most of the bees will have absconded leaving only the queen and a few small clusters of bees dead on the combs. However, early detection of the disease will allow the beekeeper to exercise options, both short and long term, to control the disease.

245

Attempts to control *Nosema ceranae* in Greece

Andreas Thrasyvoulou*, Goras Geirgios, Tananaki Chrysoula, Lazaridou Elisavet

* Lab. of Apiculture-Sericulture School of Agriculture Aristotle University of Thessaloniki Greece
thrasia@agro.auth.gr

Nosema ceranae was first found in Greece in 2006 and caused significant losses to bee colonies. The bee losses during the winter of 2007-08 in northern Greece were between 45-65% although the average losses usually are below 10%. In this research we evaluated the therapeutically products Vita feed Gold, Nosestat, Protofil and Fumidil B against *Nosema* and their side effects on honeybee colonies. We counted the number of spores in infected colonies by examining 60 bees from the entrance of experimental bee colonies as a more accurate measurement than 10 recommended by OIE Manual of Diagnostic Tests. The differentiation of *N. ceranae* and *N. apis* spores was based on molecular techniques. We performed 5 trials in different apiaries during spring and fall for three years (2006-2008). We applied the above mentioned pharmaceutical agents to totally 270 bee colonies with syrup or sugar paste. The decline of the number of nosema spores in treated colonies ranged for Vita Feed Gold from 52% to 98%, for Nosestat from 42% to 86%, for Protofil 56% to 83% and for Fumidil B 88% to 96%. Vita Feed Gold gave higher efficacy during April and May because of its stimulant effect on brood rearing. No side effects were noted on honeybee brood and colony development of treated colonies by any of the applied agent. The use of Fumidil B is not legally permitted in Europe and beekeepers should rely on natural products or biotechnical methods to control the disease. This work gave useful information in our fight against the disease but more research is needed to find a therapeutically treatment against Nosemosis based on natural products.

246

On the epidemiology of *Nosema ceranae* in France

Marc-Edouard Colin*, Magali Tournaire, Laurent Gauthier

* Montpellier SupAgro, Laboratoire de Pathovigilance et de Développement Apicole, Domaine de La Valette, 900 rue J.-F. Breton, 34090 Montpellier France, colinme@supagro.inra.fr

Described as a parasite of *Apis cerana* by Fries et al. (1996), *Nosema ceranae* was identified in Spanish bee samples collected in 2004 (Higes et al., 2006). To verify its probable presence in France, two groups of apiaries without any clinical signs were checked, one situated on the coastal plains, the other one in the Cevennes mountains, standing over the Mediterranean sea. Unexpectedly the prevalences found in the groups, were of 61.5 % and 87.5 % of positive colonies respectively. To confirm these results, samples collected in 2002 and taken out of 12 apiaries of different parts of France (Western, Eastern, Southern) were analyzed with this specific aim. Once again the high prevalence of *N. ceranae* was noticed in these productive apiaries (51 % of positive colonies). Among them, one colony on the island of Ouessant, in quarantine from the 1980's onwards, was found positive, suggesting the presence of the parasite before 1980. In contrast *Varroa destructor* is still absent. Moreover, the absence of abnormal mortalities in the island as in the remaining 11 apiaries in 2002, indicates the low contagiousness and pathogenic action of the parasite. In France, *N. ceranae* does not fulfil the features of an emergent disease.

Entomopathogenic fungi an alternative for control of *Varroa destructor*

Marta Rodríguez Sanhueza*, Marcos Gerding Paris, Nelida Molina, Miguel Neira, Andrés France

* Avda. Vicente Mendez 515, Chillán 56 Chillán Chile, mrodrigu@inia.cl

The Technological Center of Biological Control, Institute of Agricultural Research (INIA), in conjunction with the Universidad Austral, Chile, is developing a biological acaricide based on entomopathogenic fungi for management of *Varroa destructor*. To date we have selected the isolate Qu-M845, *Metarhizium anisopliae* var. *anisopliae*, for its high virulence. In order to evaluate the effectiveness of different doses of the fungus, a field test was performed applying 0, 1010, 5 x 1010, 1011 and 5 x 1011 conidia per hive using strips of paper with spores stamped with Arabic gum in addition to a formic acid treatment. The evaluation was performed by measuring mite infestation. Additionally, laboratory and field evaluations of the effect of fungus on the bees were performed. One day-old bees were confined and fed with honey syrup containing five concentrations of inoculum (0, 106, 107, 108, 109 conidia mL⁻¹), and daily bee mortality was evaluated. The effect of different methods of applying a dose of 5 x 1011 conidia per hive on the activity of hives was field measured, evaluating the traffic (entrance and departure of bees from the booby) and queen ovipositions. The treatments were stamped spores, dusted spores, formic acid, and a control. The most effective dose for control of *Varroa* was 5 x 1011 (74%), statistically similar to formic acid (79%) ($p \leftarrow 0.05$). In the laboratory, 32% mortality of bees was detected with the highest concentration ($p \leftarrow 0.05$). However, in the field assay the activity of bees and queen oviposition showed no statistical differences between treatments. These results demonstrated that is possible to develop a biological acaricide using these fungi.

Concurrent infestations by *Aethina tumida* and *Varroa destructor* alters thermoregulation in *Apis mellifera* winter clusters

Marc O. Schaefer*, Wolfgang Ritter, Jeff S. Pettis, Peter Neumann

* Schwarzenburgstr. 161 3003 Bern Switzerland, marcoliver.schaefer@alp.admin.ch

The small hive beetle, *Aethina tumida*, and the ectoparasitic mite, *Varroa destructor*, are parasites of the honeybee, *Apis mellifera*. Both parasites overwinter in honeybee colonies. Occasionally, these parasites are found concurrently within honeybee winter clusters. We tested if the efficacy of thermoregulation by bees in concurrently infested clusters is altered. We examined thermal fluctuations and maxima inside winter cluster core zones. Concurrently infested colonies showed higher thermal maxima in the winter clusters cores compared to the controls, whereas winter clusters with one parasite species alone showed no significant effect on thermoregulation. Furthermore, combined infestations and infestations by *V. destructor* alone resulted in significantly higher thermal fluctuations compared to infestations with *A. tumida* alone. One factor which could induce these changes could be altered physiology of the host workers due to *V. destructor* infestations during their pupal stage which leads to reduction in body weight and longevity. Moreover such workers don't fully develop typical winter bee features. Other factors affecting thermoregulation could be altered bee behaviour due to phoretic influences of *V. destructor* which induce general unrest, grooming behaviour and altered nestmate cleaning behaviour. Also, the presence of adult small hive beetles which induce trophallactic feeding and aggressive behaviour could be a contributing factor. Our data indicate that heavy infestations by *V. destructor* in combination with infestations by *A. tumida* reduce the efficacy of thermoregulation in honeybee winter clusters which could contribute to winter losses.

249

Can studies of Kashmir bee virus and *Varroa destructor* aid our understanding of "Colony Collapse Disorder"?

Norman L Carreck*

* New Hall, Small Henfield, West Sussex, UK, norman.carreck@btinternet.com

Kashmir bee virus (KBV) was originally discovered in honey bees in various parts of Asia, but is now known to be present in the USA and various parts of Europe, including the UK. Although demonstrated to be very rapidly fatal when injected into bees in the laboratory, it was not hitherto considered to be a serious problem in nature. The similarity of KBV to acute bee paralysis virus (ABPV), which had caused widespread losses of colonies infested with *Varroa destructor* in Europe, suggested, however, that it could be very harmful in association with the mite. Studies carried out in an indoor bee flight room demonstrated that *V. destructor* was capable of transmitting KBV. Interestingly, once established, virus infection remained in the adult bee population after mites had been removed from the colony, suggesting bee to bee transmission. Coincidentally, *V. destructor* was discovered in New Zealand, where KBV was long known to occur, and some subsequent colony losses were associated with KBV and the mite. The discovery in the USA in 2007 that the pathogen most commonly associated with colonies suffering from "Colony Collapse Disorder" (CCD) was the closely related Israeli acute paralysis virus (IAPV), raises intriguing questions. The possible role of IAPV in CCD will be discussed in the light of what is known about the epidemiology and natural history of KBV.

250

Novel lactic acid bacteria inhibiting *Paenibacillus* larvae in honeybee larvae

Eva Forsgren^{vi}, Tobias Olofsson, Alejandra Vasquez, Ingemar Fries

* P. O. Box 7044 SE-750 Uppsala Sweden, eva.forsgren@ekol.slu.se

A novel bacterial flora of lactic acid bacteria (LAB) of the genera *Lactobacillus* and *Bifidobacterium* originating from the honey stomach of honeybees was recently described. LAB is known to be good producers of antimicrobial substances; however there is variation in beneficial qualities between species and genera. In this study, the antagonistic effects on the honey bee pathogen, *Paenibacillus* larvae from a novel bacterial flora of lactic acid bacteria (LAB) of the genera *Lactobacillus* and *Bifidobacterium* originating from the honey stomach were evaluated. We used inhibition assays on agar plates and honey bee larval bioassays to investigate the effects from honey bee LAB on *P. larvae* growth in vitro and on AFB infection in vivo. The individual LAB phylotypes showed different inhibition properties against *P. larvae* growth on agar plates whereas a combination of all eleven LAB phylotypes resulted in a total inhibition (no visible growth) of *P. larvae*. Adding the LAB mixture to the larval food significantly reduced the number of AFB infected larvae in exposure bioassays. The results demonstrate that honey bee specific LAB possess beneficial properties for honey bee health. Possible benefits from enhancing growth of LAB or from applying LAB to honey bee colonies to assure honey bee health will be discussed.

251

Israeli acute paralysis virus (IAPV): Turning reciprocal host-virus dynamics into an applicative anti-viral approach

Eyal Maori*, Nitzan Paldi, Eitan Glick, Sharoni Shafir, Ilan Sela

* Hapardes 10. Tel-Aviv Israel, eyalmm@gmail.com

Bee colony losses, in particular Colony Collapse Disorder (CCD), have become a major global economic concern due to the dominant pollination contribution of these insects to a wide range of food crops. IAPV is a bee-affecting

dicistrovirus which has been strongly associated with CCD. A segment of IAPV was found to be incorporated into the bee's genome and bees harboring an integrated viral segment exhibit a virus resistant phenotype. The exchange of genetic information between IAPV and its host is reciprocal and a bee sequence was found fused to IAPV defective-RNA (dRNA) within purified virus particles. IAPV virions also carry other types of dRNAs: Some of them are recombinants of different genomic parts of IAPV and others are recombinants of IAPV and another dicistrovirus RNA. Interestingly, among some of the dRNAs population the sense oriented strand has recombined with its complement forming hairpin and stem-loop structures. Finally, we report on restraining IAPV infection by feeding bees with double-stranded RNA (dsRNA), as an efficient and applicative way of controlling this viral disease. The possible dynamics of reciprocal sequence exchange between IAPV and its host leading to association with CCD, as well as the potential of controlling viral diseases and CCD by recruiting RNAi-technology are discussed.

252

Chronic bee paralysis virus: dissemination in honeybee colonies and diagnosis

Magali Ribière*, Philippe Blanchard, Frank Schurr, Oliver Celle, Jean-Paul Faucon
* 105 route des Chappes B.P. 111 06902 Sophia Antipolis, France, m.riberie@afssa.fr

The Chronic bee paralysis virus (CBPV) is the aetiological agent of an infectious and contagious disease of adult honey bees known as chronic paralysis. Over the past few years, the outbreak in France of trembling symptoms caused by CBPV has led our laboratory to conduct studies in order to improve the knowledge on this agent and on the disease. Full-length nucleotide sequences for the two major RNAs of CBPV have been characterized, leading to the development of, firstly, molecular diagnostic tools that can be used to detect genetically variable viral isolates and, secondly, a Real-Time PCR viral quantification technique. This two step real-time RT-PCR assay allowed us to quantify CBPV genome and to determine the distribution of CBPV infection within hives and their environment. Samples of various ages of brood and adult bees were collected from several hives at different time of the year (spring, summer, and autumn). The virus was detected in all the live stages and along the year. Moreover, significant high mortality rates were observed in France during the 2007 and 2008 beekeeping season. Bee samples from apiaries located in various parts of France were analysed to evaluate the CBPV load by Real-Time PCR. Some surveyed apiaries presented high viral loads confirming the diagnosis of the chronic paralysis and highlighting the role of CBPV in bee mortalities. Knowledge on CBPV genome, sequence and variability, has allowed us to develop tools to better follow virus dissemination, including bee faeces and *Varroa destructor*, and ways of spread. We have detected CBPV, for the first time, in two species of ants (*Camponotus vagus* and *Formica rufa*). These results suggest ways by which the infection may be spread and other sites of viral persistence in the apiary environment.

253

Detection of honeybee viruses in northern Thailand using RT-PCR

Sirikarn Sanpa, Panuwan Chantawannakul*
*Thailand panuwan@gmail.com

Forty-six healthy colonies were collected from apiaries in Northern Thailand. A reverse transcription polymerase chain reaction (RT-PCR) assay was used to detect six honeybee viruses (Acute bee paralysis virus (ABPV), Black queen cell virus (BQCV), Chronic bee paralysis virus (CBPV), Deformed wing virus (DWV), Kashmir bee virus (KBV) and Sacbrood virus (SBV)). Samples of adult bees, pupae and mites were collected from apiaries in Lamphun, Lampang, Chiang Rai, Phayao, Nan, Phrae and Chiang Mai province in the northern Thailand. In adult bees, the most prevalent virus was DWV (33% of apiaries), followed by ABPV, SBV and KBV (20%, 4% and 2%, respectively). The most prevalent virus in pupae was DWV (63% of apiaries), followed by ABPV, SBV and KBV (46%, 11% and 4%, respectively). In *Varroa destructor*, only DWV were found (58% of apiaries). BQCV and CBPV were not at all present in any apiaries by using this detection technique.

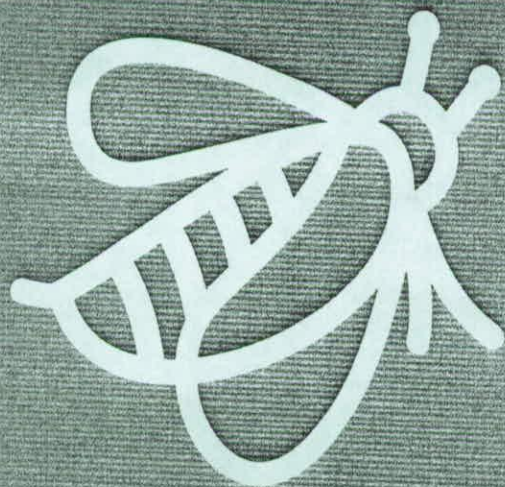
Effects of sublethal concentration of two acaricides on biological characteristics of honey bee *Apis mellifera ligustica*

Ting Zhou*, Quiang Wang, Pingli Dai, Feng Liu

* Xiangshan 100093 Beijing China, ztapis@263.net

Fluvalinate and amitraz are main acaricides for honeybee. So far, there is no report in detail regarding the effects of these acaricides on honeybees. Therefore the present study examined the effects of sublethal concentration of two acaricides on biological characteristics of the honeybee *Apis mellifera ligustica*. The LC₅₀ was determined by curve fitting using log-probit analysis. The results showed that toxicity regression equation and LC₅₀ of amitraz are $Y = 2.1387X - 0.3064$ and 302.784 mg/L, and those of fluvalinate are $Y = 2.2323X - 1.6986$ and 1001.755 mg/L respectively. We then studied effects of LC₅ level of two acaricides on biological characteristics of *Apis mellifera ligustica* at different temperatures. The results indicated that the fecundity was significantly different between honeybees treated with acaricides and the control honeybees, and amitraz significantly reduced the egg weight and the larval length of honeybee, and the larval weight and the larval width of honeybee treated with fluvalinate were significantly lower than that of the control ones. The toxicity of these acaricides was significantly higher in spring than in summer, indicating that climatic change may affect the sensitivity of honeybees on acaricides. The period of development was not significantly different between groups. The toxicity of amitraz was higher than that of fluvalinate on honeybees. Amitraz and fluvalinate affect colonies in controlling mites. For these reasons, beekeepers should take into consideration of timing and concentration when using acaricides.

Poster list



September, Wednesday 16th



POSTERS OF BIOLOGY COMMISSION

Mitochondrial dna analysis of apis mellifera populations from northern region of argentina	AGRA Marcelo	tiruggi@infovia.com.ar	Silvia Lanzavecchia, Claudia Conte, Pablo Corva, Jorge Cladera, Maria Alejandra Palacio	Argentina
A new technique for producing a higher number of queens in stingless bees (meliponini)	ALEIXO Kátia Paula	menezes.cristiano@gmail.com	Cristiano Menezes, Vera Lucia Imperatriz Fonseca	Brazil
Dependence of source protein consumption on activity of hypopharyngeal gland in the honey bee (apis mellifera).	ALI FORGHAN I Mohammad	forghanima@gmail.com	Fahimeh Amir Saifadini	Iran
Quantification of the pheromone 9-oda and 9-hda in queens of africanized and european honey bees during the absconding process	ALMEIDA Gesline F.	lsgoncal@usp.br	Andrea r. Chaves, Lionel Segui Gonçalves, Maria Eugenia c. Queiroz, David De jong	Brazil
Influence of the weight at emergence of africanized honey bee queens (apis mellifera l.) in colonies development	ALMEIDA DE SOUZA Daiana	lsgoncal@usp.br	Tiago Mauricio, Francoy Lionel, Segui Gonçalves	Brazil
Mineral content in honey from futaleufu district, this area was affected by the eruption of the chaiten volcano (chile)	BAHAMONDE Patricia	lclasing@sumet.cl	Carolina Oyarzún, Carolina Fuenzalida, Miguel Neira, Nimia Manquán	Chile
Genetic divergence of apis mellifera meda from turkey and iran using pcr-rflp analysis of mtdna genome	BALCIOGLU Soner	fulyaozdil@selcuk.edu.tr	Fulya Özdi, Cengiz Erkan, M. Muhip Özkan	Turkey
Genome-wide identification of transcriptional start sites (tss) in genome of apis mellifera by 5j long sage	BAO-HUA Xu	bhxu@sdu.edu.cn	Liang-Xian Sun, Hua-Jun Zheng	China
Life time of africanized honeybees apis mellifera linnaeus, 1758 (hymenoptera: apidae) fed by diets with citric acid and lemon juice	BRIGHENTI Deodoro	cfcarvalho@ufba.br	César Carvalho, Carla Brighenti, Stephan Carvalho	Brazil
Survival of africanized honeybee apis mellifera linnaeus, 1758 (hymenoptera: apidae) rearing with energetic and protein diets	BRIGHENTI Deodoro	cfcarvalho@ufba.br	César Carvalho, Carla Brighenti, Stephan Carvalho	Brazil
Superior protein conversion of natural and artificial diets by africanized honey bees	CAPPELARI Fabricio Aloar	ddjong@fmp.usp.br	David De Jong, Aline Patricia Turcatto, Michelle Manfrini Morais, Lionel S. Gonçalves	Brazil
The elaboration of specific norms used in honeybee colonies breeding program in republic of moldova.	CEBOTARI Vintina	valentinaceb@yahoo.com		Moldavia
Civilized and harmonious honeybee society	CHEN Yuan	flhu@zju.edu.cn		China
Influence of behavioral ontogeny on hygienic behavior of africanized honey bees (apis mellifera l.)	DE ANDRADE BUGALHO Vanessa	lsgoncal@usp.br	Lionel Segui Gonçalves	Brazil
Mtdna variations of apis cerana in qinling mountains of china	DING Guiling	guilingding@163.com	Wei shi, liping lv, Zhiguang liu	China
Diversity of aerobic bacteria associated with midgut of thai farm bees	DISAYATHANOWAT Terd	panuwan@gmail.com	Phumpuang Nokhong, Panuwan Chantawannakul	Thailand
Morpho-metric characteristics of honey bees from republic of moldova	EREMIA Nicolae	eremianicolai@rambler.ru	Lulia Mihailova, Tatiana Dabija	Republic of Moldova
Flight muscle differential development of the eusocial bees, apis mellifera and scaptotrigona postica (hymenoptera: apidae) colonies	FERNANDEZ WINCKLER Fernanda	fernanda-winckler@hotmail.com	Carmina Da, Cruz-Landim	Brazil
The study influence of feeding with different levels vitamin c on the rate of brood rearing and honey production in apis mellifera honey bee colonies	FORGHANI Mohammad Ali	forghanima@gmail.com	Ali Esmailzadeh Koshkahi	Iran
Genetic diversity of the honey bee population from corsica and its genetic relationships with continental populations.	GARNERY Lionel	gamery@legs.cnrs-gif.fr	Agnes Rortais, Isabelle Giraud, Hélène Legout, Gérard Arnold	France
A degree of dependence between the surface of brood and honey in autumn and the surface of brood in spring	GEORGIJEV Aneta	anettag@nadlanu.com	Mica Mladenovic	Serbia
Discrimination of three honeybee subspecies based on forewing venation	GERULA Dariusz	dariusz.gerula@man.pulawy.pl	Pawel Wegrzynowicz, Adam Tofiski, Beata Panasiuk, Malgorzata Bienkowska	Poland
Analysis of royal jelly proteome of two kinds honeybee	GUO Zhan-bao	apis96@gmail.com		China
Relationships between colony development characteristics in bombus terrestris	GUREL Fehmi	fgurel@akdeniz.edu.tr	Ayhan Gosterit	Turkey

Robustness of group decisions in honeybees	HAHSHOLD Sibylle	karl.craishelm@uni-graz.at	Gerald Radspieler, Ronald Thenius, Thomas Schmickl, Karl Craishelm	Austria
Pollen collection by bees under different brood colony conditions	HARIZANIS Paschalis	melissa@aia.gr	Manolis Rousiakis, Dimitris Lazarakis, Eleftherios Alissandrakis	Greece
Artificial feeding of honeybee colonies (<i>apis mellifera</i> L)	HASSAN HUSSEIN Moustafa	mhussin_12@yahoo.com		Egypt
High-throughput sequencing of honeybee (<i>apis mellifera</i>) short rnas using the solid analyzer	HU	flhu@zju.edu.cn	Xuan CHEN, Xiao-Min YU, Gui-Ming LIU, Huo-Qing ZHENG, Dong-Liang, YU Song-Nian HU	China
Manipulation of forager honeybees <i>apis mellifera</i> L. Outside the beehive	IFANTIDI Michael D. S	Alexandros. Papachristoforou@legs.cnrs-gif.fr		Greece
Running away of bee colony from the hole on the bottom of the hive	ILIC SES Dragoslav	dragoslav.ses@gmail.com		Serbia
Are ukrainian bees a separate race?	ILYASOV R.	alex-kom@nucs.kiev.ua		Ukraine
Genetic variability in honey bee populations from bulgaria	IVANOVA Evgeniya	geneiv@uni-plovdiv.bg	Maria Bouga	Bulgaria
Geometric morphometric approach to subspecies discrimination in honey bees (<i>apis mellifera</i>)	KANDEMIR Irfan	ikandemir@gmail.com	Ayca Ozkan, Stefan Fuchs	Turkey
Persian honey bees (<i>apis mellifera meda</i>) belong to c-mtdna lineage inferred from col-coi dra 1 restriction and nd2 dna sequencing	KANDEMIR Irfan	ikandemir@gmail.com	Marina D. Meixner, Mohammed G. Moradi, W. Steve Sheppard	Turkey
Full length cDNA sequence and expression of alpha-glucosidase iii in giant honeybee <i>apis dorsata</i>	KILASO Manlika	cchanchao@hotmail.com	Chanpen Chanchao	Thailand
Overwintering food consumption on the testing apiary in republic of macedonia	KIPRIJANOVSKA Hrisula	uzunov@zf.ukim.edu.mk	Aleksandar Uzunov, Sreten Andonov	Republic of Macedonia
The form	LAURINO Daniela	daniela.laurino@unito.it	Augusto Paletta, Aulo Manino, Marco Porporato	Italia
Exploring the invisible and inaudible world of honeybees	LEFEBVRE Myriam	jmartin@bourges.univ-orleans.fr	Laurence Josserand, Cyril Novaes, Jean-Pierre Martin	France
Prospects for consciousness in honeybees	LEFEBVRE Myriam	myriam.lefebvre@gmail.com		Belgique
Expression of apalbumin 5 of <i>apis cerana</i> in the larvae of silkworm, <i>bombyx mori</i>	LIU Fang	susongkun@zju.edu.cn	Yungen Miao, Wangfu Yue, Ting Tao, Shenglu Chen, Songkun Su	China
Multivariate morphometric analysis of <i>apis mellifera</i> in yili river valley of xinjiang	LIU Zhiguang	liuzhiguang186@yahoo.com.cn	Wei Shi, Gulling Ding, Liping Lv	China
Identification of 26 <i>apis mellifera</i> subspecies and africanized honey bee through standard morphometry and geometric morphometrics of wings	LOPES GRASSI Marina	lsgoncal@usp.br	Tiago Mauricio, Francoy Lionel, Segui Gonçalves	Brazil
Molecular characterization and population structure of <i>apis mellifera</i> from algeria	LOUCIF-AYAD W.	wahloucif@yahoo.fr	Achou M., Aribi N., Soltani N., Gamery L.	Algeria
Modification of olfactory learning and memory induced by rna interference targeting $\alpha 7$ nicotinic acetylcholine subunit in the honeybee	LOUIS Thierry	gauthiem@cict.fr	Ahier Amaud, Raymond-Delpech Valérie, Gauthier Monique	France
Enterobacterial micro-flora of perm region dark forest bees	LYAPUNOV Y. E.	kate@tentorium.ru	R. G. Khismatullin, R. Z. Kuzyaev	Russia
Differences in pollen foraging behavior of africanized <i>apis mellifera</i> and <i>apis mellifera carnica</i>	MAIA-SILVA Camila	ddjong@fmp.usp.br	Daiana Almeida De Souza, Michael Hmcir, David De Jong	Brazil
Comparison of some temporal parameters related to division of labor within hygienic and non-hygienic africanized honey bees (<i>apis mellifera</i>)	MANFRINI MORAIS Michelle	lsgoncal@usp.br	Vanessa de Andrade Bugalho, Tiago Mauricio Francoy, Rogério Aparecido Pereira, David De Jong, Lionel Segui Gonçalves	Brazil
Scanning electronic microscopy and bees from ouessant	MARTIN Jean-Pierre	jmartin@bourges.univ-orleans.fr		France
In vitro queens production for establishing new stingless bees colonies	MENEZES Cristiano	menezes.cristiano@gmail.com	Vera Lucia Imperatriz Fonseca	Brazil
The variation of morphometric traits of authentic honeybee race of kosovo pomoravlje area	MLADENOVIC Mica	valentinavh@neobee.net	Valentina Simeonova	Serbia
Climate change and apiculture: impacts on wellbeing and survival of bee colonies	NANETTI Antonio	antonio.nanetti@entecra.it	Vittorio Marletto, Claudia Garrido	Italy

Morphological characteristics of certain lines of honey bee in serbia	NEDIC Nebojsa	nedicn @agrifaculty.bg.ac.yu	Mica Mladenovic, Ljubisa Stanisavljevic, Goran Jevtic	Serbia
Fos-like immunoreactivity mapping in the apis mellifera brain	NOCELL Roberta C. F.I	roberta @cca.ufscar.br	Thaisa C. Roat, Elaine C. M. Silva-Zacarin, Taigo F. Souza, Mario S. Palma, Osmar Malaspina	Brazil
Genetic diversity of apis mellifera caucasica and apis mellifera anatoliaca reared in turkey as assessed by pcr-rflp of an anonymous nuclear dna locus	ÖZDİL Fulya	fulyaozdil @selcuk.edu.tr	Hasan Meydan, Mehmet Ali Yildiz	Turkey
Geometric morphometric analysis of honey bee (apis mellifera l.) Subspecies distributed in turkey	OZKAN Ayca	ikandemir @gmail.com	Irfan Kandemir	Turkey
Testing honey bees for hygienic behaviour	PANASIUK Beata	beata.panasiuk @man.pulawy.pl	Malgorzata Bienkowska, Dariusz Gerula	Poland
Morpho-ethological and biochemical-genetic characteristics of the local bulgarian honey bee apis mellifera rodopica	PETROV Plamen	info @nrp-bg.org	Evgeniya Ivanova	Romania
Wintering of bee colonies in south bačka part of serbia	PIHLER Ivan	iphiler @gmail.com	Mirjana Cinkulov, Mica Mladenovic	Serbia
Comparative analysis of spring development of some selection lines of honeybee in south and west serbia	RASIĆ Slađan	rasa.rasic @gmail.com	Mica Mladenovic, Aleksa Božekovic, Nebojsa Nediac, Saša Milosavljevic	Serbia
Molecular diagnosis and phylogenetics of lactobacillus sp.	REDDY M.S.	jenureddy @yahoo.co.in	Mahesh pattabhiramaiah, Dorothea Brueckner	India
Honeybees biomonitors of heavy metals in the air of an arid zone in northern mexico	REYES-CARRILLO Jose-Luis	jreyes54 @yahoo.com.mx	Rubi Muñoz-Soto, Elba Margarita Aguilar-Medrano, Ray Oscar Gallardo-Cruz	Mexico
Morpho-cytometric investigations on haemolymph collected from honeybees originated from south of romania	SAPCALIU Agripina	agripinasapcaliu @yahoo.com		Romania
Morphometrics study of bee colonies from nw of spain	SEJO Maria Carmen	mcoello @uvigo.es	Escuderao Olga	Spain
Honeybees are able to forage with blocked olfactory input	SU Songkun	susongkun @zju.edu.cn	Yi Zhan, Fang Liu, Shenglu Chen, Jianhua Qian, Xuezheng Lin, Shaowu Zhang	China
Honey bee colony densities across forest types in the nilgiri biosphere reserve, western ghats, india	SUMIN George Thomas	sumin @keystone-foundation.org		India
Pheromone sensing of the antennal sensillae of apis florea foragers and guards by changing membrane potential analysis	SUWANNAPONG Guntima	guntima @buu.ac.th	Paitoon Seanbualuang	Thailand
Wing vein anomalies in breeding colonies	SZALAI-MATRAY Enikő	matray @katki.hu	Edit Zajác, Livia Harka, D. Szalai, L. Békési, T. Szalai	Hungary
Genetic diversity of hungarian honeybee colonies based on morphological and rapid markers	SZALAI-MATRAY E.	matray @katki.hu	T. Révay, É. Török, N. Bodzsár, E. Zajác, L. Békési, A. Hidas	Hungary
The influence of group size on cooperative decision making in honeybees	SZOPEK Martina	karl.craissheim @uni-graz.at	Gerald Radspieler, Ronald Thenius, Thomas Schmickl, Karl Craissheim	Austria
Natural pollen diets and their effects on hemolymph protein levels in honey bees (hymenoptera: apidae)	VANAGAS Laura	lauravanagas @yahoo.com.ar	Basualdo M, Oliva M Rodriguez EM, Solana H Bedascasurre E	Argentina
Temperature monitoring of a bee colony during summer period	VECA Mauro	ilmieleli @virgilio.it	Francesco Maria Tangorra	Italy
Effects of two kinds of pollen on colony development of the bumblebee bombus hypocrita p. irez (hymenoptera, apidae)	WU Jie	apis @vip.sina.com	Jiaxing Huang, Jiandong An, Jilian Li, Shudong Luo	China
More close genetic relationship of apis. Cerana population in the changbaishan mountain area of china potentially to those in south korea, north korea and japan	XINGAN Li	Lxingan @sina.com	Fengcheng Ge, Yungbo Xue, Zhiyong Li, Yanfang Li, Qingsheng Niu, Debin Yan	China
Honey bee digestive system disease testing	YEGANEHRAD Hossein	caspianapiaries @gmail.com	Maryam Moarefi	Canada
The role of protein in drone bee's semen production, natural mating and artificial insemination	YEGANEHRAD Hossein	caspianapiaries @gmail.com	Maryam Moarefi	Canada
Genetic differentiation of honeybee, apis mellifera l.	YGIN TUNCA Rahsan	rivgin @metu.edu.tr	Meral Kence	Turkey
Influencing factors of workers' ovarian development in the honeybee apis mellifera l. Colonies	ZHAO Yazhou	zhaoyazhou0301 @hotmail.com	Wenjun Peng	China
The effect of temperature on hind wing vein	ZHOU Bingfeng	bymshj @pub3.fz.fj.cn	Zhu xiangjie, Li yue, Chen wenfeng, Zhang xing, Zhou yu, Chen yanhua	China



POSTERS OF POLLINISATION COMMISSION

The most important nectar plants which supply highest amount of honey in Turkey	ALBAYRAK Sevinc	sevinc.albayrak @hacettepe.edu.tr	Kadriye Sorkun	Turkey
Species diversity and colony characteristics of bumblebees in hebei region, china	AN Jiandong	anjandong @yahoo.com.cn	Jiaying Huang, Jilian LI, Zhanbao Guo, Yueming Tong, Jie Wu	China
Botanical origin of venezuelan bee pollen from	BARTH Monika	vit @ula.ve	Alex Da Silva, Erika Oliveira, Juan Carmona, Patricia Vit	Brasil
Interaction between <i>apis mellifera</i> x <i>baccharis dracunculifolia</i> and its relation with green propolis production in Brazil	BASTOS Esther Margarida	embastos @funed.mg.gov.br	Rânia Mara Santana, André Gabriel Ferreira Calaça da Costa, Paula São-Thiago	Brasil
Melissopalynological characteristics of croatian sage (<i>salvia officinalis</i> L.) Honey	BUBALO Dragan	dbubalo @agr.hr	Ranata Peternel, Gordana Hegic, Lidija Svecnjak, Janja Kezic	Croatia
Experimental stations pollination	CASTRO SOTOS Alberto	info @apitecnic.com		Spain
Effect of cross pollination on the fruit quality of the apple tree	CHEFROUR Azzedine	azchefrou @yahoo.fr	Berrouk Houida, Draiaia Radia, Bouzebda Abd Errezak, Loucif Wahida	Algeria
Cross pollination and the quality of the citrus fruits	CHEFROUR Azzedine	azchefrou @yahoo.fr	Berrouk Houida, Draiaia Radia, Bouzebda Abd Errezak, Loucif Wahida	Algeria
Conservation of bumblebees, <i>bombus latr.</i> (apoidea, bombinae) depicted in stamps	CHMIELEWSKI Wit	wit.chmielewski @man.pulawy.pl		Poland
Studies on pollen gathering activity in relation to brood and honey storage in the colonies of <i>apis cerana</i> f. in diversified floral conditions	CHOWDE GOWDA Y.N.	nagaraja @bub.ernet.in	C. Chandrasekhara Reddy, N. Nagaraja	India
Diploid male production in a small and isolated population of brazilian stingless bee <i>melipona scutellaris</i>	DE ARAUJO ALVES Denise	daalves @ib.usp.br	Tiago Mauricio Francoey, Vera Lucia Imperatriz Fonseca, Pêrsio de Souza Santos Filho, Tom Wenseleers	Brazil
Management of fallows to enhance flowers availability for honeybees	DECOURTYE Axel	axel.decourtye @acta.asso.fr	Jean-François Odoux, Sophie Cluzeau-Moulay	France
A preliminary work on the use of bee pollen loads as a method to study climatic change: comparison between melissopalynological and aerobiological pollen data with emphasis on <i>olea europea</i>	DIMOU Maria	mmmsj @hotmail.com	Panagiotis Kougias, Vasilios Tsampardoukas, Vasileios Ziogas, Gerasimos Martzopoulos, Andreas Thrasyvoulou	Greece
The variety of melliferous sources of perm northern territory area and adjacent territories	DREBEZGINA E. S.	kate @tentorium.ru	R. G. Khismatullin, E. A. Elovikova, E. N. Zubova, Y. A. Lyapunov	Russia
Bee forage plants of saudi arabia	HUSSEIN Moustafa Hassan	mhussin_12 @yahoo.com		Egypt
Biometrics, bee forage plants, pollen spectrum of honey and beekeeping in arab, african and asian countries	HUSSEIN Moustafa Hassan	mhussin_12 @yahoo.com		Egypt
The potential for honey production at sunflower hybrids grown in south romania	ION Nicoleta	ionnicoleta2006 @yahoo.com	Viorel ION, Razvan Coman, Grigore Fota	Romania
Comparative study of honey samples depicting the difference in important nectar yielding plants after a span of 15 years in bangalore, karnataka, india.	JAMES DEVAN Mary Scinthia	maryscinthia @rediffmail.com		India
Morpho-physiological flower characteristics of two <i>salvia</i> species in relation to honeybee attraction	MACUKANOVIC- JOCIC Marina	marmajo @eunet.yu	Zora Dajia Stevanovic, Sonja Duletia-Lausevic	Serbia
Floral origin and chemical characteristics of the honeybee pollen loads in western central france	MATEESCU C.	jean-francois.odoux @magneraud.inra.fr	Odoux JF, Feuillet D, Aupinel P, Lamy H, Moreau N, Spulber R	France
Contribution to the palynological study of some bee honey samples from yucatan	MAY-CANCHE Isabel	esauri @itmerida.mx	Rita Alfaro, Luis Cuevas- Glory, Alma Centurion-Yah, Enrique Sauri-Duch, Ana Burgos-Pérez	Mexico
The influence of honey bees in pollination and fertilization of sherry cv oblacinska	MLADENOVIC Mica	sasagrubic @gmail.com	Radomirovic Marija	Serbia
Exploratory evaluation of the influence of honey bee colonies on <i>brassica napus</i> l.	NGUYEN Bach Kim	nguyen.b @fsagx.ac.be	Quievy Sam, Mignon Jacques	Belgium
Proposal of evaluation system for quantitative and qualitative parameters of bee pollen	NOZKOVA Janka	janka.nozkova @uniag.sk	Jan Brindza, Radovan Ostrovsky, Daniela Birova, Beata Stehlikova, Valerij Brovanskij	Slovakia

Palynology contribution in assessment of the beekeeping interest from flowering fallows	ODOUX Jean-François	jean-francois.odoux @magneraud.inra.fr	Lamy H., Loublier Y., Aupinel P., Decourtye A.	France
Influence of controlled pollination by bees on fruit set in apple	RADIVOJEVIC Dragan	dragan1970 @agrif.bg.ac.rs	Nebojsa Nedic	Serbia
Madagascar: honeybee, bee flora and environment	RAMAMONJISOA RALALAHARISOA Zana.	Iramamon @yahoo.fr		
Investigations on the side effects of pyrrolizidine alkaloids on honey bees (<i>apis mellifera</i> L.) in feeding experiments	REINHARD Annika	martina.janke @laves.niedersachsen. de	Martina Janke, Werner von der Ohe, Peter Schreier, Till Beuerle	Germany
Pollen atlas of the comarca lagunera, mexico	REYES-CARRILLO Jose Luis	jreyes54 @yahoo.com.mx	Pedro Cano-Rios, Rubi Muñoz-Soto, Frank A. Eischen, Eduardo Blanco Contreras	Mexico
Contribution and improving the agro-environmental efficiency in agroforestry systems for honeybees (biodiversity useful) in agricultural environment.	RHONE Fanny	fanenvelo @gmail.com	Eric Maire, Virginie Britten, Alain Canet, Sylvie Guillemme, Gérard Briane, Fabien Liagre	France
Field application of trichoderma spp. On strawberry flowers using honeybees (<i>apis mellifera</i> Linnaeus)	SACLANGAN Dan	sayotefries @hotmail.com	Luciana Villanueva, Lita M. Colting	
Composition and properties of two unique honeys from the boreal coniferous forest zone	SALONEN Anneli	ansalone @cc.joensuu.fi	Riitta Julkunen-Tiitto	Finland
Floral constancy of uruguyan native bumblebees: <i>bombus atratus</i> and <i>b. bellicosus</i> (hymenoptera, apidae)	SALVARREY Sheena	cirobee @gmail.com	Natalia Arbulo, Estela Santos, Ciro Invernizzi	Uruguay
Herbaceous cover plants	SOURISSEAU Agnès	asourisseau @gmail.com	Philippe Balandier	France
The influence of the anemophilous trees competition on of cherry orchards visit by red mason bee (<i>osmia rufa</i> L.)	TEPER Dariusz	dariusz.teper @man.pulawy.pl	Mieczysław Bilinski	Poland
Environmental biomonitoring with bees in parks and nature reserves in sicily	VICARI Domenico	domenico.vicari @izssicilia.it	M. Sole, A. Sutura, S. Vullo, V. Randazzo, M. D'Anna, V. Ferrantelli	Italy

September, Thursday 17th



POSTERS OF BEEKEEPING TECHNOLOGY AND QUALITY COMMISSION

Physico-chemical and sensorial characteristics of honey samples from tizi ouzou	AMIR Youcef	youcefam2008@gmail.com	Mohamed Bengana, Abdenour Yesli, Rabah Sadoudi	Algeria
A protocol for cryopreservation of <i>Apis mellifera</i> drone semen.	ANDERE Cecilia	tiruggi@infovia.com.ar	Ana Capel, Maria Alejandra Palacio, Analia Martinez, Edgardo Rodriguez, Anita Collins	Argentina
Use of antibiotics in drone semen of <i>Apis mellifera</i> for instrumental insemination.	ANDERE Cecilia	tiruggi@infovia.com.ar	Cristina Monteavaro, Maria Alejandra Palacio, Marcela Brazzola, Ana Capel, Anita Collins	Argentina
The influence of age and the colour of the combs on quantity and the output of the acquired wax	ANDJELKOVIC Bojan	bojan.andjelkovic@ikbks.com	Goran Jevtic, Mica Mladenovic, Nebojsa Nedic	Serbia
Vitamin b2 stability of dried bee pollen during storage	APARECIDA SANTOS PEREIRA Aline	ligiabic@gmail.com	Vanilda Aparecida Soares de Arruda, Ligia Bicudo de Almeida-Muradian	Brazil
Physico chemical and pollen analyses of honeys from some regions in Algeria	AZZEDINE Chefrour	azcheffrour@yahoo.fr	Berrouk Houda, Draiaia Radia, Bouzebda Abd Errezak, Loucif Wahida	Algeria
The initiative 2010 honeybee queens for the ruhr-metropolis	BARDENHEUER Walter	walter.bardenheuer@uni-due.de	Dirk-Hinrich Otto, BEEgroup Würzburg (associate)	Germany
Quality of the bee pollen of coconut palm produced by communities that live in the coastland of the Sergipe state-Brazil	BARRETO L.M.R.C.	barretolidia@yahoo.com.br	Gomes, S.M.A., Orsi, R.O., Brito, J.S.A., Souza, M.M.B., Peão, G.F.R., Dib, A.P.S.	Brazil
Enzymatic activity as an indicator of honey quality	BEDNAR Michal	beedol@beedol.cz	Dalibor Titera	Czech Republic
Characterization of slovenian spruce (<i>Picea abies</i> (L.) Karst.) And fir (<i>Abies alba</i> mill.) Honey	BERTONCELJ Jasna	urska.kropf@bf.uni-lj.si	Mojca Jamnik, Urska Kropf, Terezija Golob	Slovenia
Pyrrolizidine alkaloids in honey and pollen	BEUERLE Till	werner.von-der ohe@laves.niedersachsen.de	Werner von der Ohe, Michael Kempf, Peter Schreier	Germany
Effect of the method of instrumental insemination on the number of spermatozoa in a bee queen spermatheca	BIENKOWSKA Malgorzata	beata.panasiuk@man.pulawy.pl	Beata Panasiuk, Dariusz Gerula, Pawel Wegrzynowicz	Poland
Multiple utilization of queenless colonies in mass honey bee queens' rearing	BIENKOWSKA Malgorzata	beata.panasiuk@man.pulawy.pl	Dariusz Gerula, Beata Panasiuk, Pawel Wegrzynowicz	Poland
Honey bee acidity, some suggestions for method revision	CADENA Ariel Cadena	aocadenas@unal.edu.co	Elihu Paternina, Natalia Henao, Consuelo Díaz	Colombia
Acceptance evaluation of bee wax guides <i>Apis mellifera</i> L. (hymenoptera: apidae) for the stretching of honeycombs, starting from clean wax in established colonies	CANIULLAN Claudia	ccaniullan@gmail.com	Ximena Araneda, Karina Mansilla, Claudia Dussaubat	Chile
Beebread – a rich source of fatty acids	CEKSTERYTE Violeta	violeta@lzi.lt		Lithuania
Prediction of physical and chemical honey parameters trough near infrared spectroscopy (nirs)	CLASING Luis	NMANQUIA@UACH.CL	Daniel Alomar, Miguel Neira, Nimia Manquian	Chile
Relation of mortality of honeybees <i>apis mellifera</i> with the management practice of annual replacement of queens	CORREA NETO Amaldo Mauricio	arnaldomcneto@hotmail.com	Antonia de Maria Filha Ribeiro	Brazil
Analysis of benzo(a)pyrene in spanish honey samples	CORREDERA Lourdes	lourdesc@unizar.es		Spain
Diet impacts on <i>Melipona flavolineata</i> workers (apidae, meliponini)	COSTA Luciano Costa	giorgio@cpatu.embrapa.br	Giorgio Venturieri	Brazil
Classification of yucatan peninsula honeys by aroma volatile compounds	CUEVAS-GLORY Luis	esauri@itmerida.mx	Jorge A. Pino, Enrique Sauri-Duch	Mexico
Classification and differentiation of colombian stingless bee honey by using an electronic nose and multivariate analysis	CZULUAGA-DOMINGUEZ Carlos	cmzuluagad@unal.edu.co	Consuelo Díaz-Moreno, Martha Quicazán, Carlos Fuenmayor-Bobadilla, Ariel Cadena-Sánchez	Colombia
Physicochemical and palynological analysis of brazilian <i>Apis mellifera</i> bee and stingless bee (<i>tetragonisca angustula</i>) honey	DEALMEIDA-MURADIAN Ligia Bicudo	ligiabic@gmail.com	Graziela Leal Sousa, Alex da Silva de Freitas, Ortrud Monika Barth	Brazil

Antioxidant activity changes of packing honey on different stored conditions	DIAZ Consuelo	amcdiazmo@unal.edu.co	lahoz, susana bayarri,	Colombia
Traceability in the agri-alimentary chain of honey: the experience of Uruguay	DIAZ Rosana	rdiaz@mgap.gub.uy		Uruguay
Rastreabilidad en la cadena agroalimentaria de la miel: la experiencia de Uruguay	DIAZ CORREA Rosana	rdiaz@mgap.gub.uy		Uruguay
Special features of pollen production in Colombia	DIAZ-MORENO Consuelo	amcdiazmo@unal.edu.co	Martha Quicazán, Carlos Zuluaga-Domínguez, Carlos Fuenmayor-Bobadilla, Telmo Martínez	Colombia
Characterization of propolis from colombian stigless bees by aroma profile analysis and antioxidant activity	DIAZ-MORENO Consuelo	amcdiazmo@unal.edu.co	Carlos Zuluaga-Domínguez, Martha Quicazán, Carlos Fuenmayor-Bobadilla	Colombia
Rate of approval of honey in the lab of quality control of bee products of the University of Taubate-Sao Paulo-Brazil during a four years period	DIB A.P.S.	paula.dib@unitau.br	Presotto, A.N., Campos, C.N., Pinto, F.A., Sousa, E.M.P., Peão, G.F.R., Barreto, L.M.R.	Brazil
Apicultural good practices: handling, apiaries, substructures and house of honey processing of the beekeepers of Monteiro Lobato, Paraíba valley, Sao Paulo state-Brazil	DIB Ana Paula S	paula.dib@unitau.br	Orsi, R.O, Peão, G.F.R., Bendini, J.N, Pasin, L.E.V., Carvalho, C., Barreto, L.M.R.C	Brazil
Keeping an eye on the sentinel. Commensal symbiosis between the honeyguide bird and honey hunters	DOUNIAS Edmond	edmond.dounias@ird.fr		France
The importance of protecting bee products with protected designation of origin for the development of beekeeping in Serbia	DRAGOJEVIC Zoran	rasa.rasic@gmail.com	Mica Mladenovic, Sadjan Rasic, Nebojsa Nedic, Dragi Damjanovic	Serbia
Multi-queen colonies	DRAGOSLAV Ilic Ses	dragoslav.ses@gmail.com		Serbia
Effets du traitement thermique et du stockage sur la qualité de quelques miels produits à l'est de l'Algérie.	DRAIAIA Radia	draiaiaradia@yahoo.fr	Cheffour Azzedine, Ladjama Ali	Algérie
Determination of organochlorine organophosphorus and piretroids residues in honey and beeswax samples from coquimbo until los lagos regions, Chile.	DUSSAUBAT Claudia	lclasing@sumet.cl	Nimia Manquian, Miguel Neira, Andrea Baez, Marcelo Vera, Patricia Bahamonde	Chile
Influence of the type of the breeding colonies on the yields of royal jelly in the region of Kumanovo in Macedonia	DZIMREVSKA Irena	idzimrevska@yahoo.com	Hrisula Kiprijanovska	Macedonia
Honey bee nutrition, fermented diet	ELLIS Amanda	hayesg@doacs.state.fl.us	G.W. Hayes	USA
Determination of origin in honey	ELÝF SUNAY Asli	asli@balpamnak.com.tr	Dýlek Boyacıoğlu	Turkey
The study of macro and microelements composition from bees' products and bees' body	EREMIA Nicolae	liuliamihailova@rambler.ru	Tatiana Dabija, Iulia Mihailova, Ion Dodon	Moldovia
Honeys from nw Spain: botanical origin related to phenolics content	ESCUREDO Olga	mcoello@uvigo.es	Seijo Maria Carmen Rios Beatriz	Spain
Nitrogen content of honeys from nw Spain	ESCUREDO Olga	mcoello@uvigo.es	Miguez Montserrat Seijo Maria Carmen Chouza Manuela	Spain
Identification of bee flora by palynology and evaluation of macro and micro nutrients present in the honey production unit finances the glorieta of the municipality Colon of the Zulia state Venezuela.	ESPERANZA CONTRERAS MARQUEZ Karina	karinacontreras5@gmail.com	Luis Vicente Gutierrez, Patricia Vit	Venezuela
Chromatographic-based methods and solid phase micro extraction for pesticide determination in honey.	FAUBERT François	jmartin@bourges.univ-orleans.fr	Julien Lecoq, Jean-Pierre Martin	France
Microbiological quality and antibacterial activity of tetragonisca angustula honey	FIGUEROA RAMIREZ Judith	mvgamboaa@unal.edu.co	Divian Ivonne Hernandez Moreno, M. Viviana Gamboa Abril	Colombia
Microbiological quality and antibacterial capacity of colombian honeys from Apis mellifera correlated to physical-chemical characteristics	FIGUEROA RAMIREZ Judith	jfigueroaa@unal.edu.co	Martha Quicazán, Consuelo Díaz-Moreno, Divian Ivonne Hernández-Moreno, Viviana Gamboa-Abril, Carlos Zuluaga-Domínguez, Carlos Fuenmayor-Bobadilla	Colombia
A beebread-like functional dietary supplement by means of solid state fermentation of honeybee-collected pollen with probiotic bacteria	FUENMAYOR-BOBADILLA Carlos	cafuenmayorb@unal.edu.co	Martha Quicazán, Judith Figueroa	Colombia
Antioxidant activity of colombian bee pollen and propolis	FUENMAYOR-BOBADILLA Carlos	cafuenmayorb@unal.edu.co	Consuelo Pérez, Regina Lázaro, Antonio Herrera	Colombia
Chemical analysis of propolis samples from different phyto-geographical regions of turkey	GENCAY Omur	gencay@hacettepe.edu.tr	Kadriye Sorkun, Bekir Salih	Turkey

Field trials to assess the impact of vita feed green® on colonies development in Greece, Italy and Cyprus	GOUNDY Vasiliki	Alexandros. Papachristoforou @legs.cnrs-gif.fr	Pier Giorgio della Vedova, Antonio Belletti, Moreno Greali, Alexandros Papachristoforou	Greece
Atributos sensorial y propiedades fisicoquímicas de mieles colombianas	GROSSO GUILLERMO Salamanca	salamancagrosso@gmail.com	Montoya Devia Leidy Marcela	Colombia
The significance of the builder colonies with and without queen-bee in respect to the weight and the number of queen-bees	GRUBIC Sasa	sasagrubic@gmail.com	Mladenovic Mica, Rasic Sladjan	Serbia
Research of the apiculture method with warm and cool zones on the spring	GUO Zhan-bao	apis96@gmail.com		China
Abeilles vitales	GUTH Jos	guthj@pt.lu		Luxembourg
New beekeeping technology with rotating brood beehive	HEGEDUS Denes	sofro.aniko@anivet.hu		Hungary
Apiculture research in arab countries	HUSSEIN MOHAMED Moustafa	mhussein_12@yahoo.com		Egypt
Crystallization behavior of turkish honeys by dsc	ELÝF SUNAY Asli	asli@balpamak.com.tr	Günay Akdoğan, Dylek Boyacıoğlu, Dylara Nylüfer Erdöl, Sezen Süzme	Turkey
Development of a screening method for the authentication of the botanical origin of honey by mid-infrared spectroscopy	JANKE Martina	martina.janke@laves.niedersachsen.de	Kathrin Kemper, Werner von der Ohe	Germany
Extraction and determination of polysaccharides from water lily bee pollen	YAN Jihong	yanjihong@vip.sina.com	Guofeng Zhang	China
The history and present status of pinghu italian bee, a local variety of Apis mellifera l. Characterized by high royal jelly production	JIN Shui-Hua	zjuapis@yahoo.com.cn		China
The comparison of the honey yield in dadant and multiple storey hives with the local frame dimension.	KAMLER Frantisek	beedol@beedol.cz		Czech Republic
Liquefaction of honey for analysis by fourier transformed infrared spectroscopy	KAST Christina	christina.kast@alp.admin.ch	Verena Kilchenmann, René Badertscher, Peter Gallmann	Switzerland
Physicochemical indexes of the perm territory's honey (Russia) 2007-2008	KHISMATULLIN R.G.	kate@tentorium.ru	Kuzyaev R.Z., Legotkina G.I., Zubova E.N.	Russia
Innovations in the beekeeping sector in the republic of Macedonia	KIPRIJANOVSKA Hrisula	idzimrevska@yahoo.com	Irena Dzimrevska	Macedonia
The identification of production place in honey by tce-ir/ms	KOGURE NAOKI	nao_590@hotmail.com	Mika Terakawa, Shinji Itoh	Japan
Large scale use of the extra multiple mating hives	KOMISAR Oleksandr	alex-kom@nucs.kiev.ua		Ukraine
Fingerprints of honey bees in Anatolia	KOSOGLU Mustafa	banu.yucel@ege.edu.tr	Banu Yucel, Ertan Yılmaz	
Microbiological definition method of the fold in nectar-fold honey	KUZYAEV R. Z.	kate@tentorium.ru	E. A. Elovikova, N. E. Gavrilova, R. G. Khismatullin, Y. E. Lyapunov	Russia
Technical and economical approach of royal jelly farms	LACOUR Marie	fabrice.allier@cnda.asso.fr		France
14 years of a quality approach by the gpgr (group of royale jelly producers)	LACOUR Marie	fabrice.allier@cnda.asso.fr		France
Bees wellbeing improvement with the tubes bottom board	LE PABIC Jean-Pierre	j-p.lepabic@aist.enst.fr		France
Determination of the total flavonoid content in propolis by a new method suitable for routine quality control	LINKOGEL Martin	yvonne.gamradt@intertek.com	Kurt-Peter Rætzke	Germany
Pollen evolution spectrum in honey samples of two apiaries of the north of Spain	FIDALGO Carmen M.	rm.valencia@unileon.es	Esther López Nicolás, Rosa M. Valencia-Barrera	Spain
The honeybees weight calculation as an instrument of quality control in the honey bees packages	MAESSEN BOLLA Pablo Antonio Eduardo	pablomaessen@infovia.com.ar		Argentina
Bees wax purity: how important is it?	MANQUIAN Nimia	NMANQUIA@UACH.CL	Miguel Neira, Claudia Dussaubat, Patricia Hernandez, Francisca Lopez, Patricia Bley	Chile
Improvement of the beekeepers competitiveness through the production, processing and elaboration of products made of virgin beeswax.	MANSILLA Karina	ccaniullan@gmail.com	Rene Santini, Ximena Araneda, Claudia Caniullan	Chile

Determination of lead and cadmium residues in french honeys	MARTEL Anne-Claire	ac.martel @afssa.fr	Charlotte Halimi, Philippe Porta, Sarah Zeggane, Michel O'Kombi	France
Estimates of genetic parameters for hygienic behavior in africanized honeybees considering the maternal genetic effect	COSTA MAIA Fabiana Martins	abelha.vagner @gmail.com	Vagner de Alencar Arnaut de Toledo, Elias Nunes Martins, Patricia Faquinello, Alexandre Leseur do Santos, Carlos Antonio Lopes de Oliveira, Daniela Andressa Lino Lourenço	Brazil
Relationships between d-gluconic acid of honey and electrical conductivity, ph, and acidity types	MATO I	mafeman @ubu.es	Huidobro JF, Simal-Lozano J., Sancho MT, Fernandez Muino MA	Spain
Relationships between d-gluconic acid of honey and other non-aromatic organic acids	MATO I	mtsanchu @ubu.es	Huidobro JF, Simal-Lozano J., Sancho MT, Fernandez Muino MA	Spain
Chilean honeys used as bioindicators of pollution by heavy metals: modification of biological properties of honeys with metals content.	MEJIAS Enrique	egmejias @uc.cl	Gloria Montenegro	Chile
Introducing a honeybee into the state of artificial hypobiosis (hibernation)	MELNYCHUK S.	yura @zip-ua.com		Ukraine
Levels of toxicity of some pesticides for honeybee	MELNYCHUK S.	yura @zip-ua.com		Ukraine
Study of pre-treatment method by using affinity-gel for quinolon analysis in honey	MIKA Terakawa	mikamycin @hotmail.co.jp	Naoki Kogure, Shinji Itoh, Mieko Katoh, Tsukasa Kodaira	Japan
Improved method for queen rearing	MOAREFI Maryam	maryam.moarefi @kiaia.ac.ir	Hossein Yeganehrad	Iran
Comparative study of propolis samples collected in various areas of Hungary	MOLNAR Szabolcs	molnarszabolcs.hun @gmail.com	Diána Virág, Péter Forgó, Boglárka Lénárt, Katalin Szováti, Attila Kiss	Hungary
Health safety of honey from the northwest Bosnia and Herzegovina	MUJIC Ibrahim Mujic	ibrahim.mujic @ri.t-com.hr		Bosnia and Herzegovina
Studies on physical and sensory attributes of hot air and sun dried honey based peach leather	NANDA Vikas	vik164 @yahoo.co.in	Dr. Bahadur Singh, Dr. A.S.Bawa	India
Systematization of technical information for three geographic areas from Chile: apiculture calendar 2009	NEIRA Migue	alejandromoranv @gmail.com	Nimía Manquian, Alejandro Moran, Cristian Vasquez, Patricia Bahamonde, Luis Clasing, Carolina Fuenzalida	Chile
Effects of beekeeping place on colony performance and behavior of worker honey bee (<i>Apis mellifera</i> Hymenoptera: Apidae) and quality of honey	NISBET Cevat	cnisbet @omu.edu.tr	Ahmet Güler, Yüksel Orhan, Gül Fatma Yarıym, Sena Çenesiz	Turkey
Analysis of heavy metals content of Chilean honeys: Cu, Pb and Cd content of honeys from different geographic places of Chile	OLIVARES Luis	laolivar @puc.cl	María Abenoza, Irene Lahoz, Susana Bayarri, Consuelo Pérez, Regina Lázaro, Antonio Herrera	Chile
Gc-ms analysis of Turkish honeydew honeys production of <i>Marchalina hellenica</i> on <i>Pinus brutia</i>	OZKOK TUYLU Asli	aoztuy @gmail.com	Kadırye Sorkun Bekir Salih	Turkey
Queen production in cetec-technological center of beekeeping in Mossoró-m-Brazil	GRAMACHO Katia P.	lsgoncal @usp.br	Lionel Segui Gonçalves Armando Ferreira Da Silva	Brazil
<i>Apis mellifera</i> in situ preservation: a closed population system in Argentina	PALACIO Maria Alejandra	tinuggi @infovia.com.ar	Figini, Emilio, Martinez Analia Andere Cecilia, Garcia Cristina, Bedascarrasbure Enrique	Argentina
Relationship between nutritional composition and botanical origin of dried bee pollen samples collected from São Paulo - Brazil	PEREIRA DE MELO Ilana Louise	ligiabic @gmail.com	Alex da Silva Freitas, Ortrud Monika Barth, LigiaBicudo de Almeida- Muradian	Brazil
<i>Osmia rufa</i> pedotrophic cell as a suitable tool for monitoring metal ions in central Italy	PINZAUTI Mauro	mpinzauti @agr.unipi.it	Giovanni Pacini, Serena Rocchi, Mirko Soci, Gianluca Bedini, Antonio Felicioli	Italy
Development of a prophylactic antibiotic mixture for use with extended honey bee semen during international genetic exchange	POLLARD John	jpollard @genesafe.ca	Claire Plante, Susan Cobey	Canada
Filth-test assessment of honey quality	PORPORATO Marco	marco.porporato @unio.it	Augusto Patetta, Luigi Balzola, Aulo Manino	Italia
Vitamin C in the bee pollen and their relation with the antioxidant activity	QUINTANA-EDESA Ana R	arquintana @jccm.es	A.V. Gonzalez-Porto, Felix Quiñones	Spain
Strategies for establishing origin denomination of honeybee products in Colombia	QUIZACAN Martha	mcquicazand @unal.edu.co	Consuelo Diaz-Moreno, Judith Figueroa, Guilomar Nates-Parra	Colombia

Mead production using two different fermentation times and types of commercial yeast strains	RIBEIRO PEÃO Gustavo Frederico	gustavopeao @yahoo.com.br	Lidia Maria Ruy Carelli Barreto, Ismael Maciel de Mancilha, João Batista de Almeida e Silva, Ana Paula da Silva Dib, Juliana Bendini, Janaina Aparecida Campos Coelho Basso	Brazil
Use of <i>Apis mellifera</i> like bioindicator for the evaluation of the environmental and agro-alimentary bio-security	RUIZ JAVIER A.	info @apoidea.es	Porrini C. Sabatini A.G.	Spain
Carbohydrate content-based assessment of honey	RYBAK- CHMIELEWSKA Helena	helenachmielewska @man.pulawy.pl	Teresa Szczesna Ewa Wace	Poland
Validation of an elisa test kit for the detection of fluoroquinolones in honey	SAVOY PERROUD Marie-Claude	marie-claude.savoy- perroud @rdls.nestle.com	MH Le Breton, JM Diserens	Switzerland
New technological center of beekeeping cetec in northeast Brazil	SEGUI GONÇALVES Lionel	lsgoncal @usp.br	Katia Peres Gramacho, David de Jong	Brazil
Influence of timing and production method over the queen bees' performance parameters	SENA Lumturi	lumturi.sena @yahoo.com	Fidel Gjurgji, Sabah Sena	Albania
Life span of africanized honey bees supplemented with polyunsaturated fatty acids, palmitic fatty acid, isolated soy protein, beer yeast and mixed supplement	SEREIA Maria Josiane	abelha.vagner @gmail.com	Vagner Alencar Arnaud de Toledo, Antonio Claudio Furlan, Patricia Faquinello, Renata Carolina Mesti, Satilla Emanuele da Silva de Castro, Bruno Lala Silva	Brazil
Alternative supplements effects in the quality of royal jelly production by africanized honeybees	SEREIA Maria Josiane	abelha.vagner @gmail.com	Priscila Wielewski, Vagner de Alencar Arnaud de Toledo, Antonio Claudio Furlan, Patricia Faquinello, Renata Carolina Mesti	Brazil
Electronic hive to monitorize some biological process of economic importance in honeybee colony and its environment	SICEANU Adrian	beeswoborders @yahoo.com		Romania
What percentage of tilia pollen is sufficient to define unifloral lime honey?	SIKOPARIJA Branko	nspolen @yahoo.com	Predrag Radisic, Vladimir Hunjadi, Tatjana Pejak-Sikoparija, Bojana Stanisavljev, Jelena Bozovic, Smiljka Simic	Serbia
Seasonal variation of phenolic compounds and biological activities in brazilian red propolis from <i>Dalbergia ecastophyllum</i>	SILVEIRA MORAES Cleber	clebersmoraes @gmail.com	Andreas Dausch, Yong Kun Park	Brazil
Volatile composition of sage (<i>Salvia officinalis</i>) honey from the north west adriatic region of Croatia by spme-gc-ms analysis	SPONZA Silvia	rovigno_2000 @yahoo.it	Lanfranco Conte, Dražen Lušić, Chlodwig Franz, Johannes Novak	Italy
Liquid chromatography analysis of sulfonamide residues in honey	SZCZESNA Teresa	teresa.szczesna @man.pulawy.pl	Helena Rybak- Chmielewska, Ewa Wace, Krystyna Pohorecka	Poland
The variability of the diastase activity among monofloral honey samples collected from different colonies of the same apiary	TANANAKI Chrysoula	tananaki @agro.auth.gr	Thrasylvoulou Andreas, Chaidemenos Nikolaos, Sidirokastritis Nikolaos	Greece
Old hives as a reservoir of living <i>paenibacillus</i> larvae spores	TITERA Dalibor	beedol @beedol.cz	Marcela Haklova	Czech Republic
Bee pollen - microorganisms interactions	TOTH Dezider	janka.nozkova @uniag.sk	Peter Ferienc, Jan Brindza, Jan Grof, Jan Sajbidor	Slovakia
Apiculture of Armenia	TSARUKYAN Roza	karen_avelisyan @inbox.ru	Albert Markosyan	Armenia
Determination of α -fructofuranosidase activity as method for detection of additions of inverted sugar syrup to honey	VALKOV Vassil	yvonne.gamradt @intertek.com	Dr. Kurt-Peter Raezke	Germany
Physico-chemical analysis and determination of total polyphenols in pollen of stingless bees from the brazilian amazon	VENTURIERI Giorgio	giorgio @cpatu.embrapa.br	Patricia Oliveira Marcus Vasconcelos	Brazil
Precision apiculture: geographic information system (gis) as a tool for generate a honey and beeswax bank from the agricultural faculty of the Universidad austral de Chile	VERA Marcelo	NMANQUIA @UACH.CL	Miguel Neira, Nimía Manquian, Claudia Dussaubat, Patricia Hernandez, Carolina Oyarzun	Chile
Geomatic techniques for hive metric and semantic description	VERCELLI Monica Vercelli	marco.porporato @unito.it	Aulo Manino, Augusto Patetta, Enrico Borgogno Mondino, Marco Anibaldi, Marco Porporato	Italia
Characterization of honey produced from different fruit plants of northern India	VIKAS Nanda	vik164 @yahoo.co.in	Bahadur Singh, Dr A.S.Bawa	India

New equipment for cold dehydration or dehumidification of pollen and honey.	VILANI OLIVEIRA JUNIOR José	jose.vilani@gmail.com	José Vilani Oliveira	Brazil
Integral honey extractor - the new equipment to extract honey	VILANI OLIVEIRA JUNIOR José	jose.vilani@gmail.com	José Vilani Oliveira	Brazil
Insights in the phenolic composition of portuguese propolis	VILAS-BOAS Miguel	mvboas@ipb.pt	Soraia Falcão, Susana Cardoso, Maria-Rosário Domingues	Portugal
Vegetal micro porous diffusing media	VINUESA Germain	josianevinuesa@api16.com		France
Sensory description of stingless bee honeys from Brasil, Guatemala and Venezuela	VIT Patricia	vit@ula.ve	Carlos Carvalho, Eunice Enriquez, Isbelia González, Enrique Moreno, David Roubik, Bruno Souza Jeronimo Villas-Boas	Venezuela
Choosing a matrix for clover reference odor in honey	VIT Patricia	vit@ula.ve		Venezuela
European honeydew honeys	VON DER OHE Werner	werner.von-der-ohe@laves.niedersachsen.de	Martina Janke, Katharina von der Ohe	Germany
Quality and safety of thai honey	WANJAI Chonlapin	panuwan@gmail.com	Panuwan Chantawannakul, Surutwadee Pak-uthai, Choochad Santasup	Thailand
Fast determination of atp-related compounds in royal jelly using ultra-performance liquid chromatography	WU Liming	apiswu@126.com	Xiaofeng Xue, Jinhui Zhou, Jinzhen Zhang, Fang Chen, Jing Zhao	China
Re-queening and disease control at the same time	YEGANEHRAD Hossein	caspianapiaries@gmail.com	Maryam Moarefi	Canada
A valuable gift from Turkey to the world; pine honeydew honey	YUCEL Banu	banu.yucel@ege.edu.tr	Muhsin Dogaroglu, Mustafa Kosoglu	Turkey
Studies concerning the development of two bee breeds in Romania	ZUGRAVU Corina-Aurelia	corinazugravu@gmx.net	Monica Parvu, Ioana Andronie	Romania
The effect of substitute of pollen on bees resistance to wintering	ZUGRAVU Corina-Aurelia	corinazugravu@gmx.net	Monica Parvu, Ioana Andronie, Carmen Berghes	Romania
Sensorial characteristics and composition of bulgarian's coriander (Coriandrum sativum L.) Honey	DINKOV Dinko	dinkodinkov@yahoo.com		Bulgaria



BEEKEEPING ECONOMY COMMISSION

A comparative analysis of the international competitiveness of China honey trade	LIU Pengfei	liupengfei200812@163.com	Zhanlu Wang, Jie Wu, Pengfei Liu	China
The analysis of economic indices in a typical beekeeping firm in sSerbia	MARINKOVIC Sladjana	nedicn@ptt.rs	Nebojsa Nedic, Vlade Zaric	Serbia
The cooperative like economic model of future for the bee-keepers	RODRIGUEZ MONJE Ramón	ramon.monje@gmail.com		Spain
Production and marketing of organic and conventional honey in Turkey	SANER Gamze	gamze.saner@ege.edu.tr	Sait Engindeniz, Murat Yercan, Buket Karaturhan, Figen Cukur	Turkey
Present economical situation of beekeepers in Poland	SEMKIW Piotr	piotr.semkiw@man.pulawy.pl	Piotr Skubida	Poland
The Development of the 10,000 Bee Hive Habitat Beekeepers Cooperative in Heilongjiang Province	YUNG Summer	summer-yungyung@hotmail.com		China

September, Friday 18th



BEE HEALTH COMMISSION

Efficacy of some essential oils for wax moths control	ABDELSALAM Anwar Mohamed	abdo52 @yahoo.com		
Field evaluation of some botanical oils for controlling the honeybee tracheal mite acarapis woodi (rennie)	ABDELSALAM Anwar Mohamed	abdo52 @yahoo.com		
In vitro and in vivo expression of a metalloprotease from paenibacillus larvae during infection of honeybee larvae	ANTUNEZ Karina	karina @iibce.edu.uy	Matilde Anido, Pablo Zunino	Uruguay
Evaluation of the grooming behaviour of apis mellifera L. Control in relation to varroa destructor (anderson & truman)	ARANEDA-DURAN Ximena	ccaniullan @gmail.com	Manuel Bernales-Muñoz, Jaime Solano-Solis, Karina Mansilla-Vera, Katia Peres-Gramacho	Chile
A new larval in vitro rearing method to test effects of pesticides on honey bee brood	AUPINEL Pierrick	Pierrick.Aupinel @magneraud.inra.fr	Dominique Fortini, Jean-Noël Tasei, Jean-François Odoux	France
Evaluation of brazilian green propolis extracts in vitro activity against paenibacillus larvae.	BASTOS Esther Margarida A F	embastos @tuned.mg.gov.br	Denise de Oliveira Scaoris, Ademilson Espencer Egea Soares, Maria Spivak	Brazil
American foulbrood control without the use of antibiotics in argentina	BEDASCARRASBURE Enrique	tiruggi @infovia.com.ar	Figini, Emilio, Palacio, Maria Alejandra, Passucci, Juan, Rodriguez, Edgardo, Poffier, Daniel	Argentina
Effect of parasitism by varroa destructor on morphometrical parameters of worker honeybees apis mellifera intermissa in northern algeria	BELAID Messaouda	belaidd_messaouda @yahoo.fr	Salaheddine Doumandji	Algeria
Composition of chemical and acaricide activity of 4 essential oils resulting from plants against varroa destructor in the algerian center	BERKANI Mohamed Laid	berkani_ml @yahoo.fr		Algeria
Study of the therapeutic effectiveness of three medicinal plants by fumigation and contact with respect to varroa destructor: case of the apiaries of the algerian center	BERKANI Mohamed Laid	berkani_ml @yahoo.fr		Algeria
Evaluation of varroa control using thymol in tunisia	BERRECHID Ahmed	aberrechid @gnet.tn	Trouiller Jérôme	Tunisia
Effects of queen caging for the control of varroa destructor	BESANA Andrea	andreabesana @conapi.it	Giorgio Baracani, Antonio Nanetti	Italy
Intestinal flora of honey bees and health: which relations?	BESSI Elena	elena.bessi @aat-taa.eu		Italy
A case of acute intoxication with acetamiprid in bee colonies	BIANU Elisabeta	bianu.elisabeta @idah.ro	Daniela Nica	Romania
Reliable bee management systems to help to reduce colony losses – an approach that is based on knowledge transfer	BOECKING Otto	otto.boecking @laves.niedersachsen.de	Pia Aumeier, Gerhard Liebig	Germany
Pollen: the pathway by which the systemic fipronil enter into the beehive	BONMATIN Jean-Marc	bonmatin @cnrs-orleans.fr	Marchand P.A., Decoville M., Casabianca H., Danièle G., Colin M.E., Belzunces L.P.	France
Development of bioactive ceramics to control microbial diseases in bee farm	BOOPPHA Bongkot	panuwan @gmail.com	Sukum Eittsayeam, Panuwan Chantawannakul	Thailand
The italian national project apenet: monitoring and research in apiculture.	BORTOLOTTI Laura	piotr @inapicoltura.org	Piotr Medrzycki, Anna Gloria Sabatini, Daniele Pochi, Alberto Masci, Marina Montedoro	Italy
Nosema ceranae is able to infect different apis species	BOTIAS Cristina	cristinabotias @yahoo.es	Raquel Martín-Hernández, Encarna Garrido-Bailón, Mariano Higes, Denis L. Anderson	Spain
Efficacy of organic acids for varroa control in apis mellifera intermissa L.	BOUDEGGA Haifa	haifa.boudegga @laposte.net	Barbouche Naima, Ben Hamouda Med Habib	Tunisia
Genetic diversity and distribution of ascospheara apis in denmark and europe	BRUUN JENSEN Annette	abj @life.ku.dk		Denmark
Investigating honey bee colony health in england and wales	BUDGE Giles	g.marris @csl.gov.uk	Ian Adams, Ben Jones, Gay Marris, Lynn Laurenson, Selwyn Wikins, Stéphane Pietravallo, Mike Brown	United Kingdom
Protection conferred by a bacteriocin against american foulbrood	CHACANA Pablo	tiruggi @infovia.com.ar	Maria Alejandra Palacio, Sebastián Borracci, Horacio Terzolo	Argentina

The acute oral toxicity of an insecticide used in plant protection: thiamethoxam (actara 25wg) on the honeybee <i>apis mellifera</i> intermissa.	CHAHBAR Nora	chahbar_nora@yahoo.fr	Luc Philippe Belzunces, Saleheddine Doumandji	Algeria
New diagnostic method to limit the widespread of European Foulbrood in Switzerland	CHARRIERE Jean-Daniel	jd.charriere@bluewin.ch	Roetschi Alexandra, Imdorf Anton	Switzerland
Economic consequences of varroa destructor and parasitic mite syndrome epidemic on <i>apis mellifera</i> L. Based beekeeping in India	CHAUDHARY O.P.	chaudharyop@gmail.com		India
Low cost management alternatives for varroa destructor syndrome for developing countries	CHAUDHARY O.P.	chaudharyop@gmail.com		India
Nosema diagnosis in romanian bee colonies	CHIOVEANU Gabriela	gabriela.chioveanu@idah.ro	Cioranu Raluca, Coste Handan	Romania
Hypopi of mites (acarina) phoretic on earwigs, forficula auricularia L. (insecta, dermaptera), collected from beehives	CHMIELEWSKI Wit	wit.chmielewski@man.pulawy.pl		Poland
First pcr detection of nosema species in romanian bee colonies	CIORANU Raluca Petronela	raluca.cioranu@idah.ro	Gabriela Chioveanu, Handan Coste, Mihai Turcitu	Romania
Small-cell brood combs: an evaluation of their benefit in the control of varroa destructor in honeybees (<i>apis mellifera</i>) under european conditions	COFFEY Mary F.	Mary.Frances.Coffey@ul.ie	John B. McMullan	Ireland
Thinking about postulates in experimental toxicology	COLIN Marc-Edouard	colinme@supagro.inra.fr	Patrice Marchand, Jean-Marc Bonmatin, Luc Belzunces	France
Advances in the study of the toxicity of propolis alcoholic extracts on varroa destructor and <i>apis mellifera</i>	DAMIANI Natalia	vcrouzat@apiculturamdp.com.ar	Matias Daniel Maggi, Liesel Brenda Gende, Claudia Faverin, Victor Crouzat, Martin Javier Eguaras, Jorge Augusto Marcangeli	Argentina
A methodology to evaluate the effects of pesticides to bees: recording individual behaviour of bees using microchips	DECOURTYE Axel	axel.decourtye@acta.asso.fr	James Devillers, Pierrick Aupinel, Julie Fournier, Monique Gauthier	France
Bee nosemosis: epidemiology and pathogenicity of nosema <i>apis</i> and nosema <i>ceranae</i> and potential of natural extracts for the control of this infectious disease	DELBAC Frédéric	Frederic.DELBAC@univ-bpclermont.fr	Poincloux Delphine, Diognon Marie, Roussel Michaël, Texier Catherine, Wawrzyniak Ivan, Vivares Christian, El Alaoui Hicham	France
Effects of endocrine disrupting chemicals to bees	DEVILLERS J	j.devillers@ctis.fr	Axel Decourtye, Pierrick Aupinel	France
The growth of probiotic microorganisms with antagonistic activity against <i>paenibacillus</i> larvae in a fermented wheat germ medium.	DUBNA Sona	sona.dubna@seznam.cz	Vojtech Rada, Jiří Killer	Czech Republic
Effect of bilobalide from <i>Ginkgo biloba</i> on honeybees	DUKE Rujee K	rujeek@med.usyd.edu.au	Alexandra Kaufman, Mario Pahl, Zachery Y. Huang, Van H. Tran, Colin C. Duke, Shao-wu Zhang	Australia
Incidency of varroa (<i>varroa destructor</i> anderson & truemana), nosema (<i>nosema apis</i> zander) tracheae mite (<i>acarapis woodi</i> rennie), chalkbrood (<i>ascosphaera apis</i> (maassen ex clausen), in apiaries from the national apiculture net, between 2004 and 2007. Methods	DUSSAUBAT Claudia	lclasing@sumet.cl	Miguel Neira, Nimia Manquian, Andrea Baez, Patricia Bahamonde	Chile
Bee-to-bee contact drives oxalic acid distribution in honey bee colonies	ELLIS Marion	mellis3@unl.edu	Nick Aliano	USA
Powered sugar to reduce varroa mite populations	ELLIS Amanda	hayesg@doacs.state.fl.us	Hayes Gerald, J.D.Ellis	USA
Small hive beetle (<i>aethina tumida</i>) attraction to commercial bumble bee (<i>bombus</i> spp.) colonies	ELLIS James	jdellis@ufl.edu	Jason Graham	USA
American foulbrood eradication in brittany	EMEILLAT Raymond	fabrice.allier@cnda.asso.fr		France
Sacbrood disease in chinese honeybee (<i>apis cerana</i> cerana)	FANG Bing Bing	sinoapis@126.com		China
Colony survival in untreated apiary of <i>apis mellifera iberiensis</i>	FLORES Jose Manuel	ba1f1sej@uco.es	Padilla F.	Spain
Sanitization of european foulbrood through different beekeeping practices	FORMATO Giovanni	gioformato@yahoo.es	Alessandra Giacomelli, Fabrizio Nisi, Stefano Saccares, Stefano Bassi, Stefano Pongolini, Elena Carra	Italy
Comparison of two methods to assess effects of insecticides on hypopharyngeal gland development of honey bee.	FORTINI Dominique	Pierrick.Aupinel@magneraud.inra.fr	Bruno Michaud, Pierrick Aupinel	France

Sublethal effects of thiamethoxam on the ability of honeybees to orientate in a complex maze	FOURIER Julie	axel.decourtye@acta.asso.fr	James Devillers, Pierrick Aupinel, Monique Gauthier, Axel Decourtye	France
Natural infection by nosema ceranae causes similar lesions than in experimentally infected caged-workers honeybees (apis mellifera).	GARCIA-PALENCIA Pilar	mhiges@jccm.es	Raquel Martín-Hernández, Pilar Marín, Aránzazu Meana, Mariano Higes	Spain
New diagnostic method of acarapis woodi a parasite of apis mellifera l. By pcr-rflps. Prevalence of acarapisosis in spain	GARRIDO-BAILON Encarna	megarrido@jccm.es	Mariano Higes, Raquel Martín-Hernández, Cristina Botías, Lourdes Prieto, Aránzazu Meana	Spain
Impact of delaying fall varroa treatments and hive feeding on the efficacy of varroa control and winter survival of the honey bee (apis mellifera l.)	GIOVENAZZO Pierre	pierre.giovenazzo@bio.ulaval.ca	Pascal Dubreuil	Canada
Varroa mite control : using thymol and oxalic acid in south of france	GIROD Vincent	fabrice.allier@cnda.asso.fr		France
Toxicity of thymol and linalool towards both varroa mites and honeybees	GIUSTI Matteo	a.felicioli@vet.unipi.it	Marilena Traversi, Roberto Lazzari, Fiammetta Adamo, Mauro Pinzauti, Antonio Felicioli	Italy
The impact of combs of different age on honey bee colonies	GORAS Georgios	thrasia@agro.auth.gr	Goras Georgios	Greece
Pcr-detection of nosema apis/nosema ceranae spores in honey samples	GRANATO Anna	agranato@izsvenezie.it	Mauro Caldon, Rosa Colamonico, Marilena Boscarato, Christian Falcaro, Nicoletta Stocco, Franco Mutinelli	Italy
Control of the populations of varroas by olfactive confusion by means of essential oils	GROSMOND Gilles	hippolab63@orange.fr		France
The effects of the season on the hygienic ability of the honey bee (apis mellifera hymenoptera: apidae) colonies	GÜLER Ahmet	aguler@omu.edu.tr	Hakan Toy	Turkey
Studies on the stimulating effect of some products on the bee colony productivity parameters in bulgaria	GURGULOVA Kalinka	kgurgulova@yahoo.com	Ivanka Zhelyazkova, Ivan Panchev, Vera Popova	Bulgaria
Veterinary drugs for organic beekeeping	GURGULOVA Kalinka	kgurgulova@yahoo.com	Ivanka Zhelyazkova, Vera Popova	Bulgaria
Right bacteria at the wrong place: septicemia in honeybee workers	HARTMANN Ulrike Hartmann	hartmann.ulrike@alp.admin.ch	Alexandra Rogtschi, Jean-Daniel Charnière, Peter Neumann	Switzerland
Do environment of the new reclaimed land vegetation defeat the symptoms of the honeybee colony collapse disorder (ccd)?	HASSAN Adel Rushdy	prof.adelrushdy@yahoo.com		Egypt
A study on incidence of bee pathogens, pollen pesticide residues and environmental factors in honey bee colonies depopulation	HIGES Mariano	mhiges@jccm.es	Raquel-Martin Hernández, Encarna Garrido-Bailón, Amparo Martínez-Salvador, Juan José Jimenez, José Bernal, M.J. del Nozal	Spain
The presence of nosema ceranae (microsporidia) in african honey bees (apis mellifera intermissa)	HIGES Mariano	mhiges@jccm.es	Raquel Martín-Hernández, Encarna Garrido-Bailón, Cristina Botías, Aránzazu Meana	Spain
Survey of adult honey bee diseases in republic of macedonia and ecological programme for their control	HRISTOVSKI Misho	acvetkovic@fvm.ukim.edu.mk	Aleksandar Cvetkovik	Republic of Macedonia
Pests, parasites, diseases and disorders of honeybee colonies (apis mellifera l.)	HUSSEIN Moustafa Hassan	mhussin_12@yahoo.com		Egypt
The bio organic treatments of bees	HYSI Xhafer	xhaferhysi@yahoo.com	Emrion Hysi	Albania
Two variants of hygienic behaviour in honeybees in response to chalkbrood disease depending on the presence/absence of spores in the mummies	INVERNIZZI Ciro	cirobee@gmail.com		Uruguay
Investigations on the side effects of pyrrolizidine alkaloids on honey bees (apis mellifera l.) in feeding experiments	JANKE Martina	martina.janke@laves.niedersachsen.de	Martina Janke, Werner von der Ohe, Peter Schreier, Till Beuerle	Germany
First molecular detection of honeybee diseases (viruses) in uganda: occurrence, prevalence and distribution patterns	KAJOBE Robert	kajobe@forest.mak.ac.ug	Gay Marris, Giles Budge, Lynn Laurenson	Uganda
Flight activity of bees infected by nosema ceranae by using radio frequency identification methodology	KRALJ Jasna	jasna.kralj@nib.si	Stefan Fuchs, Christof Schneider, Jürgen Tautz	Slovenia
Homology modeling and molecular dynamics study of a protease from paenibacillus larvae causing american foulbrood disease	KRONGDANG Sasiprapa Krongdang	panuwan@gmail.com	Vannajan Sanghiran Lee, Panuwan Chantawannakul	Thailand

Monitoring network of bee disorder in the rhône-alpes area	LEONCINI Isabelle	fabrice.allier @cnda.asso.fr		France
Potential of destruxins from metarrhizium anisopliae for the control of the honeybee parasitic mite varroa destructor	LODESANI Marco	cecilia.costa @entecra.it	Cecilia Costa, Chiara Dall'Asta, Gianni Galaverna	Italy
Influence of copper gluconate and amitraz on throw down varroa number in beehives	LOLIAE Bijana	b_lolic @yahoo.com	Prof. Dr. Mlađa Mlađenović, MSc Goran Mirjanec	Bosnia and Herzegovina
Assessment of potential harmfulness for honeybee (apis mellifica L) of preparations containing oxalic acid and citric acid as biologically active substances, used in poland for control of v. Destructor	LONDZIN Wiesław	wp.londzin @op.pl	Hanna Nowacka- Krukowska	Poland
Evaluation of secondary effects of some acaricides on apis mellifera intermissa (hymenoptera, apidae): acetylcholinesterase and glutathione s-transferase activities	LOUCIF-AYAD Wahida	wahloucif @yahoo.fr	Aribi N., Soltani N.	Algeria
Impact of some acaricides used against varroa destructor (mesostigmata: varroidae) on the physiology of apis mellifera intermissa (hymenoptera: apidae)	LOUCIF-AYAD Wahida	wided.84 @hotmail.fr	Bouchema W.F., Chaabane S., Benchaabane M., Aribi N., Chefrou A., Soltani N.	Algeria
Comparing two acute oral test methods to evaluate the toxicity of pesticides to bumblebees	LUO Shudong	shudongluo @126.com	Wenjun Peng, Jiandong An, Jilian Li, Jiaxing Huang, Jie Wu	China
Histopathological and ultrastructural analysis of the midgut and malpighi tubules of honeybee worker submitted to fipronil exposition	MALASPINA Osmar	elaine @ufscar.br	Daiane Jesus, Thaisa C. Roat, Roberta Nocelli, Elaine C. M. Silva-Zacarin	Brazil
Nosema ceranae impact on franche-comté (nord-east of france) bee hives during 2008	MALRAUX Jean-Baptiste	fabrice.allier @cnda.asso.fr		France
The influence of pesticides on honeybees	MARKOSYAN Albert	karen_avetisyan @mail.ru	Rafayel Harutyunyan, Dzanna Markosyan	Armenia
Influence of disinfectants on spores of the agent of american foul brood paenibacillus larvae, subsp. larvae and on adult bees	MASLIY Irina	matmas @ukr.net	Ludmila Stupak, Svitlana Neimkova	Ukraine
Ensuring bee products quality through an active supervision of the honeybee colonies and controlling the varroa disease with non-conventional products and technologies	MATEESCU Cristina	crismatapiter @hotmail.com	George Dobre	Romania
Developing a beauveria bassiana -based biopesticide against varroa mites: impacts on varroa and on honeybee colony health	MEIKLE William	william.meikle @ars.usda.gov	Guy Mercadier, Marie-Claude Bon, Fatima Guermeche, Vincent Girod, Niels Holst	USA
Levels of toxicity of some pesticides for honeybee	MELNYCHUK Sergiy	info @honeyua.com	Vitaliy Zhulai	Ukraine
Testing varroa mite levels by alcohol washing	MOAREFI Maryam	maryam.moarefi @kia.ac.ir	Hossein Yeganehrad	Iran
Evaluation of flumethrin residues in honey after an experimental apiary treatment	MOLINO Francisco	fmolino @unizar.es		Spain
Potential influence of habitat type and seasonal variations on prey spectrum of the invasive alien species vespa velutina var. Nigrothorax du buysson	MULLER Franck	fmuller @mnhn.fr	Quentin Rome, Adrien Perrard, Claire Villemant	France
Portuguese varroa populations highly tolerant to fluvalinate and amitraz are anthropogenic artifacts that pose no major direct biological threat to beekeeping	MURILHAS Antonio	murilhas @uevora.pt	Pires S, Maia M, Pereira O	Portugal
Honey bee pathogens and apicultural future of turkey	MUZ Mustafa	mustafamuz @gmail.com	Dilek Muz	Turkey
Rate of varroa infestation in the brood of overwintering honeybee colonies	NANETTI Antonio	andreabesana @conapi.it	Sergio Massi, Andrea M. Besana	Italy
Bees and varroa in a world of genomics: digging new tools for understanding host/parasite relationships	NAVAJAS Maria	navajas @supagro.inra.fr	Jean-François Martin, Cedric Alaux, Gene Robinson, Jay Evans, Yves Le Conte	France
A case of acute intoxication with thiametoxam in bees	NICA Daniela	nica.daniela @idah.ro	Elisabeta Bianu, Gabriela Chioveanu	Romania
Organic acids for the control of the development varroa destructor (anderson and trueman, 2000) population in honey bee colonies apis mellifera L.	NIEMKOVA Niemkova Svitlana	myza-64 @mail.ru	Masliy Irina	Ukraine
Climatic effects on honey bee health in turkey in between 2006 and 2008	ÖZKIRIM Asli	ozkirim @hacettepe.edu.tr	Nevryn Keskyn, Aygun Yalcinkaya	Turkey
An unusual occurrence of european foulbrood and disease control without antibiotics	PARVANOV Parvan	parvanp @yahoo.com	Nikolina Rusenova	Bulgaria

Evaluation the effectiveness of fumagillin and alternative therapies for the control of nosema ceranae	PERNAL Stephen F.	pernals @agr.gc.ca	Andony P. Melathopoulos	Canada
Honey bee poisoning incidents and maize production - background and facts	PISTORIUS Jens	jens.pistorius @jki.bund.de	Gabriela Bischoff, Udo Heimbach	Germany
Mass losses of bee colonies in poland (2007/2008) - the analysis of pathogens	POHORECKA Krystyna	krystyna.pohorecka @man.pulawy.pl	Andrzej Bober, Sylwia Kasprzak, Marta Skubida	Poland
COLOSS Working Group 1: Monitoring and Diagnosis	RITTER Wolfgang	ritter @beehealth.info	Yves Le Conte	Germany
Toxicological effects of sublethal doses of the insecticide fipronil on the nervous system of apis mellifera (hymenoptera, apidae)	ROAT Thaís Cristina	thaisaroat @yahoo.com.br	Tiago Favaro de Souza, Roberta. C. F. Nocelli, Elaine C. M Silva-Zacarin, Osmar Malaspina	Brazil
Relation between signs of american foulbrood (paenibacillus larvae) and the microbiological analysis of nurse bees and honey of the breeding area	RODRIGUEZ Graciela	graciela.rodriguez @gmail.com	Maria Alejandra Palacio, Soledad Garcia Paoloni, Anahi Tabera, Lionel Segui Goncalves, Enrique Schmidt	Argentina
Using Maximum Entropy (MAXENT) Models to Predict the Expansion of the Invasive Alien Species Vespa velutina var. nigrothorax, the Asian Hornet, in Europe	ROM Quentin	villeman @mnhn.fr	Gargominy O, Jiguet F., Muller F. J., Villemant C.	France
Morphometrical study of parasitic bee mite varroa destructor (acar: varroidae) in algeria	ROUBI Asma	roubiasma @yahoo.fr	Achou Mohamed, Bouchema Fella Wided	Algeria
Study of the causes of colony collapse disorder (ccd) in commercial spanish hives.	RUZ José María	zo3fepej @uco.es	José Manuel Fernández, Francisco Puerta	Spain
Principle of successful formic acid dispenser & treatment	RUZICKA Bill	billruzicka @mitgone.com		Canada
New economic method of american foulbrood detection	RYBA Stepan	beedol @beedol.cz	Pavel Kindermann, Dalibor Titera, Marcela Haklova, Pavel Stopka	Czech Republic
Essential oils from uruguayan native plants against varroa destructor (acar: varroidae). Chemical and bioactivity characterization.	SANTOS Estela, UMPIEREZ María	esantos @fcien.edu.uy	Andres Gonzalez, Yamandu Mendoza, Carmen Rossini	Uruguay
Effects of pesticides on flight behaviour and foraging activity of honey bees apis mellifera carnica	SCHNEIDER Christof	Christof.Schneider @bio.uni-frankfurt.de	Danilo Bevk, Jasna Krajc, Jürgen Tautz, Stefan Fuchs	Germany
Experimental results on the efficacy of some drugs used for alternative varroa treatment in pazin and rijeka (croatia) in 2007 and 2008	SEKULJA Damir	dsekulja @veteri.hr	Ibrahim Mujic	Croatia
Natural and chemical control of varroa destructor and tropilaelaps mercedesae in afganistan	SHAHROUZI Reza	rezashahrouzi @yahoo.com		Iran
Morphological alterations induced by fipronil in the midgut and malpighi tubules of worker honeybee larvae	SILVA-ZACARIN Elaine C. M.	elaine @ufscar.br	Aline S. Cruz, Roberta Nocelli, Thaís C. Roat, Osmar Malaspina	Brazil
Occurrence of honey bee (apis mellifera l.) Parasites acarapis woodi (rennie) and varroa destructor in the region of mugla, turkey	SIMSEK Duygu Simsek	dsimsek @hacettepe.edu.tr	Nevin Keskin	Turkey
Food processing hypopharyngeal glands as a model for screening the effects of the action of pesticides	SMODIS SKERL Maja Ivana	maja.smodis.skerl @kis.si	Aleš Grecorč	Slovenia
Efficacy of the thymol-based varroacide thymovar® in a multi-site trial in france during the end of summer and autumn 2007	SUARD Thierry	suard @biovet.ch	Benoît Siefert	Switzerland
Nosema disease treatment with „nozevit“— histology approach	TIK GAJGER Ivana	ivana.tik @vef.hr	Zvonimir Kozarić, Ljiljana Pinter, Zdravko Petrinec	Croatia
Nosema ceranae has been present in poland since at least 1995	TOPOLSKA Grazyna	grazyna_topolska @sggw.pl	Anna Gajda	Poland
Detection of viruses in tropilaelaps mites collected from european honeybee (apis mellifera) in thailand	TRIYASUT Prapun	panuwan @gmail.com	Kitiphong Khongphinitbunjong, Giles Budge, Mike Brown, Panuwan Chantawannakul	Thailand
Long-term preservation of coagglutination reaction components for diagnostics of bees infectious diseases	TSARUKYAN Roza	karen_avetisyan @mail.ru	Gayane Petrosyan	Armenia
Assessment of the honey bee colony losses in republic of macedonia for the winter season 2007/2008	UZUNOV Aleksandar	uzunov @zf.ukim.edu.mk	Hrisula Kiprijanovska, Sreten Andonov	Macedonia
Availability for veterinary medicines (vm) for bees in the eu	VANDAELE Bill	bill.vandaele @klifovet.com		Belgium
Bio-electronic terrain analysis in apiculture	VANHOOF Peter	pastrus @wp.pl		Poland

First experiment of organic and integrated pest management against varroa destructor in ischilín región (córdoba-argentina)*	VECA Mauro	ilmielediella @virgilio.it	Eduardo Cossutta	Italy
Strategic actions to make vigilance, diagnosis, and control stronger for american foulbrood disease in apis mellifera.	VERA Marcelo	alejandromoranv @gmail.com	Miguel Neira, Nimía Manquian, Claudia Dussaubat, Alejandro Moran	Chile
Species of chalkbrood (ascosphaera) competing within the honey bee host.	VOJVODIC Svjetlana	svo @life.ku.dk	Jensen, Annette Bruun	Denmark
Development of an attractant lure for monitoring of the small hive beetle, aethina tumida, to support contingency planning for invasive species in the uk	WAKEFIELD Maureen	m.wakefield @csl.gov.uk	Larissa Collins, Lisa Blackburn, James Mathers, Andrew Cuthbertson, Gay Marris, Mike Brown	United Kingdom
After colony losses in hatay and adana region of turkey the investigation of honey bee diseases	YALÇINKAYA Aygun	aygun @hacettepe.edu.tr	Nevyn Keskin, Asli Özkirim	Turkey
Passage of natural deformed wing virus sequence polymorphisms during different transmission routes between honeybees	YANEZ Orlando	oriandoyanez @gmail.com	Robert Paxton, Joachim de Miranda, Ingemar Fries	United Kingdom
The impact of nosema apis 2. Infestation of honey bee (apis mellifera l.) Colonies after using different treatment methods and their effects on the population levels of workers and honey production on consecutive years	YUCEL Banu	banu.yucel @ege.edu.tr	Muhsin Dogaroglu	Turkey
Specificity of the sex pheromone in varroa destructor	ZIEGELMANN Bettina	tinaz @uni-hohenheim.de	Peter Rosenkranz, Johannes Steidle, Anne Lindenmayer	Germany
Lead and cadmium pollution of honey: links with their environmental presence in romania	ZUGRAVU Corina-Aurelia	corinazugravu @gmix.net	Monica Parvu, Georgiana Nitu	Romania



BEEKEEPING FOR RURAL DEVELOPMENT COMMISSION

Economical study about bees in syria	ALATTAR Said	attarbassem @yahoo.com	Hicham Alrouz	Syria
Wild forest honey and indigenous peoples of palawan: the case of natripal wild honey enterprise	ALSA Loreta	natripal @yahoo.com	Mercedes Limsa	Philippines
Beekeepers categorization according different analysis of segmentation, real case of study, national beekeeping network (chile).	BAEZ Andrea	NMANQUIA @UACH.CL	Claudia Dussaubat, Miguel Neira, Nimía Manquian, Marcelo Vera	Chile
Physical, chemical, and melisopalínological characterization, from honeys of the atacama desert, chile	BAHAMONDE Patricia	lclasing @sumet.cl	Carolina Fuenzalida, Cristian Vásquez, Miguel Neira, Nimía Manquian, Marcelo Vera, Leticia Silvestre	Chile
Research activities apiarian at the department of livestock productions of the agronomic national institute in algers.	BERKANI Mohamed Laid	berkani_ml @yahoo.fr		Algeria
Difusión de la apicultura en medios sub urbanos y rurales	CASANOVA OSTOS Raul	rcasanov @gmail.com		Venezuela
Use of indicators of sustainability in beekeeping	DIAZ Rosana	rdiaz @mgap.gub.uy		Uruguay
The characterization of the honey from the flowers of the cashew (anacardium occidentale l.).	DO NASCIMENTO BENDINI Juliana	jbendini @yahoo.com.br	Darcet Costa Souza, Francisco de Assis Veloso Filho, Lídia Maria Ruv Carelli Barreto	Brazil
Algarrobo unifloral honey (prosopis spp.): first results of palynological, physico-chemical and sensorial characterization, in ischilín región (córdoba-argentina)*	FAGUNDEZ Guillemina	ilmielediella @virgilio.it	Mauro Veca, Eduardo Cossutta	Argentina
Apiculture in the future	FERNANDEZ Marcos Daniel	marcd73 @hotmail.com		Argentina
Recovery program of the canaries black bee in the island of la palma (canaries, spain)	GRACIA Anselmo	agracia @dpat.ulpgc.es	Fert Gilles, García Carmela, Rodríguez Sara, Cabrera Fernando, Batista Miguel, González Fernando	Spain
Sustainable management of stingless bees (meliponini) in the piaroa native indian community uothuja from paria grande, atures county, Amazonas state, venezuela	INFANTE Jesus	jinfante @inia.gob.ve	Erick Salas, Alfonzo Perez	Venezuela

Ethnobiological and ecological study of the black bee of the cévennes bred in hollow chestnut trunks. Conservation towards sustainable development	LEHEBEL-PERON Amline	edmond.dounias @ird.fr	Bertrand Schatz, Edmond Dounias	France
Modern hives are out of date in africa	LOWORE Janet	probynlowore @beesfordevelopment. org	Nicola Bradbear	United Kingdom
Program of technological transference and diffusion for beekeeping industry: bio-bio region, chile	LOYOLA VALENZUELA Rodrigo	rloyola @inia.cl	Marcos Gerding Paris, Marta Rodriguez Sanhueza	Chile
New approach to beekeeping sector of east herzegovina	MAKSIMOVIC Radivoje	radivojemaksimovic @yahoo.com		Bosnia- Hercegovina
New alternative of technical training for apiculture sector in chile and latin america: "good apicultural practices integrated to quality insurance norms"	MORAN Alejandro	alejandromoranv @gmail.com	Miguel Neira, Nimia Manquian, Marcelo Vera, Carolina Fuenzalida, Cristian Vasquez, Patricia Bahamonde	Chile
Strategic actions to strengthen apiculture along chile, trough integration between the universidad austral de chile and the national apiculture net.	NEIRA Miguel	lclasing @sumet.cl		Chile
Starting a beekeeping development project - a tool for decision making	PAM Gregory	g.marris @csl.gov.uk	Gay Marris	United Kingdom
Monitoring of cyanide acid content in honey produced by apis mellifera africanized culture in cassava (manihot esculenta crantz)	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Dalany Menezes Oliveira, Angela Kwiatkowski, Cassia Inês Lourenzi Franco Rosa, Edmar Clemente, Valter Eugenio Saia	Brazil
Beekeeping in sahel	PORPORATO Marco	marco.porporato @unito.it	Elisabetta Dosio	Italy
The apicultural activity in the bailique archipelago, amapa, amazonian, brazil.	ROSARIO Lucia Tereza	luciatereza @yahoo.com.br		Brazil
L'apiculture dans le developpement agricole, l'exemple de la region de rustaq en afghanistan	SHAHROUZI Reza	rezashahrouzi @yahoo.com		Iran
Regression methods for evaluating factors that determine beekeeping production	TASSINARI Wagner	lorenzoni_ufrj @yahoo.com.br	Maria Cristina Lorenzon, Eduardo Terra Peixoto	Brazil
Honey quality improvement project with the cooapis cooperative (cordoba-argentina)	VECA Mauro	ilmielediela @virgilio.it	Andrea Migliavacca, Diana Hubbard	Argentina
Mielcita, the little honey bee from ischilín	VECA Mauro	ilmielediela @virgilio.it	Davide Veca	Argentina

September, Saturday 19th

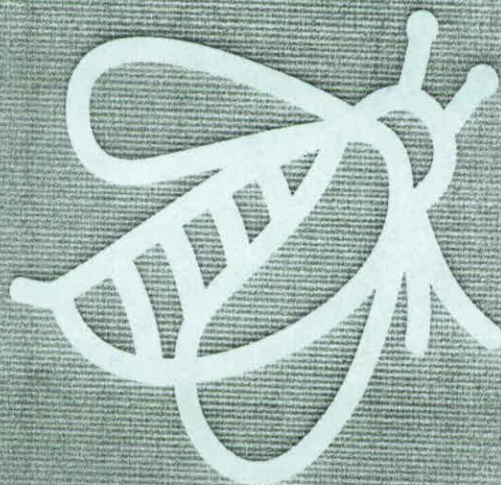
APITHERAPY COMMISSION

Synergistic effectiveness of the consumption of bee products infused with medicinal herbs and berries to promote proper function of the immune system.	ADZHIGIREY Galina	galina @beetechllc.com	Darya Adzhigirey	USA
Application of a gel fungicidal and propolis in the treatment of angular queilitis.	ARELLANO GAMEZ Leylan	leylan @ula.ve	Bustillos Lorena, Ana Adela Teran	Venezuela
Bees and the cosmos	BLAIS Monique	apicanada @gmail.com		France
Using tissue conditioner and propolis in the treatment of prosthetic stomatitis. Pilot study	BUSTILLOS Lorena	bustillo @ula.ve	Leylan Arellano, Teran Anadela	Venezuela
Bioactivities of thai propolis from trigona laeviceps stingless bees	CHANCHAO Chanpen	cchanchao @hotmail.com	Supawadee Umthong, Petladda Siripat, Songchan Puthong	Thailand
New insights into the composition of bee, wasp and ant venoms and how it can contribute to a better therapy of patients suffering sting allergy	DE GRAAF Dirk C	Dirk.deGraaf @UGent.be	Ellen Danneels, Marleen Brunain, Frans J. Jacobs	Belgium
Inhibitory effect of cerumen melipona genus on streptococcus mutans	DIAZ Nathalie	anajulia7 @yahoo.com	Laguado Paola, Premoli Gloria, Villarreal Juana, Gonzalez Anajulia, Perez Cesar	Venezuela
Antioxidant properties of dried bee pollen samples from selected plant species	FATRCOVA- SRAMKOVA Katarina	janka.nozkova @uniag.sk	Janka Nozkova, Magda Mariassyova, Miroslava Kacaniova, Daniel Biro, Maria Fil, Olga Grygorieva	Slovakia
The honey revolution - restoring the health of future generations	FESSENDEN Ronald	ron @worldclassempire. com	Mike McInnes, MRPS	USA
Antibacterial activity of bee pollen	GRIGORYAN Karina	foodlab @inbox.ru	Jan Brindza, Mariam Sargsyan, Lusine Hakobyan, Ignat Ter-Avetisyan	Armenia
Somatic cell count in milk of bee venom treated dairy cows with mastitis	HAN SangMi	sangmih @rda.go.kr	KwengGill Lee, JooHong Yeo, SonnOk Woo, HaeYong Kweon	Korea
Antioxidant activities of enzymatic hydrolysates from royal jelly	HU Fu-Liang	flhu @zju.edu.cn	Wen-Jing Ji, Fu-Liang HU	China
The effects of propolis on laser induced wounds	JANG-IN Shin	gudgai @paran.com	Jae-Wook Lee, Jin-Chul Ahn, Chung-Ku Rhee, Yong-kap Hur	Korea
What are the possibilities of propolis usage in modern domestic animals feeding protocols?	KLARIC Ivana	maja.miskulin @inet.hr	Zdenka Lalic, Andrija Lalic, Maja Miskulin	Hungary
Antifungal activity of the bee products against candida spp. And trichosporon spp.	KOC Nedret	silicis @erciyes.edu.tr	Sibel Silici, Filiz Kasap, Hömet Öz, Hikmet Mavus- Buldu, Barys Derya Ercal	Turkey
Biological activities of turkish propolis	KOCOGLU Elif	silicis @erciyes.edu.tr	Sibel SILICI	Turkey
The opportunity of per os administration of bee venom	KRYLOV V. N.	kfg @bio.unn.ru	L. V. Oshevsky, N. S. Fisenko	Russia
Burn disease apitherapy	KRYVLOV Vasily N.	kfg @bio.unn.ru	Svetlana Kopylova, Sergey Peretyagin	Russia
The bee venom as adaptogen to action of various doses of fractional gamma-irradiation	KRYVLOV Vasily N.	kfg @bio.unn.ru	A.S. Korjagin, E.A Yerofeeva	Russia
Antibacterial activity of honey from kenyan stingless bees and honeybees	MACHARIA J K	jmacharia86 @gmail.com	Gitonga L M, Raina S K, Koos Biesmeijer	Kenya
Development and physicochemical characterization of spray-dried propolis extract	MARQUIAFANEL Flávia	andresaberretta @hotmail.com	Andresa A. Berretta-Silva, Luis Alexandre P. de Freitas, Jairo Kenupp Bastos	Brazil
Antioxidant activity and constituents of ethanolic propolis extracts from romanian market	MATEESCU Cristina	crismatapiter @hotmail.com	Florentina Gatea, Alina Oana Danila, Gabriel Lucian Radu	Romania
Application perspectives of propolis in winemaking	MOLNAR Szabolcs	molnarszabolcs.hun @gmail.com	Sándor Rapi, Zoltán Murányi	Hungary
Applications of bee products in modern medicine	MÜNSTEDT Karsten	karsten.muenstedt @gyn.med.uni-giessen.de	Stefan Bogdanov	Germany

Bee venom compared with hyaluronic acid injections for the treatment of osteoarthritis of the knee in rabbits	NISBET H. Ozlem	onisbet @omu.edu.tr	Ahmet Ozak, Cenk Yardimci, Cevat Nisbet, Y. Sinan Sirin, Murat Yarim, I. Koray Bayrak	Turkey
Evaluation of the antibacterial activity of melipona honey and flavonoids isolated from melipona honey of yucatan	ORTIZ-VAZQUEZ Elizabeth	elyortiz2001 @yahoo.com.mx	David Chan-Rodriguez, Luis Cuevas-Glory, Jesus Ramon-Sierra, Jorge Lope-Ayora, Jose Martinez-Guevara	Mexico
Carcass characteristics of feedlot cattle fed with 50%:50% forage to concentrate ratios with addition of propolis based products -Ilos*	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Silvia Cristina de Aguiar, Lúcia Maria Zeoula, Ivanor Nunes do Prado, Selma Lucy Franco, Eduardo Marostegan de Paula, Jair Araújo Marques	Brazil
Crude protein effective degradability of some protein sources on bovines with daily dosages of monensin or propolis	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Lúcia Maria Zeoula, Daiane Terezan Lopes, Ricardo Kazama, Hanna Carla Cardoso Gomes, Roberta Alexandre de Oliveira, Selma Lucy Franco	Brazil
Digestibility and ruminal parameters of diet based in roughage with the addition of propolis and monensin sodium for steers	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Odimári Pricila Pires do Prado, Lúcia Maria Zeoula, Selma Lucy Franco, Hanna Carla Cardoso Gomes, Ricardo Kazama, Claudio Roberto Novello	Brazil
Influence of use of the product containing propolis s1491* base for the diet of rabbits: characteristics of resistance of leather	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Maria Luiza Rodrigues de Souza Franco, Alessandra Aparecida Silva, Marcellie do Prado, Selma Lucy Franco, Eliane Gasparino, Claudio Scapinello	Brazil
Isolation and expeditiously characterization morphology, biochemistry and kinetics of rumen bacteria tolerant to propolis - Ilos*	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Odimári Pricila Pires do Prado, Lúcia Maria Zeoula, Selma Lucy Franco, Sara, Barbosa de Paiva, Juliana Alves Resende, Pedro Braga Arcuri	Brazil
Occurrence of ectoparasites of tilapia-do-nilo (oreochromis niloticus) food with different levels of s1492* (product-based propolis)	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Juliana Minardi Gato, Melanie Digmayer, Lauro Vargas, Ricardo Pereira Ribeiro, Selma L. Franco, Cláudio R. Novello	Brazil
Performance of Nile tilapia (oreochromis niloticus) fed with different levels of s1491* based on propolis rations	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Maria Luiza Rodrigues de Souza, Rafael Seki Kioshima, Selma Lucy Franco, Cláudio Roberto Novello, Nilson P. Franco, Roberto Alvarez	Brazil
Powder pollen on the rabbit semen characteristics	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Priscila Ventura Loose, Cássia Maria de Paula Garcia, Gentil Vanini de Moraes1, Marcela Matavelli, Lidia Maria Ruy Carelli Barreto, Edney Magalhães	Brazil
Própolis (Ilos®) in replacement the sódica monensin in the performance of finished young bulls nelore in feedlot	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Fernando Zawadzki, Ivanor Nunes do Prado, Jair de Araújo Marques, Lúcia Maria Zeoula, Daniele Maggioni, Robério Rodrigues Silva	Brazil
The influence of product s1491* propolis on the basis of performance and carcass characteristics of New Zealand white rabbits	PERES DE MOURA PONTARA Lucimar	lucimarpontaraperes @gmail.com	Cláudio Scapinello, Alessandra Aparecida Silva, Selma Lucy Franco, Adalberto R. Lobo Junior, Vanderlei Bett, Roberto Alvarez	Brazil
Evaluation of the phenolic content, antiradical, antioxidant and antimicrobial activity of Turkish honeys	SAGDIC Osman	silicis @erciyes.edu.tr	Sibel Silici, Lütfiye Ekycy	Turkey
Propolis protects against oxidative stress in human saliva.	SANCHEZ Nuvia	anrod @ula.ve	Sonia Miranda, Patricia Vit, Antonio Jesús Rodríguez- Malaver	Venezuela
Determination of the total phenolic and flavonoid contents in stingless bee honey collected in the Yucatan peninsula, México	SANCHEZ-GARCIA Simón	esauri @itmerida.mx	Luis Cuevas-Glory, Elizabeth Ortiz, José Lira- Maas, Alma Centurión-Yah, Enrique Sauri-Duch	Mexico

The influence of propolis supplementation on performance, egg quality and serum variables of laying hens	SILICI Sibel	silicis@erciyes.edu.tr	Berrin Kocaoglu-guclu, Fatma Uyanik	Turkey
Bee venom reduce pro-inflammatory mediators in	SOO-JUNG Kim	kkpark@cu.ac.kr	Ji-Hyun Park, Kyung-Hyun Kim, Woo-Ram Lee, Sang-Mi Han, Kwan-Kyu Park	Korea
Classification of manuka honeys using phenolic compounds	SPEER Kar	stefanie.oelschlaegel@chemie.tu-dresden.de	Stefanie Oelschlaegel, Anne Kuehne, Isabelle Koelling-Speer	Germany
Phenolic contents and radical scavenging activities of rambutan and kapok honey	SRISAYAM Montra	panuwan@gmail.com	Panuwan Chantawannakul	Thailand
Effect of a dietary supplement containing brazilian propolis on the common cold and cellular immune parameter in winter season in japan	TAKAKI-DOI Shima	ay0518@yamada-bee.com	Kiyoshi Okihara, Akio Ohkuma, Mitsuhiro Kawaguchi, Tomoki Tatefuji, Ken Hashimoto	Japan
Antibiotic activity of colombian propolis and its correlation with the origin ecoregions	TALERO URREGO Cesar Augusto	catalerou@unal.edu.co	Judith Figueroa Ramirez	Columbia
Effects of propolis and aconite iodine on ulcer effect of post-insert prosthetic injuries	TERAN DE RINCON Ana Adela	anaadelat@gmail.com	Arellano Leylan, Bustillos Lorena	Venezuela
About conservation and packaging of propolis and pollen	TSARUKYAN Roza	karen_avetisyan@inbox.ru	Albert Markosyan, Vladimir Melikov	Armenia
Modification of synthetic polymeric surfaces with resins of natural origin (propoleo)	VELAZCO VILORIA Gladys Josefina	gvelazco@ula.ve	Reynaldo Ortiz, Leylan Arellano, Anajulia González, Lorena Bustillos	Venezuela
Effects of melittin on ethanol-induced hepatocyte apoptosis	WOO-RAM Lee	kkpark@cu.ac.kr	Ji-Hyun Park, Kyung-Hyun Kim, Soo-Jung Kim, Kwang-Gil Lee, Kwan-Kyu Park	Korea
Volatile constituents and antimicrobial activities of essential oil with different extraction methods from chinese propolis	XU Xiang	xuxiang5000@yahoo.com.cn	Liping Sun	China

Index



		Abstract number
ADZHIGIREY	Galina	188
ALAUX	Cédric	2;109
ALBURAKI	Mohamed	213
ALLIER	Fabrice	162
ALMEIDA-MURADIAN	Ligia Bicudo	44
AOSAN	Cristina	184
ARCA	Mariangela	134;136
ARUNDEL	Jonathan	55
ÅSEN	Eli	87
ATAURI	David	56
AVARGUES-WEBER	Aurore	62
BAIYA	Harun	200
BARRETO	Lidia	203;243
BARTOMEUS	Nacho	150
BEHRENS	Dieter	143
BENCSIK	Martin	33
BENDINI	Juliana	202
BENGSCHE	Eberhardt	76;199
BERA	Alexandre	239
BERETTA-SILVA	Andresa A.	187
BERGMAN	J David	126;128
BERNARO	Pierangelo	159
BIENKOWSKA	Malgorzata	226
BIESMEIJER	Koos	21
BILIKOVA	Katarina	74;139
BLACQUIERE	Tjeerd	17
BOECKING	Otto	24
BOGDANOV	Stefan	182
BONMATIN	Jean-Marc	167
BOUGA	Maria	221
BOYD	Barbara	197
BOZIC	Janko	36
BRADBERRY	Nicola	95
BRANKOVIC	Danijela	121
BRUNEAU	Etienne	51
BUCHLER	Ralph	112
CALDERON	Rafael	107
CARRECK	Norman L.	249
CASANOVA OSTOS	Raul Alberto	206
CAUIA	Eliza	231
CHAGNON	Madeleine	16
CHAUZAT	Marie-Pierre	15
CHEN	Yue-Wen	82
CHEN	Lihong	85;88
CHIFFLET	Rémy	175
CHISENGA	Kenneth	101
COBEY	Susan	113



COLIN	Marc-Edouard	246
CORNELISSEN	Bram	32
CRAILSHEIM	Karl	20;70
DAILLY	Hélène	238
DAINAT	Benjamin	8
DANIELE	Gaëlle	41
DE JONG	David	14
DE MIRANDA	Joachim R.	142
DESROCHERS	Anicet	223
DEVANESAN	Stephen	119
DEVANY	Liam	90
DIAO	Qingyun	37
DIETEMANN	Vincent	9
DIMOU	Maria	151
DOMEREGO	Roch	194
DORIN	Mindrescu	186
NNOMO DOUANLA	Roland	189
DU CHAXEL	Alain	209
DUKE	Colin C	79
DYER	Adrian	60
EDRICH	Wolfgang	105
EELES	Harriet	201
ELAMIN	E. M.	124
ELLIS	James	166
ESAIAS	Wayne	23
FLORES	Jose Manuel	108
FORSGREN	Eva	250
FREITAS	Breno	171
FREYTAG	Izabela	49
GALLMANN	Peter	241
GARNERY	Lionel	5;217
GAUTHIER	Laurent	165
GEMMILL-HERREN	Barbara	27
GIGIN	Murat	207
GIRARD	Mélissa	176
GONZALEZ-PORTO	Amelia V.	50
GRECO	Mark K	31
GREGORC	Aleš	232
GRÜNEWALD	Bernd	65
GÜLER	Ahmet	57
HADDAD	Nizar	13; 99; 132
HAKOBYAN	Norak	229
HECK	Thomas	233
HIGES	Mariano	18
HIGES	Mariano Pascual	164
HOURCADE	Benoît	68
HU	Fu-Liang	47
HUANG	Jiaxing	179



HUSSELMAN	Madeleen	103
HUTAGALUNG	James S	78
IFANTIDIS	Michael	135
IMPERATRIZ FONSECA	Vera Lucia	148
IVANOVA	Evgeniya	212
IVGIN TUNCA	Rahsan	214
JAFFÉ	Rodolpho	144
JAGANATHAN	Saravana Kumar	192
JANNONI-SEBASTIANINI	Riccardo	125
JEVTIC	Goran	228
JONES	Richard	198
JOSHI	Surendra Raj	98
JOSSERAND	Laurence	59
KANDEMIR	Irfan	216
KAWASAKI	Hiromu	196
KEFUSS	John	110
KEKECOGLU	M.	215
KENCE	Aykut	35
KHISMATULLIN	Rail	210
KHISMATULLINA	Nailya	193
KLINKE	Ina	67
KOZMUS	Peter	155
KRALJ	Jasna	6
KRIVOPALOV-MOSKVIN	Igor	181
KROPF	Urska	45
KRYGER	Per	219
KRYLOV	Vasily N.	71
LACKNER	Gottfried	147
LAMBERT	Olivier	26
LARTIGOU	Fabrice	53
LE CONTE	Yves	29;106;160
L'HOSTIS	Monique	158
LI	Jilian	39
LICHTENBERG-KRAAG	Birgit	234
LIU	Zhiguang	211
LORENZON	Maria Cristina	157;235
LOUBLIER	Yves	156
LOUIS	Thierry	66
MACHARIA	Joseph K	123
MADRID-JIMENEZ	Jesús	220
MAHER	Nevile	131
MAISONNASSE	Alban	3
MAJTAN	Juraj	75
MAORI	Eyal	251
MARDAN	Makhdzir	117
MARRIS	Gay	170
MARSIT	Nagi M.	195
MARTINEZ-ANZOLA	Telmo	204



MATSUKA	Mitsuo	94
MAURÍCIO FRANCOY	Tiago	34
MC MULLAN	John B.	244
MEDRZYCKI	Piotr	115
MEDZIHRADSKY	Zsófia	154
MENGASSINI	Andrea	152
MENZEL	Randolf	1
MERCER	Alison	63
MIRANDA	Sonia	81
MITEMBE	William	100
MIZUKAMI	Osamu	191
MOHD. YUSOFF	Kamaruddin	183
MOLITAS-COLTING	Lita	172
MORITZ	Robin F.A.	137
MONTENEGRO	Gloria	40
MULLER	Frank	129
MUTINELLI	Franco	12
NANDA	Vikas	46
NAGARAJA	Narayanappa	153
NEUMANN	Peter	161
OCHOLA	Simon Peter	122
ODOUX	Jean-François	4
OLDROYD	Benjamin	116
ORTEGON - SIERRA	Yair	174
OSBORNE	Juliet	61
OTIS	Gard W.	118
PAPACHRISTOFOROU	Alexandros	133
PASHCHENKO	Oleksiy	190
PAUMGARTEN	Fiona	102
PERCIE DU SERT	Patrice	73
PETTIS	Jeff	163
PHIPPS	Ronald	86
PICARD	Philippe	92
PICHICHERO	Elena	77
PLOTKIN	Marian	127
POLLARD	John	230
PRATHAPAN	K.	89
RANGEL	Juliana	7
REY	Francisco	91
RIBIERE	Magali	252
RICHARDSON	Jane	169
ROBERTS	Stuart	149
RODRIGUEZ	Marta S.	247
RONDELET	Yves	104
ROSENKRANZ	Peter	141
ROUBIK	David W.	25
ROY	Pratim	96
SALEH NEZHAD	Saleh	83



SANFORD	Malcom T.	114
SANPA	Sirikarn	253
SCHÄFER	Marc O.	248
SCHATZ	Bertrand	28
SCHEINER	Ricarda	69
SHAIBI	Taher	145
SHI	Wei	10
SHUMAKOVA	Iryna	177
SICEANU	Adrian	80
SIMUTH	Jozef	140
SKAREAS	Spyros	58
SOEKARTIKO	Bambang	52
SOERENSEN	Poul Erik	222
SOROKER	Victoria	19
SOSSA	Euloge	185
STRANGE	James	218
SU	Songkun	38
SUN	Liping	72;84
SUNAY	Asli Elif	54;208
SZCZÉSNA	Teresa	237
TAN	Ken	130
THRASYVOULOU	Andreas	245
TITERA	Dalibor	146
TOMAS-BARBERAN	Katarina	138
TSCHUENGUEM	Fernand	180
URLACHER	Elodie	64
UZUNOV	Aleksandar	111
VAISSIERE	Bernard	22
VALENTINUS	Heri	97
VALLON	Julien	30
VAN DER STEEN	Jozef	168
VAN ENGELSDORP	Dennis	11
VANDAME	Jérôme	120
VANDAME	Rémy	205
VENTURIERI	Giorgio	178
VERJUS	Olivier	227
VERMA	Laiq Ram	93
VIDAL	Maria	173
VIT	Patricia	236
VOGEL	Melanie	43
WAS	Ewa	48
ZAVALA	Angélica	242
ZHAO	Jing	240
ZHENG	Huo-Qing	225
ZHOU	Ting	254
ZULUAGA-DOMINGUEZ	Carlos Mario	42
ZVOKELJ	Lucija	224

