Action FA0803

8th COLOSS Conference / MC meeting FA0803

Halle-Saale, Germany, 1-3 September 2012

Martin-Luther-Universität Halle-Wittenberg
06099 Halle (Saale), Germany

Immediately prior to EurBee 5

Registration & reimbursement

- A registration fee of **20.- €** is required, and should be paid on site Saturday (1 September) between 18.30-19.00 or Sunday (2 September) between 8.00-8.30.
- Travel reimbursement is provided to attendees from COST countries that submitted an abstract.
- All abstract authors, except plenary and WG speakers, must provide a poster for the Sunday morning break. WG speakers will be contacted directly by WG chairs.

LOCAL ORGANIZER CONTACT FOR FURTHER INFORMATION

Prof. Dr. Hans-Hinrich Kaatz
Institut für Biologie/ Bereich Zoologie
Room 127b
Martin-Luther-Universität Halle-Wittenberg Hoher Weg 4
06099 Halle (Saale), Germany
Tel. 0049-345-5526395
Fax 0049-345-5527264
Mobile: 0049 179 205 96 48
email: kaatz@zoologie.uni-halle.de

CONTACTS FOR FURTHER INFORMATION ABOUT COLOSS

Dr. Aslı Özkırım
Hacettepe University
Dept. Biology
Bee Health Lab 06800
Beytepe/ANKARA/TURKEY
Tel: +90 312 297 80 43
Fax: +90 312 299 20 28
E-mail: ozkirim@hacettepe.edu.tr

Dr. Fani Hatjina
Hellenic Institute of Apiculture (N.AG.RE.F.)
63 200 N. Moudania, Greece
Tel: +30 23730 91297
Fax: +30 23730 91676
E-mail: fhatjina@instmelissocomias.gr
or fhatjina@yahoo.gr

CONTACTS FOR FURTHER INFORMATION ABOUT THE COLOSS *BEEBOOK*

Dr. Vincent Dietemann, Editor
Swiss Bee Research Centre,
Agroscope Liebefeld-Posieux Research Station ALP-Haras, Bern Switzerland
Email: vincent.dietemann@alp.admin.ch

Dr. Peter Neumann, Editor
Swiss Bee Research Centre,
Agroscope Liebefeld-Posieux Research Station ALP-Haras, Bern Switzerland
Email: peter.neumann@alp.admin.ch

Dr. Jamie Ellis, Editor
Honey Bee Research and Extension Laboratory, Department of Entomology and Nematology, University of Florida, Gainesville, Florida, United States
Email: jdellis@ufl.edu

Prepared by G. Williams, Swiss Bee Research Centre

Agenda

Saturday, 1 September 2012

Time	Activity	Location
18.30-19.00	Registration	Melanchthonianum, Lecture Hall G Universitätsplatz 8/9
19:00-20:30	Executive Committee meeting	

Sunday, 2 September 2012

Time	Activity	Location
8:00-8:30	Registration	Lecture Hall 22, Auditorium Maximum, Universitätsplatz 1
8:30-8:40	Welcome and organizational matters by H Kaatz & P Neumann	
8:40-9:00	"COLOSS overview" by P Neumann & G Williams	
9:00-9:30	"Bridging the Atlantic: Honeybees, politics and science" by J Pettis	
9.30-10.00	"US colony losses & mitigation management techniques" by D vanEngelsdorp	
10:00-11:30	Break (drinks & snacks) & poster session	
11.30-12.00	"The COLOSS *BEEBOOK*" by J Ellis & V Dietemann	
12:00-12:15	"COLOSS dissemination & publication of the COLOSS *BEEBOOK*" by N Carreck	
12:15-12:30	The EU Reference Laboratory by MP Chauzat	
12:30-14.30	Lunch	Restaurant "Zum Schad's" Kl. Klausstr. 3
14:30-16.30	Separate Work Group 1, 2, 3 & 4 meetings	Melanchthonianum Universitätsplatz 8/9
20:00-open	Social dinner	Restaurant 'Palais S' Ankerstr. 3c

Monday, 3 September 2012

Time	Activity	Location
9:00-9:05	Opening remarks by H Kaatz & P Neumann	Lecture Hall 22, Auditorium Maximum
9:05-10:00	WG1 overview by chairs & WG presentations (P. Neumann, S. Wilkins, H. Human, V. Soroker)	
10:00-11:00	WG2 overview by chairs & WG presentations (A. Jensen, E. Genersch, A. Özkirim, C. Dussaubat, E. Forsgren, M. Natsopoulou, N. Adjlane, V. Doublet)	
11:00-11:30	Break (drinks & snacks)	
11:30-12:30	WG3 overview by chairs & WG presentations (K. Crailsheim, R. Brodschneider, A. Gregorc, P. Medrzycki, S. van der Steen, T. Blacquière)	
12:30-13:30	WG4 overview by chairs & WG presentations (M. Meixner, C. Costa *et al.*)	
13:30-15.30	Lunch	Restaurant Hallesches Brauhaus Gr. Nikolaistr. 2
15.30-15.40	COLOSS awards	Lecture Hall 22, Auditorium Maximum
15:40-16:00	Future perspectives by P Neumann	
16.00-18.00	Management Committee Meeting & Final Scientific Report discussion	

Attendees

Name	Country
Adjlane, Noureddine	Algeria
Alaux, Cédric	France
Bienkowska, Malgorzata	Poland
Blacquière, Tjeerd	The Netherlands
Bouga, Maria	Greece
Brodschneider, Robert	Austria
Brusbardis, Valters	Latvia
Bubalo, Dragan	Croatia
Carreck, Norman	United Kingdom
Chantawannakul, Panuwan	Thailand
Chauzat, Marie-Pierre	France
Chejanovsky, Nor	Israel
Chlebo, Róbert	Slovakia
Costa, Cecilia	Italy
Crailsheim, Karl	Austria
Dahle, Bjørn	Norway
Dainat, Benjamin	Switzerland
Di Pasquale, Garance	France
Dietemann, Vincent	Switzerland
Doublet, Vincent	Germany
Dražić, Maja	Croatia
Dussaubat, Claudia	France
Ellis, Jamie	United States
Escobedo-Kenefic, Natalia	Guatemala
Fauser, Aline	Switzerland
Filipi, Janja	Croatia
Forsgren, Eva	Sweden
Forsi, Mohammad	Iran
Gajda, Anna	Poland
Genersch, Elke	Germany
Gómez-Moracho, Tamara	Spain
Gregorc, Aleš	Slovenia
Grzęda, Urszula	Poland
Güzerin, Elif	Turkey
Hassan, Adel Rushdy	Egypt
Hatjina, Fani	Greece
Human, Hannelie	South Africa
Ivanova, Evgeniya	Bulgaria
Janeš, Mateja	Croatia
Jensen, Annette	Denmark
Kaatz, Hannes	Germany
Kence, Aykut	Turkey
Kezić, Nikola	Croatia
Kristiansen, Preben	Sweden
Landaverde, Patricia	Germany
Laurino, Daniela	Italy
Le Conte, Yves	France
Lecocq, Antoine	Denmark
Manino, Aulo	Italy

Name	Country
McDonnell, Cynthia	France
McMahon, Dino	Germany
Medrzycki, Piotr	Italy
Mehmann, Marion	Switzerland
Meixner, Marina	Germany
Mladenović, Mića	Serbia
Murray, Tomás	Germany
Mutinelli, Franco	Italy
Nanetti, Antonio	Italy
Natsopoulou, Myrsini	Germany
Neumann, Peter	Switzerland
Novosel, Hrvoje	Croatia
Oskay, Devrim	Turkey
Özgör-Fouat, Erkay	Turkey
Özkirim, Asli	Turkey
Palacio, Maria Alejandra	Argentina
Paxton, Robert	Germany
Peng, Yan	Australia
Petrov, Plamen	Bulgaria
Pettis, Jeff	United States
Pirk, Christian	South Africa
Porporato, Marco	Italy
Rademacher, Eva	Germany
Rašić, Sladjan	Serbia
Rosenkranz, Peter	Germany
Ruiz, José Antonio	Spain
Santrac, Violeta	Bosnia/Hercegovina
Saša, Prđun	Croatia
Scheiner, Ricarda	Germany
Schneider, Saskia	Germany
Soroker, Victoria	Israel
Stanisavljević, Ljubiša	Serbia
Svečnjak, Lidija	Croatia
Tanner, Gina	Switzerland
Topolska, Grażyna	Poland
Tosi, Simone	Italy
Tran, Toan Van	Vietnam
Tritschler, Manuel	Germany
Uzunov, Aleksandar	Macedonia
Van der Steen, Sjef	The Netherlands
vanEngelsdorp, Dennis	United States
Vejsnæs, Flemming	Denmark
Wilde, Jerzy	Poland
Wilkins, Selwyn	United Kingdom
Williams, Geoff	Switzerland
Winiger, Pius	Switzerland
Yalçınkaya, Aygün	Turkey
Yañez, Orlando	Switzerland

Abstracts

Table of Contents

pg.

Plenary abstracts

Carreck, N.L. Disseminating the results of the COLOSS network. 9

Chauzat, M.P., Ribière-Chabert, M. The EU reference laboratory: its functions and its role in an EU wide surveillance programme 10

Ellis, J.D., Dietemann, V. The COLOSS *BEEBOOK*. 11

Neumann, P., Williams, G. The COLOSS Network: from beginning to present........ 12

Pettis, J. Bridging the Atlantic: honeybees, politics, and science 13

vanEngelsdorp, D., Petti, J., Rennich, K., Rose, R., Caron, D. Delaplane, K., Wilkes, J., Lengerich, E., Bayli, K., the Bee Informed Partnership. US colony losses & mitigation management techniques 14

Submitted abstracts

Adjlane, N., Kechih, S., Haddad, N., Doumandji, S. Survey of American foulbrood in honey bee colonies *Apis mellifera intermissa* in mid- northen region of Algeria (2010-2011)........ 15

Arslan, O.C., Kayım, M., Tozkar, C.Ö., Ünal, H., Giray, T., Kence, M., Kence, A. Effect of Imidacloprid and *Nosema ceranae* on the locomotor activity of honey bees 16

Balaguer, C., Jiménez, J.F., Corrales, I., Arguilés, M.A., Simó, E., Calatayud, F.Gutiérrez., M., Ruiz, J.A. Forapi Network: an opportunity to develop beekeeping in Spain and to prevent colony losses 17

Blacquière, T., Brodschneider, R. Cornelissen, B., Crailsheim, K., van Hoofwijk, H., Musters, K., Obregon-Arzaluz, V., Remkes, G., Vijver, M. Are honey bee development and physiological performance influenced by electromagnetic radiation? 18

Bogo, G., Medrzycki, P., Tosi, S. Comparison between two different sampling methods of forager bees 19

Brodschneider, R., Moosbeckhofer, R., Crailsheim, K. Highest level of winter colony losses in Austria over five years of monitoring reached in 2011/2012 20

Brusbardis, V. Impact of chemical treatments on population of *Varroa destructor* in *Apis mellifera* L. colony 21

Chlebo, R., Kopernicky, J. Update on bee colony losses, health status and bee diversity in Slovakia... 22

Chrobock, T., Winiger, P., Fischer, M., van Kleunen, M. The cobblers stick to their lasts: Pollinators prefer native over introduced plant species in a multi-species experiment........ 23

Costa, C., Büchler, R., Berg, S., Bienkowska, M., Bouga, M., Bubalo, D., Charistos, L., Le Conte, Y., Drazic, M., Dyrba, W., Filipi, J., Ivanova, E., Kezic, N., Kiprijanovska, H., Kokinis, M., Korpela, S., Kryger, P., Lodesani, M., Meixner, M., Panasiuk, B., Pechhacker, H., Petrov, P., Oliveri, E., Ruottinen, L., Uzunov, A., Vaccari, G., Wilde, J., Ntouras., V. Results of the Europe-wide genotype – environment interactions experiment 24

Dahle, B. Norwegian winter losses of honeybee colonies 2011-2012 26

Dainat, B., Neumann, P. DWV clinical symptoms as an in-built hive marker for predicting colony losses 27

Doublet, V., McMahon, D.P., Labarussias, M., de Miranda, J.R., Paxton, R.J. Interactions between pathogens and pesticides on honey bee health 28

Dussaubat, C., Higes, M., Sagastume, S., Gómez-Moracho, T., Botías, C., García-Palencia, P., Martín-Hernández, R., Le Conte, Y. Comparative study of artificial infections in the European honey bee with *Nosema ceranae* spores from two different geographic origins 29

Fauser-Misslin, A., Sandrock, C., Sadd, B., Brandenburg, J., Neumann, P. Investigation of traits shaping reproductive performance of bumblebee sexuals raised in a fully crossed ‘multiple drivers’ experiment 30

Forsgren, E., Fries, I. Temporal study of *Nosema* spp. in a cold climate 31

Gajda, A., Grzęda, U., Topolska, G. The fourth year of research on type C nosemosis course in Poland 32

Gregorc, A. Acute toxicity in honeybee colonies induced by coumaphos strips against *Varroa destructor* 33

Ivanova, E.N., Nikolova, S.R., Petrov, P.P. Genetic variability in a local Bulgarian honey bee population – allozyme and microsatellite DNA analysis 34

Jensen, A.B., Özkirim, A., Genersch, E. Status of and achievements through WG 2 “Pest and Pathogens” 35

Kristiansen, P. Survey on winter losses in Sweden 36

Krongdang, S., Chantawannakul, P., Nimmanpipug, P., Lee, S.V. Molecular modeling study on a metalloprotease from Paenibacillus larvae and its peptide based inhibitors 37

Landaverde, P., Escobedo, N., Calderón, C., Enríquez, E., Monroy, C. The incidence of three honey bee virus in collapsing colonies in Guatemala 38

Laurino, D., Manino, A., Patetta, A., Peraldo, N., Porporato M. Influence of honey bee origin on toxicity test results 39

Laurino, D., Manino, A., Porporato, M. Electronic scales: bee hive productivity and development 40

Lecocq, A., Luengo Hendriks, C.L., Locke, B., Terenius, O. Artificial Light Affects honey bee activity 41

Manino, A., Laurino, D., Patetta, A., Peraldo, N., Stillavato, A., Porporato, M. Morphometric variability of honey bee populations in northwestern Italy 42

Martín-Hernández, R., Gómez Moracho, T., Sánchez, C.G., Meana, A., Higes, M. COLOSS monitoring in Spain 43

McDonnell, C., Dussaubat, C., Le Conte, Y., Alaux, C. From gene to behaviour: impact of the microsporidian *Nosema ceranae* on bees 44

Medrzycki, P., Bogo, G., Tosi, S. A method for the selective collection of forager bees for toxicological research 45

Meixner, M., Charistos, L., Hatjina, F., Bouga, M., Kryger, P., Ivanova, E. Genetic variability of honey bee origins used in the GEI experiment: geometric morphometry analysis 46

Mutinelli, F., Barzon, L. Data and comments on the COLOSS questionnaire - Italy 2011 47

Nanetti, A., Baracani, G., Besana, A. Summer treatment against *Varroa* mites with oxalic acid on artificially broodless colonies 48

Natsopoulou, M.E., Paxton, R.J. Flight performance of honey bee drones in response to DWV load ... 49

Novosel, H., Janeš, M., Dražić, M., Filipi, J., Bubalo, D., Svečnjak, L., Prđun, S., Kezić, N. Genotype-Environmental Interactions on Island Unije 50

Oskay, D., Gürcan, E.K., Tuna, Y.T. The effective of Varroa (*Varroa destructor*) population level on wintering ability and survival rates of none-treated honeybee colonies in Trace region 51

Özkırım, A., Yalçınkaya, A., Güzerin, E., Özgör, E., Yılmaz, B. Winter losses of honey bees in Turkey and possible causes during the 2011-2012 period 52

Palacio, M.A., Figini, E., Lorenzo, A., Bacci, M., Basualdo, M., Fondevila,N., Bedascarrasbure, E. Colony losses in Argentina 53

Pirk, C.W.W., Strauss, U., Dietemann, V., Crewe, R., Human, H. Seasonal prevalence of *Varroa destructor* and viruses in the African honeybee (*Apis mellifera scutellata* Lepeletier) 54

Rašić, S., Stanisavljević, L., Mladenović., M. Using geometric morphometrics as discrimination method for selected lines of the carniolan honeybees (*Apis mellifera carnica*) in Serbia and Montenegro: the two years study 55

Santrac, V., Tomljanovic, Z., Gajger, I.T., Maksimovic, R. Colony losses and good veterinary practice in apiaries 56

Scheiner, R. Phototaxis in honey bees 57

Soroker, V., Slabezki, Y., Efrat, H., Avni, D., Kamer, J., Zeidman, I., Kelogin, A., Rene, S., Rivkin, H., Litovsky, A., Hezron, A., Yakobson, B., Voet, H., Chejanovsky, N. Colony losses and their potential causes in Israel an update 58

Tanner, G., Williams, G., Mehmann, M., Neumann, P. Comparison of mass versus individual inoculation of worker honey bees with *Nosema ceranae* 59

Tosi, S., Bogo, G., Medrzycki, P. Role of temperature on susceptibility of honey bee larvae and adults to pesticides 60

van der Steen, J., Cornelissen, B., Blacquière, T., van Dooremalen, C. Colony vitality, pollen supply and hibernation........ 61

Vejsnæs, F. Distribution of the most easy to recognize bee diseases in Denmark 2011........ 62

Wilkins, S., Budge, G., Brown, M., Pietravelle, S., Marris, G., NBU Inspectors. The National Bee Unit: Random apiary survey findings 64

Yañez, O., Zheng, H.Q., Hu, F.L., Neumann, P., Dietemann, V. Honeybee virus prevalence in single and mixed-species apiaries of Western and Eastern honeybees 65

PLENARY ABSTRACTS

Disseminating the results of the COLOSS network

Norman L. Carreck[1,2].

[1]International Bee Research Association, 16, North Road, Cardiff, CF10 3DY, UK.
[2]Department of Biological and Environmental Science, University of Sussex, Falmer, Brighton, East Sussex, BN1 9QG, UK.
Email: norman.carreck@btinternet.com
Telephone: +44 (0)1273 872587

The COLOSS Network was set up not to directly fund research, but to coordinate research efforts and importantly to facilitate the transfer of information. It has led to unprecedented cooperation between bee researchers throughout the world, and a number of methods for the dissemination of information have been used. These will be discussed from a journal editor's perspective. To date, the network has produced over 130 papers with more than one COLOSS member published in refereed scientific journals. COLOSS members greatly contributed to the Special Issue of the *Journal of Apicultural Research* on "Colony losses" published in January 2010, and as the first phase of the network reaches its conclusion, the major output will be the COLOSS "BEEBOOK: standard methodologies for *Apis mellifera* research", to be published at the end of this year. In 2013 there will be another Special Issue on the COLOSS "Genotype Environment Interactions experiment", and many individual papers.

The EU reference laboratory: its functions and its role in an EU wide surveillance programme

Marie-Pierre Chauzat, Magali Ribière-Chabert.

Anses

The European Commission designated the ANSES Sophia-Antipolis laboratory as the European Union Reference Laboratory for bee health by Regulation (EU) No. 87/2011 as from 1 April 2011.
In addition to its general functions and duties pursuant to Article 32(2) of Regulation (EC) No 882/2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules, the EU Reference Laboratory (EU RL) for honeybee health coordinates, in consultation with the Commission, the methods employed in the Member States for diagnosing the relevant bee diseases, *inter alia,* by typing, storing and, where appropriate, supplying strains of the pathogenic agents to facilitate the diagnostic service in the EU. These will be use for example for epidemiological follow-ups or verification of diagnosis. The EU RL will also supply standard material and other reference reagents to the National Reference Laboratories (NRLs) in order to standardise the tests used in each Member State. The EU RL will also retain expertise on the *Tropilaelaps* mites and the small hive beetle (*Aethina tumida*) and other pertinent pathogenic agents to enable rapid differential diagnosis.

The EU RL for bee health covers the main parasitic, bacterial and viral bee diseases, as well as the invasive species (insects and mites) threatening the honeybee population in Europe. The laboratory addresses the aspect of colony poisoning through research on the most dangerous pesticide residues for honeybees. The EU RL liaises with, the European Food Safety Authority, other laboratories, scientist and networks as appropriate to ensure the availability of best possible science on this area.
In 2009, the EFSA project entitled “Bee mortality and bee surveillance in Europe” highlighted the variety of factors involved in the decline of the honeybee population. The main conclusions from the project underlined the general weakness of most of the surveillance systems in the 24 European countries investigated; the lack of representative data at country level and comparable data at EU level for colony losses; the general lack of standardisation and harmonisation at EU level (systems, case definitions and data collected).

In 2011, the European Commission started to set up and co-finance a standardized and Europe wide voluntary surveillance programme to obtain reliable and accurate measure of honey bee colony losses and information on honey bee health. This program was based on the technical document ‘Basis for a pilot surveillance project on honey bee colony losses’ that the EU RL has elaborated as one of its priority missions. The surveillance procedure foresees to study randomly selected apiaries in order to quantify colony losses (both mortality and weakening) and to investigate the possible causes for such losses. Sampling methods will be consistently implemented in each of the 17 selected Member States in order to provide comparable data. Preparatory work and training for this project is already underway and visits to apiaries and sampling starts in September 2012.

The COLOSS *BEEBOOK*

Ellis J[1], Dietemann V[2,3]

[1]Department of Entomology and Nematology, University of Florida, Gainesville, USA
[2]Swiss Bee Research Centre, Federal Department of Economic Affairs EVD Research Station Agroscope Liebefeld-Posieux ALP, Bern, Switzerland
[3]Social Insect Research Group, Zoology and Entomology Department, University of Pretoria, Pretoria, South Africa

During their activities, COLOSS members recognised the need for research methods to be standardised to facilitate comparison of experimental results gathered from different countries. The COLOSS "*BEEBOOK*: standard methods for *Apis mellifera* research" will be the definitive, yet evolving, honey bee research manual, and will be composed of 25 peer-reviewed chapters authored by more than 170 of the world's leading honey bee experts. Chapters will describe methods for studying honey bee biology, methods for understanding honey bee pests and pathogens, and methods for breeding honey bees. It is expected to be completed by late 2012, and will be published both online as an Open Access Special Issue in the *Journal of Apicultural Research* and as a hard copy book for use at the laboratory bench. Due to the fast evolving field, it will be kept updated via an online tool and subsequent new editions. As we are nearing the publication date, we will give you an update on the content, progress and dissemination strategy of the manual.

The COLOSS Network: from beginning to present

Peter Neumann & Geoff Williams

Swiss Bee Research Centre, Federal Department of Economic Affairs EVD Research Station Agroscope Liebefeld-Posieux ALP, Bern, Switzerland; email: peter.neumann@alp.admin.ch

The research network COLOSS was established in late 2008 in response to increased honey bee colony losses experienced in many regions of the world. The purpose of the network is to promote collaboration among honey bee scientists, veterinarians, beekeepers, and other relevant stakeholders, with the main objectives of: 1) developing standards for monitoring & research on honey bee colony losses; 2) identifying factors & mechanisms responsible for colony losses; 3) explaining and preventing large scale colony losses; and 4) developing emergency measures & sustainable management strategies.

Expanding from its initial 72 members, the network has grown at a tremendous pace and now boasts a membership exceeding 300 from 58 countries worldwide. Engaged at numerous networking events across Europe (*i.e.*, over seven conferences, 30 workshops, 40 Short-term Scientific Missions, and one training school), COLOSS members (almost half are Early Stage Researchers) have successfully implemented an effective colony loss survey (*i.e.*, the COLOSS Questionnaire) that has been adopted by more than 20 countries globally, have nearly completed the COLOSS BEEBOOK, a seminal manual of standardized honey bee laboratory methods, as well as have coordinated multiple pan-European honey bee experiments.

Ultimately, COLOSS has enabled a deeper understanding of the causes of honey bee colony losses, and has laid a foundation for established and early stage researchers to continue honey bee studies for years to come.

Bridging the Atlantic: Honeybees Politics and Science

Jeff Pettis

USDA-ARS Bee Research Laboratory, Beltsville, MD 20705 USA

Pollinator decline has been headline news over the past 5-15 years. Managed honeybee colony losses are just one component of the larger issue of pollinator decline. All too often there has been competition between those working on native or wild pollinators and those working with managed pollinators, most often honeybees. This competition serves little purpose. When we all make the case that pollinator declines are real and that both the natural and agricultural ecosystems are threaten by these declines, we all benefit. The causes of declines in both managed and wild pollinators are in fact linked; broad factors such as habitat destruction and pesticide exposure are surely impacting all pollinators. We need to work together on pollinator issues if we are to change land use practices and pesticide exposure issues. In the US, The North American Pollinator Protection Campaign (NAPPC) and other groups work to protect and promote all pollinators. In Europe COLOSS works for honey bee issues but needs to further strengthen partnerships with other pollinator efforts by groups such as STEP, OECD and FAO in order to present a united front on the challenges that all pollinator face. In North America we will continue to work closely with COLOSS to harmonize data collection on honey bees and create common data bases that will serve to strengthen our message and put reliable data on colony losses in the hands of policy makers. Competition often arises because we compete for limited resources. We must realize that; together we provide a strong voice for conservation efforts in both agricultural and natural ecosystems. Examples of successful collaborative pollinator efforts across the Atlantic and beyond will be discussed.

Preliminary Results: Honey Bee Colony Losses in the U.S., winter 2011-2012

Dennis vanEngelsdorp[1], Jeffery Pettis[2], Karen Rennich[1], Robyn Rose[3], Dewey Caron[4], Keith S. Delaplane[5], James T. Wilkes[6], Eugene J. Lengerich[7], Kathy Baylis[8], and the Bee Informed Partnership.

[1]University of Maryland; dennis.vanengelsdorp@gmail.com 717-884-2147;
[2]USDA-ARS Bee Research Laboratory, Beltsville, MD
[3]USDA APHIS Plant Protection and Quarantine, Riverdale, MD 20737
[4]University of Oregon, Corvallis, OR
[5]University of Georgia, Athens , GA
[6]Appalachian State University, Boone, NC
[7]The Pennsylvania State University, Hershey, PA
[8]University of Illinois, Urbana-Champaign, IL

The Bee Informed Partnership (http://beeinformed.org), in collaboration with the Apiary Inspectors of America (AIA) and the United States Department of Agriculture (USDA) conducted an online survey to estimate honey bee colony losses for the 2011/2012 winter season. A total of 5,543 U.S. beekeepers responded, approximately 20% of the beekeepers in the United States. Collectively, responding beekeepers managed over 14.6% of the country's estimated 2.49 million colonies.

Preliminary survey results indicate that 21.9% of managed honey bee colonies in the United States were lost during the 2011/2012 winter. This represents a substantial improvement in mortality compared to the previous 5 years when losses of approximately 30% were recorded. Previous survey results found a 30% total colony loss in the winters of 2010/2011, 34% in 2009/2010, 29% in 2008/2009, 36% in 2007/2008, and 32% in 2006/2007.

On average, beekeepers lost 25.3% of the colonies in their operation. This is a 13.1 percentage point or 34.0% decrease in the average operational loss experienced by U.S. beekeepers during the winter of 2010/2011 when they reported an average loss of 38.4%. Almost half of responding beekeepers (46%) reported losses greater than 13.6%, the level of loss that beekeepers stated would be acceptable.
Colony Collapse Disorder (CCD) is a phenomenon in which the entire colony of bees abruptly disappears from its hive. Of beekeepers surveyed who reported losing colonies, 37% lost at least some of their colonies without the presence of dead bees. While we cannot confirm that these colonies had CCD, these respondents reported higher average colony losses (47%) than respondents who lost colonies but did not report the absence of dead bees (19%).

The winter of 2011-2012 was unseasonably warm with NOAA ranking January as the fourth warmest in U.S. history. This could have favorably impacted colony survival this past year.

The Bee Informed Partnership is funded by the National Institute of Food and Agriculture, USDA.

SUBMITTED ABSTRACTS

Survey of American foulbrood in honey bee colonies *Apis mellifera intermissa* in mid- northen region of Algeria (2010-2011)

ADJLANE Noureddine[1], KECHIH Saliha[2], HADDAD Nizar [3], DOUMANDJI Salah-eddine.[4] ,

[1]Département de Biologie, Faculté des Sciences, université de Boumerdès, adjlanenoureddine@hotmail.com
[2] Laboratoire de microbiologie, Laboratoire régional de la de médecine vétérinaire TiziOuzou Algérie
[3] National Center for Agriculture Research and Extension, Bee Research Unit.P.O . Box 639- Baq'a 19381. Jordan, drnizar@yahoo.com
[4] Ecole Nationale supérieure agronomique El Harrach, Algérie

In the beekeeping industry, the pathology of American foulbrood caused by the bacterium *Paenibacillus larvae i*s one of the most serious bacterial diseases of honeybee brood. Few data are currently available on the prevalence of this disease in Algeria. The present study provides an overview of the prevalence of the latter in the Mid-North. Samples of adult bees were collected from 65 apiaries. Detection of spore samples was performed using methods bacteriological, microscopic and biochemical. Spores of *Peanibacillus larvae* were detected in 23.5 % of the apiaries examined in 2010 and 30 % in 2011. The prevalence of the wreck is different from one region to another. Many factors can possibly explain this difference in the prevalence of the disease.

Effect of Imidacloprid and *Nosema ceranae* on the locomotor activity of honey bees

Okan Can Arslan[1], Mehmet Kayım[1], C. Özge Tozkar[1], Hüseyin Ünal[3], Tuğrul Giray[2], Meral Kence[1], Aykut Kence[1]

[1] Department of Biology, Middle East Technical University, Ankara, Turkey
[2] Department of Biology, University of Puerto Rico, Puerto Rico
[3] Pendik Veterinary Control and Research Institute, İstanbul, Turkey
Contact: Aykut Kence, aykut@metu.edu.tr, +90 312 2105176

The level of locomotor activity (LMA) of honey bees is an important sign of colony health. We have investigated the effect of imidacloprid and *Nosema apis* separately on the LMA of worker honey bees representing *A. m. anatoliaca* (2 ecotypes), *A. m. caucasica* and *A. m. carnica* races in Turkey. In order to quantify LMA, we used an activity monitoring system that can supply high resolution data (at 1 minute periodic intervals). For imidacloprid experiments, our purpose was to show the effect at low doses (5 ppb, 10 ppb and 50 ppb). Our results for imidacloprid indicate that LMA of honey bees is significantly reduced even at the lowest dose (5 ppb) applied. In addition, imidacloprid experiments also revealed the variation in the LMA of different races studied. According to the results of the *N. apis* experiments, throughout the 12 days post-infection, the mean activity of controls were significantly higher than the infected bees of the races in spring and fall period (except for Caucasian honey bees). The results of the hoarding cage trials showed that, dosing with *N. apis* spores significantly reduced the lifespan of bees for all races and ecotypes studied for spring and fall periods. Similar analyses on LMA of honey bees as a reaction to perizin and terramycin are also under way.

Forapi Network: an opportunity to develop beekeeping in Spain and to prevent colony losses

C. Balaguer[1], J.F. Jiménez[1], I. Corrales[2], M.A. Arguilés[3], E. Simó[4], F. Calatayud[4], M. Gutiérrez[5], J.A. Ruiz[5*]

[1]Instituto de Educación Secundaria "Galileo Galilei" de Córdoba.
[2]Escuela de Viticultura y Enología de Requena (Valencia).
[3]Centro de Formación del Medio Rural de Moraleja (Cáceres).
[4]APIADS (Agrupación de Def. Sanitaria Apícola de Cdad Valenciana).
[5*]Apoidea SL. (Biotecnological enterprise in Cordoba University).
E-mail: info@apoidea.es, Font del Riego, 38. 14009-Córdoba. (Spain), Tfs. 957-420633; 658-031243.

Forapi Network is an initiative from the project "Opportunities for Employment, Innovation and New Technology in Beekeeping Sector", funded by Ministry of Education for academic year 2011-2012. This project aims to initiate, develop and promote beekeeping training in three vocational centers: Secondary School "Galileo Galilei" in Cordoba, as coordinating center, School of Viticulture and Enology Requena (Valencia) and Center for Rural Training of Moraleja (Cáceres). Apoidea SL and APIADS have collaborated on technical assistance. This paper describes the rationale for the project, its main objectives and activities undertaken so far in order to create a network of centers in the national scene, which are engaged in teaching of beekeeping, research and demonstration of methods and practices that can foster the employability of qualified technicians.

Forapi Network can help to prevent colony losses through different manners.

Are honey bee development and physiological performance influenced by electromagnetic radiation?

Tjeerd Blacquière[1], Robert Brodschneider[2], Bram Cornelissen[1], Karl Crailsheim[2], Hugo van Hoofwijk[3], Kees Musters[4], Victor Obregon-Arzaluz[1], George Remkes[5], Martina Vijver[4]

[1]Bees@wur, Plant Research International, Wageningen University & Research, PO Box 69, 6700 AA Wageningen, The Netherlands
[2] Karl-Franzens-University Graz, Department of Zoology, Universitätsplatz 2, A-8010 Graz, Austria
[3]De Groene Link, Wageningen, The Netherlands
[4] University of Leiden, Center of Environmental Sciences, Einsteinweg 2, 2333 CC Leiden, The Netherlands
[5]NOVEC BV, Clarissenhof 1D, 4133 AB Vianen, The Netherlands
E-mail: tjeerd.blacquiere@wur.nl; Tel: +31 317 481 330

Among the suspected in the lost honey bee colonies mantra, Electromagnetic Fields (EMF) often figurate, but seldom pertain as a subject of study. A survey of the literature, of which very much is obscure and often suspect, showed that since early studies on the effects of steady EMF and on fields around high voltage power lines, not many convincing studies have been performed. In the meantime the presence and abundance of new EMF types have increased strongly worldwide, with the use of mobile phones, electronic devices and Wi-Fi. Effects can however not be ruled out, and many people are concerned about possible effects on bees as well as other organisms including man.

An experiment was conducted in 2011 in which honeybee colonies were subjected to the radiation of a nearby antenna, shielded (control) by placing in a Faraday cage, or exposed by placing in a comparable cage with plastic instead of metal netting. Field strengths inside and around the cages were registered and analysed.

Bee parameters measured were:

- the developmental success from egg to larva to adult bee,
- the flight performance of adult bees, developed from egg to pupation under EMF or as a control (without EMF, in Faraday cage),
- morphometric and physiological parameters (body weight and size, fluctuating asymmetry)
- the longevity of bees developed with or without EMF, by marking upon hatching and introduction in a host colony (not shielded),
- the development of the shielded and unshielded colonies, as well as winter survival

At this moment data collection has (almost) finished, but since the experiment has been carried out with a blind, and where possible double blind, set up, no information is as yet available about the results. We will however show the results of the experiment in September in Halle.

Comparison between two different sampling methods of forager bees

Gherardo Bogo, Piotr Medrzycki, Simone Tosi

Agricultural Research Council – Research Unit for Apiculture and Sericulture
Via di Saliceto 80, 40128 Bologna, Italy
tel. +39 051 353103 int. 420
fax. +39 051 356361
email: gbogo@inapicoltura.org

Previous studies demonstrated different susceptibility of hive bees and foraging bees to pesticides intoxication. Moreover, the guidelines for toxicity tests often require the use of foragers. With this study we wanted to compare a new method of forager collection that doesn't stress the family and prevent the collection of younger bees, against the classical sampling method, which consists in using a bottle at the hive entrance. We tested the susceptibility of bees obtained with the two methods to intoxication by thiamethoxam and fipronil, through acute oral intoxication tests, at two different temperatures. The parameter for comparison was the value of LD_{50} calculated at 24 and 48 hours.

Highest level of winter colony losses in Austria over five years of monitoring reached in 2011/2012

Robert Brodschneider[1*], Rudolf Moosbeckhofer[2], Karl Crailsheim[1]

[1]Department of Zoology, Karl-Franzens University Graz, Universitätsplatz 2, A-8010 Graz, Austria.
[2]Austrian Agency for Health and Food Safety, Department for Apiculture and Bee Protection, Spargelfeldstraße 191, A-1220 Vienna, Austria.
Robert.brodschneider@uni-graz.at

In Austria we now monitor winter losses of honey bee colonies the fifth consecutive year using the international COLOSS questionnaire. Previous winter losses were in a rather moderate range compared to other European countries (13.3, 9.3, 16.2 and 16.4%, from 2007/08 to 2010/11, respectively; n=311-575 beekeeping operations). The winter of 2011/2012 evoked reports of high losses in some parts of the country already in February. We took advantage of media attention and the increased awareness of beekeepers and could confirm unusual high losses by our multi-media survey (meetings, journal, internet). So far, 1256 beekeepers maintaining 27204 colonies before winter responded. Preliminary results suggest a total colony loss of 25.8% in Austria. Data collection and analysis of risk factors is still on-going. High response rates, in particular from the eastern regions of Austria, which were obtained by close cooperation with beekeeping organizations, allow analysis of winter colony losses on district level. This enables us to record the epidemiology of overwinter colony mortality on the most accurate scale so far. We found pronounced differences in colony losses among provinces and also neighboring districts. Relating colony losses not only to colony management risk factors, but also to geographic factors like land use or climate, needs careful consideration, because our previous results indicate a strong spatial fluctuation in colony losses among the years of monitoring.

Impact of chemical treatments on population of *Varroa destructor* in *Apis mellifera* L. colonies

Valters Brusbardis

Latvian Beekeepers Association
valters.brusbardis@gmail.com
Rigas iela 67, Jelgava, Latvia, LV-3004
+37126135748

Field experiment was carried out in Latvia with an aim to evaluate impact of chemicals used in Latvian bee-keeping on development of *V. destructor* population in a bee colony. In total 240 *Apis mellifera* L. bee colonies were subjected to diagnostics and scientific analysis. The research was carried out in 6 versions with 40 repetitions. In each of the versions bee colonies were treated by one of the following chemicals: 1. the vaporization of oxalic acid dihydrate by Varrox vaporizer; 2. the trickling of 3,2% oxalic acid solution; 3. formic acid (Muravinka); 4. thymol (Apiguard); 5. acrinathrin (Gabon PA); 6. flumethrin (Bayvarol). Bee colonies were treated with the chemicals once a year in autumn after the honey harvest was removed and bee colonies were prepared for the winter season. Other measures to curb the *V. destructor* population were not taken during the season. Diagnostics of *V. destructor* population in bee colonies was based on counting how many mites were encountered on every 100 worker bees (washing method).

Only Bayvarol and Gabon PA showed solid effectiveness in all repetitions and extinction of bee colonies were not observed in the next autumn after the treatment. Efficiency of Apiguard, oxalic acid trickling and oxalic acid vaporization treatments were not fully efective. Despite the fact that in some colonies we found good efficiency we also experienced colonies which perished because of too high population of mite. Muravinka is not effective in Latvia's conditions for the late autumn treatment. Already in the next autumn after the treatment bee colonies perished due to the high levels of *V. destructor* population.

Diagnostic results of washing method revealed that efficiency of autumn treatment can be judged during the season by analyzing the group of bee colonies (≥10). If the action to curb *V. destructor* population in bee colonies was not taken in spring and summer, then survival of the group until the chemical treatment in the next autumn was observed in those cases where in Latvia's conditions in early May the number of mites on 100 worker bees were $\bar{x} \leq 0{,}2$ (in >80% of bee colonies the presence of mites were not observed), in middle of July the number was $\bar{x} \leq 5$ and in late August/early September it was $\bar{x} \leq 8$.

Update on bee colony losses, health status and bee diversity in Slovakia

Robert Chlebo and Jan Kopernicky

Slovak University of Agriculture in Nitra, Tr. A. Hlinku 2, 949 76 Nitra, Slovakia,
robert.chlebo@uniag.sk, +421 37 6414318

On the territory of Slovakia, around 250,000 honey bee colonies mainly of the Carniolan race of Carpathian and Alpine ecotypes are kept by more than 15 500 beekeepers (year 2011).
Honeybee colonies winter losses during last 3 years were relatively small, up to 8%, no CCD symptomes has occured. The main reasons of these losses are *Varroa* overpopulation or colony starvation, influence of other pathogens is monitored. Few losses of overwintered colonies are caused by pesticides or bears.

For *Varroa* control administration of formic or oxalic acid has been only method used during honey-flowing season, this year also thymol products were allowed for use. The other treatment methods used after last honey harvest include fumigation (amitraz) or contact applications (fluvalinate). Last season's aerosol winter treatment of colonies is promoted among beekeepers to eliminate *varroa* in broodless colonies which seems to be very efficient measure to eliminate winter colony losses. Aerosol applicators are used to apply amitraz into hives when outside temperatures reaches from +10 to -5°C.
Annually around 100 outbreaks of American foulbrood appears, chalkbrood, nosematosis (*Nosema ceranae* has been detected as well) and viral diseases (sacbrood, DWV, ABPV, SBV, KBV) causing also problems to some beekeepers. Main bee predators are wax moth, ants, mouse and bears.
Breeding of Carnica queens is actually performed in 5 breeding and in 52 reproduction stations (apiaries). Morphometrics methods are used to verify subspecies purity, molecular and genetic methods for discrimination of ecotypes have recently begun to be used. First results of the project to discriminate bee population in Slovakia using mtDNA analysis and characterisation of haplotypes will be reported.

The cobblers stick to their lasts: Pollinators prefer native over introduced plant species in a multi-species experiment

Thomas Chrobock[1, °], Pius Winiger[1, *], Markus Fischer[1,2] and Mark van Kleunen[3]

[1]University of Bern; [2]Botanical Garden of the University of Bern; [3]University of Konstanz;
° Current address: thomas.chrobock@ips.unibe.ch, Carl Zeiss Naturzentrum Amrum, Strunwai 31, D - 25946 Norddorf auf Amrum;
* Corresponding author: pius.winiger@alp.admin.ch; Federal Department of Economic Affairs FDEA, Agroscope Liebefeld-Posieux, Research Station ALP, CH-3003 Bern; 0041 76 574 29 83

Flowering plants, in particular angiosperms, and insects are two relevant taxa that prevail the biotic world on Earth’s land surface. The majority of angiosperms largely rely on animals, rather than on abiotic agents such as wind or water. Here we investigated pollinator visitation in artificial (i.e., gardens) and semi-natural habitats to better understand possible effects of pollinator visitation on spread of invasive angiosperm species from human-assisted occurrence in gardens to more natural habitats. Using 17 plant species from five families, we artificially placed one native, non-invasive, and invasive plant species in artificial and semi-natural habitats (i.e., three plants per habitat). In general, pollinator visitation was significant higher for native compared to the alien plant species, but did not differ between introduced invasive and introduced non-invasive plant species. Moreover, pollinator visitation was on average higher in semi-natural than in artificial garden habitats. These data suggest that once introduced species have escaped from gardens into more natural habitats, pollinator limitation will not be a major barrier to establishment and invasion.

Results of the Europe-wide genotype – environment interactions experiment

Cecilia Costa*[1], Ralph Büchler[2], Stefan Berg[3]; Malgorzata Bienkowska[4], Maria Bouga[5], Dragan Bubalo[6], Leonidas Charistos[7], Yves Le Conte[8], Maja Drazic[9], Winfried Dyrba[10], Janja Fillipi[11], Evgeniya Ivanova[12], Nikola Kezic[6], Hrisula Kiprijanovska[13], Michalis Kokinis[14], Seppo Korpela[15], Per Kryger[16], Marco Lodesani[1], Marina Meixner[2], Beata Panasiuk[4], Hermann Pechhacker[17], Plamen Petrov[18], Eugenia Oliveri[19], Lauri Ruottinen[15], Aleksandar Uzunov[13], Giacomo Vaccari[1], Jerzy Wilde[20], Vasileios Ntouras[21]

1) CRA-API, Bee and Silkworm Research Unit, Via di Saliceto 80, 40128 Bologna, Italy
2) LLH, Bee Institute, Erlenstrasse 9, 35274 Kirchhain, Germany
3) Bayerische Landesanstalt für Weinbau und Gartenbau, Bee Division, An der Steige 15, 97209 Veitshöchheim, Germany
4) Research Institute of Horticulture, Apiculture Division, 24-100 Pulawy, Poland
5) Agricultural University of Athens, Laboratory of Agricultural Zoology and Entomology, 75 Iera Odos St., Athens 11855 Greece
6) Faculty of Agriculture, University of Zagreb, Svetosimunska 25, 10000 Zagreb, Croatia
7) Hellenic Institute of Apiculture (N.AG.RE.F.), N. Moudania, Greece
8) INRA, UMR 406 Abeilles et Environnement, Laboratoire Biologie et Protection de l'abeille, Site Agroparc, Avignon, France
9) Croatian Agricultural Agency, Ilica 101, 10000 Zagreb, Croatia
10) Bee breeding centre Bantin, Dorfstrasse 50, 19246 Bantin, Germany
11) The University of Applied Sciences "Marko Marulic" in Knin, Knin, Croatia
12) Department of Developmental Biology, University of Plovdiv, Bulgaria
13) Faculty for Agricultural Science and Food, bul. Aleksandar Makedonski b.b., 1000 Skopje, Republic of Macedonia
14) Veterinary Centre of Vasilika, Region of Central Macedonia, Greece
15) MTT, Agrifood research Finland, 31600 Jokioinen, Finland
16) University of Aarhus, DJF, Research Centre Flakkebjerg, 4200 Slagelse, Denmark
17) Austrian Carnica Association, Sulzbach 1, 3293 Lunz am See, Austria
18) Agricultural University of Plovdiv, 12, Mendeleev Str, Plovdiv 4000, Bulgaria
19) University of Palermo, Department of Agro-Environmental Systems, Viale delle Scienze, Edificio 4, 90128 Palermo, Italy
20) Apiculture Division, Warmia and Mazury University, Sloneczna 48, 10-710 Olsztyn, Poland
21) Federation of Greek Beekeepers Associations, Kuma 4, 41 222 Larisa, Greece
* cecilia.costa@entecra.it +39 051 353103

The results of the Europe-wide genotype – environment interactions experiment conducted by members of Working group 4 (Diversity and Vitality) will be presented. A total of 621 honey bee colonies, representing 18 different genotypes, were comparatively tested in 16 apiaries across Europe. The colonies were kept without any chemical treatments against *Varroa destructor* and other diseases. Colony and queen survival were registered continuously, besides bee population development, productivity, feed balance, swarming, gentleness, hygienic behaviour and the infestation with Varroa, Nosema and viruses.

The tested genotypes differed in colony development, survival, and in traditional traits such as honey productivity, gentleness and swarming tendency. The latter can at least partially be explained as a consequence of different breeding intensity for these traditional selection characters. However, it is important to note that even for these traits highly significant genotype – environment interactions were observed.

A high relevance of interactions between honeybee genotypes and different environmental conditions within Europe was observed, showing that the genetic adaption of honey bees to a specific environment influences its population dynamics, health status, productivity, and most importantly, colony survival.

Our results highlight the importance of conservation of European honey bee diversity and show that local breeding activities should be encouraged.

Norwegian winter losses of honeybee colonies 2011-2012

Bjørn Dahle

Norwegian Beekeepers Association, Dyrskuev. 20, NO 2040 Kløfta. Norway & Norwegian School of Veterinary Science, email: bjorn.dahle@norbi.no, phone: +47 63942083

So far winter losses of honeybee colonies in Norway have been low compared to most other European countries. For the winter 2011-2012, 346 beekeepers (about 12% of the beekeeper population) answered the COLOSS questionnaire that was available at the Norwegian Beekeepers Association's home page. These 346 beekeepers wintered 10 545 colonies which represents about 20-25% of the honeybee colonies. In the period October 1. 2011 – May 1. 2012, 5.2% of these colonies were lost. The winter 2011-2012 was warmer than normal and this might have contributed to the low winter losses.

DWV clinical symptoms as an in-built hive marker for predicting colony losses

Benjamin Dainat,[a,b*] and Peter Neumann[a],[c]

[a]Swiss Bee Research Centre, Agroscope Liebefeld-Posieux Research Station ALP, Bern, Switzerland;
[b]USDA-ARS Bee Research Laboratory, Beltsville, Maryland, USA;
[c]Department of Zoology and Entomology, Rhodes University, Grahamstown, South Africa
*Corresponding author: benjamin.dainat@gmail.com, Tel: +41313238201, Fax: +413132382 27

Considerable losses of managed honeybee, *Apis mellifera*, have been recently repeatedly reported worldwide. Honeybees have to face numerous threats including parasites. There is a growing consensus that parasites can interact with each other's or with other factors thus facilitating the collapse of the colonies. The ectoparasitic mite *Varroa destructor* interact with deformed wings virus (DWV) acting as a biological vector. Face at the complexity of virus analysis a cheap, easy, accurate and rapid tool is needed to estimate impact of these two factor on colony health. Here we evaluated if the obvious clinical symptoms of DWV, wing deformities, can be used as a biomarker for predicting colony collapse the following winter. In a survey study in 2007/2008 dead-bees trap were placed in N = 29 queenright colonies of *A. m. carnica* and workers exhibiting wing deformities were counted. The results show that i) colonies which collapsed during winter had significantly higher number of workers with wings deformities than those which survived ii) the correlation between *V. destructor* infestation levels and the number of workers displaying wing deformities was significantly positive. A logistic regression model suggests that number of workers with wing deformities, colony size and *V. destructor* infestation levels constitute predictive markers for winter colony losses. The results of this study is further supporting the mite's impact on virus infections at the colony level, and suggests that it is possible to develop effective tools for extension specialists.

Interactions between pathogens and pesticides on honey bee health

Vincent Doublet[1]*, Dino P. McMahon[1], Maureen Labarussias[1], Joachim R. de Miranda[2], Robert J. Paxton[1]

[1] Institute for Biology, Martin-Luther-University Halle-Wittenberg, Hoher Weg 8, 06120 Halle (Saale), Germany
[2] Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden
*email: vincent.doublet@zoologie.uni-halle.de

Many drivers of honey bee decline have been identified, but no single factor seems to be the main one explaining colony losses. In recent studies, focus has been placed on the interactions among several honey bee diseases, and particularly on the interaction between the microsporidian *Nosema* spp. and sublethal doses of pesticides. Our research on honey bees aims to test how interactions among pathogens and pesticides affect individual bees, both on adult (cages experiment) and larvae stages (*in vitro* rearing). We use the microsporidian *Nosema ceranae*, two common viruses (black queen cell virus and deformed wing virus) and two widely used pesticides (thiacloprid, τ-fluvalinate), that we feed or inject into bees in sub-lethal doses. Different responses to these multiple infections are recorded as honey bee mortality and response of the bees' immune system, as well as the changes in infection course of pathogens when pesticides are applied.

Comparative study of artificial infections in the european honey bee with *Nosema ceranae* spores from two different geographic origins

Claudia Dussaubat[1*], Mariano Higes[2], Soledad Sagastume[2], Tamara Gómez-Moracho[2], Cristina Botías[2], Pilar García-Palencia[3], Raquel Martín-Hernández[2], Yves Le Conte[1]

[1]INRA, UMR Abeilles et Environnement, Laboratoire Biologie et Protection de l'abeille, Site Agroparc, 84914 Avignon, France
[2]Bee Pathology Laboratory, Centro Apícola Regional, JCCM, 19180 Marchamalo, Spain
[3]Veterinary Faculty, Universidad Complutense de Madrid, 28040 Madrid, Spain

*INRA UMR Abeilles et Environnement, Site Agroparc, 84914 Avignon, France, Email: cdussaubat@avignon.inra.fr, Phone : +33 (0) 4 32 72 26 19

The microsporidia *Nosema ceranae* is an obligate intracellular parasite that develops in the midgut epithelium of the honey bee. Since 2005, when it was first isolated from the European honey bee, it has been the focus of an increasing number of laboratory assays to study its impact on honey bee health. Interestingly, the effects of *N. ceranae* differ between countries and laboratories, making comparisons of results difficult. Consequently, we carried out artificial infections of honey bees with two groups of *N. ceranae* spores, each one from a different geographical origin (South of France and Central Spain). We characterize genetically both *Nosema* isolates and performed artificial infections to evaluate the development of infection. Preliminary results show that infection development was similar between both infected groups but differed significantly from controls. We discuss different factors that can influence *N. ceranae* effects on the honey bee.

Investigation of traits shaping reproductive performance of bumblebee sexuals raised in a fully crossed 'multiple drivers' experiment

Fauser-Misslin A[1], Sandrock C[1], Sadd B[2], Brandenburg J[1], Neumann P[1]

[1]Swiss Bee Research Centre, Research Station ALP – Haras, CH-3003 Bern, Switzerland; 2. ETH Zürich, Ecology & Evolution, ETH-Centre NW, CHN–8092 Zürich, Switzerland

In social insects fitness largely depends on the reproductive performance of male and female sexual. Limitations of reproductive capacities may be caused by environmental effects, including parasites, pesticides and/or interactions amongst them. Mitigating recent pollinator declines therefore calls for an assessment of such suspected drivers with detrimental effects on reproductive success.
Here, the effects of sublethal exposure to systemic neonicotinoids and the gut parasite *Crithidia bombi* on sperm quantity and viability were studied in male bumblebees, *Bombus terrestris*. Similarly, the ability to store sperm in the spermatheca was investigated in mated, post-hibernated queens deriving from this fully crossed experimental design. The data suggests that sublethal pesticide exposure and *C. bombi* infections in combination reduce the number of sperm in the accessory testes, but do not alter their viability. No significant effects on sperm viability and quantity in the accessory testes were observed in the other treatment groups. Likewise, no significant effects were found on sperm viability in the gynes' spermatheca. Worker offspring reared in a neonicotinoid and/or *C. bombi* environment exhibited no significant differences in marginal wings size compared to controls, which was also the case for males and gynes across different treatments. This indicates that sublethal exposure to neonicotinoids alone or in combination with *C. bombi* infections had no apparent effects on the evaluated traits under the chosen experimental conditions.

Temporal study of *Nosema* spp. in a cold climate

Eva Forsgren, Ingemar Fries

Department of Ecology, Swedish University of Agricultural Sciences, P.O. Box 7044, SE-750 07 Uppsala, Sweden

In a nationwide Swedish survey, 967 honey bee colonies from 521 beekeepers were sampled in the spring of 2007 and the samples assayed for *Nosema* spp. infections. Of the 319 positive samples, only 32 samples contained a proportion of *N. ceranae* DNA in mixed infections with both *Nosema* spp above the cut-off point chosen for comparisons of 1 %. Only one pure *N. ceranae* infection was found, with the rest 284 infected samples being pure *N. apis* infections. In 2009 and 2011, beekeepers or bee inspectors providing *N. ceranae* mixed positive bee samples in 2007 were again asked to submit samples (2009, N=96; 2011, N=83). No trend of an increased proportion of *N. ceranae* infected samples could be found. The proportion of *N. ceranae* DNA in samples with mixed infection did not increase between 2007 and 2011. In some cases (N=10) it was possible to monitor samples from the same beekeepers over the whole period (2007, 2009 and 2011). At the last sampling occasion, *N. ceranae* could not be detected in any of these apiaries. It is concluded that *N. apis* is still the dominating Microsporidia infection in honey bees in Sweden and that there is no tendency for *N. ceranae* replacing the *N. apis*.

The fourth year of research on type C nosemosis course in Poland

Anna Gajda, Urszula Grzęda, Grażyna Topolska

Warsaw University of Life Sciences, Faculty of Veterinary Medicine, Ciszewskiego 8, 02-786 Warsaw, Poland, anna_gajda@sggw.pl

Observation of type C nosemosis course is ongoing at WULS experimental apiary since 2007, when we first confirmed pure Nosema ceranae infection of our colonies. The colonies are still alive and the infection is still pure. We are also examining bees from two other apiaries with mixed Nosema (apis +ceranae) infections. We examine all the colonies for Nosema species (using common PCR); we also determine spore counts and the percentage of infected bees (light microscopy). The examination of dead winter bees (collected from bottom boards at the end of each winter, starting 2009/2010) from one of the outside apiaries shows that, in over 38 % of the colonies during each following winter, the level of infection kept decreasing from winter to winter. Also in over 38% of the colonies, in which, during the winter of 2010/2011, the level of infection first increased (comparing to the winter of 2009/2010), it decreased significantly during the winter of 2011/2012. In over 15 % of the colonies we observed an increase in the level of infection during the winter of 2011/2012. Almost 8% of colonies freed themselves of Nosema after the winter of 2009/2010 and stayed uninfected for the two following winters. During the summer of 2009, from all infected colonies (in both outside apiaries), over 94% had mixed infections (N. apis+ N. ceranae). Of the 94%, in 2010, 52% were found to be infected with N. ceranae only. In 2011, 42% of them stayed infected with pure N. ceranae and over 47% became uninfected. Only 8% of the colonies initially uninfected, stayed clear of nosemosis during all the following seasons.

Acute toxicity in honeybee colonies induced by coumaphos strips against *Varroa destructor*

Aleš Gregorc

Agricultural Institute of Slovenia, Hacquetova 17, 1001 Ljubljana, Slovenia Tel.: +386 -1- 28 05150, Ales.gregorc@kis.si

In an apiary with national back load hives with *Apis mellifera carnica* colonies, problems with adult bee mortality after the insertion of coumaphos strips were observed. Each treated colony had ten national standard AŽ frames and an average of 7 (± 2) sealed brood, larvae and eggs in the brood compartment. Approximately 55000 bees were estimated in each hive. Colonies in the apiary have never been treated with coumaphos before. The current treatment was performed by beekeeper with the insertion of two CheckMite+ strips in between two brood frames in each colony. Strips were inserted in mid day August 2, with outside temperature 29 ^{0}C. Four hours after coumaphos strips insertion, un-normal worker bee behavior was observed. Bees started to leave the hives, flew extensively around the hives, clustered on the front hive wall and dropped down in the grass in front of the hives. Workers also gathered there in smaller clusters with 10 to 40 bees and were dying in the surrounding of the treated hives with extended wings, and curved, shortened and tremored abdomens. Bees were also clustering on the back hive walls in the inner side of the hives. Dead workers were sampled from the bottom board in the brood compartment, live workers were sampled from the honey comb from upper honey compartment and the third group of workers was collected while crawling on the grass in front of the hives. Quantification of coumaphos was conducted using gas chromatography- electron capture detection (GC-ECD). The limit of quantification (LOQ) was 30 ppb. Coumaphos quantities in workers sampled in hive’s brood compartment, honey compartment, and in front of the hives were 1771, 606 and 514 µg/kg respectively. Workers from untreated colonies were coumaphos negative. The treated colony populations were reduced by approximately one third of their previous adult bee population. The toxic diet for bees determined for coumaphos in Perizin (LD50) is approximately 80 times less concentrated than the coumaphos concentration found in sampled dead bees from brood compartment. Pesticide dose inserted into the hives accompanied with other potential factors such as high ambient temperature, potential secondary pathogens, induced stresses can interact and induce toxic effect in honeybee colonies immediately after coumaphos insertion.

Genetic variability in a local Bulgarian honey bee population – allozyme and microsatellite DNA analysis

Evgeniya N. Ivanova[1*], Stanimila R. Nikolova[1], Plamen P. Petrov[2]

[1]Plovdiv University "Paisii Hilendarski" Biological Faculty
[2]Agricultural University – Plovdiv
*Department of Developmental Biology, 24, Tsar Assen Str. Plovdiv 4000 Bulgaria
geneiv@uni-plovdiv.bg, tel. +359 32 261 549; +359 898 749133

Local Bulgarian honey bee *Apis mellifera rodopica* from selective center -Plovdiv has been studied for genetic variability using analysis of six enzymic systems (MDH, ME, EST, ALP, PGM and HK) corresponding to six loci (Mdh 1, Me, Est 3, Alp, Pgm and Hk) and DNA analysis of 9 microsatellite loci (Ac011; A024; A043; A088; Ap226; Ap238; Ap243; Ap249 and Ap256). All of the studied loci were found to be polymorphic. Two to five alleles were detected with the allozymic analys: two alleles – at Mdh-1 and Pgm loci; three alleles – at Me, Alp and Hk loci. Est-3 locus was polymorphic with five alleles. It was calculated that the average number of alleles per locus is 3; the percent of polymorphic loci (P=0.95) is 83.3 and the observed and expected heterozygosity – 0.24 and 0.259, respectively. Three to seven alleles were detected using microsatelite DNA analys: three alleles – at Ap243 and Ap249 loci; four alleles – at Ac011, A043, A088, Ap226 and Ap238; six alleles – at A024 and seven alleles – at Ap256. It was found that the observed heterozygosity varies between 0.444 and 0.567 and the expected heterozygosity – between 0.435 and 0.548. This research provides new information regarding the genetic variability in selected local Bulgarian honey bees and will be useful for selection and conservation purposes.

Status of and achievements through WG 2 "Pest and Pathogens"

Annette Bruun Jensen[1], Asli Özkirim[2], Elke Genersch[3*]

By now it is a widely accepted view that honeybee pests and pathogens play a key role in colony losses. Therefore, when we want to prevent colony losses we first need to understand pathogen-honeybee interactions and then we need to use this understanding for increasing honey bee health and well-being. Hence, one of the prime goals of our COLOSS working group 2 has been to bring together researchers from all over the world who are working in the field of bee pathology in order to increase the available knowledge related to all aspects of honey bee pests and pathogens. We installed new and fruitful collaborations in both (i) applied research and (ii) basic research and provided new insights to the relation between various pests / pathogens and the individual honey bee or the honey bee colony thereby furthering our understanding of the how and why of colony losses. In the forthcoming meeting we will shortly present the outcomes of our workshops and STSMs. We will also present scientific breakthroughs and progress which contributed to an increased understanding of bee diseases and related colony losses and helped us to achieve our goal 'Improved basic knowledge on bee pests and pathogens to improve our understanding of the complex phenomenon of pest- and pathogen-associated colony losses'.

Survey on winter losses in Sweden

Preben Kristiansen

Swedish Beekeepers Association, Trumpetarev. 5, 590 19 Mantorp, Sweden.
Phone: +46 142 48 20 07, E-mail: preben.kristiansen@biodlarna.se

The estimated number of beekeepers in Sweden is about 12000 with approximately 120000 colonies. Each year since 1920 beekeepers have sent in reports about their beekeeping to the Swedish Beekeepers Association. The reports include information about e.g. the number of hives, the honey yield and the losses. According to these reports the average yearly losses 1920-2011 was around 12,9 %, varying between 6 and 22 %.

Since 2009 we have carried out web based surveys on winter losses. The questionnaires we have used have been based on questionnaires developed by WG1 within the COLOSS network. The winter losses according to theses surveys have been the following: 2008/2009: 17,5 % (n=7354); 2009/2010: 24,7 % (n=13598); 2010/2011: 14,5 % (n=11700); 2011/2012: 11,9 % (25108).

The losses have generally been higher in the areas of Sweden where Varroa is present compared to areas without Varroa. Inadequate Varroa control appears to be one of the main reasons for colony losses in Sweden. But our data show that even other factors play a role, e.g. timing of wintering and amount of food.

In addition to the web based survey we have conducted a survey on overwintering among 1200 randomly selected beekeepers.

Data from the web based surveys, from the survey among the randomly selected beekeepers as well as results from surveys on pathogens will be presented.

Molecular modeling study on a metalloprotease from *Paenibacillus larvae* and its peptide based inhibitors

Krongdang, S.[1,2], Chantawannakul. P.[2,3]*, Nimmanpipug, P.[1,4] and Lee, S. V. [1,4]

[1]Department of Chemistry and Center for Innovation in Chemistry, Faculty of Science, Chiang Mai University, Chiang Mai, 50200, Thailand.
[2]Bee protection center, Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand.
[3]Matererials Science Research Center, Faculty of Science, Chiang Mai University, Chiang Mai, 50200, Thailand.
[4]Thailand Center of Excellence in Physics, Commission Higher on Education, 328 Sri Ayutthaya Road, Bangkok, 10400, Thailand.
E-mail address: panuwan@gmail.com, Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand 50200. Tel: +66 53 943346

The metalloproteases from *Paenibacillus larvae* have been described as an important virulence factor for American foulbrood disease. The three dimensional structure of a metalloprotease from *P. larvae* was generated by using computational modeling method and also validated by molecular simulation with AMBER 09. The 3D structure of the metalloprotease showed a similar structure to the known metalloprotease, Thermolysin. Hexapeptides were also chosen to form a binding complex with the metalloprotease. The C and N terminal of hexapeptide sequences were tagged with hydroxamic acid and hydrazide analogues, which have been reported to be potent and specific inhibitors for thermolysin, a closely related enzyme. These functional groups had a positive effect in improving potency and stabilizing the enzyme-inhibitor binding complex. This could be a novel inhibitor for *P. larvae* metalloprotease.

The incidence of three honey bee virus in collapsing colonies in Guatemala.

Patricia Landaverde[1,2], Natalia Escobedo*[2], Claudia Calderón[1], Eunice Enríquez[2] and Carlota Monroy[1].

1Laboratorio de Entomología Aplicada y Parasitología –LENAP- Escuela de Biología, Facultad de Ciencias Químicas y Farmacia, Universidad de San Carlos de Guatemala.
2Unidad de Investigación para el Conocimiento, Uso y Valoración de la Biodiversidad. Departamento de Estudios y planificación-DEyP. Centro de Estudios Conservacionistas. CECON, Facultad de Ciencias Químicas y Farmacia. Universidad de San Carlos de Guatemala.
rihannon52@yahoo.com, escobedo.natalia@usac.edu.gt

The decline in honey bee populations occurring worldwide has been reported in Guatemala since 1992, mainly in the southwest of the country. Due to the difficulty in determining the true causes of bee loss in hives, it was hypothesized that the responsible factors could be bee virus infections. Bees were collected in apiaries in southwestern Guatemala during thirteen months. We detected three viruses out of four tested: Acute Bee paralysis virus (ABPV), Black Queen Cell Virus (BQCV) and Deformed wing virus (DWV). Kashmir virus (KBV) was not detected. No correlation was observed between *Varroa* infestation and decline in bee populations, or between the use of acaricides and the loss of bees. In 2005, during the period of field work, Hurricane Stan afflicted the area, apparently causing a decline in bee populations in all the apiaries studied. However, we recommend the assessment of apiary management, floral resource supply, weather conditions, and the study of other viruses and parasites, in order to gather more information to infer on the causes of bee hive loss in Guatemala.

Influence of honey bee origin on toxicity test results

Laurino D, Manino A, Patetta A, Peraldo N, Porporato M

Università di Torino
marco.porporato@unito.it
via Leonardo da Vinci 44, I-10095 Grugliasco TO, Italy
+390116708584

Toxicity tests on honey bees performed by different laboratories often yield substantially different values; on such occasions, a different genetic response to the active substances (a.s.) is sometimes advocated to explain such uneven results. Therefore, toxicity effects of the neonicotinoid insecticides Clothianidin, Imidacloprid, and Thiametoxam were tested in the laboratory on worker honey bees (*Apis mellifera*) taken from nine hives: one of *A. m. mellifera* from South-East France, two of *A. m. carnica* from Croatia and belonging to the same strain, and six of *A. m. ligustica* from Piedmont (Italy) and belonging to three different strains. Oral and indirect contact trials were carried out for each pesticide, using commercial formulations; the acute oral toxicity (AOT) LD_{50} and the acute indirect contact toxicity (ICT) LC_{50} were calculated.

Mean AOT DL_{50} at 24, 48, and 72 hours from the test start were of the same order of magnitude of those reported in the literature for all three a.s., but some statistically significative differences emerged within the tested hives: five pairwise comparisons for Clothianidin; between four *A. m. ligustica* hives and the *A. m. mellifera* hive for Imidacloprid; between the two *A. m. carnica* hives and the *A. m. mellifera* hive, three *A. m. ligustica* and the two *A. m. carnica* hives, one *A. m. ligustica* and the *A. m. mellifera* hive for Thiametoxam. Although ICT LC_{50} was obtained for a reduced number of hives only, statistically significative differences were observed in a single pairwise comparison for Imidacloprid and in two for Thiametoxam. The results tend to point out that some genetic differences in the response to the pesticide's toxic action exist in the honey bee, but other factors should be involved to explain the inequality of toxicity data in the literature.

Electronic scales: bee hive productivity and development

Laurino D, Manino A, Porporato M

Università di Torino
daniela.laurino@unito.it
via Leonardo da Vinci 44, I-10095 Grugliasco TO, Italy
+390116708586

Hive productivity and development heavily depend on environment, climatic conditions, and nectar and pollen resources. Among the various tools available for the beekeepers to know family trends and honey flow periods, the daily weighing of some of the apiary hives has long been recommended, especially in out apiaries, but is limited to a few research institutes.

In the apiary of the University of Turin, Faculty of Agriculture, three high-precision electronic scales have set up; they are certified under the OIML standard R76-1 and equipped with a data collection system on MMC memory cards that allow to record continuously the weight of each hive every 10 minutes. The data are periodically downloaded to a PC and can be processed to highlight the trend over time in order to relate it with colony development, which is independently determined by periodic evaluations of the comb surface occupied by adult bees, brood and stores, and with the performance of the main flowering honey plants in the area around the apiary.
During two years of continuous measurements, since spring 2010, it was possible to verify the complete scale reliability and the respondence of changes in weight, both in the short and long-term, with colony development throughout different seasons and under other circumstances, and with surplus honey production.

The adoption of electronic scales for continuous weighing of the hives by beekeepers may improve apiary management optimizing the yields.

Artificial Light Affects Honey bee Activity

Antoine Lecocq[1]*, Luengo Hendriks Cris L. [2], Locke Barbara[3], Terenius Olle[4]

[1]Institute of Agriculture and Ecology, Københavns Universitet, Thorvaldsensvej 40, 1871 Frederiksberg C, Denmark, antoine@life.ku.dk, +4581503509
[2]Centre for Image Analysis, Swedish University of Agricultural Sciences, Uppsala, Sweden
[3]Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden
[4]Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden

To determine whether artificial light has an impact on honey bee activity, we exposed bees in an observation hive to invisible infra-red and visible white light, perceived by the bees as darkness and light respectively. Each time the perceived light intensity changed from dark to light, a sudden increase in bee activity was observed. This increased activity, which appeared to be a 'nervousness' or 'runniness' behavior, lasted for less than a minute before returning to normal levels. During exposure of low intensity light followed by high-intensity light, sudden increased bee activity was again seen at every shift. The duration of the increased activity was shorter during the second time phase indicating possible habituation in response by the bees after the first light intensity stimulus. The data suggests that observation hive experiments can be conducted in white light but that caution should be taken to record behavior during the initial period of light exposure.

Morphometric variability of honey bee populations in northwestern Italy

Manino A, Laurino D, Patetta A, Peraldo N, Stillavato A, Porporato M.

Università di Torino
aulo.manino@unito.it
via Leonardo da Vinci 44, I-10095 Grugliasco TO, Italy
+390116708669

Apis mellifera ligustica is widespread throughout the continental part of Italy where it shows some variability and hybridizes in the Alps with the nearby subspecies *A. m. mellifera* in the West and *A. m. carnica* in the East. In recent years, the honey bee population in Italy suffered severe losses and many colonies were replaced with bees obtained from commercial queen producers who were based in different regions of Italy or abroad; these events, along with long-range migratory beekeeping and the partiality of many professional beekeepers for alien subspecies, may have had an impact on the characteristics of the honey bees in Italy.

Therefore a survey has been undertaken in order to determine the extent of morphological variability among honey bee colonies living in North-Western Italy and to gain some indications on the degree of *A. m. ligustica* hybridization with other subspecies in the area. To this end, worker bee samples were taken from local and reference hives and the relative position of 19 wing landmarks was determined and elaborated by means of the DataBees 2.0 software so as to obtain 17 vein angles, 7 lengths, 5 indexes and one area.

Multivariate analysis of preliminary results showed that honey bee populations in northwestern Italy still belong basically to *A. m. ligustica*, but some *A. m. carnica* introgressions of anthropogenic origin have occurred; in any case further investigations are needed to better understand their extension and their impact on native *A. m. ligustica* populations. On the contrary, the natural hybrid zone between *A. m. mellifera* and *A. m. ligustica* remained substantially unchanged.

COLOSS monitoring in Spain

Martín-Hernández Raquel, Gómez Moracho Tamara, Sánchez Collado Germán, Meana Aránzazu, Higes Mariano

Centro Apícola Regional (CAR), Camino de San Martín s/n, 19180 Spain, rmhernandez@jccm.es

As in the last 3 years, COLOSS Questionnaires have been disseminated in Spain in 2012. Due to the low participation registered in the previous years and following the guidelines agreed during the COLOSS Working Group 1 Workshop (York 2012), we focused on a smaller region of Spain.

We sent the questionnaire to the 1735 beekeepers registered in Castilla –La Mancha (Central Spain) to their postal address to be filled it our by themselves. At the moment of writing this abstract, a hundred of beekeepers had remitted the filled out questionnaire to our Beekeeping Center (CAR, Marchamalo, Spain). Although participation again was low, it was over the 6%. The number of honey bee colonies managed by beekeepers answering the questionnaire was 13,122 with an average of 130 colonies per beekeeper. The mean percentage of losses was around the 18% and the 54% of them were lost without bees inside the colony.

The most of beekeepers declared that colonies reared the queen by their own and they rarely buy bees to other countries. As well, the most of them declared to perform at least one varroa treatment per year (more frequently two per year) and the 3% do not declared any treatment.
Honeydew use to be present at the colonies during overwintering period and the main flowers declared to be foraged were bee-pastures. In the same way than in previous years, pollination services were not frequently used and transhumance for pollination services was linked to professional beekeepers usually with more than 300 colonies.

From gene to behaviour: impact of the microsporidian *Nosema ceranae* on bees

Cynthia McDonnell, Claudia Dussaubat, Yves Le Conte, Cédric Alaux

INRA, UR 406 Abeilles et Environnement, Site Agroparc, 84914 Avignon, France, Tel : (33) (0)4 32 72 26 18, email: cedric.alaux@avignon.inra.fr

In honey bees, nosemosis is a major disease affecting adults and caused by the proliferation of *Nosema* spores in midgut epithelial cells. Recently, *Nosema ceranae*, originally parasitizing the Asian honey bee (*Apis cerana*), has also been found to naturally infect the European honey bee (*A. mellifera*) and is associated with colony losses across the world. However, besides reducing the lifespan of bees, the pathology caused by this microsporidian remains largely unknown. We therefore performed an extensive characterization of *N. ceranae* pathology from gene to behaviour.

We showed, at the immunity level, that neither the haemocyte number nor the phenoloxidase activity was affected by *N. ceranae* in our experimental conditions. However, the spore proliferation inhibits the transcription of genes in the midgut involved in cell signalling and tissue integrity and induces oxidative stress. We then analysed the consequences of those physiological modifications on behavioural interactions but did not see any agonistic behaviour toward infected bees, indicating that *Nosema*-parasitized bees are not evicted by nestmates. In conclusion, *N. ceranae* can provide important insight into honey bee/microsporidian interactions.

A method for the selective collection of forager bees for toxicological research

Piotr Medrzycki, Gherardo Bogo, Simone Tosi

Agricultural Research Council – Research Unit for Apiculture and Sericulture
Via di Saliceto 80, 40128 Bologna, Italy, tel. +39 051 353103 int. 420, fax. +39 051 356361, piotr.medrzycki@entecra.it

Common guidelines for the evaluation of side effects of plant protection products on honey bees describe the procedures to be respected during the toxicological tests. These methods often require the utilisation of forager bees. However the guidelines do not contain specific indications concerning the methods to obtain this category of bees. With the commonly applied method (bee collection on the flying board) often a mix of foragers and hive bees are collected.

In this study a new bee trap, which enables collection only of exiting foragers is presented. The trap doesn't disturb the hive so no guard bees nor other hive bees are collected.

This method may prove a useful tool to facilitate the standardisation in toxicological studies.

Genetic variability of honey bee origins used in the GEI experiment: geometric morphometry analysis

Meixner Marina[1], Leonidas Charistos[2], Fani Hatjina[2] , Bouga Maria [3], Kryger Per[4], Evgeniya Ivanova[5]

[1]LLH Bieneninstitut Kirchhain, Erlenstr. 9, 35274 Kirchhain, Germany, Tel: +49 (0)6422 940639 / Fax: +49 (0)6422 940633, E-mail: marina.meixner@llh.hessen.de
[2]Hellenic Institute of Apiculture (Hellenic Agriculture Org. "DEMETER"), N. Moudania, Greece
[3]Lab of Agricultural Zoology & Entomology, Agricultural University of Athens, Greece
[4]University of Aarhus, PBS-DJF, Research Centre Flakkebjerg, Denmark
[5]Department of Developmental Biology, University of Plovdiv, Bulgaria

One of the main goals of COLOSS WG 4 is to establish a common protocol for the discrimination of honey bee populations. In Europe, different methods are used to determine the subspecies origin of honey bees. In WG4, different methods have been applied to analyze samples of the colonies that are part of the common GEI experiment; data obtained by geometric morphometric analysis will be combined with the results from microsatellite, mtDNA, isoenzymic and classical morphometric analyses.

These data will contribute to the documentation of the genetic origin of each colony involved in the common experiment and to the establishment of a published and accessible reference database that will be of value to scientists and apiculturists working in the field of European honey bee biodiversity and conservation. The geometric morphometric approach, using the coordinates of 19 landmarks located at vein intersections has been conducted on GEI samples. Principal Component Analysis and Procrustes analysis were applied in order to discriminate the samples studied.

Data and comments on the COLOSS questionnaire - Italy 2011

Franco Mutinelli, Luciana Barzon

Istituto Zooprofilattico Sperimentale delle Venezie, Viale dell'Università, 10, 35020 Legnaro (PD), Tel.: + 39 049 8084287, e-mail: fmutinelli@izsvenezie.it

A summary of the data (2010/11) collected through the COLOSS questionnaire circulated in Italy in 2011 is provided. The number of returned questionnaires was 274, originating mainly from northern Italy: Veneto region = 149 (54%), Emilia Romagna = 56 (20%), Trentino Alto Adige = 57 (21%), others =12 (5%). In the Summer period 2010 (1 April-1 October) 1,044 colonies were lost. Winter losses calculated as the difference between the number of productive colonies at October 1st 2010 and those still present at April 1st 2011 were 2,546 (13,423-10,877; 18,9%). The most represented honey bee races in Italy were A.m. ligustica (37.2%), A.m. carnica (30.3%)), and hybrids (12.8%). Queens originated mainly from beekeeper's own colonies (57.5%), queen breeders (27.6%), and beekeeper's own selected queens (14.2%). Varroa control treatments were carried out mainly in July-August and November in the period 11/2009 - 2/2011. Most responders carried out 2 to 4 treatments (72.5%). Almost 10% of responders carried out a single treatment, while approximately 12% carried out 5-6 treatments. The most relevant sources of honey flows were meadow, dandelion, robinia and willow. Concerning sugar feeding, of 216 responders, 94 (43.1%) used beet sugar, 49 (22.5%) honey, 38 (17.4%) inverted beet sugar syrup, 32 (14.7%) HFCS, and 3 other products. 64.2% of responders fed honey bees only once using a single product. 14.7% of responders fed honey bees two or three times using two or three different products. In 42 (19.3%) of the returned questionnaires this question remained unanswered. Only 40 responders declared the use of a protein supplement (18%), mainly in March-April and September. In conclusion, despite the limited number of returned questionnaires and the fact that it is often disregarded or neglected by beekeepers, COLOSS questionnaire proved to be a successful tool to collect information on colony losses and beekeeping procedures.

Summer treatment against varroa mites with oxalic acid on artificially broodless colonies

Antonio NANETTI[1], Giorgio BARACANI [2], Andrea BESANA[3]

[1]CRA-API, Research Unit of Apiculture and Sericulture, Via di Saliceto 80, 40129 Bologna, Italy, tel.: ++39 051 353103
[2]CONAPI, Italy
[3]Beekeeper Association of Bologna, Italy

In spite of the large efforts made in the past decades to put the varroa infestations under control, this major upset for the apiculture worldwide is far to be resolved.

The control concepts may change according to local conditions but, generally, the narrow range of available acaricides implies that a combination between different substances and/or techniques must be used by the beekeepers. Pharmacoresistance against the acaricides and the restrictions for organic beekeepers make the multifaceted problem of varroa control even more complicate.
The various substances that can be used against the varroa are subject to limitations in their application. For instance, the oxalic acid -one of the most important natural acaricides- is suitable to hit varroa mites that are in their phoretic stage at the moment of the treatment, whereas the reproducing mites in the brood cells do not have contact with effective doses of the acid. As a consequence, oxalic acid is used very frequently by beekeepers of non-temperate regions during the winter, when a natural brood interruption occurs.

We could set-up a new technique for the control of varroa infestations with oxalic acid during the summer, normally impeded by large amounts of brood in the colonies. By a prolonged queen confinement a broodless condition is induced, forcing varroa mites to the phoretic stage. The oxalic acid administration is then performed by the trickling technique.

Replicate tests were made in different years and locations in Italy to measure efficacy against the mites, tolerability at individual level, colony reactions, queen survival to the manipulation etc. with highly promising results. Based on them, the extension to the field practice has been initiated.

The new treatment technique offers a new tool for beekeepers to control varroa infestations in summer. It appears as highly robust to the environmental variables that were taken into consideration until now; nevertheless, further experiments must be performed before the method is generalised to new conditions.

Flight performance of honey bee drones in response to DWV load

Natsopoulou ME[1], Paxton RJ[1]

[1]Institute for Biology, Martin Luther University Halle-Wittenberg, Halle (Saale)
Correspondence: myrsini.natsopoulou@zoologie.uni-halle.de

Honey bee (*Apis mellifera*) mating behavior involves drones flying to and aggregating at specific mate rendezvous sites called drone congregation areas (DCAs), where they mate with virgin queens. In order for drones to reach a DCA they may fly several kilometers and thus their successful arrival at a DCA depends on their flight ability. Previous studies have shown that drones captured in DCAs can be infected with deformed wing virus (DWV) and viral loads can cover a wide range of magnitudes. Here we examine whether honey bee drones experimentally infected with various DWV titres are still able to maintain flight activity. Newly emerged drones were infected via injection and/or feeding with different doses of DWV, marked individually and then introduced to colonies. Age, departures and returns of drones from colonies were recorded and flight activity was assessed. Flights that last longer than 20 min were assumed to be flights to DCAs, in contrast to shorter orientation flights. By comparing the flight activity of drones infected with different concentrations of DWV we are able to determine the range of DWV titres that do not affect flight ability of adult drones, and determine if there is a threshold of viral load above which a drone's flight ability is impaired. These results also give us an indication of whether the DWV loads found in drones collected from DCAs cover the whole range of viral loads that may be present in drones in the colonies.

Genotype - Environment Interactions in honeybee (*Apis mellifera* L.) on Unije Island

Hrvoje Novosel[1], Mateja Janeš[1], Maja Dražić[2], Janja Filipi[3], Dragan Bubalo[1], Lidija Svečnjak[1], Saša Prđun[1], Nikola Kezić[1*]

[1]University of Zagreb Faculty of Agriculture, Department of fisheries, beekeeping, game management and special zoology, Svetošimunska cesta 25, 10 000 Zagreb, phone: ++385 1 239 3793, e-mail: nkezic@agr.hr
[2]Croatian Agricultural Agency, Ilica 101, 10 000 Zagreb Croatia
[3]The University of applied sciences Marko Marulić in Knin, Kralja Petra Krešimira IV 30, 22 300 Knin, Croatia

Unije Island is an isolated Croatian island situated in the northern pool of Adriatic sea (44° 38' 58.3" N and 14° 15' 09.1" E) characterized by mild Mediterranean climate and covered with natural vegetation. An experiment on GEI started in autumn 2009. Seven honeybee genotypes were randomly distributed on 5 experimental apiaries located on Unije Island. A total of 62 colonies entered 2010. The following colonies were observed: *Apis mellifera carnica* from Croatia (N=10), Germany (N=10) and Austria (N=9), *A. m. mellifera* from France (N=7) and Denmark (N=7), *A. m. macedonica* from FRY-Macedonia (N=10) and *A. m. ligustica* colonies from Finland (N=9). All colonies were managed and estimated according to the guidelines of COLOSS BEEBOOK.

Meteorological data were monitored during 2010 showing typical Mediterranean climate, with recorded values of the highest temperature of 36°C in July, the lowest temperature of -2°C in December, average humidity of 66% and average rainfall of 10 mm/m^2.

The highest number of bees in spring counting was observed in *A. m. carnica* – Austria (160 515), *A. m. ligustica* – France (169 425) and *A. m. carnica* - Croatia (160 380).Increase in the number of bees between spring and summer census counting were determined in *A. m. macedonica* (+24 705), *A. m. carnica* – Germany (+13 770) and *A. m. mellifera* – France (+7 425), while a high loss in bee count was recorded in *A. m. carnica* – Croatia (-39 555) and *A. m. mellifera* – Denmark (35 910) respectively. At the end of autumn census the highest bee count loses were recorded in *A. m. ligustica* – Finland (140 940), *A. m. carnica* – Croatia (127 980) and *A. m. carnica* – Austria (127 170) respectively.

Colony losses due to *Varroa destructor* were estimated to 50% for *A. m. carnica*- Croatia, 40% for *A. m. carnica* – Germany, 55% for *A. m. carnica* – Austria, 33% for *A. m. ligustica* – France, 10% for *A. m. Macedonica*, 57% for *A. m. mellifera* – Finland and 14% for *A. m. mellifera* – Denmark. Queen related colony losses affected all subspecies equally.

The Effective of Varroa (*varroa destructor*) Population Level on Wintering Ability and Survival Rates of None-treated Honeybee Colonies in Trace Region

Devrim Oskay*, doskay@yahoo.com, Namik Kemal University, Faculty of Agriculture, Department of Agricultural Biotechnology, 05314625323
Eser Kemal Gürcan, egurcan@nku.edu.tr , Namik Kemal University, Faculty of Agriculture, Department of Animal Science, 05334313762
Yahya Tuncay Tuna, yttuna@nku.edu.tr Namik Kemal University, Faculty of Agriculture, Department of Animal Science 05424816846

The development of *Varroa destructor* population dynamics in none-treated honeybee (*Apis mellifera L.*) colonies was monitored from October 2011 to March 2012 in Trace region, Turkey. Our experiment colonies were examined by using geometric morphometric methods. A correlation between the mite infestation level, the colony wintering ability and survival rates was evaluated. Sticky boards were placed on the bottom boards of each colony to collect fallen mites. Infestation of *Varroa* in adults was measured ones a week during the winter. The condition of the colonies was evaluated by measuring the amount of adult bees. Our results consistently showed that fallen mite level in autumn significantly higher than winter in all colony's sticky boards (H:120,83, $P<0.001$). We found that fallen mite level different among colonies in the autumn and winter time. Survival rate of wintering colonies is %76,4. High-level wintering ability of colonies showed that low fallen mite level on sticky boards.

Winter Losses of Honey bees in Turkey and possible causes during 2011-2012 period

Aslı Özkırım*[1,2], Aygün Yalçınkaya[2], Elif Güzerin[2], Erkay Özgör[2], Bahri Yılmaz[3]

[1] Bee and Bee Products Research and Application Center, Hacettepe University, Turkey
[2]Bee Health Lab, Department of Biology, Hacettepe University, Beytepe, Turkey
3Turkish Central Beekeepers Association
phone: +90 312 297 80 43, mail: ozkirim@hacettepe.edu.tr

During 2011-2012 winter period, colony losses at the end of the winter have been expected by beekeepers. Because, weather was too cold and not stable. There were big differences between days. Our team in Bee Health Lab. had monitored temperatures and moistures in different provinces and recorded the exact time for the first flying of honeybees. In April, we applied the Coloss Questionary1 in all provinces of Turkey and also collected samples from the apiaries observed colony losses in winter.

By now, 254 samples have been analyzed in the laboratory and the data from questionaries recorded for statistical analyses. All results will be presented in the meeting.

Colony losses in Argentina

PALACIO, M.A[1]*; FIGINI, E[2]; LORENZO, A[3]; BACCI,M[4]; BASUALDO,M[2]; FONDEVILA,N[1]; BEDASCARRASBURE,E[1].

[1]INTA - Argentina
[2]FCV – Universidad del Centro de la Provincia de Buenos Aires- Argentina
[3]ProFeder - Argentina
[4]SENASA -Argentina
*mariaalejandrapalacio@gmail.com. UI INTA-FCA Balcarce. CC 276. Balcarce. 7620. Argentina.
+54- 9 249 4479726

There have been no reports of massive colony losses in Argentina, at least from the symptoms of CCD (colony collapse disorder) or in the proportion and extent of the situations in the US and Europe.. However, it could be considered that a fragile equilibrium exits because the increasing trend of land use intensification affects biodiversity and leads to declines in honey bee health and population size. It could be considered that from 2000 up to now colony population at the end of wintering have decreased in two honey bee frames in average. This situation is variable in different areas in the country and varrooosis with viruses associated and deficient nutrition (specially protein nutrition) could be considered as factors affecting colony population and colony losses. The high incidence of Varroosis in temperate areas requires strict management of this parasitosis: regular monitoring and treatment with appropriate acaricide and at the right time are essential to keep under control mite populations. Beekeepers who did not consider some of these management procedures, have lost much of their colonies during the winter Though sampling to determinate Nosema prevalence is performed regularly and N. ceranae is present in apiaries in Argentina, spores counting has not be useful to associate this disease with colony losses or population reduction. Five viruses have been detected DWV, SBV, BQCV, ABPV y IAPV but it was not possible to associate viruses presence with colony losses.

In a general way, the decoupling of colony management performed by beekeepers in relation to new environmental situations is the main factor to be considered. In this sense, it was proved that the moment for *Varroa destructor* control affects colony mortality significantly and monitoring is the key. In order to adjust colony management in different situations, Beekeeping National Program (PROAPI-INTA), the Federal Program for Rural development (ProFeder) and some Universities work with thousands of beekeepers joined in small groups and applied a technological path (TP) with the help of technical support. TP involves inspection of apiaries to obtain information of colony status, monitoring to determinate disease prevalence that allow to take decision of use of chemical control, strategy control of AFB without use of antibiotics and strategic feeding (energetic and protein feeding). As part of the results of TP can be mentioned a 50% reduction in mortality of colonies, AFB and chalkbrood prevalences below 1 % and increased productivity of the hives.

Seasonal prevalence of *Varroa destructor* and viruses in the African honeybee (*Apis mellifera scutellata* Lepeletier)

C.W.W. Pirk [1*], U. Strauss[1], V. Dietemann[1,2], R. Crewe[1] and H. Human[1]

[1] Department of Zoology & Entomology, University of Pretoria, cwwpirk@zoology.up.ac.za
[2] Swiss Bee Research Centre, Agroscope Liebefeld-Posieux Research Station ALP-Haras, Bern, Switzerland.

The ectoparasitic mite, *Varroa destructor* is one of the major parasites affecting honeybees worldwide. *Varroa* mites and their associated honeybee viruses have been implicated in the death of many colonies. The status of *Varroa* mites and honeybee viruses was examined by collecting adult honeybee and worker brood samples from 13 *Apis mellifera scutellata* apiaries situated in the Gauteng region of South Africa. The prevalence of *Varroa* mites and eight honeybee viruses were compared per season between sedentary (permanently stationed colonies) and migratory (transportation of colonies for pollination purposes) apiaries. Honeybee viruses, Acute bee paralysis virus (ABPV), Black queen cell virus (BQCV), Chronic bee paralysis virus (CBPV), Deformed wing virus (DWV), Israeli acute paralysis virus (IAPV), Sacbrood virus (SBV), *Varroa destructor* Macula-like virus (VdMLV) and *Varroa destructor* virus 1 (VDV-1) were screened in both adult honeybees and *Varroa* mites using RT-PCR. No significant differences were found per season in the prevalence of *Varroa* mites and viruses between sedentary and migratory apiaries and consequently all results were pooled. Three (BQCV, VDV-1 and IAPV) of the eight viruses screened were detected in honeybees, while two of these viruses (VDV-1 and IAPV) were also confirmed in *Varroa* mites. This is the first report of IAPV and VDV-1 in South African honeybees as well as in *Varroa* mites infesting *A. m. scutellata* colonies. BQCV was the most common virus and was detected in eight of the 13 screened apiaries. *Varroa* mites were found in 94% of the colonies screened, thereby confirming their omnipresence in *A. m. scutellata* apiaries.

Using geometric morphometrics as discrimination method for selected lines of the Carniolan honeybees (*Apis mellifera carnica*) in Serbia and Montenegro: the two years study

Slađan Rašić, University of Belgrade – Faculty of Agriculture
Ljubiša Stranisavljević, University of Belgrade – Faculty of Biology, Studentski trg 16, 11000 Belgrade, Serbia; email: ljstanis@rcub.bg.ac.rs; Tel. +381642225433
Mića Mladenović, University of Belgrade – Faculty of Agriculture

In the period of the honeybee (*Apis mellifera*) natural selection, from the indigenous ecotypes appeared different lines which must be recognized. In the past, honeybee lineages are typically distinguished by standard morphometrics and recently by usage of molecular markers, but these approaches are both costly and time consuming to apply. Instead of, in the recent past, the geometric morphometric method was often used. The recognition of the purity of honeybee geographic races is very important for regional and country regulations to allow a sustainable conservation of the huge variety of local honeybees. In this two years study, the honeybee samples were collected from stationary apiaries (belongs to the Centers for honeybee queen selection) from two different Serbian areas: Vršac (Northeastern Serbia, mostly plain region) and Vranje (Southern Serbia, mostly mountain region), and two different Montenegrian areas: Bijelo Polje (Northern Montenegro, mountain region) and Sutomore (Southern Montenegro, Adriatic coast region). The samples was consisted from 150 honeybee workers, collected from 10 hives (15 specimens each). On the honeybee left forewings a total of 19 vein intersections are used to determine the differences among of individual honeybees and among of colonies by usage of MorphoJ 1.4a software. Canonical variate analysis (CVA) slightly separated the honeybee lines into one overlapping cloud of specimens at the individual level in both years of study. On the first canonical variable (more than 60% of total variability) was main discrimination between Montenegrian honeybee lines. Therefore, on the colony level, CVA evidently separate all four groups (more than 80% of total variability on the first and second canonical axes) of breeding honey bee lines. This results show that geometric morphometrics is reliable for colony discrimination of honeybee lines within the same subspecies.

Colony losses and good veterinary practice in apiaries

Violeta Santrac, Zlatko Tomljanovic, Ivana Tlak Gajger, Radivoje Maksimovic

Veterinary Institute of Republic of Serpska, Bosnia and Hercegovina, Branka Radicevica 18, Banja Luka 7800, e-mail:violeta.santrac@virsvb.com

Colony losses of the European honeybee *Apis mellifera* have been observed worldwide during the last decade. As a result of active monitoring losses in Bosnia and Herzegovina we can finally give the data of four years survey conducted with given COLOSS questioner.
The data of total percentage of loses were as follows: *2008/2009*:**10, 23**%;, *2009/2010*:**8.6%**;, *2010/2011*:**13,7%**;, *2011/2012*: **20, 23**%.

Concerning that veterinary medicine is obliged by lows to deal with honey bee health, authors want to bring new tool for veterinarians on the field. We created a book, guideline, which can be used in field veterinarian work in the apiary, up-to-dated and very easy understandable. Book was named as" ***Good veterinary practice in apiary***".

The book of GVP can help idea to improve veterinary knowledge about beekeeping which vets have obtained during University education as well supplying them with right protocols and recommendation about practical things once they get in to the apiary. Given this, we would expect more veterinarians to get concerned in honey bee health by using their competence in etiology, epidemiology, clinical findings, diagnosis, treatment and disease control.

With that knowledge loses can be diminished in area that *can be managed by vets*.

Knowing that losses are present we want bring small but practical product that can help to whom it can be concerned.

Phototaxis in honey bees

Ricarda Scheiner

Universität Potsdam, Institut für Biochemie und Biologie – Zoophysiologie – Karl-Liebknecht-Str. 24-25, Haus 26; 14476 Potsdam, Germany, phone: 0049 331 9775932, Ricarda.scheiner-pietsch@uni-potsdam.de;

As many other insects, honey bee foragers are attracted by light sources in an otherwise dark surrounding. Their responsiveness to light and their locomotor behavior can be separately studied in a phototaxis arena. This is a dark arena which can be illuminated by light sources of different intensities. Using this sensitive assay, individual differences in responsiveness to light can be measured.
Honey bees differ strongly in their responsiveness to light, depending on their age, social task and feeding status. Foragers display a higher responsiveness to light than nurse bees. Among returning foragers, nectar bees walk faster to the light than pollen foragers. This difference is partly related to different satiation levels. Satiated bees walk faster than hungry bees. But even satiated pollen foragers differ from nectar foragers. In contrast to foraging role, the duration of foraging has no effect on phototaxis, although it strongly affects learning of honey bees. Responsiveness to light is presumably mediated via biogenic amines and their receptors, because octopamine and tyramine can differentially affect phototaxis in honey bees.

The phototaxis assay thus provides an ideal opportunity to test if sensory responsiveness of honey bees is affected by external conditions, pesticides or infections.

Colony losses and their potential causes in Israel an update

Victoria Soroker[1]*, Yossi Slabezki[2] ,Haim Efrat[2], Dorit Avni[1], Joseph Kamer[1], Ilya Zeidman[1], Aksana Kelogin[1], Saadia Rene[1], Hadassah Rivkin[1], Anna Litovsky[1], Amots Hezron[3], Boris Yakobson3 , Hillary Voet[5], Nor Chejanovsky[1*]

[1]Institute of Plant Protection, [2]Department of beekeeping, the Extension service, The Israeli Ministry of Agriculture [3]Institute of Agricultural Engineering, Agricultural Research Organization; The Volcani Center, Bet Dagan [4]Veterinary Institute, [5]Faculty of Agricultural, Food and Environmental Quality Sciences, Rehovot

For the last four years we evaluate and characterize colony losses in Israel applying two complementary approaches:

1- An indirect one, via beekeepers' surveys,
2- A direct one, by regular monitoring of selected hives at representative apiaries along the season.

The beekeepers' survey, includes two types of questionnaires: a detailed local questionnaire, evaluating annual losses distributed among the beekeepers since 2008 and one dedicated to evaluation of winter losses developed by COLOSS working group 1 since 2010. In parallel, annual monitoring of at least 100 hives at five apiaries is conducted since 2009 up to date. In 2010, the emphasis was put on the impact of Varroa infestation on the outbreak of diseases and colony collapse while in 2011-2012 it concentrated on the role played by Nosema, by comparing condition of treated and untreated colonies. Over the years, our survey data represented 34-50% of total colonies, but only 9-15% of the beekeepers, and indicated that the overall level of colony losses was below 20%. However in the last two years an increase in the level annual losses and frequency and in reports of CCD like losses was documented. Still, most of losses occurred in the summer or in autumn rather than during the winter. From all the evaluated factors so far Varroa and its associated viruses were found to be the most significant causes of colony loss. Regarding *Nosema cerana* , the level of hive infection increases towards autumn, but its effect on the condition of the colony varies between apiaries. Research about the role of the *N. ceranae* on colony loses in Israel is still in progress.

Comparison of mass versus individual inoculation of worker honey bees with *Nosema ceranae*

Gina Tanner[1], Geoffrey R. Williams[1], Marion Mehmann[1], Peter Neumann[1,3]

[1]Swiss Bee Research Centre, Federal Department of Economic Affairs EVD Research Station Agroscope Liebefeld-Posieux ALP, Bern, Switzerland, gina.tanner@alp.admin.ch
[2] Institute for Biology, Martin-Luther-University Halle-Wittenberg, Hoher Weg 8, 06120 Halle (Saale), Germany
[3]Department of Zoology and Entomology, Rhodes University, Grahamstown 6140, South Africa

In recent years, the honey bee microsporidium *Nosema ceranae* has received a great deal of attention because of its recent discovery during a period of high colony losses. Nearly ubiquitously distributed, this midgut parasite is known to affect honeybee health, especially when it is associated with neonicotinoid insecticides such as thiacloprid and thiamethoxam.

As a result of intense speculation about its effects on honey bees, and because known quantities of *N. ceranae* spores can be orally fed to honey bees for study in the laboratory, numerous experiments have been performed of late to further understand this parasite. In most cases, researchers individually inoculated honey bees with spores; however, this can be extremely time consuming and may limit experiment sample size. In order to reduce workload and allow for a greater number of honey bees to be inoculated, we compared parasite development in honey bees inoculated with *N. ceranae* spores either individually via a pipette or as a group via a communal cage feeder available to all caged honey bees.

After both days 7 and 14 post-infection, our results suggest that spore intensity was no different between inoculation type, and that mass feeding is an efficient method to infect honey bees with *N. ceranae* because it allows considerably more honey bees to be inoculated in a short time.

Role of temperature on susceptibility of honey bee larvae and adults to pesticides

Simone Tosi[1]*, Gherardo Bogo[2], Piotr Medrzycki[2]

[1]University of Bologna - Department of Agroenvironmental Sciences and Technologies.
Via Fanin, 44 - 40127 Bologna – Italy, s.tosi@unibo.it, Tel.: +39 051 2096285, Cell.:+39 349 0610343
Fax: +39 051 2096245, www.dista.unibo.it
[2]Agricultural Research Council – Research Unit for Apiculture and Sericulture

Honey bees could be exposed to different temperatures in relation to the developmental stage and age. Honey bee brood is usually maintained at the optimal temperature of 34-35°C while forager bees are exposed to a wider range of temperatures.

Larvae reared at suboptimal temperature (33°C) seem less susceptible to intoxication by active ingredients (i.e. dimetoato) than larvae reared at optimal temperature (35°C). Nevertheless, adults originated from brood reared at suboptimal temperature were significantly more susceptible to the active ingredient then adults that were kept during the larval stage at optimal temperature.

Forager bees reared at different temperatures exclusively during the toxicity test showed significant differences in the LD_{50} values. In addition, different trends of LD_{50} values in relation to the test temperature were noticed according to different active ingredients (neonicotinoids and fipronil).

Colony vitality, pollen supply and hibernation

J. van der Steen, B. Cornelissen, T. Blacquière, C. van Dooremalen

PRI bees@wur, P.O. box 16, 6700 AA Wageningen,
email. Sjef.vandersteen@wur.nl P.O. Box 16, 6700 AA Wageningen, 0031317481331

The vitality of a honeybee colony depends on several factors, among which pollen supply and the possible presence of parasites. We described the vitality of a honey bee colony with the parameters total hemolymph protein, mean hemolymph vitellogenin concentration, number of bees and number of sealed brood cells. As the colony has compensation mechanisms to cope with low protein income and since vitellogenin is age and task dependent, only an overall reduction of vitellogenin is relevant to be measured. Our studies demonstrated that discontinuous pollen flow and low diversity of pollen, both resulted in postponed transition to winter colonies in September. This may have serious consequences for the success of the Varroa control in July/August and the composition and size of the winter population at the start of the winter period in October.

Distribution of the most easy to recognize bee diseases in Denmark 2011

Flemming Vejsnæs

Danish Beekeepers Association, Fulbyvej 15, DK-4180 Sorø, Ph: 0045 57 86 54 70, Email: fv@biavl.dk

A huge amount of effort, time and money is used to analyze the distribution of bee diseases in the laboratory. Of course we recognize the importance of lab analyses. But it is time consuming and slow. Practical beekeepers do need much faster answers. The simple approach is made in Denmark in 2011. We "just" asked the beekeepers for observed diseases in their own apiaries. A questionnaire was distributed over the internet to 4.299 members of the Danish Beekeepers Association. Several questions were asked, but especially questions about recognized bee diseases in the beekeepers apiary were used. In the questionnaire descriptions and pictures of American foulbrood, chalk brood, sac brood, DWV were presented. There was also the possibility to answer: "I have seen some kind of disease, but I do not know what it is"

We got 1392 answers (32,4 % of all the members).

Denmark is divided into different regions (see graphic above)

Table. Recognized bee deseases by beekeepers in 2011 in Denmark in percent

	American foulbrood	Chalkbrood	Sacbrood	DWV	Other disease
Denmark	0,7	13,5	5,9	13,7	5,1
Sjælland	1,1	17,0	4,6	11,8	6,5
Sydjylland	0,0	13,5	3,1	16,2	6,5
Hovedstaden	0,5	12,7	4,3	6,6	2,4
Midtjylland	1,3	8,9	8,5	19,2	5,0
Nordjylland	0,0	12,5	8,8	18,6	4,9
Fyn	1,3	10,8	6,2	18,0	6,0
Vestjylland	1,6	13,5	7,2	14,1	7,3
Bornholm	0,0	27,8	11,1	22,2	0,0

This is the first time that we have an estimation of the distribution of bee diseases in Denmark, using the knowledge from the beekeepers. We find these method very useful in evaluating the bee season and predicting the development of the most common diseases.

We have very good observations on American foulbrood back to 1949. We find a close relationship between the observation of the beekeepers and the analyses made by the Danish Bee Lab. We expect the same for the other observations. We are surprised by the high level of chalk brood and the high level of sac brood on the small island of Bornholm. On Bornholm there are is more than 50-70 beekeepers. The distribution of DWV is expected, since varroa has been well-established since the mid of the 1990. The answer “some kind of disease – but we do not know what it is” we expect to be on an acceptable level. We will repeat these questionnaire the next years to see if we can use the “beekeeper-tool” for predicting increasing disease problems in the future.

The National Bee Unit: Random Apiary Survey Findings

Selwyn Wilkins*, Giles Budge, Mike Brown, Stéphane Pietravelle, Gay Marris and the NBU Inspectors

Food and Environment Research Agency, York, UK

To get an accurate estimate of the prevalence of honey bee brood diseases and to monitor pathogens, including up and coming species in adult honey bees, in 2009the Department for Environment, Food and Rural Affairs (Defra) and the Welsh Government commissioned a two year survey of Apiaries across England and Wales – The Random Apiary Survey (RAS). The Food and Environment Research Agency (Fera) NBU Inspectorate conducted sampling over two years inspecting a total of 19,000 colonies. Colonies were inspected and data collected on colony condition (number of bees, amount of brood) and presence of clinical signs of European (EFB) and American Foul brood (AFB), in addition a sample of adult bees was collected and returned to Fera where they were screened for a range of pests, and pathogens: *Nosema apis, N. ceranae Melissococcus plutonius* (EFB), *Paenibacillus larvae* (AFB), *Acarapis* spp (Tracheal mites) *Varroa,* Black queen cell virus (BQCV), Kashmir bee virus (KBV), Sacbrood virus (SBV), Acute bee paralysis virus (ABPV), Deformed wing virus (DWV), Chronic bee paralysis virus (CBPV), Slow paralysis virus (SPV) and Israeli acute paralysis virus (IAPV). The survey was randomised across England and Wales, Spatially, temporally and by BK operation size. The sample size chosen was to allow a 99% confidence level of finding disease within the samples collected. This randomised approach would allow comparison with the normal Risk Based Targeted approach to disease inspections carried out by the inspectorate in England and Wales.

Brood disease prevalence across England and Wales was 1 in 400 apiaries (0.25%) for AFB and 1 in 80 apiaries (1.25%) for EFB. The data suggested that the usual Risk Based approach is 1.5 – 3 times more efficient at finding AFB and 3-4 times more efficient at finding EFB compared to Random Inspections. In addition to this it was highlighted that brood disease detected in areas already highlighted a sat risk areas. There have also been recent concerns about newly emerging pathogens, including KBV and IAPV, which have been suggested as risk indicators for Colony Collapse Disorder in the United States also *N. ceranae* has been linked to losses in Spain and Portugal. The RAS findings indicated that KBV and IAPV were exceptionally rare. *N ceranae* however, was shown to be present in more than a third of tested apiaries. Analysis of data collected shows that this organism is not consistently linked to poor colony health in England and Wales – on the other hand - as would be expected the presence of high levels of Varroa was.

In the current economic climate the spending of public money is quite rightly in the spotlight. When compared with our risk-based inspections data, the results of the RAS demonstrate that the NBU programme of inspections is efficient in finding disease, and not missing unknown pockets of infection.

Honeybee virus prevalence in single and mixed-species apiaries of Western and Eastern honeybees

Orlando Yañez[a*], Huo-Qing Zheng[b], Fu-Liang Hu[b], Peter Neumann[a,c] and Vincent Dietemann[a,d]

[a]Swiss Bee Research Centre, Federal Department of Economic Affairs EVD, Research Station Agroscope Liebefeld-Posieux ALP Schwarzenburgstrasse 161, CH-3003 Bern, Switzerland. Email: orlando.yanez@alp.admin.ch. Telephone: +41 (0)31 323 8343
[b] College of Animal Sciences, Zhejiang University
[c] Department of Zoology and Entomology, Rhodes University
[d] Social Insect Research Group, Zoology and Entomology Department, University of Pretoria

Human induced sympatry of Western (*Apis mellifera*) and Eastern (*A. cerana*) honey bees in Asia has had major effects on global beekeeping due to host switches of pathogens. The occurrence of multiple-species apiaries might facilitate the exchange of viruses and parasites between species. The association between viruses and mites has been identified as a likely cause for colony losses. However, little is known about virus transmission between bee species and their potential adaptation to new hosts. To investigate the potential for host shifts of honeybee viruses between bee species, we monitored virus prevalence in apiaries hosting both *A. mellifera* and *A. cerana* and compare the data with virus prevalence in apiaries hosting these two species separately. We detected DWV, IAPV and SBV out of the eight viruses tested. Our results provide evidence for the transfer of IAPV and DWV between species while SBV strains seem to be species specific.

The COLOSS *BEEBOOK*

The international research network COLOSS (Prevention of honey bee COlony LOSSes) was established to coordinate efforts towards improving the health of western honey bee populations at a global level. It has developed into a network of more than 300 scientists in 59 countries worldwide.

An immediate difficulty in coordinating efforts has been a lack of standardisation of methods. The result is the COLOSS BEEBOOK, the definitive guide to carrying out research on *Apis mellifera*. It will consist of 29 peer-reviewed papers covering all aspects of honey bee research, both in the laboratory and in the field, and will be authored by nearly 150 of the world's active bee scientists.

The papers will be published as a Special Issue of the *Journal of Apicultural Research* in December 2012 and as a hard copy in early 2013.

IBRA

INTERNATIONAL BEE RESEARCH ASSOCIATION

The COLOSS *BEEBOOK*

Chapters:

Section 1 - *Apis mellifera* research protocols

Standard methods for behavioural studies of *Apis mellifera*
Standard methods for *Apis mellifera* cell culture
Standard methods for chemical ecology research in *Apis mellifera*
Standard methods for estimating Strength Parameters of *Apis mellifera* Colonies
Standard methods for maintaining adult *Apis mellifera* in cages under in vitro laboratory conditions
Standard methods for in vitro rearing of *Apis mellifera* larvae
Miscellaneous standard methods for *Apis mellifera* research
Standard methods for molecular research in *Apis mellifera*
Standard methods for physiology and biochemistry research in *Apis mellifera*
Standard methods for pollination studies of *Apis mellifera*
Standard methods for *Apis mellifera* products analyses
Standard methods for toxicology research in *Apis mellifera*

Section 2 - Techniques associated with *Apis mellifera* pests and pathogens

Pests

Standard epidemiological methods to understand and improve *Apis mellifera* health
Standard questionnaires for estimating colony losses and explaining factors in *Apis mellifera*
Standard methods for small hive beetle research
Standard methods for tracheal mites research
Standard methods for *Varroa* research
Standard methods for wax moth research

Pathogens

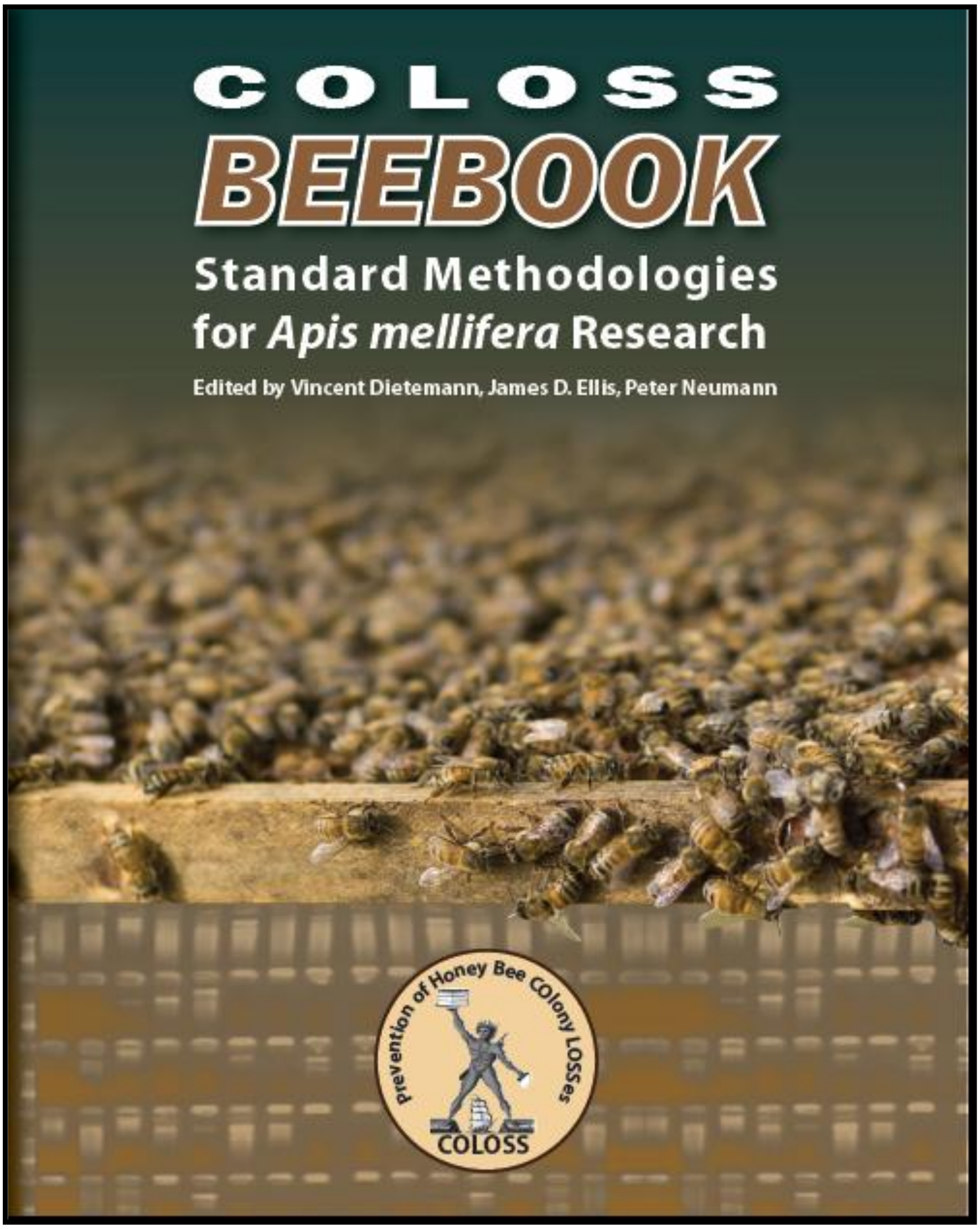
Standard methods for American foulbrood research
Standard methods for European foulbrood research
Standard methods for fungal brood diseases research
Standard methods for *Nosema* research
Standard methodologies for virus research

Section 3 - Breeding *Apis mellifera*

Standard methods for characterising subspecies and ecotypes of *Apis mellifera*
Standard methods for instrumental insemination of *Apis mellifera* queens
Standard methods for rearing and selection of *Apis mellifera* queens

IBRA, 16, North Road, Cardiff, CF10 3DY, UK.
Tel: +44(0)2920372409
jar@ibra.org.uk

INTERNATIONAL BEE RESEARCH ASSOCIATION



Coming Soon

The definitive guide to conducting research on honey bees…

IBRA
INTERNATIONAL BEE RESEARCH ASSOCIATION

cost
Action FA0803

Ricola Foundation
Nature & Culture