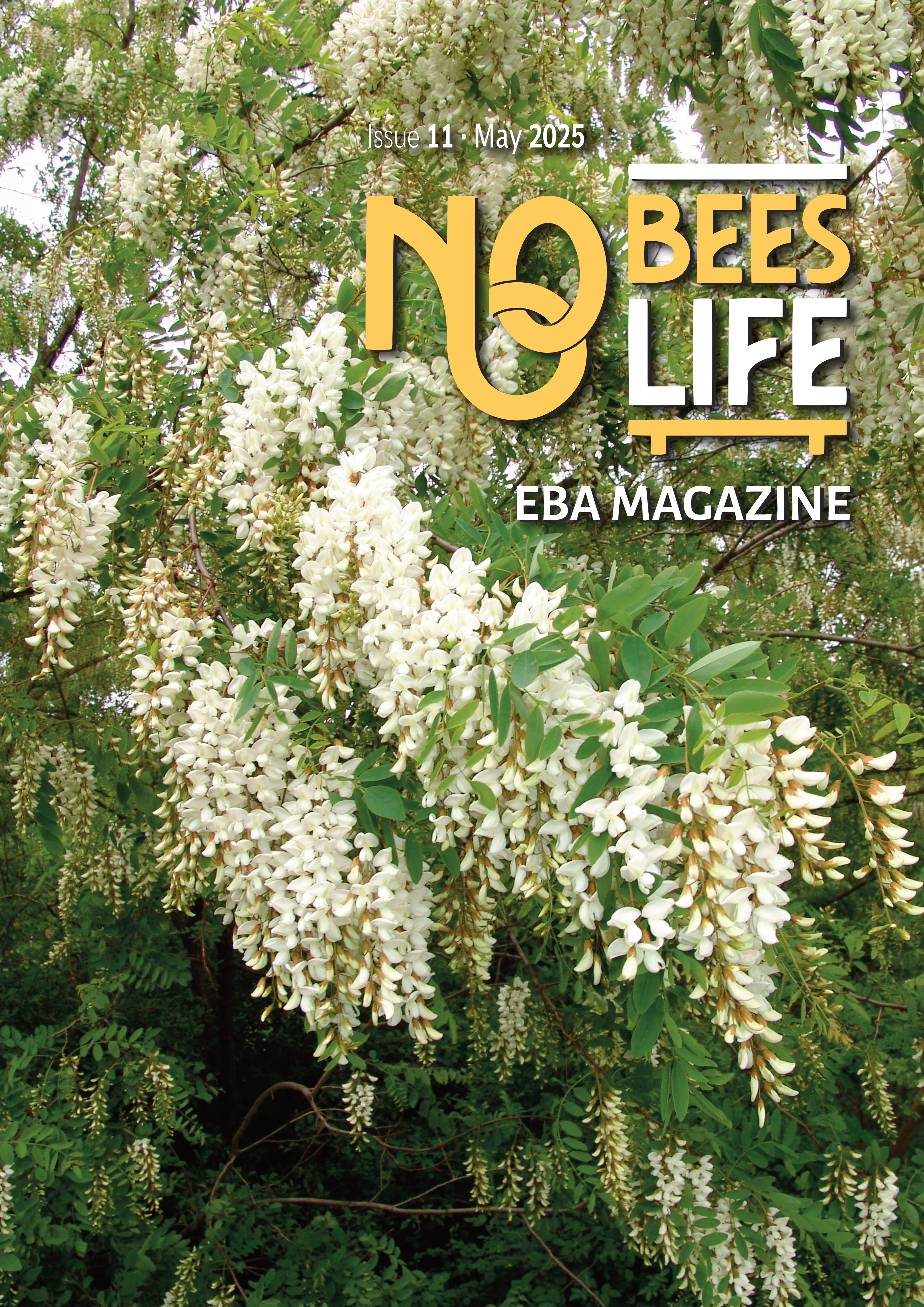
Issue 11 · May 2025

NO BEES NO LIFE

EBA MAGAZINE



30 COUNTRIES

FROM WHICH EBA HAS MEMBERS

(52 beekeeping organizations)

In order of confirmation of the Statute of EBA

405.114 beekeepers

Serbia
Slovenia
North Macedonia
Bulgaria
Greece
Romania
Malta
Germany
Hungary
Ukraine
Montenegro
Lithuania
Bosnia and Hercegovina
Sweden
Croatia
Czech Republic
Poland
United Kingdom
Netherlands
Italy
Ireland
Belgium
Cyprus
Türkiye
Switzerland
Prishtina
Portugal
Spain
Slovakia
Austria
Albania

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EUROPE, PAY ATTENTION, IT'S NOW OR NEVER

IT'S ALL ABOUT BEES, BEEKEEPERS, AND CONSUMERS!

Christophe Hansen, the European Commissioner for Agriculture and Food, will meet with the leadership of the European Beekeeping Association and the Slovenian Beekeepers' Association

It's now or never! For European beekeeping, May 24, 2025, is D-Day. The day when EU Commissioner Christophe Hansen will meet with the leadership of the European Beekeeping Association (EBA) and the Slovenian Beekeepers' Association (ČZS) on the sidelines of the main celebration of World Bee Day in Britof near Predoslje, in the Municipality of Kranj, Slovenia. By accepting the invitation to the World Bee Day celebration and the meeting with the leadership of the EBA and the ČZS, the Commissioner has already demonstrated his commitment to bees, beekeepers, and European consumers of bee-related products.

Let us realise that, until now, organised European beekeeping has never had the opportunity to meet with the highest official in the field of agriculture — a position undoubtedly held by the European Commissioner for Agriculture and Food, under whose responsibility beekeeping also falls. Since the establishment of the EBA over a year ago, we have been waiting for this day — the day when the EBA, on behalf of more than 400,000 beekeepers from 30 countries, will present to the Commissioner the key issues facing the beekeeping sector, while also proposing our solutions. Let us be proud to be a part of history. Right now, it's all about preserving the bees and beekeepers, and protecting European consumers! It doesn't matter whether you are a member of the EBA or the EU; what matters to us is preserving the bees, protecting European beekeepers, and safeguarding all European consumers!

Bees do not know national borders, they do not recognise political colours, backstage games, or interest lobbies — and just like the bees, the EBA operates and will continue to operate in the same way!

First, we will present to the Commissioner the impossible conditions in the current honey market. According to the European Commission, half of the honey (which we can't even call honey) on the market is counterfeit and fake. As a result, we will ask the Commissioner to address these issues as a matter of priority. The Honey Platform, established by the European Commission to develop solutions, has already begun its work and is supported by the EBA. The group will establish analytical methods in cooperation with experts, which will be recognised throughout Europe, above all by inspection authorities. It is essential to adopt methods that will effectively detect all types of counterfeit honey, which is why it is important to thoroughly examine all the currently available methods in this field. Unfortunately, the work of the Honey Platform is progressing slowly due to the immense scope of its task. As a result, a solution is not yet in sight, which could, in the meantime, be detrimental to beekeepers. Beekeeping urgently needs change, which is why we will propose that concrete measures be adopted by the end of this year to both support beekeepers and protect consumers. In the meantime, we will propose to the Commissioner that the import of honey into Europe be banned from those countries that are most problematic in terms of counterfeit honey. Let this be done to protect consumers, so they can continue to enjoy real honey, honey that strengthens their health, instead of 'fake' honey, which can even be harmful to health. Control over honey MUST be implemented at the entry points into Europe, as this counterfeit honey can, under no circumstances, be allowed to reach the store shelves!

Secondly, the EBA demands that the bee be recognised as the primary pollinator for food production, since approximately 30% of plants are directly dependent on bee pollination. Furthermore, the bee must be acknowledged as an increasingly important pollinator for the preservation of biodiversity, meaning that we must all recognize today the basic fact that bees cannot survive without beekeepers. Accordingly, Europe must ensure, through agricultural and environmental measures, direct payments for each bee colony as compensation for the free pollination services provided by bees. This year alone, approximately 50% of bee colonies in Europe were lost over the winter. Without immediate financial support for beekeepers to continue raising bees, we are facing a potential catastrophe — both in terms of food production and the preservation of biodiversity! Pollination cannot be imported!

Wild pollinators have been decimated in recent years by the excessive use of plant protection products and aggressive agricultural practices — let's not allow the bees to disappear as well! The protection of wild pollinators and bees is essential. The proper use of plant protection products and close cooperation between beekeepers and farmers is the correct path to-

ward achieving this. Slovenia is living proof that it can be done. For the past 15 years, beekeepers and farmers have worked together exceptionally well, with strong support from the responsible government ministry. As a result, there has been no significant bee die-off in Slovenia since 2011. We are all aware that without bees and wild pollinators, there is no pollination — and that the loss of bees and wild pollinators causes harm to all of us: farmers and beekeepers alike!

It is essential that Europe also considers introducing import quotas for honey, since unfair competition from counterfeit honey (which should not even be called honey) is forcing beekeepers in Europe to abandon beekeeping. The consequences will be catastrophic for all of Europe. Without first preserving bees, talking about food self-sufficiency in Europe is, to put it mildly, frivolous.

As a third step, we will ask the Commissioner to support the EBA's efforts for the EU to launch a unified European promotional campaign — encouraging Europeans to choose food with origins in Europe. It's time for Europe to protect Europeans, especially European farmers and beekeepers, and, most importantly, to protect European consumers, so they can once again enjoy quality, healthy food — food that, without a doubt, includes honey and other locally sourced products, from their own country or at least from Europe! If we are talking about Europe's sustainable development, then the first step is consuming fresh, local food, without "million" kilometre-long transportation routes!

I hope the Commissioner will listen to our words, and that together we will preserve bees and beekeepers across Europe. Above all, I hope

"Bees do not know national borders, they do not recognise political colours, backstage games, or interest lobbies — and just like the bees, the EBA operates and will continue to operate in the same way!"

we can protect our consumers, as Europeans do not deserve to consume honey that is not actually honey and should not even be labelled as honey.

We produce truly high-quality honeys in Europe, and these should be available to Europeans!

Let's not forget: "A spoonful of real honey a day keeps the doctor away!"

Boštjan Noč

President of the
European Beekeeping Association and
President of the
Slovenian Beekeepers' Association

ANNOUNCEMENT OF EBA MEETING WITH EU COMMISSIONER

Environment, Water Resilience and a Competitive Circular Economy

Jessika Roswall EU COMMISSIONER (2024-2029) I Environment, Water Resilience and a Competitive Circular Economy will meet via video with the leadership of the European Beekeeping Association on May 15, 2025.

We will present the EU Commissioner with the importance of bees for the environment and propose that she also include bees in environmental measures.

ON 20 MAY, WORLD BEE DAY, MEPS WILL RECEIVE HONEY!

At the invitation of Slovenian MEP Zala Tomašič, a delegation from the European Beekeepers' Association and the Slovenian Beekeepers' Association consisting of Noč Boštjan, Urška Ratajc and Tina Žerovnik, will visit the European Parliament on World Bee Day.

The Slovenian MEP will distribute a jar of Slovenian honey (Slovenski med) with a protected geographical indication to all 720 MEPs. MEPs will have the opportunity to enjoy a "honey" breakfast that day. Most importantly, the working meetings on the day will bring together key people in the EU Parliament who are deciding on the future of European beekeeping.

Boštjan Noč

President of the
Slovenian Beekeeping Association
President of the
European Beekeeping Association

THE SCIENTIFIC COMMITTEE OF EBA ON BEE HEALTH

The Scientific Committee of EBA on Bee Health provides professional and scientific advice and information to the Executive Board through the Head of the Scientific Committees. The Scientific Committee provides expert guidance to support and advance the objectives of the EBA and helps answer questions of the European beekeeping community. The primary mission of the Scientific Committee is to advocate for:

- regulatory updates,
- best beekeeping and best veterinary practices,
- sustainable beekeeping and bee welfare,
- better education of beekeepers and advisors,
- increased public awareness of bee health aspects,
- support beekeepers' positions with scientifically based arguments,
- relevant research topics proposals,
- community engagement.

Members of the Scientific Committee have expertise in one or more fields relevant to bee health, public health and welfare, as reflected in their publications, reports, participation in working groups, etc. The members have a strong understanding of European animal health policy, relevant legislative frameworks, exhibit a comprehensive grasp of local and regional challenges within the beekeeping domain, particularly those affecting the health of honey bee colonies. Let's introduce more closely the members of the EBA Scientific Committee on Bee Health and their approaches for the EBA's aims and activities.

Prof. Dr. Aslı Özkırım - President of the SC

Aslı Özkırım is Senior Professor at Hacettepe University in Turkey. Her expertise areas are microbiology and parasitology. She has been working with honey bees for 26 years. She received "Award of Honour in BeeScience" from the Turkish Ministry and Beekeeping Association in 2016. She is particularly focusing on beekeeping education and research. In addition to her expertise on various aspects of bee parasites and pathogens, including Varroasis and Nosemosis, she has also scientific studies on beneficial microorganisms, microbiota and prebiotics. She has contributed to both academic literature and field studies. She is willing to provide expert guidance on *organic/ herbal/ soft and hard chemicals and home-made solutions against Varroa and their possible effects,

**Regional Assessment to Beekeeping Techniques for Bee Wellfare in Europe (Mediterranean, North Europe, Central Europe, Macedonia and Balkans),

***Bee Health and Beekeeping Cultures in different Countries (Malpractices in Beekeeping directly depend on Beekeeping Culture and habits cause Bee diseases),

****Bee Health and Climate Change for the future of Beekeeping issues to support and advance EBA's goals.

Dr. Giovanni Formato - Vice-President of the SC

Giovanni Formato holds a Doctor of Veterinary Medicine (DVM) from the University of Bologna and a Master's degree in bee pathology from the University of Pisa. Since 2009, he has been in charge of the Apiculture Laboratory of IZSLT (Istituto Zooprofilattico Sperimentale Lazio e Toscana, Rome, Italy), which is a Public Body of the Italian National Health Service. Here he is mainly involved in diagnostic, training and research activities related to bees. He collaborates with Government Institutions, Universities, other laboratories and International Organizations (FAO, WOAH). Since 2020, he is in charge of the FAO "Bee Health and Food Security" for the Apiculture Sector" Reference Centre, which is located in IZSLT. Since 2021, he is the "Contact Point" of the "WOAH Collaborating Centre for Good Beekeeping Management Practices and Biosecurity Measures in the Apiculture Sector", which is placed in IZSLT. Since August 2022, he is a DISCONTOOLS expert group member on Varroosis. Since September 2022, he has been coordinating B-THENET, the first EU-wide knowledge-sharing platform on apiculture (www.bthenet.eu) focused on best beekeeping practices and innovation for modernizing the sector.

Dr. Fani Hatjina - Member of SC

Fani Hatjina is a Biologist with a PhD on Pollination (University of Wales College of Cardiff). Senior researcher in the Department of Apiculture - Institute of Animal Science ELGO 'DIMITRA' in Greece. She is also the Director of the Research Institute of Animal Science, a collaborating expert with European Food Safety Authority (EFSA) and OECD and since 2019, the Chair of the BEE HEALTH Scientific Commission of APIMONDIA. Fani is also the Coordinator of the APIMONDIA Working group "Adverse effects of pesticides and veterinary medicines on bees". In October 2022, she was elected as Chair of the Council in the International Bee Research Association. She has about 80 published research articles, over 150 conference presentations, and as many popular articles. Fani is also the Scientific Coordinator of

16 Greek and European research projects. Main research Interests are: Effects of environmental stressors and climate change on honey bees' health, bee behaviour and relationship with plants, honey bee physiology, breeding for resistance, conservation of local honey bee populations.

Prof. Dr. Ivana Tlak Gajger - Member of SC

Ivana Tlak Gajger is an accomplished professor at the Faculty of Veterinary Medicine University of Zagreb. She graduated in 2005, and in 2010 she defended a Ph.D. dissertation. Since 2006, she has been employed at the Department for Biology and Pathology of Fish and Bees, Faculty of Veterinary Medicine, where she is still working as a Full Professor with Tenure. Besides her scientific and research work, she is also a lecturer in the field of biology and pathology of beneficial insects. She was the supervisor of 47 graduate and 7 doctoral students. She is the Head of the postgraduate master's study program Honeybee Health Protection and the founder of the Educational-archive station for beekeeping. Also, she is the Head of accredited (according to HRN EN ISO/IEC 17025), official, and Croatian National Reference Laboratory for Honeybee Diseases – APISlab. She works in close collaboration with beekeepers and other stakeholders through various science-based activities to identify opportunities that can be made to simultaneously promote beekeeping, healthy food production, and natural biodiversity and improve the implementation of honeybee health protection measures. Her goal is to find smart solutions for real beekeepers' problems that ultimately inform policymakers, promote education and good apiary–veterinary–environmental practices, and help primary producers. As the greatest recognition of her work, in 2022, she received the Award of the Croatian Academy of Sciences and Arts for the highest scientific achievements in the Republic of Croatia in the field of medical sciences. In 2023, she was elected as a full member of the Collegium of Veterinary Sciences of the Croatian Academy of Medical Sciences. According to research by Stanford University in the USA, she is on the list of the 2% most influential scientists in 2022 and 2023.

Prof. Dr. Vlasta Jenčič - Member of SC

Vlasta Jenčič is a retired university professor. At the Veterinary Faculty University of Ljubljana, she taught students about diseases and health care of fish and bees. Although her scientific research activities focused more on fish health, she was always interested in researching bee diseases. In the EBA Scientific Committee on Bee Health, she aims to collaborate with notable European scientists in this field and contribute to solving problems related to globalisation and the emergence of new diseases and pests, climate change and related pasture conditions, in short, the welfare of bees and other pollinators in the modern world.

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Dr. Violeta Santrač - Member of SC

Violeta Santrač is a Veterinarian, M.Sc, PhD and Researcher who is dedicated to advancing bee health through diagnostics, innovative research, and effective communication in line with the evolving fields of biotechnology and artificial intelligence. Member of Apimondia, EurBEE, and she also serves on the Scientific Committee for Bee Health within the EBA. She had numerous experience in international projects and collaborations, including partnerships with the FAO, USDA Bee Research Lab, and the Bee Institute in Celle, among many others. Inspired by the book "The Life of the Bee", she has spent over 30 years exploring truths in veterinary medicine and biology. Visiting over 50 countries, she holds a "nomadic" approach to gathering and sharing scientific knowledge. Alongside her field and laboratory efforts, she prioritizes clear and inclusive communication to connect with beekeepers, researchers, and policymakers. Her mission is to support the animal welfare of bees while promoting better understanding and practices within the veterinary and beekeeping sectors. She is the leader of newly estabilished Apimondia Working Grup GOOD VETERINARY PRACTICE AND APICULTURE. Affiliated to Public Institution Veterinary Institute of the Republic of Srpska "Dr. Vaso Butozan" in Banja Luka, Republic of Srpska, Bosnia and Herzegovina, she is grateful for the immense support provided for her work.

Dr. Olena Metlytska - Member of SC

Olena Metlytska is a geneticist, breeder, scientist, and forensic expert. A specialist with extensive practical experience who possesses several complex biochemical and molecular genetic techniques, author of more than 150 scientific publications, with over 25 years of experience in specialized research institutes of Ukraine, including in the Department of Genetics and Biotechnology of the Institute of Animal Breeding and Genetics in Kyiv and has experience in conducting species identification of Apidae within the framework of environmental monitoring of Ukrainian forestry. The organizer of the Round Table on the Conservation of the Gene Pool of Aboriginal Subspecies of Bees of the International Beekeeping Congress "Apimondia – 2013" (Kyiv) is currently a member of the EBA Scientific Committee on Bee Health. In the Scientific Committee on bee health, she hopes for fruitful cooperation with leading scientists on the study of the adaptive capabilities of bees in the conditions of climate change, the use of GMO technologies in crop production as a threat to organic beekeeping, reducing the spread of bee infections through modern methods of diagnosis and treatment, breeding and genetic improvement of bees on signs of resistance to diseases, the development of a passport of the expert specialty "veterinary expertise in beekeeping" and other pressing problems for the sustainable development of beekeeping in Europe.

Prof. Dr. Xesús Feás - Member of SC

Xesús Feás (Santiago de Compostela, 1977) is a distinguished researcher with a multidisciplinary background in veterinary medicine, food science, and analytical chemistry, specializing in the study of bee health and apicultural products. He holds a degree in Veterinary Medicine (2000), awarded with an Extraordinary Prize, and a degree in Food Science and Technology (2002), both from the University of Santiago de Compostela (USC). His research career has been marked by a strong focus on developing advanced analytical methodologies to address challenges in food safety, veterinary medicine, and public health, with a particular emphasis on bee health and the characterization of apicultural products. His work in this area has contributed significantly to understanding the composition, quality, and health benefits of apicultural products. In recent years, he has focused on the impact of invasive species, particularly Vespa velutina (Asian hornet), on bee health and ecosystems. His research in this area has been published in Q1 journals and addresses critical aspects such as the biological cycle of Vespa velutina, the epidemiology of its impact on bee populations, and the proteomics of its venom. This work integrates a One Health perspective, combining veterinary medicine, analytical chemistry, and public health to address the challenges posed by invasive species to bee colonies, biodiversity and human health. His work not only contributes to the scientific community but also provides practical solutions for beekeepers, policymakers, and public health professionals, ensuring the sustainability of apiculture and the protection of pollinator populations.

Dr Joachim R. de Miranda - Member of SC

Joachim de Miranda is a world-renowned expert on bee health at the Swedish University of Agricultural Sciences, specializing in bee pathology and disease ecology. His research subjects include honeybees, bumblebees and solitary bees, and how their communal pathosphere and health are affected by a range of nutritional, chemical and physical stressors in both natural and cultivated landscapes. His primary interests are the viruses that infect bees: their transmission, epidemiology, evolution and adaptive ecology, and how these are affected by internal and external factors, from long-term landscape-level changes in bee habitat and ecology to rapid virus population-genetic dynamic fluxes and evolution in controlled laboratory settings. He is a long-standing member of the European bee research community, having served on a variety of national and international committees and panels promoting bees, bee health and bee research.

Prof. Dr. Dalial Freitak - Member of SC

Dalial Freitak is a Professor at the Department of Biology at Karl Franzens University of Graz, Austria. Originally from Estonia, she has been working in different labs during her academic career, from Germany to Finland to Norway and Austria, where she is leading the group of Insect Health and Biology. Her studies have been focused on insect immunity, starting with solitary insects and then moving to work with ants and honeybees. Her desire to understand how organisms adapt to stressors has led to paradigm paradigm-shifting discovery of the underlying mechanisms behind immune priming in honeybees. Her lab is studying different questions in what keeps our insects healthy, raning from behavior to molecular mechanisms. At the University, she is teaching students about immunology and social insects. Outside of basic research, Dalial is a founding member of Dalan Animal Health, Inc. – a company pioneering the development of a first vaccine for honeybees.

With this senior scientific team, which has carried out successful studies in different European countries and on international platforms, we aim to be in constant communication with our beekeepers in the field of bee health and to offer solutions to their questions and problems through scientific approaches.

BEES LIFE

2025 PROGRAM FOR THE EBA SCIENTIFIC COMMITTEE ON APITHERAPY

I. Primary Goals

1. Education and Awareness

- Establish a standardized European apitherapy educational program.
- Raise public awareness of apitherapy's preventive and therapeutic benefits.
- Organize online and offline seminars, conferences, and workshops for beekeepers, apitherapists, and the public.
- Develop and distribute educational materials including articles, booklets, and online resources.
- Prepare a practical manual for beekeepers, apitherapists, and the general public.
- Train apitherapy lecturers based on a unified European curriculum.
- Launch a dedicated apitherapy section on the EBA website.

2. Regulation and Standards

- Develop and refine guidelines for medical and functional use of bee products.
- Collaborate with regulators to standardize labelling, marketing, and sales of bee-based health products.
- Create a Code of Ethics defining apitherapists' roles and competencies.
- Promote evidence-based and safe apitherapy practices through all outreach channels.

3. EBA Media

- Encourage members to regularly contribute apitherapy-related articles to the EBA magazine.
- Ensure the committee provides continuous apitherapy content for the EBA website.

II. Secondary Goals

1. Support for National Apitherapy Associations

- Create a comprehensive database of European apitherapy organizations and practitioners.
- Support national associations in gaining recognition from health ministries and regulatory bodies.
- Assist in the accreditation and formalization of apitherapy practices across Europe.

2. Integration with Classical Medicine

- Build a database of medical doctors practicing apitherapy.
- Foster collaboration with national European medical doctor associations.

INVITATION TO THE JOINT MEETING OF THE EUROPEAN BEEKEEPING ASSOCIATION

This year's World Beekeeping Congress will be held in Denmark in September - https://apimondia2025.com/.

Many EBA members will be present at Apimondia, so we will have a joint meeting of EBA members and EBA scientific committee members. We will also invite all European beekeeping associations and all EBA business partners and supporters to the meeting. We will inform you about the exact time and location in due time. At the meeting, we will present the main goals and activities of the EBA, and above all, there will be time to socialize, exchange opinions and make personal contacts and friendships.

In order to facilitate the organization of the meeting, we ask you to register for the meeting as soon as possible with our secretary Biljana - eba@ebaeurope.eu.

Everyone is welcome, together we are stronger!

Boštjan Noč
President of the European Beekeeping Association

APIMONDIA
SCANDINAVIA
SWEDEN | DENMARK | NORWAY
23-27 SEPTEMBER
2025
COPENHAGEN

EBA EXECUTIVE BOARD MEETING AHEAD OF UPCOMING HONEY PLATFORM MEETING

The Scientific Committee on Safety and Quality of Bee Products prepared a proposal for EBA's position in the next Honey Platform meeting.

At tonight's meeting, Dr. Urška Ratajc gave a presentation to the EBA Executive Board. The EBA Executive Board expresses its gratitude for the effort and work invested of the Scientific Committee for the Safety and Quality of Bee Products, to all those who participated in the preparation of this extremely important position of the EBA at the next meeting of the Honey Platform.

FREE WEBINAR EBA

EBA SCIENTIFIC COMMITTEE ON BEE HEALTH:

Adopting Sustainable Colony Management Practices to Enhance Bee Health

On April 30, the first free EBA webinar was held under the auspices of the SCIENTIFIC COMMITTEE ON BEE HEALTH.

Topic: Maintaining bee health and sustainable beekeeping relies on effective colony management.

The lecturers at the first EBA webinar were:Prof. Dr. Aslı Özkırım, Prof. Dr. Ivana Tlak Gajger and Dr. Giovanni Formato. The introductory speech at the webinar was given by Dr. Urška Ratajc – Head of the EBA Scientific Committees.

The webinar lecturers covered the following topics:

1. “Best Beekeeping Practices in Europe: the B-THENET platform” –Dr. Giovanni Formato;
2. “How to properly use medicines to treat bees” – Prof.Dr. Ivana Tlak Gajger;
3. “Integrated Varroa destructor Control – Prof.Dr. Asli Ozkirim.

After the presentations, the leactures answered questions from the webinar participants.

This webinar provided a comprehensive overview of European Best Beekeeping Practices, regulatory guidelines for colony treatments, and integrated Varroa destructor control. By integratin preventive measures, organic and medical treatments, and biotechnical strategies, beekeepers can improve colony resilience and productivity. Standardized Best Beekeeping Practices and responsible medicine use, in accordance with national regulations, promote healthier bee populations and sustainable apiculture.

Objective: To provide EU beekeepers, researchers, and policymakers with insights into sustainable colony management practices that enhance bee health, focusing on best practices, regulatory compliance and integrated pest management.

Subtopics: To inform participants on B-THENET as a tool where they can exchange best beekeeping practices; provide participants with an overview of national and EU regulations on hive treatments and responsible medicine use; propose information on winter colony losses and IPM strategies against varroa mite; strategies to enhance colony resilience and reduce disease incidence.

EBA would like to thank all the participants in the webinar. The lectures, the head of the EBA scientific committees and everyone who contributed to making this webinar successful and educational in these challenging times for beekeeping.

VIDEO MEETING WITH A MEP WHO IS ALSO A BEEKEEPER!

The President of the ČZS and EBA, Noč Boštjan, and Dr. Urška Ratajc, Head of the EBA Scientific Committees, met yesterday with MEP Thomas Waitz from Austria.

He represents the Greens in the European Parliament—and he's also a beekeeper! We asked for his support of the EBA, especially in the fight against counterfeit honey and in our joint effort to have bees officially recognized as invaluable pollinators. Europe must acknowledge that without beekeepers, bees cannot survive. Therefore, beekeepers should receive financial support—not only for their essential beekeeping work but also for providing the free pollination service that contributes to more than 30% of the world's food production and helps preserve biodiversity. We also highlighted the issue of the decreasing number of honey plants available for bees and other pollinators. We proposed the idea of a European Honey Plant Planting Day and asked for his support. In addition, we requested his help in getting beekeeping included on the agenda of the AGRI Committee, and in incorporating beekeeping initiatives into EU environmental programmes. Mr. Waitz expressed strong support for European beekeepers. We are fortunate to have an MEP who is not only knowledgeable about the challenges we face—but who also shares our passion as a fellow beekeeper. He was very supportive of our proposals and emphasized several important points, including challenges in the honey market, issues related to pesticides, and the need for stronger forest protection. We have agreed to meet again on 20 May in Brussels for further constructive discussion. We also invited him to celebrate World Bee Day on May 24th in Slovenia. It's clear that Mr. Waitz understands and supports us!

https://thomaswaitz.eu/language/en/

CALL TO EU LEADERSHIP, BEEKEEPERS NEED HELP NOW!

“As the President of the EBA, I am appalled by the news from Serbia. The news that a honey control laboratory was robbed into is very bad news for all of Europe, which is fighting against counterfeit honey on the market.

As the President of the EBA, I support all the efforts of the President of the SPOS, Rodoljub Živadinović, in the fight against counterfeit honey that is destroying beekeeping across Europe.

Beekeepers in Europe must unite even more and demand a faster solution to this problem from the EU leadership. This will be one of the main topics of the meeting of the ČZS and EBA leaders with the Commissioner for Agriculture Hansen on May 24, 2025 in Slovenia.

WITHOUT BEEKEEPERS, THERE ARE NO BEES, WITHOUT BEES, THERE IS NO POLLINATION, AND WITHOUT POLLINATION, THERE IS NO FOOD, THERE IS NO BIODIVERSITY!

HONEY CAN BE IMPORTED (IT IS TRUE THAT MOST OF WHAT IS IMPORTED IS NOT EVEN CLOSE TO REAL HONEY), POLLINATION CANNOT BE IMPORTED”, said President EBA Mr. Boštjan Noč!!

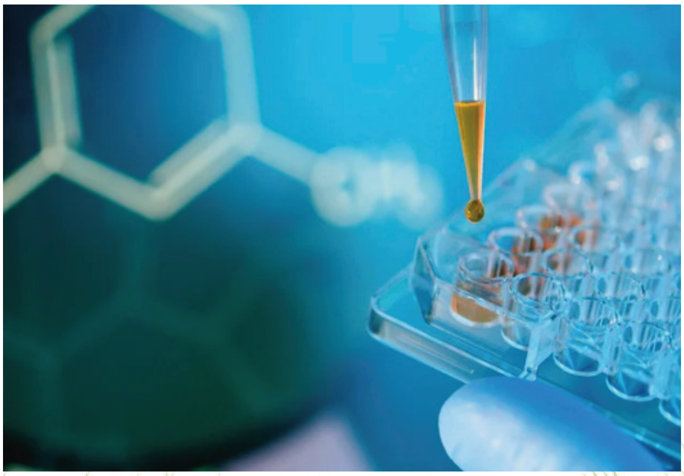
Read all about what is happening in Serbia on the SPOS website https://spos.info/opljackana-analab-laboratorija (CHOOSE ENGLISH FLAG ON THE MENU)

EBA SUPPORTS THE FIGHT AGAINST COUNTERFEIT HONEY

Ana Lab in Serbia has been robbed and efforts are being made to raise funds to reopen it.

EBA President Boštjan Noč said:

“As EBA President, I am fully aware of the importance of all laboratories around the world that are involved in detecting adulterated food. I strongly condemn the theft of laboratory equipment and we hope that those responsible will be brought to justice. I support the initiative to help Ana Lab with contributions and donations.”



THE EPBA ALSO SUPPORTED SERBIA

The European Professional Beekeepers Association (EPBA) also supported Analab, Serbian Federation of Beekeeping Organizations – SPOS and Serbia, in the fight against counterfeit honey, with its announcement on the business social network Linked In.

The post HERE can only be viewed by those who have Linked In installed, but we are publishing a screenshot of the post here, as well as an accompanying video of the recent visit of the President of the European Professional Beekeepers Association, Bernhard Heuvel, to the Analab laboratory (see the video HERE, and the news about the visit in Serbian language HERE – choose English flag on the Menu for English language).

14:07
◂ Viber
4G

Clean Up The Honey Market
733 followers
4h • Edited •

🧠 The global honey market is broken.
And some players don't want it fixed.
AnaLab is the only accredited laboratory in the world with a proprietary method capable of reliably detecting honey fraud — with unmatched accuracy.
Recently, the Serbian government made a bold move: AnaLab was appointed the country's official partner in identifying fake honey.
🔒 Just weeks later, their lab was broken into.
💰 Irreplaceable, high-value equipment was stolen.
❓ Coincidence? Or something more?
Let's face it — there are big profits in fake honey.

14:07
◂ Viber
4G

Let's face it — there are big profits in fake honey.
And where there's money, there's fraud.
Counterfeit "honey" has quietly become a standard in the industry.
🌱 Those trying to bring the truth to light face pressure.
Some, like AnaLab, face actual attacks.
👁️ It's time to open our eyes.
🌟 It's time to face the truth.
🔴 It's time to act.
🎥 Bernhard Heuvel (EPBA) visiting Serbia / AnaLab – video overview:
👉 https://lnkd.in/d7295tvR
This massive global fraud can be stopped — but only if we stop looking the other way.
📖 Read more (in Serbian):
👉 https://lnkd.in/dDQSSAzi

#Honey

A GOLDEN PRIZE FOR A FALSE HONEY

How a laboratory product won global acclaim — while real honey faces misrepresentation

In a surprising outcome at the international synthetic biology competition iGEM — organized by the Massachusetts Institute of Technology — a student team from the Technion – Israel Institute of Technology was awarded the gold medal for creating a product that mimics honey without involving bees at all.

The synthetic substance is produced using genetically modified *Bacillus subtilis* bacteria, programmed in the laboratory to secrete a liquid that visually and aromatically resembles honey. The project was proudly labeled "vegan honey" and selected for the highest distinction among 300 university teams from around the world.

Yet, the irony is striking: the product was considered so potentially unsafe that neither its creators nor the competition's judges dared to taste it!!

Despite this, the synthetic liquid was celebrated for one reason alone: its similarity in look and scent to real honey.

But "honey" is far more than appearance or aroma. Genuine honey is the product of a sophisticated biological process performed exclusively by bees (*Apis mellifera*) — involving the enzymatic transformation of nectar, evaporation, natural preservation, and the complex cooperative behavior of an entire hive. Its composition and bioactivity cannot be replicated in a laboratory.

Nor does this synthetic version offer any of honey's known nutritional or health benefits.

Moreover, no scientific safety trials — not even animal studies — have been conducted to assess its effects on health. Nonetheless, the use of the name "honey" is being carelessly applied.

This is not innovation. It is marketing-driven deception, at the expense of both consumers and nature.

The name honey must remain exclusively reserved for the authentic product of bees. Anything else — whether derived from sugarcane, beets, maple trees, starch, or genetically engineered bacteria — is simply syrup, no matter how sophisticated the technology behind it.

It is crucial that legislators at both national and European levels take decisive action. The terms HONEY and HONEY SUBSTITUTE must be legally protected and forbidden from being used on any product that is not the genuine output of bees.

This is not merely about defending the name of a product. It is about safeguarding the integrity of nature and protecting consumers from deliberate misrepresentation.

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Has the time come for us to stop using our eyes and brain, even though we have them?

SCIENCE UNCAPPED: BEE BEHAVIOR

Do bees have personalities?

I think most beekeepers would agree that on a colony level they do. I remember, back when I ran 500 hives, that even with so many, there were a few that whenever I got to I was like "oh, Hive 317, how are you?" because I had fond memories of something particular about them. But how much do we know about bees as individuals? I have a story about a bee I actually got to know as an individual, which I'll put in this issue elsewhere. But this article is about the science of this.

A 2016 study[1] looked into exactly thism the question of if individual bees have personalities. To study something scientifically you of course need to define things exactly, and what does it mean to have a personality? They defined their criteria as, among individuals within the worker caste of an individual hive: (1) consistent individual behavioral differences over time; (2) consistent individual behavioral differences across contexts; and (3) the presence of correlated suites of behaviors.

To assess the first two criteria, they subjected groups of same-age bees in cages to "stimuli relevant to bee life history". To assess the third criterion they used an observation hive to record the behaviors of select individual bees across their entire lifetimes. Their results showed that some individual bees were much more likely to be highly interactive with other workers (more extroverted?).

An earlier study, in 2012,[2] notes that some bees act as scouts for new sources of food or nest sites, while other bees never do (they become foragers but only to already-discovered locations). Such scouts, they tell us summarizing earlier research, only make up 5-25% of the total foragers in the colony. These scouts continue to look for new locations even when the hive already has adequate sources, their wanderlust apparently unsated. Similarly, less than 5% of the members of a swarm actively search for new potential nest sites.

In this study they marked the nest scouts from swarms and then observe their behavior after establishing the swarm in a hive. In nine trials, they found the nest scouts were 3.4 times more likely to become food scouts than bees that had not been scouts in the swarm. This shows consistent "novelty-seeking behavior" in certain individuals.

These same researchers (Liang et al) then collected scouts and subjected them to "whole genome microarray analysis," which, I'll be frank with you, I am but a humble beekeeper and don't have any idea what that actually involves. But this revealed a "large neurogenomic signature for scouting in the bee brain.

"Among the differentially expressed genes were several … which are involved in regulating novelty seeking and reward in vertebrates. … These signaling systems also are implicated in personality differences between humans that are related to novelty seeking."

They then collected non-scouts and orally dosed them with the neurochemicals the scout bees had had more of. As they predicted, the neurochemicals (glutamate and octopamine, the latter we'll talk a lot more about) increased scouting tendencies of the subject bees. Lest this drugging of bees sound questionable, the researchers assure us that “the treatments not cause excess mortality, aberrant locomotion, hyperactivity, or a general increase in foraging activity,” so let us assume they all had an enjoyable time. “Our results demonstrate intriguing parallels between honey bees and humans in novelty seeking behavior” (presumably they're not talking about the drug use).

We're often being warned not to overly anthropomorphize bees, that is, to project human motives and feelings on them, but I think this quote from the Liang paper's conclusion makes a nice counterpoint to that usual advice: “It is common to look to animal models to generate insights that may be applicable to human behavior. Our findings highlight the potential of the converse—using insights from human research to further elucidate the molecular basis of animal behavior.”

Octopamine

Speaking of octopamine, Spivak et al in a 2003 paper looked very specifically at octopamine and its role in hygenic behavior. They note that the uncapping and removal of diseased brood is done by bees aged 15-20 days, and that olfactory (ie smell) based behaviors in bees are heavily influenced by octopamine. They examined both bees that had been bred for hygenic behavior, and bees that had not been, to analyze their optopamine expression. They found in both types of bees that the individual bees expressing hygenic behavior had octopamine-immunocreactive neurons that exhibited more intense labeling than similarly aged bees that were not pulling their weight in maintaining hygiene. Long story short, they found that octopamine “has the potential to facilitate the detection and response of honey bees to diseased brood.”

But scientists weren't done dosing bees with octopamine. Barron et al.[3] looked at effects of octopamine on dance behavior (and some at least of their experiments were performed at Research School of Biological Sciences, Canberra, ACT, by Drs Andrew Barron and Ryszard Maleszka.). We'll assume you know about the bee dance in general, but one key point is the focus here, the likelihood, duration, and vigor of the dance are all measures of the bee's assessment of the value of the floral rewards at the end of it. To quote the paper:

"Bees modulate their dance behavior by using cues that reflect their colony's foraging state. When forage is plentiful, the threshold forage profitability that triggers dancing increases, but when forage is scarce, bees dance for less profitable resources (1, 12) . This mechanism ensures that a colony exploits all available forage sites when food is scarce but focuses on the most profitable sites only when food is plentiful. Dance is therefore an expression of the total integrated information gathered by a forager about her foraging trip and the current status of her colony. "

Oral dosing with octopamine increased the likelihood of foragers dancing. Low doses increased the number of dance circuits the most, as well as vigor (as manifested in a quick restart after the dance loop is finished), while intermediate doses increased the likelihood of performing dances the most. High doses effected the waggle (distance reporting) portion significantly, "perhaps suggesting the onset of hyperactivity at high octopamine doses" the researchers speculate parenthetically. Further speculation in their discussion section mentions some more neurochemicals you might recognize from human contexts:

Dopamine affects laboratory-based learning assays differently than octopamine (23, 24), in some cases reducing responsiveness to sucrose, in opposition to octopamine (17). Consequently, it will be interesting to clarify whether dopamine and octopamine indeed have similar effects on dance behavior. Serotonin has also been shown to act in opposition to octopamine in sensory systems (25–27), and it is an important modulator of the visual system (26); however, whether it modulates dance behavior is presently unknown.

Incidentally it just occurred to me to google if octopamine is in human brains, apparently not really: "Although octopamine is still found in the mammalian brain in trace amounts, its function has been replaced by epinephrine.

Long thought to have been an evolutionary leftover in mammals, the role of octopamine in the human brain has not previously been well understood."[4]

And I don't like to rely too much on large chunk quotes but these closing paragraphs of their paper I think are very interesting and wouldn't benefit from my paraphrasing:

There has been much speculation about how dance behavior in honey bees might have evolved from the simpler behavioral patterns involved in food searching. Esch (40) proposed that the waggle dance evolved as a ritualization of simpler intention movements that partly reenacted flying to flowers. Octopamine modulation of honey bee dance behavior supports this hypothesis by identifying a commonality between the neurochemical mechanisms motivating personal appetitive behavior and the social dance response.

Forager honey bees do not directly benefit from their foraging efforts; they forage for the benefit of the whole colony. Octopamine modulation of dance communication demonstrates that a common neurochemical mechanism can motivate both self-feeding and altruistic behavior, providing an example of how social evolution can shape a neural system for a novel function.

So all this about octopamine is basically evaluating a genetic trait bees are born with. What about the age old argument of "nature versus nurture" – to what degree does upbringing effect adult individuals? Specifically, one obvious factor that can be easily examined is effect of brood nest temperature on developing brood – Tautz et al.[5] looked at this. They placed honey bee pupae in incubators held constant at 32°C, 34.5°C, and 36°C, which are all within the normal range they might experience in a hive. Once the bees emerged as adults they were marked and introduced to colonies to live out their lives, subject to observation of subsequent behavior (like a bee version of that movie The Truman Show). Generally though none of the subject bees had particularly noteworth behavioral differences from eachother or their generic sisters through their house-bee life stages. However, when they became field bees they were trained to visit a feeder

200 meters from the hive and at this point differences became apparent. The bees raised at the colder range, at 32°C, only completed one fifth as many dance circuits as the warmer-raised bees. Also the cold-raised bees' waggle dance varied more in duration, and we imagine they were probably awkward dancers.

The bees were also trained on proboscus-extension reflex, wherein bees are trained via basic pavlovian reponses to associate a scent with a reward and extend their proboscis in response to the scent. The bees raised at 36°C were classed as "good learners," while 32°C and even 34.5°C bees did not do very well. The temperature bees were raised at during their capped stage therefore seems to have definite effects on their learning and/or memory abilities later in the life to a degree that would effect their usefulness. Factors that can effect the temperature pupae are raised at in turn can be the time of year they are

raised, and their position in the brood nest. The outer edges of brood nests are frequently only 33°C, which is, incidentally, the typical temperature for drone rearing and, not coincidentally, the varroa optimum.[6]

Can bees suffer childhood trauma?

Schulz et al.[7] looked at the lasting effect of starvation on bees, specifically, the later size and age distribution of the foraging force. They put together single-cohort (all same age) colonies of young bees and subjected some to a food shortage. A significantly higher percentage of bees became precocious foragers in the starved colonies and at a younger age.

Later they starved the colonies that had been fed, and fed the ones that had been starved, and found after a day the originally-starved colonies had reduced their foraging forces. The colonies that had initially been fed were slower to react, recruiting more foragers only after a two day delay.

But this is again, as usual, looking at the "personality" of colonies as a whole. So they put bees from initially-starved colonies in well fed ones and vice versa. Did the bees behave like all their new hive-mates? No, the bees from initially starved colonies behaved like bees from initially-starved colonies even when placed in well fed colonies, and vice versa.

Another study, by Sigg et al,[8] looked at the structural plasticity of bees' brains – that is to say, to what degree their brain physically changes with experience. They looked at the "glomeruli," which for our purposes I think are safe to think of as clusters of neurons ("a small sphere of densely packed synaptic neuropil that contains the terminal arbors of primary sensory afferent neurons"), located in the antennal lobes. It was already known that these glomeruli vary in size over the lifetime of bees but that it was caused by actual activity was only speculated about. By administering (a chemical analog to) juvenile harmone to bees or removing the foragers from subject nucleous hives, they were able to cause precocious (earlier in life than usual) foraging. As they hypothesized, the glomeruli associated with olfactory learning increased in volume compared to same aged bees who had not been caused to become precocious foragers, and improvement in associative learning performance corresponded to the glomeruli size.

Sullivan et al.[9] wanted to study to what degree the advancement of honey bees through their various jobs up to and including foraging is controlled by the juvenile hormone, versus other possible causes – so they removed the gland that produces it (the "corpora allata," I hear you shouting from the back) from some bees. They "sham operated" on some other bees for a control, the details of which we can only imagine since I only have access to the abstract. Not surprisingly, the

age at which the "allatectomized" bees became foragers was much older than their sham-operated peers. Manually administering juvenile hormone back to allatectomized bees reversed the effect though. The allatectomized bees did initiate foraging sooner, however, if they were placed in a single-cohort colony. Thus, while the juvenile hormone clearly has a lot to do with the progression of bees through jobs, it is not everything – they'll still advance just at a slower pace and can be affected by what their colleagues are doing.

Okay back to analyzing bees human-like qualities. Do bees get crook? I mean, we obviously know they get nosema as adults in addition to the numerous lethal brood diseases we know of, but do they get sick in the sense we can relate to, getting lethargic, grouchy and wanting to call in a sickie? Yes, it turns out. Kaziauskas et al.[10] studied this by injecting a lipopolysaccharide (LPS) (outer membrane component of gram-negative bacteria) into the thorax of honey bees, which should mimic a bacterial infection from the immune system's perspective without any active infection. The control bees were injected in the same manner but with a saline solution only. They then evaluated the subject bees for activity indicative of "sickness behavior." For a short time after this the "sick" bees exhibited lethargic behavior ("reduced locomotor activity"), and lost their appetite for the following 60-90 minutes. They interpret a reduction of antennal movements as the bees generally becoming unmotivated. It also led to diminished interaction between individuals. So there you have it, bees could be suffering from any sort of sub-lethal bee cold making them unmotivated and antisocial and you would probably not otherwise know about it.

Trophillaxis or food sharing by honey bees. (Bee Culture 2017 Clarence Collison)[11]

One question frequently wondered is why bees perform the "tremble dance," whereupon the individual shakes her body back and forth while rotating her body about 50° every second, whilst traveling throughout the broodnest, continuing doing so for about half an hour. Thomas Seeley, in a paper published in 1992[12] shows that the worker will reliably do this if she visits a highly profitable nectar source but upon return to the hive has trouble finding a food-storer bee to offload it to. As Seeley deduces, the message clearly seems to mean "I have visited a rich nectar source worthy of greater exploitation, but already we have more nectar coming into the hive than we can handle."

One might expect certain consequences of such a message being spread, and indeed the outcome one would expect reliably follows: the more bees quickly turn to nectar processing to increase capacity and fewer bees are recruited to nectar sources. Because of the division of labor in hives and lack of any central authority telling bees what to do, this means that the one message of which we have the assumed translation above is actually interpreted differently by bees in different tasks. Bees working inside the hive interpret it as "I should switch to the task of processing nectar," while field bees gathering nectar take it as meaning to them "I should refrain from recruiting additional foragers to my nectar source".

So all these studies about precocious foragers, is it good?

Do you want your bee children to be precocious? I think if you have a few naturally precocious bees it's fine to be proud of them, but don't start doping all your bees with octopamine. A study by researchers at Macquerie University[13] once again created precocious foragers by producing single-cohort colonies (SCC) and comparing them to "normal demography" colonies (NDC). They found that precocious foragers, who are less efficient flyers and heavier than normal foragers, were significantly more likely to die quickly during foraging flights. If I'm reading these charts right it looks like they have a barely over fifty percent chance of surviving their first 30 minutes, and 30% of the total precocious foraging force dies every day. Bees that became foragers at less than 14 days of age spent less time outside the hive, completed fewer flights, and took longer to perform the foraging flights they did do.

Because, of course, primarily bees are recruited to be foragers by the fact of an inadequate number of current foragers, where any factors are causing a high forager mortality this can cause a feedback loop where bees are recruited to be foragers at a younger age, die even more quickly out foraging, even younger bees are recruited to replace them, etc, leading eventually to the collapse of the colony. As Perry et al. note, “the failure of a honey bee colony is a breakdown of a society.”

Corresponding with author Andrew Barron, trying to find out exactly how long these bees live, he put me on to another paper[14] with which studied bees in Tasmania and NSW. To stoke inter-state rivalries I'll note “Hobart bees required fewer orientation flights to practice flying or orientate back to the nest.” The longest lived bees were Hobart bees that became foragers after 19.76 days and survived 12.24 days at foragers. The shortest lived were Sydney bees that became foragers after only 9.83 days and survived an average of 3.39 days.

You might note, this is a runaway feedback loop of ever younger bees being recruited to foragers and being ever more inefficient and prone to die at it eventually leads to a colony with nearly no adult bees, no dead bees in the hive, but a healthy queen and brood. What does that sounds like? Well those are the exact symptoms described for Colony Collapse Disorder.

Kris Fricke
Editor of the Australasian Beekeeper

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ASSESSING VIRULENCE OF VARROA DESTRUCTOR MITES FROM DIFFERENT HONEY BEE MANAGEMENT REGIMES

Abstract

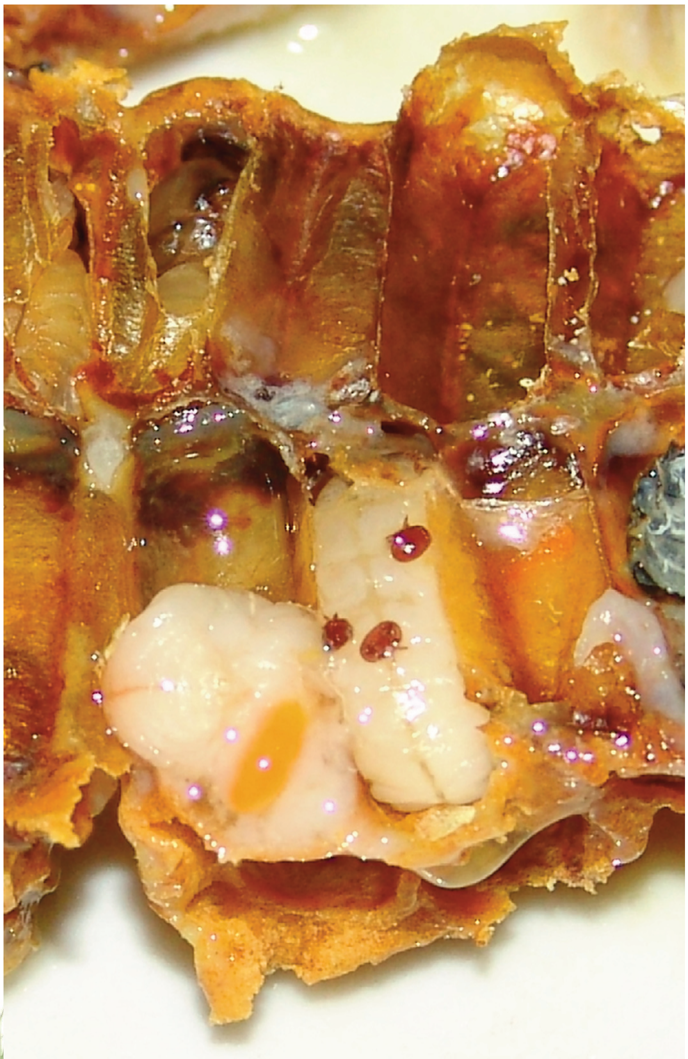
The mite Varroa destructor is an important honey bee parasite that causes substantial losses of honey bee colonies worldwide. Evolutionary theory suggests that the high densities at which honey bees are managed in large-scale beekeeping settings will likely select for mites with greater growth and virulence, thereby potentially explaining the major damage done by these mites. We tested this hypothesis by collecting mites from feral bee colonies, "lightly" managed colonies (those from small-scale sedentary operations), and "heavily" managed colonies (those from large-scale operations that move thousands of colonies across the US on a yearly basis). We established 8 apiaries, each consisting of 11 colonies from a standardized lightly managed bee background that were cleared of mites, and artificially infested each apiary with controlled numbers of mites from feral, lightly managed, or heavily managed bees or left uninoculated as negative control. We monitored the colonies for more than 2 years for mite levels, colony strength (adult bee population, brood coverage, and honey storage), and survival. As predicted by evolutionary theory, we found that colonies inoculated with mites from managed backgrounds had increased V. destructor mite levels relative to those with mites from feral colonies or negative controls. However, we did not see a difference between heavily and lightly managed colonies, and these higher mite burdens did not translate into greater virulence, as measured by reductions in colony strength and survival. Our results suggest that human management of honey bee colonies may favor the increased population growth rate of V. destructor , but that a range of potential confounders (including viral infections and genotype-by-genotype interactions) likely contribute to the relationship between mite reproduction and virulence.

1. INTRODUCTION

European honey bee (Apis mellifera L.) colonies have experienced widespread losses in the past decades in the US and Europe, which is a particular concern due to the importance that honey bees play in agricultural pollination services critical to both the economy and human health (National Research Council 57; Pettis and Delaplane 59). While honey bees are facing numerous challenges, from pesticides to land use changes, parasites have emerged as a significant factor in these losses (Potts et al. 60). In the first half of the 20th century, the obligate ectoparasitic mite Varroa destructor (Acari: Mesostigmata: Varroidae) made a sustained host switch from the Asian honey bee (Apis cerana) to the European honey bee (Rosenkranz et al. 65). Since that time, V. destructor has spread around the world and become the largest biotic threat, termed "varroosis", currently facing the beekeeping industry (Sammataro et al. 66; Rosenkranz et al. 65). In addition, V. destructor is a vector for a range of economically important viruses, and the interaction between these viruses and V. destructor is considered the single most impor tant factor in honey bee colony losses worldwide (Boecking and Genersch 9; Wegener et al. 71).

In the honey bee\system, the dynamics by which V. destructor mites interact with honey bee colonies can vary drastically. Feral honey bee colonies, those colonies that are unman aged by humans, typically occur at a density of around one per square kilometer in the USA (Seeley 67). In these isolated settings, bees and mites are not likely to interact with individuals from other honey bee colonies on a regular basis. In contrast, industrial beekeeping operations manage thousands of colonies in a much smaller area. Virulence-transmission trade-off theory (Boots and Sasaki 11; Boots et al. 12; Alizon et al. 2; Lion and Boots 50; Webb et al. 70) suggests that the higher colony densities and high rates of between-colony mixing foun d i n m a n ag ed op erations fav o r V. destructor mites with increased reproduction and virulence. According to trade-off theory, natural selection favors virulent parasites that cause reductions in host fitness by selecting for between-host parasite transmission (Levin and Pimentel 49; Anderson and May 5; Ewald 31; Bremermann and Pickering 14; Antia et al. 6; Bull 16; Levin 48; Boots and Mealor 10). This theory is based on the assumption that both between-host transmis- sion and virulence (usually defined as parasite-induced host mortality) increase with increasing within-host parasite reproduction, an assumption that has found empirical support in a wide range of systems (Messenger et al. 54; Mackinnon and Read 51, 52; Jensen et al. 40; De Roode et al. 25; Hawley et al. 37). As a result, parasites are generally expected to evolve an intermediate level of within-host growth and consequent virulence: parasites with low growth rates are selected against because of low between-host transmission, while parasites with high growth rates are selected against by killing the host before transmission can occur (Levin and Pimentel 49; Lenski and May 46). The expected level of optimal virulence, however, depends strongly on the density of susceptible host individuals, as well as the spatial structure of the population (Kamo and Boots 42; Boots and Mealor 10). In well-mixed high-density host populations, transmission opportunities are ample and the cost of high virulence in terms of killing hosts before transmitting is low. This type of environment is common in agricultural settings and according to theory can favor the evolution of higher virulence (Kennedy et al. 43). In contrast, in highly structured lowdensity host populations, transmission opportunities are rare and costs of virulence are high. As a result, evolutionary theory predicts selection for greater virulence in highly dense and well-mixed populations than in low density populations with high spatial structure. Evidence for such increased virulence evolution due to greater host density remains lacking outside of laboratory settings (Kerr et al. 44; Boots and Mealor 10), but it is now clear that practices imposed by agriculture can select for more deadly parasites, as has been demonstrated, for example, in the increased virulence of the virus causing Marek's disease due to vaccination of chickens with a vaccine that provides tolerance, but not resistance, to the target virus (Atkins et al. 7; Read et al. 62).

The contrasting transmission conditions driven by density and population mixing are crucial to honey bees, where industrial beekeeping practices have shifted the hostparasite interaction from low densities with high spatial structure in feral bees to highly dense and well-mixed populations in industrially managed bees. Thus, based on virulence transmission trade-off theory, we would expect greater selection for parasite growth and virulence in managed honey bee colonies than in feral colonies (Brosi et al. 15). By promoting increased transmission opportunities, manage- ment practices such as moving frames of brood to boost struggling colonies (a common beekeeping practice) and the high rates of mixing of managed bees due to migratory beekeeping could contribute to Varroa destructor virulence evolution and be responsible for maintaining virulent Varroa destructor genotypes in managed honey bee colonies (Fries and Camazine 32; Calderón et al. 17; Guzmán-Novoa et al. 36; Brosi et al. 15).



Our current understanding of these relationships in the honey bee system is limited, but there is a small amount of research that is consistent with the virulence-transmission trade-off hypothesis. Based on a comparison of bee colonies infected with mites from different backgrounds, Seeley (67) proposed that avirulent mite strains may explain feral colonies surviving V. destructor better than feral bee resistance to the mites. Migratory beekeepers have reported more colony mortality than small-scale beekeepers (Dahle 22). More V. destructor transmission has been observed in higher-density (compared to lower-density) honey bee colonies (Nolan and Delaplane 58; Dynes et al. 30). Furthermore, studies indicate a genetic basis for variation in mite virulence, confirming that virulence could be acted upon by natural selection (De Jong and Soares 23; Anderson 4; Corrêa-Marques et al. 20, 21).

To understand if mites from different management regimes have evolved contrasting virulence, we completed a large and replicated study at the apiary level to examine varroosis using a highly standardized approach which to our knowledge has not been previously attempted. Specifically, we compared how mites evolved from different honey bee management histories (feral, lightly managed, or heavily managed) reproduced and affected bee colonies from a common, lightly managed background. We hypothesized that V. destructor mites that evolved under more intensive honey bee management regimes had greater population growth rates and increased virulence compared with lower honey bee management intensity. We measured both mite burdens and effects on colony strength over more than 2 years. The strength of our approach lies in our colony and queen standardization, mite clearance, standardized inoculations, and replication at the apiary level.

2. MATERIALS AND METHODS

2.1. Overview

We performed a virulence assay on V. destructor mites collected from different honey bee management backgrounds on bees obtained from a lightly managed background such as one would find with backyard beekeepers. Our purpose was to determine whether management conditions have selected for mites with differential growth rate and/or virulence and whether colony response differs among these backgrounds. We established eight apiaries, each consisting of 11 colonies, for a total of 88 colonies, in June 2015 around Athens, GA, USA, maintained by the University of Georgia Honey Bee Lab. Colonies were initially cleared of mites and subsequently inoculated with mites (N = 100 in multiple doses over the course of 2 months). We used 7–9 mite donor colonies for each management background type (feral, lightly managed, and heavily managed). In order to ensure a sufficient quantity of mite inoculations for each experimental colony, mites were pooled from between 1 and 3 of the 7–9 possible donor colonies (Table I). Colonies in two apiaries each were inoculated with mites from feral, lightly managed, or heavily managed backgrounds, while two apiaries were established as negative controls and were not inoculated with mites.

2.2. Mite and honey bee backgrounds

2.2.1. Mite sources

We collected live mites from different source backgrounds by dusting colonies with powdered sugar and gathered mites that were dislodged and fell onto a piece of cardboard placed on the bottom of the hive. Mites from feral backgrounds were obtained from honey bee colonies that originated from swarm traps placed in remote forest settings (to reduce likelihood of swarms from recently managed colonies) in Georgia (Oconee National Forest or the Okefenokee National Wildlife Refuge), while mites from lightly managed backgrounds originated from colonies from typical backyard beekeeper management systems. For the heavily managed mites, we acquired mites from a migratory beekeeper that manages thousands of colonies. Colonies were housed in standard five-frame Langstroth nucleus hive boxes and we attempted to minimize drift by arranging colonies in a circular layout with all entrances facing outwards from the center of the circle, with 1 m between the colonies. We further attempted to minimize drift by maximizing bees' ability to visually distinguish between colonies (Dynes et al. 30). The colonies were painted different colors, placed at different heights above the ground (5, 20, or 40 cm), with different symbols painted at the hive entrance.

Apiary	Mite background	Number of colonies receiving mites (mite donor source)
1	Negative control	NA
2	Heavily managed	5 (HM7), 2 (HM1/6), 1 (HM8/13), 1 (HM10/12), 1 (HM6/10/12)
3	Lightly managed	3 (LM1/8), 2 (LM2), 2 (LM3), 2 (LM6/29), 1 (LM5)
4	Feral	4 (F7/13), 2 (F1), 2 (F3/10), 1 (F6), 1 (F2/14), 1 (F6/13)
5	Lightly managed	3 (LM5), 2 (LM2), 2 (LM3), 2 (LM6/Farm9), 1 (LM1/8), 1 (LM1/2/8)
6	Heavily managed	5 (HM7), 2 (HM1/6), 2 (HM10/12), 1 (HM2/27), 1 (HM8/13)
7	Negative control	NA
8	Feral	5 (F7/13), 3 (F6), 1 (F1/2), 1 (F2/14), 1 (F3/F10)

Table I. Mite inoculation sources within each apiary

2.2.2 Colony standardization, mite clearance, and mite inoculation

We started with highly standardized colonies to minimize variation. We obtained mated queens from a single queen breeder in southern Georgia, USA, and added 1.1 kg (2.5 lb) adult bees from a common genetic background to each package. To clear mites from the standardized packages, we placed them in a dark room overnight at 16.6 °C (62 °F) and sprayed with sugar water 1 h prior to the application of 30 mL of a 2.8% oxalic acid solution (Milani 55). Each package was installed 3 days later into a nucleus colony in a randomly assigned apiary at least 5 km from any known colonies (Figure S1, map). Mites were collected from source colonies outside of the experiment by sifting powdered sugar over the colony and collecting dislodged mites at the bottom of the colony. We used small natural fibered paintbrushes to place mites on damp coffee filters. We kept mites in an incubator set at 35 °C (95 °F) until all mites were collected for each dose. We then transferred all mites (N = 100 mites per colony) evenly to an uncapped brood frame and waited to ensure that mites were crawling before returning the frame to the colony.

To maintain our focus on these original colonies (and their queens), we enacted swarm control on colonies likely to swarm by splitting those colonies. We standardized swarm control in this manner to ensure that small colonies were not jeopardized by the procedure. A total of 33 out of the 72 colonies that remained alive were split in March and April of 2016. We employed a Fisher's exact test to determine that there was not a statistically significant difference (X 2(3) = 6.44, P = 0.092) in amount of splitting between our treatment groups. During the experiment, we did not conduct any control measures against V. destructor . We continued the experiment from June 2015 through December 2017, at which point only 12 of the original 88 colonies were surviving.

2.3. Data collection

2.3.1 Measuring V. destructor infestation

We measured V. destructor infestation levels using three different methods. First, we used an alcohol wash method described by Fries et al. (33). This method involves destructively sampling approximately 300 bees from a colony in alcohol and counting bees and mites (which detach from the bees allowing easier counting) to get a relative mite level on the adult bee population. We took eight alcohol wash samples throughout the experiment (roughly once a month during summer and fall and once every 3 months at other times of the year). Second, we used sticky boards (Branco et al. 13), a standard method to evaluate V. destructor levels in a colony by collecting mites that fall and become entrapped on a board placed at the bottom of a colony. We measured mite levels with sticky boards six times through- out the experiment including one measurement immediately following package installation to confirm that colonies were V. destructor free (roughly every 3 months during the first year and at the end of the experiment). Third, we measured the mite population in brood cells by opening 100 covered brood cells in each colony and counting the number of mites. We measured mite levels in brood cells five times throughout the experiment (roughly every 4 months).

2.3.2. Colony strength assessments

We took periodic strength assessments throughout the experiment in order to evaluate the effect of mite background on colony strength. We followed the assessment guidelines outlined in Delaplane et al. (27) to measure colony strength in terms of (1) adult bee population, (2) amount of brood, and (3) amount of honey stored for each colony. We performed these colony assessments five times over the 2 years of the experiment (roughly every 4 months). We also recorded the date each colony was found to be dead and last known date it was alive for survival analyses.

2.4. Statistical analysis

2.4.1. Overview

We explored how our treatment levels (mites from feral, lightly managed, and heavily managed backgrounds) affected the mite burdens and health response outcomes at the colony level. We also assessed the effects of mites from our different mite donor colonies within each treatment level to determine whether variation exists within the treatment levels. We conducted analyses based on three classes of response variables: (1) colony-level mite infestation levels, (2) colony strength parameters, and (3) colony-level survival.

2.4.2. Mite infestation levels and colony strength

Our experiment used longitudinal repeated measures and nested random effects which can result in temporal and within-subject autocorrelation and violates the assumption of independence for parametric and linear regression methods. Therefore, we used generalized estimation equations (GEE) to account for repeated measures including temporal autocorrelation. GEE models are similar to the more common generalized linear mixed models (GLMM), but handle within-group correlation as a marginal model rather than as a conditional model found in GLMMs (Hubbard et al. 39). We used the 'geeglm' function in the 'geepack' package v1.2-1 (Højsgaard et al. 38) in R v.3.4.2 (R Core Team 19) to specify and evaluate the GEE models in particular because it allows for longitudinal data with missing observations. We blocked the data by apiary and c olony and utilized an autoregressive (AR1) autocorrelation structure to compare treatment levels with negative control colonies. We used the 'lsmeans' package v. 2.27 in R to conduct post hoc pairwise comparisons of response variables of mites from different donor colonies using Tukey's method for multiple comparisons (Lenth 47). We used the 'missMDA' package v.1.12 in R (Josse and Husson 41) to impute missing values (N = 917 out of a total of 1869 values) for mite measurements that did not occur in the same months and then created a composite index combining the three methods of mite measure using a unity-based normalization index (Dodge et al. 28). This index takes each method of mite measurement and scales the measurement to a value between 0 and 1 by comparing the measurement to the minimum and maximum value for that method. The normalized value for each method of measurement is then added to the other methods for that particular sample for a composite index value. We employed a GEE model to evaluate this composite index in addition to each of the individual mite measures. We similarly assessed colony strength measures (adult bee population, brood production, and honey stores) using GEE models to compare treatment levels to negative control colonies.

2.4.3. Survival analysis

We performed survival analyses to determine whether there was a difference in colony survival based on mite background. Colonies were inspected periodically throughout the experiment and exact timing of colony death could not be determined. Therefore, we used an interval of date of observed colony death and date of last known colony viability. Given this data structure, we analyzed survival with mixed-effects survival (frailty) Cox proportional hazard models, with interval censoring via the 'frailtypack' package (Rondeau et al. 64) in R.

3. RESULTS

3.1. Overview

We collected data on mite levels and colony strength parameters for each colony. The colony strength assessments resulted in 231 measurements from each colony on the adult bee population, brood coverage, and honey storage. In order to evaluate V. destructor levels throughout the experiment, we collected 413 sticky boards, 353 alcohol washes (each containing approximately 300 worker bees), and 189 counts of mites in the brood (each including 100 brood cells).

3.2. Mite infestation levels

The GEE model for mite levels as assessed by sticky boards showed that colonies inoculated with mites from heavily managed backgrounds had significantly (Wald = 4.06, P = 0.044) higher mite levels over the course of the experiment than the negative control colonies (Figure 1a).

The model for the alcohol wash data showed that colonies inoculated with mites from lightly managed backgrounds had significantly (Wald = 3.94, P = 0.047) higher mite levels (Figure 1b). The mites in brood measurement did not show any treatment level significantly different from negative controls (Figure 1c).

However, the trend in this measurement is consistent with the other two measures with colonies inoculated with feral mites tending to have the lowest mite levels and the treatment groups from managed backgrounds having the most mites.

The GEE for the composite index, which combines the three measurements of mite level, indicated that colonies inoculated with mites from both lightly and heavily managed backgrounds had significantly (Wald = 5.99, P = 0.014 and Wald = 4.55, P = 0.033, respectively) higher mite levels than the negative controls (Figure 1d). We did not find significant differences in mite levels within mite donor colony treatment groups.

3.3. Colony strength and survival analysis

The GEE model for the amount of brood showed that colonies inoculated with mites from feral backgrounds had significantly (Wald = 8.27, P = 0.0040) lower levels of brood production (Figure 2). The models for adult bee population and honey stores did not show any significant differences between the treatment groups and the negative control colonies. The feral and heavily managed treatments showed pairwise within treatment differences for adult bees based on mite donor colonies. The feral treatments had three significantly different pairwise comparisons (Wald = 19.67, P = 9.2 × 1−6 to Wald = 4.13, P = 0.042). The heavily managed treatments had five significantly ifferent pairwise comparisons (Wald = 14.38, P = 0.00015 to Wald = 3.91, P = 0.048).

4. DISCUSSION

4.1. Overview

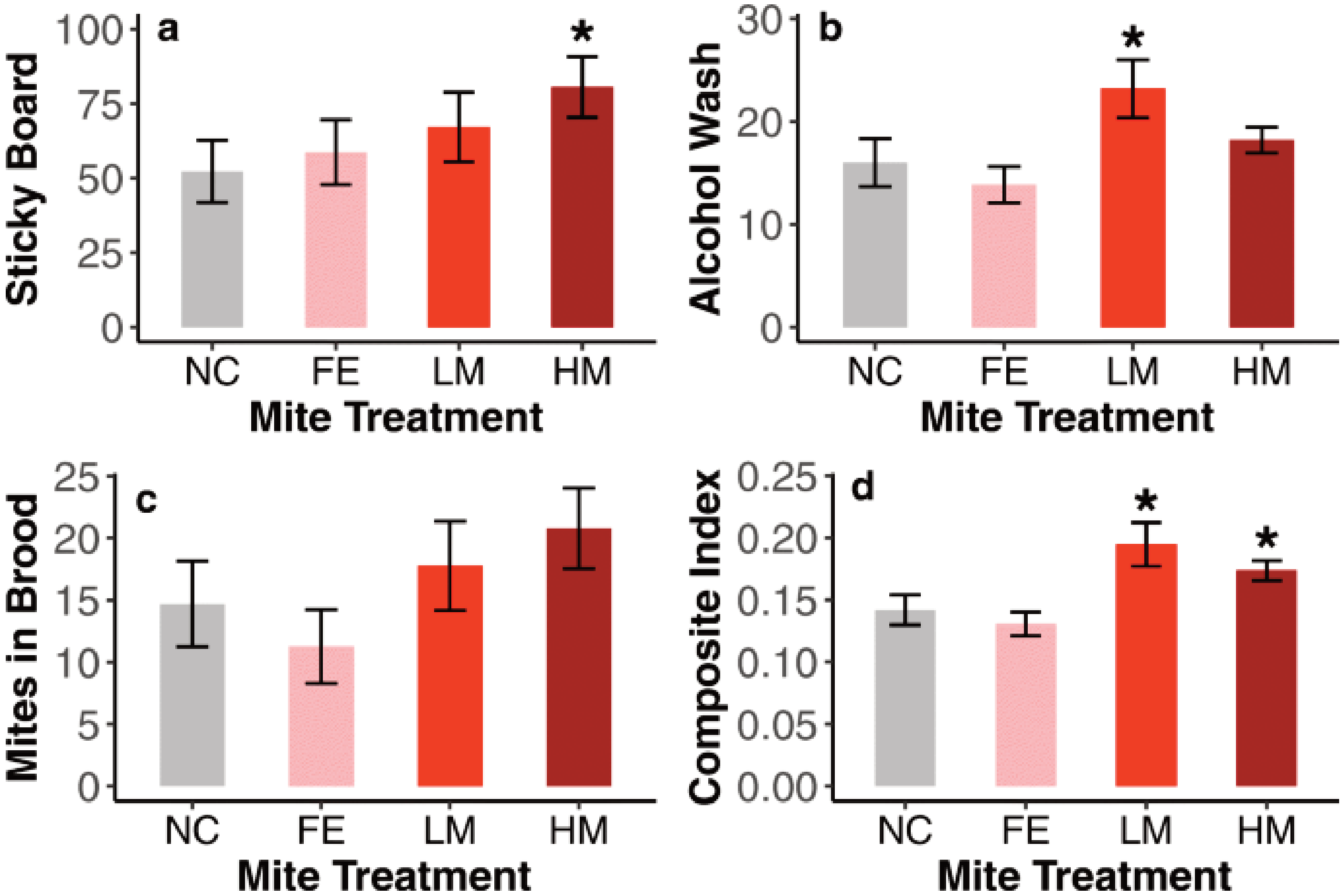


Figure 1. Measures of mite abundance by treatment over the course of the experiment (NC = Negative Control, FE = Feral, LM = Lightly Managed, HM = Heavily Managed). a Sticky board, b alcohol wash, c mites in brood, and d composite index of all three measurements. GEE models were employed for data in each panel to determine significant differences from the negative controls. More mites were found in colonies with mites from heavily managed backgrounds (a Wald = 4.06, P = 0.044) and lightly managed backgrounds (b Wald = 3.94, P = 0.047). Note that while significance was not always found in each mite measurement (a –c), the trend in each is consistent with our hypothesis. A unitybased normalization index was used in panel d to combine all three mite measurements. This reduced the measurement variation and showed a significant difference between mites from the lightly managed (Wald = 5.99, P = 0.014) and heavily managed (Wald = 4.55, P = 0.033) backgrounds from the negative controls which is consistent with our hypothesis. Error bars represent SEM

The conditions for V. destructor are substantially different in managed bee colonies versus feral bee colonies (Seeley 67). The colony densities found in managed colonies far exceed those found in feral populations and may facilitate dis- ease transmission (Seeley and Smith 68). According to theory, increased transmission between honey bee colonies may alter selection pressure to favor increased replication and virulence (Brosi et al. 15). We performed a large replicated study assessing how mites from different management backgrounds interacted with honey bees from a single background. We were able to replicate varroosis by standardizing bee background, clearing mites, and inoculating with controlled doses of mites in a large replicated study, which has not been documented before. Our work provides evidence consistent with theory that densities in managed colonies have favored Varroa destructor strains with increased growth rates. Specifically, we found increased levels of mites in colonies inoculated with mites taken from managed honey bee populations. However, we did not find the negative consequences we expected for colony strength and survival based on increased mite levels. In fact, for one response variable (brood production), we found that colonies inoculated with mites from feral backgrounds had a negative colony strength outcome relative to bees inoculated with mites from managed backgrounds.

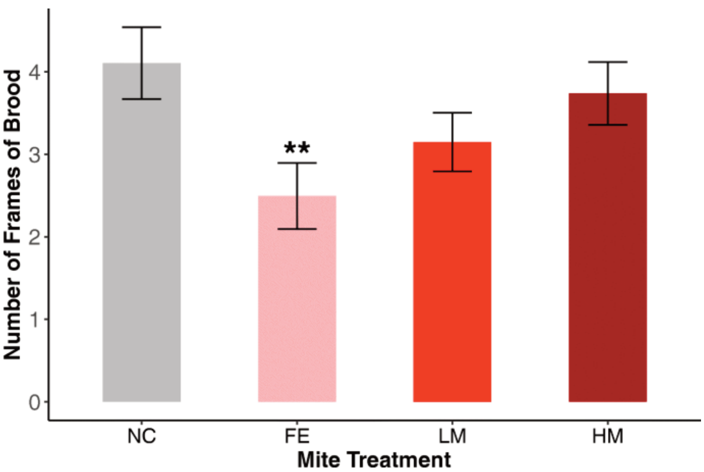


Figure 2.
Number of frames of brood by treatment over the course of the experiment (NC = Negative Control, FE = Feral, LM = Lightly Managed, HM = Heavily Managed). A GEE model found significantly (Wald = 8.27, P = 0.0040) fewer frames of brood in the colonies inoculated with mites from a feral background. Note that the trend in the experimental treatment groups is opposite to what we predicted.
Error bars represent SEM

4.2. Mite infestation

Our finding of increased levels of V. destructor mites in colonies inoculated with mites from man- aged backgrounds (Figure 1) suggests that honey bee management conditions have favored increased mite reproductive rates. While these levels were not always significantly different from negative controls for each mite measure (Figure 1a–c), the trend was always consistent with our predictions, with colonies inoculated with mites from feral backgrounds exhibiting the lowest mite levels and mites from managed back- grounds showing increased mite burdens. The composite index of all three mite measures (Figure 1d) reduced within-group variation and showed that colonies inoculated with mites from managed backgrounds had increased levels of infestation. This is consistent with the idea that mites from feral vs managed backgrounds are under different selection pressures with potential differences in mite growth and/or virulence (Corrêa-Marques et al.

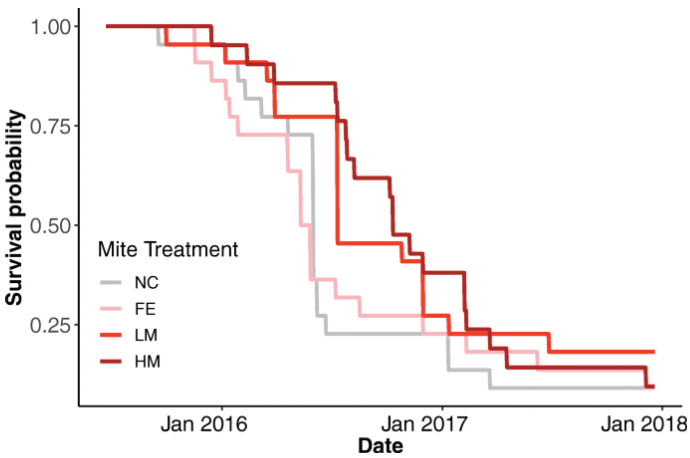


Figure 3.
Survival curves by mite treatment (NC = Negative Control, FE = Feral, LM = Lightly Managed, HM = Heavily Managed). A Cox proportional hazard model with interval censoring did not find a significant difference between the groups

4.3. Colony strength and survival analysis

We found significant within-treatment differences based on mite donor colony for adult bee population in apiaries inoculated with mites from feral or heavily managed bees. This indicates genetic variation in mites among feral and heavily managed bee popu- lations, as has been found in other studies (Dynes et al. 29). While we did not find significant differences in adult bee population or honey stores across treatment groups, we found that bees inoculated with feral- background mites produced less brood than bees inoculated with mites from managed backgrounds (Figure 2). This was surprising because we expected the opposite: that higher levels of mites would lead to negative colony strength outcomes. There are five potential explanations for this pattern that we consider here.

First, the bees we used could be adapted to the mite strain that they coevolved with. Predicting the outcome of host-parasite interactions, such as in the honey bee—V. destructor system—can be complicated by interactions between host and par asite genotype. Genotype-by-genotype (G × G) interactions mean that some parasite strains are more successful against some hosts and some hosts less susceptible to certain parasite s t rains (Lambrechts et al. 45). When G × G interac- tions occur, no single parasite strain optimally infects all hosts, while no single host strain is optimally defended against all parasite strains (Carius et al. 18; Lambrechts et al. 45; de Roode and Altizer 24). Both theory and empirical studies indicate that coevolution can lead to increased host tolerance; as a conse- quence, a novel parasite strain from another evolutionary background can lead to more vir- ulence than a coevolved parasite (Greischar and Koskella 35; Miller et al. 56; Read et al. 61; Hawley et al. 37; Gibson et al. 34). If this is the case, the observed patterns of mite growth and colony strength may be due to a genetic mismatch between lightly managed bees and mites from feral colonies, with lightly managed bees resisting, but not tolerating, mites from feral colonies. This means that the bees are able to keep parasite population levels in check (resistance) but are unable to cope with the damage caused by these lower levels of para- sites (tolerance) (Restif and Koella 63; Best et al. 8). Thus, while we would predict that the higher transmission opportunities in managed honey bees select for greater mite virulence, we may also predict greater selection for host resistance and tolerance, and the existence of mismatches in coevolved mite and honey bee strains may make virulence outcomes more difficult to predict. A full cross-infection experiment using bees from different backgrounds (in addition to mites of different backgrounds, as we assessed here) is needed to follow up and explore this hypothesis.

Second, honey bee queens may adjust their egg laying frequency based on mite-induced bee mortality. This pattern of increased brood production as a potential means of compensation for higher brood parasitism in V. destructor -infested colo- nies was noted by Delaplane and Hood (26). Third, our negative controls, which were initially cleared of mites and not inoculated, had greater mite levels than we expected. This suggests that horizontal transmission of mites from outside the experiment could have occurred (Nolan and Delaplane 58). We isolated our experimental apiaries from all known colonies by at least 5 km to minimize this potential, but we cannot discount this as a possibility. Fourth, our mite clearance protocol may not have been as successful as we anticipated, and residual mite populations could have overtaken the inoculated population. However, our first sticky board samples taken after clearance and before inoculation showed most colonies having zero mites and an overall low average of 2.29 mites detected in the 72-h sample per colony. Thus, our inoculation of 100 mites should have overwhelmed any residual mite population. Finally, it is well known that the negative consequences of Varroa destructor infestation are both due to the mites themselves and the viruses they transmit, and differences in viral virulence are well established (Anderson 4; Vojvodic et al. 69; McMahon et al. 53).

As such, it is possible that feral mites harbor different populations of viruses than those circulating in managed colonies and these feral viruses could have differential virulence or G × G interactions, leading to distinct health outcomes relative to mite infestation on their own in the absence of viruses.

Colony level mortality was a key measurement in our assessment of virulence of Varroa destructor on the honey bee colonies. The level of colony mortality (86%) across 2 years by the simple addition of mites indicates just how virulent V. destructor mites are for honey bee colonies. These findings are in line with another study that determined V. destructor was responsible for > 85% of the colony mortalities (Guzmán-Novoa et al. 36). However, we did not find an effect of mite background on colony survival (Figure 3). We had expected that the higher mite levels in colonies inoculated with mites from managed backgrounds would translate into worse health outcomes and reduced colony survival in these colonies. That we did not see these results suggests that there are other factors such as queen health (Amiri et al. 3) or viral infections that play a more important role than mite infestation. Additionally, the finding that our negative controls had similar survival outcomes as our treatment groups demonstrates that a single treatment for Varroa destructor infestations is ineffective, even when that treatment clears all or nearly all mites from a colony. One study found that while a single treatment of oxalic acid caused 97.6% mortality in V. destructor mites, an additional treatment resulted in 99.6% mortality leaving the possibility that a small population of mites could reestablish after a single treatment (Al Toufailia et al. 1).

4.4. Future research

While our study provides insights into how mites from different backgrounds interact with bee colonies of a similar background, our results also indicate that a cross-infection study with bees from different backgrounds would help us further understand the trade-offs that occur in this system. Specifically, we suggest that future studies explore how human management contributes to virulence-transmission trade-offs by measuring transmission and virulence of mites introduced into mite-free apiaries such as Hawley et al. performed with a bird disease (2013). Additionally, we need to determine the conditions under which mite levels are dissociated from colony harm. Future work needs to focus on the role viruses play in the Varroa destructor - honey bee system. This three-way system could interact in potentially unexpected ways including mechanisms that confound our present understanding.

5. CONCLUSION

Host population densities in managed honey bee apiaries are vastly different than what Varroa destructor experiences in feral honey bee populations. We provide evidence consistent with the idea that selection pressures on mites in these managed conditions favor increased reproductive rates. This could act to increase the transmission rate in these managed environments. However, we did not find negative strength and survival outcomes that we expected with these higher mite burdens. Mites from feral backgrounds may have caused negative health outcomes due to a mismatch in coevolved bee and mite strains. Future research needs to determine the conditions under which mite levels are dissociated from virulence and whether human management of bee colonies is driving selection for more damaging mites.

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SOME BEE PRODUCTS AS ANTIPARASITIC REMEDIES

Abstract

Honeybee gives people one of the most valuable and healthy foods. These are honey, propolis, royal jelly, bee pollen, bee venom, wax. The healing properties of bee products are described in manuscripts discovered in ancient Egypt, Greece and China. Many of them are widely used in medicine for the treatment of bacterial and viral infections, to enhance the immunity of organism, for treatment of poorly healing wounds, in a variety of tumor diseases, in the gastro-intestinal diseases, promote the potency and fertility. Bee products have comparable healing properties to established drugs but they have fewer side effects. In this work we present some of the experiments that explore the impact of bee products to different parasites.

Introduction

Parasitic diseases are among the most prevalent infections worldwide. Human parasitic diseases can be classified into two principal groups: those caused by protozoa and those caused by helminths. Although helminths are probably the most widespread of human parasites, most are relatively benign, and treatable with relatively straight forward regimens of modern drugs. Of course traditional medicines are still used, and are valuable especially for those who do not have access to such drugs. However, the most lethal parasitic diseases, to which modern medicine has yet to find optimal treatments, are the blood and tissue protozoa, namely malaria, trypanosomiases and leishmaniases [8]. According to Centre for Host-Parasite Interactions, Institute of Parasitology, Quebec, Canada (2012) infections by parasitic protozoa and helminths cause considerable death, suffering and economic loss both in developing and developed countries. Malaria infection is one of the most prevalent and debilitating diseases in developing countries with 300–500 million clinical cases each year and 1–2 million deaths, mostly in children under 5 years of age. More insidiously, malaria reduces economic growth in Africa alone by 1,3 % per annum (p.a.). Parasites also threaten animal productivity and food production. Over 500 million large ruminants are infected with parasitic worms resulting in economic losses of over $3 billion p.a. worldwide. It has recently been estimated that production of meat and milk in South Eastern Asia alone will need to grow by 3 % p.a. over the next 2 decades to avoid a food crisis by 2020. The widely use of chemical drugs to combat with parasites in animals and humans has resulted in a growing resistance to them. On the other hand a large part of the used drugs have a number of side effects to host or to environment.This requires searching and studying the new, most effective, unexpensive and harmless to hosts of the parasites remedies. In the literature there is evidence for some anti-parasitic properties of bee products – honey, propolis and bee venom. In this paper we present some of the lates experiments that explore the impact of bee products on some social and economic actual parasitoses.

Honey

The aqueous extract of natural sweeteners, including honey, has been investigated for anthelmintic activity using earthworms (Pheretima posthuma), tapeworms (Raillietina spiralis) and roundworms (Ascaridia galli) by Prasad et al. [6]. Various concentrations (100–300 mg/ml) of sweeteners extract have been tested in the bioassay. Piperazine citrate (10 mg/ml) has been used as reference standard drug whereas distilled water as control. Determination of paralysis time and death time of the worms have been recorded. Extract of honey has exhibited high significant anthelmintic activity at highest concentration of 300 mg/ml. The result has shown that aqueous extract possesses vermicidal activity and has found to be effective as an anthelmintic. Higher concentration of extract has produced paralytic effect much earlier and the time to death has been shorter for all worms. Aqueous extract has showed anthelmintic activity in dosedependent manner giving shortest time of paralysis and death with 300 mg/ml concentration, for all three types of worms. Extract has exhibited more potent activity at lower concentration (100 mg/ml) against roundworm (Ascaridia galli). Honey has showed less paralytic time and death time when compared to Cane jaggery and Palm jaggery. The orders of anthelmintic activity of natural sweetening agents have been as follows: Honey > Palm Jaggery > Cane Jaggery. The authors explain that acidic pH level of natural sweeteners prevents the growth of many helminthes and that natural sweeteners have a saturated mixture of monosaccharides. This mixture has a low water activity; most of the water molecules are associated with the sugars and few remain available for helminthes, so it is a poor environment for their growth.

Sajid and Kamran Azim [7] have examined the effect of natural honey on model nematode Caenorhabditis elegans and analyzed the honey components responsible for nematicidal activity. Characterization of honey-treated C. elegans has done using fluorescence and phase contrast microscopy. Egg-laying and egg-hatching defects of honey-treated C. elegans have been studied.

For identification of nematicidal components, bioactivity-directed fractionation of honey samples has been carried out using dialysis, ultrafiltration, chromatographic, and spectroscopic techniques. Natural honeys of different floral sources have showed nematicidal activity against different developmental stages of C. elegans. The nematicidal components of honey have induced cell death in intestinal lumen and gonads of C. elegans as revealed by microscopy. The nematicidal action of honey has been found to due to reproductive anomaly as manifested by defects in egg-laying and hatching by C. elegans. Honey with concentration as low as 0,03 % has exerted profound egg-laying defects, whereas 6 % honey has showed defects in egg hatching. The major sugar components of honey have not been involved in observed nematicidal activity. The bioactive components responsible for anti-C. elegans activity have been found in the 2–10 kDa fraction of honey, which has been resolved into 25 peaks by reverse phase HPLC. LCMS followed by further spectroscopic characterization have revealed a glycoconjugate with the molecular mass of 5511 as the major nematicidal component of honey.

Propolis

Duran et al. [3] have investigated antileishmanial activities of «Bursa» and «Hatay» propolis samples against Leishmania infantum and Leishmania tropica strains. Propolis samples have been analysed with the gas chromatography-mass spectrometry technique. Promastigotes have been incubated in the absence and presence of several concentrations (50, 100, 250, 500, 750, and 1,000 µg/mL) of each propolis sample. The viability and cell morphology of promastigotes in each concentration have been examined after 24, 48, 72, and 96 h of incubation. The growth ofleishmania parasites has been significantly suppressed in the presence of 500, 750, and 1,000 µg/mL of «Hatay» propolis. «Bursa» propolis has found to be efficient in inhibiting the growth of leishmania promastigotes in culture media at these concentrations, 250, 500, 750, and 1,000 µg/ mL. Thus, the in vitro results have showed that the «Hatay» and «Bursa» propolis samples have decreased significantly the proliferation of L. infantum and L. tropica parasites, however «Bursa» propolis has found to be more effective than «Hatay» propolis against leishmania promastigotes. According to the authors these two natural products may be useful agents in the prevention of leishmanial infections.

Brazilian red propolis was administered orally to Santa Inês ewes, and evaluation was made of general health and hematological, biochemical, and parasitic responses during and after flushing [5]. Thirty mature, nonlactating, nonpregnant ewes have been grazing tropical pasture and, as flushing after synchronization, have been supplemented with a concentrate-roughage mixture at a rate of 4 % body weight (BW). Ewes have been divided according to BW and fecal egg count (FEC) into two groups: control and propolis that have received propolis ethanolic extract at rates of, respectively, 0 and 3 g/ewe/day. The treatments have lasted 21 days until the end of flushing period. BW and body condition score (BCS) have been recorded, and blood and fecal samples have been taken weekly for 8 weeks. Mean values of BW and BCS have not been affected by propolis administration. Propolis has increased total leukocytes, but no significant differences have been observed for other hematological parameters. Propolis has increased total protein and globulin concentrations and decreased triglycerides, glutamate oxaloacetate transaminase, and glutamate pyruvate transaminase. Propolis decreased FEC. The authors have made the conclusion that propolis administration had good impact on ewe health and may be a promising feed additive during critical periods such as flushing.

Bee venom

Aiming to avoid adverse effects of metronidazole which is used for trichomoniasis treatment Kim et al. [4] have studied antiparasitic effect of bee venom on Trichomonas vaginalis. In this investigation, bee venom effectively has inhibited T. vaginalis growth in a concentrationdependent manner. In their study Adade at al. [1] have demonstrated that bee venom can affect the growth, viability and ultrastructure of all Trypanosoma cruzi developmental forms, including intracellular amastigotes, at concentrations 15- to 100- fold lower than those required to cause toxic effects in mammalian cells. The ultrastructural changes induced by the venom in the different developmental forms have led authors to hypothesize the occurrence of different programmed cell death pathways. They have established that the main death mechanism in epimastigotes is autophagic cell death, characterized by the presence of autophagosomes-like organelles and a strong monodansyl cadaverine labelling. In contrast, increased TUNEL staining, abnormal nuclear chromatin condensation and kDNA disorganization has been observed in venom-treated trypomastigotes, suggesting cell death by an apoptotic mechanism.

The same authors group has found that the influence of bee venom is due to effect of the antimicrobial peptide melittin, which comprises 40–50 % of the dry weight of it [2]. Findings of the authors have confirmed the great potential of A. mellifera venom as a source for the development of new drugs for the treatment of neglected diseases such as Chagas disease.

Conclusion

The present review on the influence of some bee products on helminthoses and protozoan diseases showed promising results about the use of honey, propolis and bee venom in the fight against parasitic diseases.

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USE OF GEOMETRIC MORPHOMETRICS TO DIFFERENTIATE SELECTED LINES OF CARNIOLAN HONEYBEES (APIS MELLIFERA CARNICA) IN SERBIA AND MONTENEGRO

Abstract

In a selection of honeybees from autochthonous ecotypes, different lines must be identified. Honeybee lineages are usually distinguished by classical morphometrics and molecular markers, but these approaches are both costly and time-consuming to implement. Recognition of the purity of races is very important for regional and country regulations to allow a sustainable conservation of the huge variety of local honeybees. A geometric morphometric approach has been frequently used. In this work, honeybee samples were collected from stationary apiaries (belonging to the centers for honeybee queen selection) from two different Serbian areas: Vršac (northeastern Serbia, mostly flatland) and Vranje (southern Serbia, mostly mountainous), and two different Montenegrin areas: Bijelo Polje (northern Montenegro, mountainous region) and Sutomore (southern Montenegro, coastal region). Each sample consisted of 150 honeybee workers, collected from 10 hives (15 specimens each). On the honeybee left forewings, a total of 19 vein intersections were used to determine the differences among the honeybees using MorphoJ 1.4a software. Canonical variate analysis (CVA) slightly separated the honeybee lines into one overlapping cloud of specimens at the individual level. The first canonical variable (60.57% of the total variability) discriminated mainly between Bijelo Polje and Sutomore honeybee lines. Therefore, on the colony level, CVA separated all four groups of breeding honeybee lines. The results show that geometric morphometrics are reliable in the discrimination of honeybee lines within subspecies only at the colony level.

Introduction

The first serious selection work of honeybees in Serbia (and the former Yugoslavia) began in the former Beekeeping Corporation Belgrade in the early 1980s. As a basis for selection work, populations of "gray honeybees" from the Serbian part of the Pannonian Plain were used. The first center for honeybee breeding and reproduction of honeybee queens licensed by the Serbian Ministry of Agriculture was the “Apicentar” from Belgrade. In the late nineties, the Faculty of Agriculture of the University of Belgrade assumed the leading role in apiculture selection methods throughout the territory of the Republic of Serbia by forming Centers for honeybee selection and a network of subcontractors of queen breeders. The basic model of this work was the breeding of pure honeybee races and application of the selection of the open line type (a method of line breeding). With this type of selection and with the help of pedigree on the mother’s side, a significant improvement in honey productivity and more disease tolerance can be achieved (Moritz, 1986). This work was only with the autochthonous Carniolan honeybee subspecies Apis mellifera carnica, and to date no other subspecies of A. mellifera has been used in Serbia.

Many selected lines of the Carniolan honeybee occur over a wide range of the Balkan Peninsula. They mainly differ in behavioral and morphological traits. Originally, discrimination of selected lines is not possible based on descriptive methods, and in many cases, standard morphometric methods are not successful (Alpatov, 1929; DuPraw, 1964; Ruttner, 1988). The standard morphometric methods are based on multiple measurements of distances, angles and discrete classes of pigmentation. The complex shape of an organism cannot easily be summarized by using the linear measurements in standard morphometrics. In recent years, based on the statistical shape analysis theory, geometric morphometrics were used (Bookstein, 1991, Pavlinov 2001). Instead of linear measurements, it uses landmarks (coordinates of points). After superposition (namely, scaling and rotation), the landmarks differ only in shape, and can be ready for multivariate statistical analyses (Zelditch et al., 2004). Thus, we performed a generalized Procrustes analysis (GPA) to separate the size and shape components of form variation (Rohlf and Slice, 1990).

Insect wings are solid structures and they have become very useful tools for geometric morphometric studies (Pavlinov 2001). This methodology has affected the studies of honeybees (Rortais et al., 2007; Tofilski, 2008). In the present paper, we analyzed the morphometric variability of honeybee lines selected from two different Serbian regions (plain and mountain), and two different Montenegrin regions (mountain and coast). We also wanted to assess if the selected honeybee lines are morphometrically similar or not, and if this approach is useful for their discrimination.

Materials and methods

Honeybee samples were collected from indigenous stationary apiaries (belonging to the centers for honeybee queen selection) from two Serbian areas: Vršac (northeastern Serbia, mostly plain, UTM: EQ29) and Vranje (southern Serbia, mostly mountainous, UTM: DP24), and two Montenegrin areas: Bijelo Polje (northern Montenegro, mountainous region, UTM: CN96) and Sutomore (southern Montenegro, coastal region, UTM: CM36). Each sample (selected line) consisted of 150 honeybee workers, collected from 10 hives (15 specimens each), with a total of 600 workers from 40 colonies. The left forewing of each worker was dissected, and then passed through four ethanol solution series

(95%, 70%, 50%, 20%, respectively), and finally in distilled water. Images of the wings were obtained using a video camera mounted on a Leica stereomicroscope with a 1 x objective. The coordinates of 19 landmarks located at vein intersections (Fig. 1) were recorded and measured twice by the TPSdig software (Rohlf, 2001). Further statistical analyses (Procrustes distance, the diagram for the average shape, CVA) used to determine the differences among of honeybees were performed using the MorphoJ 1.4a software package (Klingenberg, 2011). For better visualization and simplicity, the measurements of 15 specimens per colony were averaged and the same analyses performed on an individual level were also performed on honeybee colonies.

Results

Among the investigated individual samples, low intra-population variability was detected. Procrustes distances among honeybee breeding lines are shown in Table 1. Differences between honeybee breeding lines at individual level were tested with multivariate analysis of variance (MANOVA) for forewing shape and were statistically significant (Wilks' λ = 0.249, F102,1671= 9.666, P <0.001). Results of the canonical variate analysis of individuals indicated that the first, second and third axes explained 60.73%, 26.44% and Results of the canonical variate analysis of individuals indicated that the first, second and third axes explained 60.73%, 26.44% and 12.82% of the total variation, respectively. The "bp" and "sm" breeding lines showed partial overlapping, whilst the "vr" and "vs" breeding lines formed an apparent overlapping cloud (Fig. 2). Only 62% of the individuals were correctly classified to predicted groups. ANOVA showed that all Cartesian coordinates of landmarks displayed statistically significant differences among colonies of breeding lines. According to the results of colony CVA, the first, second and third axes explained 55.50%, 28.03% and 16.47% of the total variation, respectively. A scatter plot of colonies demonstrated high discrimination results (Fig. 3) compared with the scatter plot of individuals. Crossvalidation tests based on discriminant functions correctly classified 100% of the colonies.

Discussion

The individual variation in left forewing morphology of honeybee breeding lines was large. This result is probably related to the influence of environmental and genetic factors, particularly

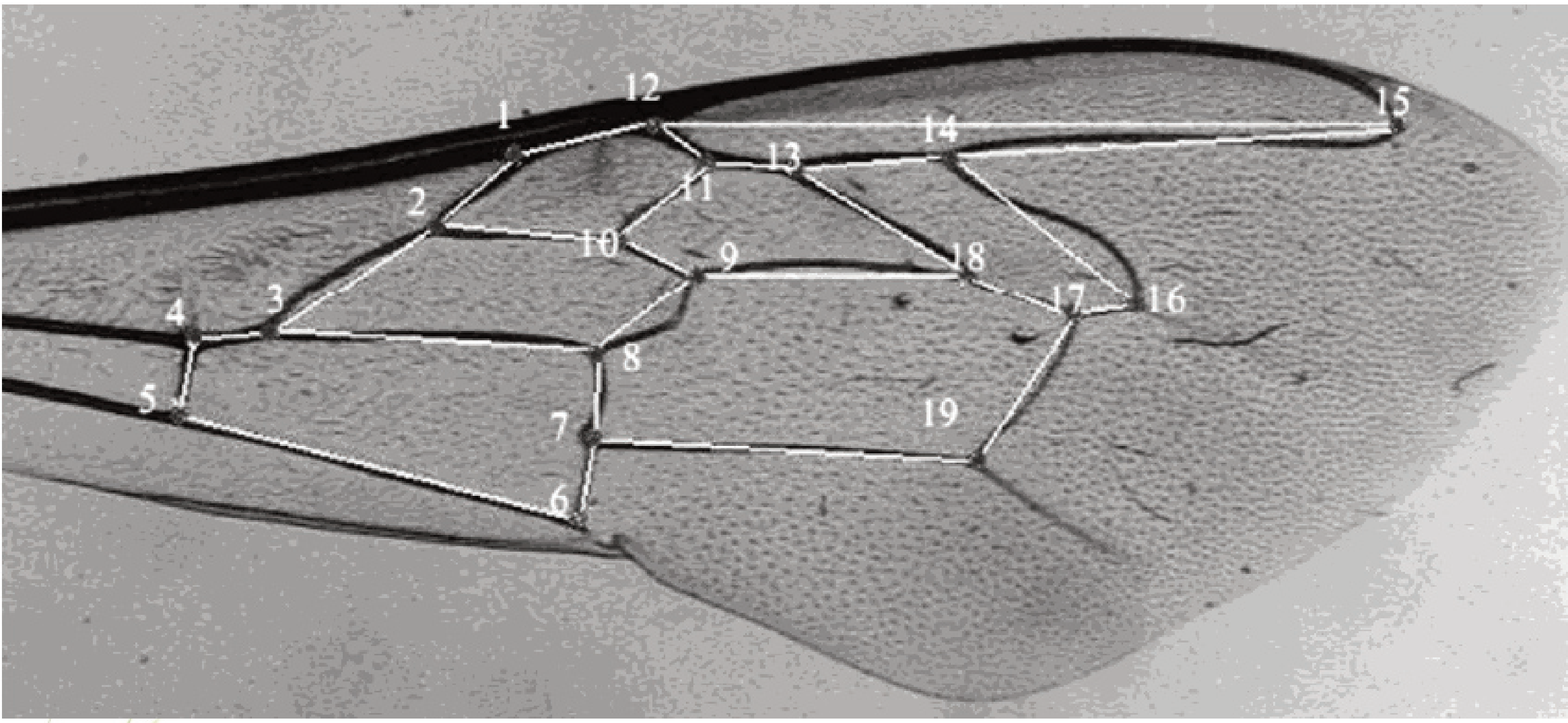

Fig. 1. Position of 19 landmarks on A. mellifera worker forewing. White lines represent visualization of average shape

the spatial differences of the environment. However, at the level of honeybee colonies it has been shown that there are statistically The individual variation in left forewing morphology of honeybee breeding lines was large. This result is probably related to the influence of environmental and genetic factors, particularly the spatial differences of the environment. However, at the level of honeybee colonies it has been shown that there are statistically highly significant differences in wing shape among all the breeding lines. The highest difference was between "vr" and "sm" on the one hand and "bp" and "vs" on the other side. Differences among the four geographic populations were large and significant. This also slightly matches our expectations, as we compared samples from not so distant localities within the same sub-species, but from specific and isolated localities. It is evident that the differences between the hives were higher than the differences within a hive, which is expected if we consider the origin of the samples. This observation is reasonable in terms of both genetics and environment, as individuals from the same colony share not only identical genes but also, to some extent, a more homogeneous environment compared to individuals from different colonies.

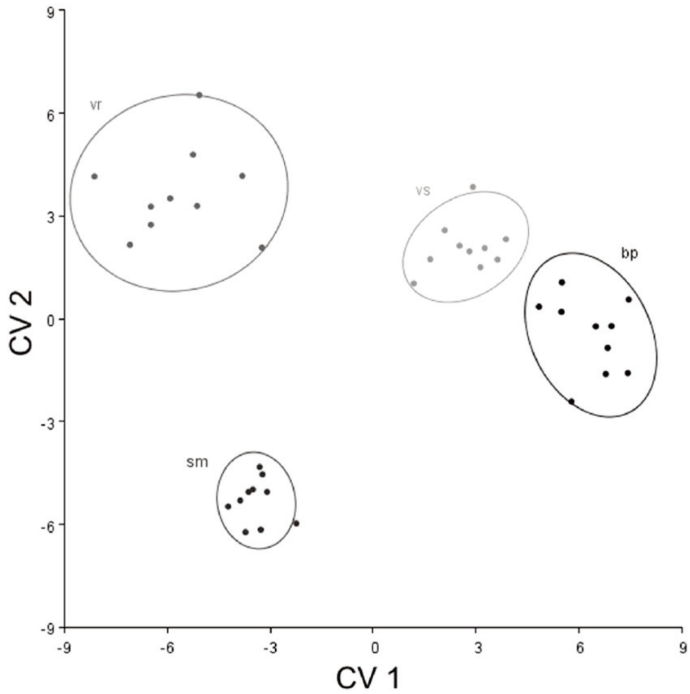

Fig. 3.

Scatter plot of four honeybee selected lines based on CVA for Cartesian coordinates of the landmarks on the left forewing discrimination of colonies

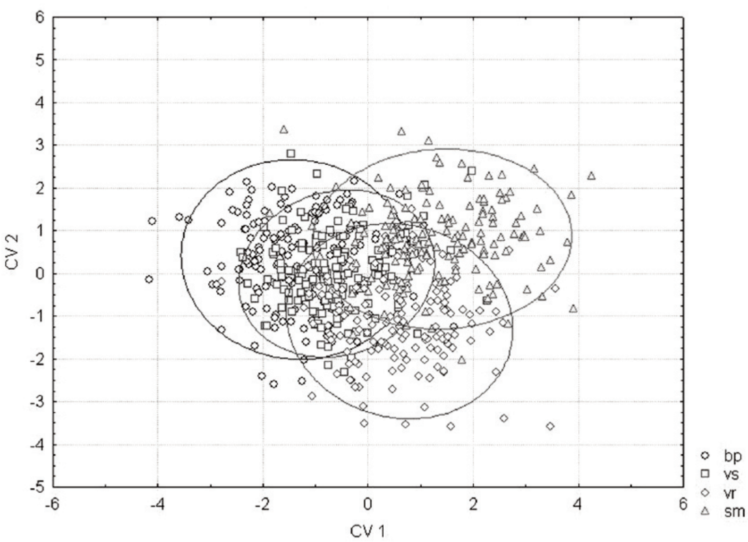

Fig. 2.

Scatter plot of four honeybee selected lines based on CVA for Cartesian coordinates of the landmarks on the left forewing discrimination of individuals

In recent studies on the application of geometric morphometrics to explain differences among A. mellifera subspecies, it was shown that it is easier to interpret plots of subspecies vectors and deformation grids than to compare numerous distances and angles as in traditional morphometrics. The wing regions that contribute most to the discrimination are easily identified on the deformation grid (Tofilski, 2008; Kandemir et al., 2011). There is no evidence for the implementation of this approach on the lower taxonomic level, e.g. ecotypes or breeding lines. In this paper, we showed that differences among honeybee breeding lines are possible to elucidate, especially at the colony level. This approach is very suitable for the further monitoring of honeybee breeding line status, and can be implemented in biodiversity conservation in combination with a molecular approach. The preliminary and largely exploratory results we have obtained indicate that geometric morphometrics is effective in revealing very small-scale variation. To understand better phenotypic variation in Carniolan honeybees, research will have to be expanded by sampling more localities and a greater range of environmental conditions. Modeling geographic variation in the Serbian, Montenegrin and other populations of Carniolan honeybees might help to quantify patterns, the occurrence of isolation by distance and covariation with genetic and environmental factors. An accurate knowledge of heritable phenotypic diversity is essential to effective beekeeping management.

The molecular data collected to date indicate a genetic flow between populations in the investigated area and statistically significant genetic differences. In the region of the Balkan Peninsula the study of honeybee races has intensified. Kekecoglu et al. (2009) used the PCR-RFLP method by analyzing two segments to examine mtDNA genetic divergence and phylogenetic relationships among honeybee populations in Turkey. This investigation was compared with similar surveys conducted on the territory of Greece where they have found differences that are very important for the preservation of local ecotypes of honeybees. Ivanova et al. (2010) used allozyme analysis to examine six enzyme systems (MDH, ME, EST, ALP, PGM and HK), corresponding to genetic loci in six populations of bees from Bulgaria, and identified genetic variation between them, the authors demonstrating polymorphisms in all six gene loci of bee populations. In a similar study (Ivanova, 2010) in populations of bees from Bulgaria (A. m. rodopica), Serbia (A. m. carnica) and Greece (A. m. macedonica), the authors observed clearly separated two clusters: one branch in Greece and Bulgaria and the second in the Serbian popu-

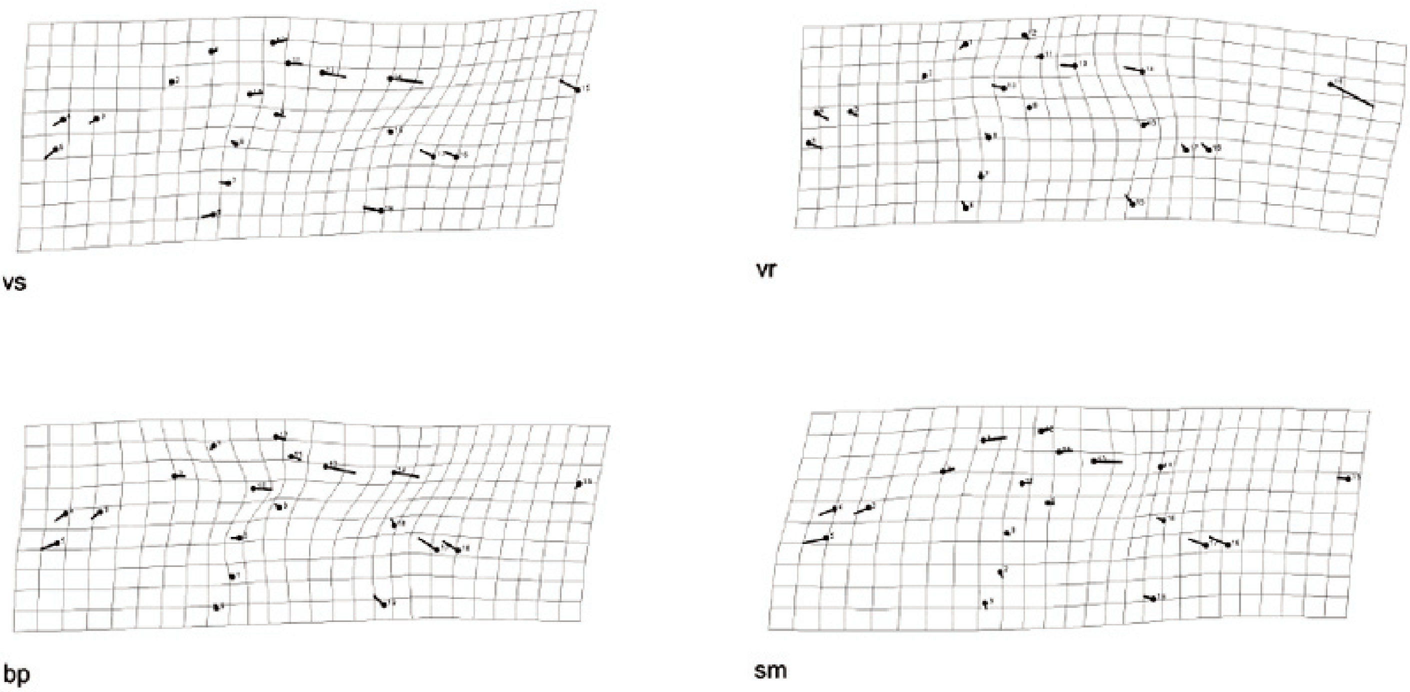

Fig. 4.

Deformation grids of honeybee breeding lines: sm (Sutomore, MNE), bp (Bijelo Polje, MNE), vr (Vranje, SRB), vs (Vršac, SRB). The difference between the average wings of four breeding lines is revealed by the nonlinearity of the deformation grids. The black spot corresponds to vein junctions, and the black lines from them indicate the magnitude and direction of the difference between the average wing and the wing of selected lines. *fig. 4. Deformation grids of honeybee breeding lines: sm (Sutomore, MNE), bp (Bijelo Polje, MNE), vr (Vranje, SRB), vs (Vršac, SRB). The difference between the average wings of four breeding lines is revealed by the nonlinearity of the deformation grids. The black spot corresponds to vein junctions, and the black lines from them indicate the magnitude and direction of the difference between the average wing and the wing of selected lines*

lation. Extensive research in Greece with the use of geometric morphometric analysis showed great diversity of honeybee populations on Greek mainland and islands. The presence of hybridization between the Greek populations of bees has been shown, which is caused by uncontrolled importation of bees and the practice of migratory beekeeping (Bouga and Hatjina, 2005).

All reviewed studies allowed us to complete the picture of the diversity of honeybees on the Balkan Peninsula. To preserve the original variety, we must first be familiar with the differences among local populations of honeybees, and then take the appropriate measures for their protection and conservation.

Acknowledgments

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THE HIDDEN ALCHEMY OF HONEY: WHY BEES SHOULD BE MAKING MEAD, NOT HONEY

I have had the great pleasure of collaborating with author Mike McInnes, the brilliant mind behind Honey Sapiens.

Together, we wish to share some of the fascinating discoveries we have made about honey—findings that are not widely known.

One of the most intriguing mysteries surrounding honey is that, under normal circumstances, it never ferments in the beehive.

From a biochemical perspective, this is surprising. When bees collect nectar, they inadvertently gather wild yeast from the environment.

Once inside the hive, the nectar is stored in a warm and humid environment at approximately 36°C (97°F)—conditions seemingly ideal for yeast fermentation, given that nectar contains around 20% sugar. Yet, fermentation never occurs inside the hive. Why?

The answer lies in a powerful, yet often overlooked, group of microbes: lactic acid bacteria (LAB). These bacteria reside in the honey stomachs of bees and are also present in the flowers from which they collect nectar.

LAB outcompete yeast by acidifying the nectar and producing antimicrobial compounds that suppress yeast activity. Without LAB, bees would not be able to produce honey as we know it.

However, something intriguing happens when water content falls below 20%—the lactic acid bacteria die. This means that honey is, in fact, a naturally fermented food, shaped by microbial interactions that influence both its flavor and sugar composition.

A Forgotten Discovery: The Patent on Nature

A group of Swedish researchers identified these lactic acid bacteria in honeybee colonies and, in a bizarre twist, secured a 20-year patent on them.

This raises fundamental ethical and scientific questions—how can one patent something that has existed naturally in bees for millions of years?

Fortunately, the patent is set to expire in 2028, providing an opportunity for beekeepers worldwide to reclaim and explore the potential of these extraordinary microbes.

Rediscovering LAB-Enhanced Honey

Inspired by this knowledge, I conducted an experiment: I harvested honey early, while it was still "splashy" in the hive, and mixed it with approximately 50% water.

Stored in a cool, dark environment, the mixture underwent a transformation. Over a few months, it developed a pronounced sourness—clear evidence of active lactic acid bacteria.

Surprisingly, despite having all the conditions necessary for alcoholic fermentation, no mead was produced.

The LAB continued to dominate, preventing yeast from taking hold.

To further explore this, I blended this lactic-acid-fermented honey must back into mature honey at a 10–20% ratio.

Even at 40% water content, stored in a warm kitchen for two years, the honey remained stable, without any yeast-driven fermentation.

The result? A uniquely delicious honey, rich in acidity and complex flavors.

Potential Health Benefits of LAB in Honey

The presence of LAB in honey opens up exciting possibilities for health and nutrition. Research suggests that these bacteria could provide several benefits:

- Antimicrobial Properties: LAB produce organic acids, hydrogen peroxide, and antimicrobial peptides that can combat harmful pathogens, making LAB-enhanced honey a potential natural preservative and medicinal food.

- Gut Health: Probiotic LAB strains may support a healthy gut microbiome, aiding digestion and boosting immune function.

- Wound Healing: LAB's antimicrobial effects could make honey an even more effective treatment for wounds and skin infections.

- Metabolic Effects: Some studies suggest that LAB could influence glucose metabolism, potentially offering benefits for blood sugar regulation.

The Future: LAB-Infused Honey Products

With the patent expiration on the horizon, it is time for beekeepers to reclaim control over LAB research and development. The possibilities are vast, including:

- Probiotic Honey: Raw honey enriched with live LAB for enhanced gut health.

- Fermented Honey Drinks: Non-alcoholic, probiotic-rich honey tonics.

- Honey-Based Wound Dressings: Enhanced with LAB for superior antimicrobial action.

- LAB-Enriched Honey for Functional Foods: Exploring its role in diabetes management, digestive health, and immune support.

The Need for Beekeeper-Led Research

Despite the immense potential, research on LAB in honey remains limited. Most studies have been conducted by pharmaceutical and biotech companies rather than beekeepers. This must change.

It is crucial that beekeepers take an active role in researching, developing, and marketing new LAB-enhanced honey products.

By doing so, we can ensure that these discoveries benefit those who truly work with bees—rather than being monopolized by corporations.

Conclusion

Bees should, by all logic, be making mead, not honey. The fact that honey does not ferment in the hive is a testament to the power of lactic acid bacteria, which play a fundamental role in shaping honey's properties.

As the scientific and beekeeping communities begin to rediscover the importance of LAB, we stand at the brink of a new era—one where honey is not just a sweetener, but a functional, fermented, and probiotic-rich superfood.

The time to act is now. With the impending expiration of the LAB patent, beekeepers worldwide must take back control, invest in research, and develop groundbreaking honey products that honor and harness the ancient microbial symbiosis between bees and bacteria.

The future of honey is not just sweet—it is alive.

Fabian Lindhe
Sweden
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REPUBLIKA SLOVENIJA
MINISTRSTVO ZA GOSPODARSTVO, TURIZEM IN ŠPORT

SPIRIT SLOVENIJA

ARE YOU INTERESTED IN ESTABLISHING BUSINESS CONNECTIONS WITH SLOVENIAN BEEKEEPING COMPANIES, QUEEN BEE BREEDERS, OR BEEKEEPING TOURISM PROVIDERS?

Slovenian beekeeping will be showcased at the World Beekeeping Congress this September in Denmark, stand A60. In a 54 m² presentation space, we will present Slovenia, our rich beekeeping tradition, and various companies and public institutions involved in the beekeeping sector.

If you are interested in business cooperation with any of the participating entities listed below, please contact us at nocb@czs.si. We will be happy to arrange a B2B meeting during Apimondia in Denmark.

If you are interested in cooperating and connecting with the Beekeeping Association of Slovenia (www.en.czs.si) and the European Beekeeping Association (www.ebaeurope.eu), I am also at your disposal - nocb@czs.si .

Boštjan Noč

President of
Slovenian Beekeeping Association
President of
European Beekeeping Association

The following organizations will be represented at Apimondia in Denmark:

The House of the Carniolan Bee

The House of the Carniolan Bee in Višnja Gora is a special place dedicated to Slovenia's native bee, the Carniolan bee. It offers a fun and educational exhibition about the life of bees, their importance in nature, and the benefits of bee products.

One of the highlights is the unique honeycomb-shaped rooms where visitors can stay. These rooms are designed to look like beehive cells and offer great views of the area.

The house also includes a café, where guests can enjoy honey-based treats made by local producers. This supports the local community and gives visitors a taste of local flavors.

There is also a tourist information center with souvenirs, bee products, and helpful info about nearby attractions.

A key part of the house is ApiLab, a center for innovation and small businesses. It helps entrepreneurs with modern technology like 3D printing and supports them in creating new products.

The House of the Carniolan Bee brings together nature, culture, and business. It helps people learn about bees, supports the local economy, and encourages new ideas in a beautiful setting.

WEB: www.hisakranjskecebele.si/
FB: www.facebook.com/hisakranjskecebele/about?locale=sl_SI
INSTAGRAM:
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BeeConn: Smart technology for modern beekeeping

BeeConn is an advanced, patented, and certified beekeeping solution designed to integrate smart technology into hive management. Developed by Strip's d.o.o., a company with 30 years of expertise in providing custom-built electronics and mechatronics solutions, BeeConn brings a reliable, data-driven approach to modern beekeeping—enhancing efficiency, sustainability, and hive health across operations of all sizes.

The comprehensive product range includes the BeeConn Set, BeeConn Solar Set, BeeConn Lite, Lite GPS, and the upcoming Swarming Sensor, offering flexible and scalable solutions for various beekeeping operations. Each device is engineered to provide continuous tracking of essential hive parameters such as weight, temperature, and humidity. Additionally, the optional inclusion of external weather data enhances the system's ability to monitor environmental factors that influence hive health.

Data is transmitted via cloud-based services or SMS, providing remote access through the BeeConn mobile and web apps (Android and iOS). These platforms deliver real-time, trends, and alerts, allowing beekeepers to make informed decisions at any time, from any location.

BeeConn devices are constructed from durable, weather-resistant materials, ensuring longevity and reliability in various environmental conditions. The BeeConn scale is one of the thinnest of its kind in the world, featuring a sleek, low-profile design that fits seamlessly under any beehive—without compromising strength or measurement accuracy.

BeeConn's presence at leading industry events such as APIMONDIA underscores its commitment to shaping the future of beekeeping. By combining precision and sustainable practices, BeeConn is poised to revolutionize hive management and support the continued success of beekeeping globally.

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EMAIL: info@beeconn.net

Medikoel d.o.o.

Medikoel is a family-owned Slovenian company, founded in 2005. With a strong focus on apitherapy we developed 2 innovative apitherapy devices and have certified numerous individuals seeking specialized education and expertise in this natural healing practise.

1. Propo Steam - propolis vaporiser

This apitherapy device allows to fully exploit the extensive therapeutic potential of propolis in effective way. Experience the power of nature's best antibacterial and respiratory aid with Propo Steam – your partner for air disinfection and respiratory care in a 100% natural way. Propo Steam heats propolis to create a vapour of propolis essential oils that may relieve respiratory problems, disinfect and cleanse the air, and pleasantly scent the room.

The device can be used in two ways: for intensive respiratory therapy by inhaling the vapor using the included mask and hose or using it in a room and let vapor be dispersed in the air to cleanse and refresh the environment.

2. Api Aerosol for bee hive air inhalation

Our Api Aeorosol makes it easy to inhale and benefit from all the advantages of hive air therapy. The Api Aerosol 2 is the most sophisticated version of the hive aerosol therapy device, as it automatically pulls the hive air through the hose to the user (no free pulling required) using a built-in fan. The volatile substances in hive air have antimicrobial and antioxidant properties, which are very beneficial to humans.

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The Museum of Apiculture in Radovljica A Unique World of Beekeeping Heritage

In the heart of the picturesque medieval town of Radovljica lies the Museum of Apiculture – one of the most beautiful and unique museums in the world, dedicated to bees and the rich beekeeping heritage of Slovenia. Here, you won't just learn about the history of beekeeping – you will experience bees with all your senses: watch them, listen to them, admire them – and connect with them in your own way.

Founded in 1959, the museum has been delighting visitors in its renovated spaces since 2021 with the permanent exhibition "Living Together. About Bees and Mankind" – an interactive, contemporary, and inspiring experience designed for all generations. It is filled with stories, symbols, and meaning – perfect for nature lovers and curious minds alike. Built on three pillars – heritage, experience, and education – it invites visitors into the magical world of the Carniolan bee, Slovenia's native bee species, which we proudly protect and preserve.

One of the museum's biggest attractions is the observation hive, where visitors can safely and closely observe the life of bees. The museum also offers numerous interactive features, such as computer games, quizzes, and kinetic installations, that make learning playful and engaging.

Every year, the museum welcomes a large number of visitors from all over the world – including presidents, distinguished guests, and countless groups of all ages. In 2022, we were honored to welcome Dr. Jeff Pettis, President of Apimondia, the World Federation of Beekeepers' Associations, who gave the museum his highest praise.

A special highlight of the museum is Slovenia's largest collection of painted beehive panels – with over 900 examples, some more than 250 years old. These vibrant wooden panels represent a unique form of folk art, humor, and spiritual belief, not found anywhere else in the world. The museum also features an authentic bee house with AŽ-hives, as well as a large collection of historic beekeeping equipment, tools, and acces-

sories, all testifying to the rich and inventive tradition of Slovenian beekeeping.

The Museum of Apiculture in Radovljica is more than just a place of heritage – it is a place of connection, discovery, and wonder. Once you visit, it stays in your heart. Step into the world where bees tell their story – a story that connects us all.

WEB: www.mro.si/en/musem-of-apiculture

Čebelarstvo Pislak Bali

Čebelarstvo Pislak Bali is a family owned company with almost 80 years of tradition. The third generation of our family lives in close connection with bees. We continue the tradition with respect and love, while introducing new insights from science and beekeeping technology. We are located in Slovenia, EU, and manage more than 2000 beehives, which makes us the biggest beekeeping in our country.

At the beginning we were oriented mainly in the production of honey. In recent decades, we have also focused on breeding high-quality queen bees of the Carniolan Bee breed (Apis Mellifera Carnica, Krainer Biene) which are known throughout Europe, and in production of the royal jelly. To our customers we offer queen bees, royal jelly, honey, beeswax and other bee products.

We strive for the highest possible quality of our products while are commited to protecting bees and nature. We are proud of many awards

and prizes that encourage us to keep on working for better and better quality of our work.

Contact us: Čebelarstvo Pislak Bali, Adela Pislak Bali s.p., Apače 303, 2324 Lovrenc na Dr. polju, Slovenia, EU

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ApiRoutes Travel – Unique and Authentic Travel Experiences

ApiRoutes is a full-service travel company specialised in organization and arrangement of travel. With more than 30 years of experiences they provide comprehensive services, ranging from transfer and accommodation arrangements to the organization of tailor made tours, professional excursions, educational programs and trainings. Their partners, such as tour operators, guides, beekeepers, beekeeping associations, decision-makers, initiators, hotels, service providers and tourism workers, are very diverse and wide-spreaded, which allows them to provide tours not only in Slovenia, but worldwide. Through providing authentic experiences in the presentation of unique forms of knowhow and understanding in apiculture, they offer a new concept in travel – Apitourism. Formulated as a fusion of apiculture and travel, the environmentally and socially responsible tours are developed on a worldwide level.

ApiRoutes

Apitourism and Apiwellbeing are emerging worldwide as novel tourism concept that combine the fascination with honey bees and beekeeping with the pursuit of wellness. These concepts offer unique travel experiences that are both educational and therapeutic, making them an attractive option for tourists seeking meaningful and enriching journeys. The mystic world of bees attracts business environments as managers want to learn why and how the bees are so well organised.

Contact: Tanja Arih Korošec

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Novak Carnica Queen

Renowned for its diligence and high yield, the gray bee, or “Sivka”, as the locals call it, is highly appreciated worldwide.

Beekeepers and breeders from all over the world recognize the benefits of the Carnica’s natural tendency of keeping small colonies in winter and exploding in early spring to prepare for the early honey flow.

In its homeland, the Carnica bee is the only bee race allowed to be bred, as it is protected by law as an indigenous Slovenian species. Novak Carnica Queen mating sites are located within 15 km radius from the Carniolan bee race epicenter. Combined with the fact that no other bees’ race is permitted, our location secures that our mating yards are surrounded only by pure Carnica colonies, providing reliable gene purity even in open mated Production Queens.

Located at the heights from 300 to 1070 m, Novak Carnica Queen production sites provide various climatic conditions for selection. Despite the country’s small surface area, it offers several types of climatic conditions - from mediterranean to the alpine, thus providing perfect testing conditions for the addaptability to different nectar and honey dew sources and availability, the ability of providing strong colonies before the foraging season and sustaining ever hotter and dry summer conditions.

Novak Carnica Queen is pure and bred with care.

Our main selection goals: high honey yield, resistance to bee diseases, calmness, placidity and good brood laying, size of the Queen, good cleaning instinct, purity of the breed.

Exported in over 30 countries, from the Europe’s far north to the Middle Eastern Desert, our Queens adapt to the destination’s microclimatic conditions and pass on their traits to the future generations of bees.

Awarded the best foraging Queen bee line in 2024 with a top score yield per hive.

ADVERTISING EVIPLASS

Eviplass offers gift bags for wine producers, olive growers, beekeepers, cosmetics and boutiques. They have a large selection of colors, sizes, and commemorative designs, since they are custom made for bottles or glasses and have a specific purpose. They can also create a bag of your choice, print you a logo or graphics in monochrome hot press, there is even possibility of smaller quantities.

Quality, beautiful and elegant bag with printed logo adds the finishing touch to your first-rate yield. Since 2017 they presents the first COVER FOILS for BEEHIVE. Size for LR and DB. And they also offer wonderful wooden spoons and spoons for honey. More informations on email: evald@super-e.si and on Apimondia ApiEXPO 2025, stand A60.

Evald Vodopivc s.p., Brestanica, Slovenia
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EMAIL: evald@super-e.si

APILOGER

The APILOGER brand stands for innovation in modern beekeeping.

Its most renowned products include the APILOGER DIGITAL BEEKEEPING SCALE and the APILOGER BEEQUEEN LOCATOR. The latter is a groundbreaking innovation in the world of beekeeping and will be unveiled for the first time at the Copenhagen Fair. This unique device allows precise tracking and monitoring of the queen bee within the hive, making it especially valuable for scientific research.

Both devices greatly simplify the work of beekeepers and, most importantly, contribute to increased honey production.

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Logar Trade d.o.o.

Logar trade is a European manufacturer of premium beekeeping equipment from Slovenia, with nearly 60 years of tradition. The company designs and produces high-quality products such as honey extractors, honey storage tanks, wax melting and processing equipment, and uncapping tanks. Their product range is tailored to both hobbyist and professional beekeepers.

The company is known for its reliability, innovation, and the superior quality of its products. More than 80% of its production is exported, primarily to demanding markets such as Germany, Austria, and Switzerland. In September 2025, Logar trade will showcase its products at the Apimondia international congress in Copenhagen, where it will also actively seek new distributors – particularly from Scandinavia, Italy, France, and Spain. These are key markets where the company aims to further expand its presence in the future.

Logar trade warmly welcomes all parties interested in cooperation to get in touch and establish a business relationship.

Logar trade d.o.o., Poslovna cona A 41, 4208 Šenčur, Slovenija

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WEB: www.logar-trade.si

Lamorix d.o.o.

Premium Natural Skincare with Bee Venom Innovation

Lamorix is a premium Slovenian skincare brand that combines nature and science to deliver visible, clinically backed results. At the heart of our formulas lies bee venom, a rare, potent ingredient often called “natural Botox” for its ability to stimulate collagen production, improve microcirculation, and visibly rejuvenate the skin. Combined with powerful natural actives like hyaluronic acid, coenzyme Q10, peptides, and rosehip oil, our signature Elixir line offers a complete anti-aging solution—safe, ethical, and cruelty-free.

Crafted with 100% natural origin ingredients and developed over two years of research, Lamorix products are tailored for consumers aged 30–60 who seek high-performance skincare with clean, conscious formulations. Independent testing shows over 93% of users report improved skin firmness, smoothness, and elasticity, while more than 95% would recommend Elixir to others.

We invite you—distributors, niche retailers, beauty clinics, hotels, and pharmacies—to partner with Lamorix and join a fast-growing market. The global bee venom cosmetics segment is projected to grow from $378 million to over $618 million in the next decade, driven by demand for effective, nature-inspired skincare.

We support our partners with marketing tools, product training, and flexible collaboration models, ensuring mutual growth and customer satisfaction.

Join us in redefining beauty—naturally.

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Čebelarstvo Dremelj

The main branch of our beekeeping DREMELJ is queen bee breeding. We have been breeding for many years and with tradition. We try to breed the highest quality queen bees, which we can also prove with awards and satisfied customers. We currently have 6 breeding stations, surrounded by the best possible bee colonies with quality genetic material. We produce between 4,000 and 6,000 queen bees annually, and 80% of them are exported abroad, mainly across Europe and some beyond its borders. The Carniolan honey bee (Apis mellifera carnica) is a honey-producing native bee species, distributed mainly throughout Europe and the Balkans. It is the second most widespread bee species in the world and one of the most honey-producing bees. It is also characterized by low winter food consumption, rapid spring development, and good orientation. Based on many years of experience, we select queen bees primarily based on the stability of the bee colony, the highest possible honey yield, purity and vitality, and the lowest possible fertility. Our queen bee breeding is under the supervision of the Agricultural Institute of Slovenia, which supervises the work every year and performs various tests (measurement of the cubital index, performance of the cleaning ability (PIN test) and progeny testing). Most packages are sent by mail and via parcel services, but larger orders can also be sent by air at the customer's request. We accept orders all year round by e-mail.

Contact us:
Beekeping Dremelj, Slovenia
EMAIL: vzreja.dremelj@gmail.com

DREMELJ Beekeeping

NOČ BOŠTJAN HONORARY AMBASSADOR OF KNOWLEDGE

On April 2, 2025, the President of the Beekeeping Association of Slovenia and President of the European Beekeeping Association, Mr. Boštjan Noč, received the honorary title of AMBASSADOR OF KNOWLEDGE (https://ambassadorsofknowledge.com/) in the Ljubljana City Hall. The title of AMBASSADOR OF KNOWLEDGE is awarded to nominated individuals who demonstrate a high level of professional knowledge and ethics. More than 30 countries are involved in the project.

INSTEAD OF WEAPONS, APITHERAPY!

The Slovenian Beekeeping Association will propose to the Slovenian Government that instead of weapons, it finance the construction of an apitherapy center that would help physical and psychological victims of violence. We will inform you about the program of the apitherapy center in the next issue of EBA MAGAZINE.

Boštjan Noč


Images by Astronavt

NATIONAL VOCATIONAL QUALIFICATION (NVQ) FOR APITHERAPIST IN SLOVENIA

National Vocational Qualification

A National Vocational Qualification (NVQ) is a formal recognition that an individual is qualified to practice a specific profession, regardless of how they have acquired the necessary knowledge and skills. There are multiple pathways to professional qualification—some go through the formal education system, while others gain expertise through self-education, work experience, and the development of personal competencies.

The NVQ certification provides an official confirmation of professional competence through a structured evaluation process, assessing an individual's work experience, knowledge, and skills.

The certification process under the National Vocational Qualifications Act (ZNPK) is designed for adults (18 years and older) who:

· do not possess a formally recognized vocational or professional education certificate,

· have acquired professional competencies through experience, knowledge, and practical skills,

· wish to advance in their professional career without the need to obtain a higher level of formal education.

The NVQ system applies to professions approved by the Expert Council of the Republic of Slovenia for Vocational and Technical Education and formally adopted by the Minister responsible for labor.

The assessment and validation of vocational qualifications can be conducted by: Inter-company training centers, Schools, Adult education institutions, Chambers and other organizations that offer accredited educational programs and meet the required material and human resource conditions. These institutions must comply with the catalog of professional knowledge and skills standards and other relevant regulations, where applicable.

Boris Potočnik
NVQ consultant for Beekeeper
at Slovenian Beekeepers' Association

National
Vocational Qualification
Apitherapist

Apitherapy is a branch of alternative medicine that uses honey bee products, including honey, pollen, propolis, royal jelly and bee venom.

Catalog of professional knowledge and skills standards for National Vocational Qualification of Apitherapist have listed professional competences of apitherapist and key tasks of apitherapist. In professional competencies of apitherapist are competencies from planning, organizing, managing business, administrative process, communication, monitoring, ensuring own safety and others, using primary bee products, massage with honey, providing first aid,.. and for key tasks of apitherapist are plans, organizes and manages the work process in the field of apitherapy, prepare yourself, workplace and tools, performs a massage with honey, uses primary bee products for apitherapy purposes, advises customers on the use of bee products and products for maintaining and strengthening health, manufactures preparations for apitherapy, allows customers to relax with bee air from the hive, guarantees the quality of apitherapeutic preparations and services provided, provides first aid to clients in the event of bee stings and other medical complications, within the scope of the activity orders clients for apitherapy services and manages the administration in connection with the organization of activities in the apitherapy field, develops entrepreneurial qualities, skills and behavior, communicates with customers, experts and representatives of professional institutions, ensures own work safety and the safety of others, protects the environment.

Procedure for obtaining National Vocational Qualification Apitherapist

The condition for entering the NVQ apitherapist procedure is the age of 18 and education at least at SOK level 4 (completed secondary education). Foreigners can also enter the procedure,

but they must ensure the translation of documents and a translator for the practical examination.

If the candidate meets the entry conditions, he/she compiles a personal portfolio, which should contain: an application or registration for the procedure with personal data, a certificate of education, a CV and other certificates of education in the field of apitherapy.

The conductor at the provider of the NPK apitherapist procedure collects the documents, reviews them and, if necessary, invites the candidates to supplement them. When all the documents are in order, the consultant publishes the date of checking the personal portfolio and the date of the practical test on the NRP website (the website of the National Reference Point - https://www.nrpslo.org).

The Republic Examination Center appoints a three-member commission that checks the suitability, authenticity and validity of the documents and indicates in adapted forms which key tasks can be certified to the candidate based on the documents and in which key tasks the candidate must demonstrate additional knowledge or his knowledge needs to be additionally verified. The knowledge test takes place one week after the document verification. The candidate is previously informed about the content of the knowledge test and the key tasks in which he will have to demonstrate additional knowledge. If the candidate demonstrates adequate knowledge in all key tasks, the consultant awards him the Apitherapist certificate.

For more information you can call +38641469604 or send a mail on kristina.dolinar-paulic@guest.arnes.si.

Kristina Dolinar Paulič
NVQ consultant for Beekeeper and
Apitherapist at Biotehnical school Maribor

Insight from a certified apitherapist

Several Slovenian apitherapists are very active in Slovenia and abroad. Some of them present apitherapy in the media, organise popular lectures to inform the general public about the importance of bees and their products, and thus work in the direction that Slovenian beekeepers strive for - to give bee products the value they deserve on the market.

Under the leadership of Vlado Pušnik, Slovenia has trained more than 360 apitherapists. 120 of them have also obtained the NVQ Apitherapist. This qualification not only strengthens professional credibility but also opens new opportunities in the field.

Apart from the desire and knowledge to help others to feel better, apitherapy is also an additional employment opportunity for women as a vulnerable group. Often the work of a beekeeper is physically demanding, but the work of an apitherapist does not require such physical fitness; what is needed are quality bee products and knowledge. Apitherapy is an extension and a higher level of beekeeping where the whole family can easily be involved.

As an apitherapist with a certificate, more opportunities are reachable. You have deeper knowledge and you are much more confident in giving information and lectures about these topics to the general public. Also, it makes a difference when the person sharing this knowledge is certified. People are more trusting and more open to learning.

I also took part in the one-year apitherapist training program, and it was an incredible learning experience both in theory and practice. Through lectures and workshops, students acquire essential knowledge of human anatomy and physiology, first aid, communication skills, honey massage techniques, the use of bee products, and hive air therapy. Several students from EU countries (particularly from the Czech Republic) have already attended this course. Some of them even went on to obtain Slovenia's National Vocational Qualification, aiming to bring this model of good practice back to their own countries.

Getting certified as an apitherapist really opened new doors for me. I feel much more confident sharing what I know, because I know it's based on real knowledge and experience, not just passion.

People also take you more seriously when you're officially qualified and that makes a big difference. Apitherapy is a beautiful mix of nature, tradition, and care for others. I'd really recommend this path to anyone who loves working with bees and wants to help people in a meaningful way.

Even though I now have the certificate, I don't see this as the end. I'm still learning and looking for new ways to get better at what I do.

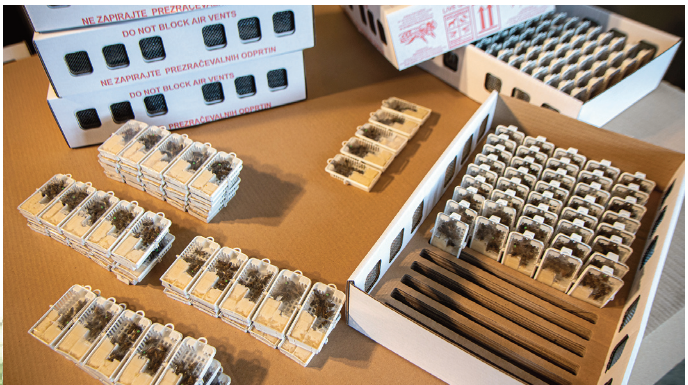
Nika Pengal
Certified NVQ Apitherapist

PISLAK BALI
CARNIOLAN QUEENS

Čebelarstvo Pislak Bali is a family owned company with almost 80 years of tradition. We are located in the northeastern part of Slovenia. The third generation of our family lives in close connection to bees. The beginning of our beekeeping dates back to 1946, when Janko Pislak, the legendary Slovenian beekeeper, bought his first swarm of bees. He was twelve years old at the time and he bought it with the money he got for his confirmation. Today we continue the tradition with respect and love, while introducing new insights from science and beekeeping technology. We manage more than 2000 beehives, which makes us the biggest beekeeping in our country. We enhance our proven knowledge with new scientific and practical insights. We have a doctor of veterinary medicine and a beekeeping master (Imkerschule Graz) permanently employed at our company.

In the territory of Slovenia, we have been cultivating the native breed of honey bee, Apis mellifera carnica, for centuries. It is one of the most famous and widespread breeds of bees in the world. We call it 'Kranjska sivka' in Slovenia, and it is also known as the Carniolan bee, Carnica Biene and Krainer Biene." The breeding of the Carniolan queens at Pislak Bali Beekeeping dates back to the 1970s, when the need to arose to provide quality queens for the growing beekeeping industry's own needs and later for sale.

Over the years, Pislak Bali's Carnica bee lines established themselves as reliable, well-selected queens that achieve top production results. Basic selection is carried out from over 2,000 bee families, of which the best Carnica queens are selected for honey yield, calmness, purity of the breed, cleaning instinct, liveliness and non-swarming. The same attention is paid to the breeding of drones. To date, we have bred almost half a million Carniolan queens. Our queen bees and their offspring live in all countries of the European Union, in Great Britain, Middle Eastern countries, Japan and elsewhere. They thrive in both warm and cold climates.



Many years of rich experience in Carniolan queen breeding and cooperation with the Agricultural Institute of Slovenia are reflected in the quality and recognition of our Carniolan queen lines. Today, we are a reliable partner in the supply of top-quality breeding material.

CONTACT:

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www.cebelarstvo-pislak.si
https://queencarnica.com

About the product

Propo Steam is a 100% natural and effective solution for **respiratory care** and air disinfection. It helps maintain a microbe-free environment while supporting optimal breathing health.

This apitherapy device allows to fully exploit the extensive **therapeutic potential of propolis** providing powerful antibacterial protection and respiratory care in a completely natural way.

Key Benefits

- **Respiratory Relief:** Inhalation of propolis vapors helps alleviate breathing issues and supports the immune system.
- **Air Purification**: Effectively removes microbes, organic solvents, and airborne particles, ensuring cleaner air.
- **Natural Fragrance:** Fills the space with a fresh, pleasant scent without artificial additives.
- **High-Quality Design:** Built to last, easy to use with a simple one-button operation.
- **Versatile Use:** Suitable for homes, clinics, hotels, wellness centers.

Propo Steam

propolis vaporiser

Medikoel

About us

Medikoel is a family-owned Slovenian company, founded in 2005, specializing in the production and distribution of medical equipment and other health-support products.

With a strong focus on **apitherapy**, we have certified numerous individuals seeking specialized education and expertise in this natural healing practise.

Breathing nature's finest

Experience the power of nature's best antibacterial and respiratory aid with Propo Steam – your partner for cleaner air and better breathing, naturally.

How does it work?

The device heats raw propolis to 82°C, releasing a vapor rich in **12% essential oils.** This can be:

- inhaled using the included mask and hose for intensive respiratory therapy, or
- dispersed in the air to cleanse and refresh the environment.

Contact us

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Medikoel

CEREMONIAL AWARDING OF LICENSES TO LECTURERS AND THE VISION FOR THE DEVELOPMENT OF BEEKEEPING KNOWLEDGE AT THE SECOND ANNUAL RIHAR DAY

On Thursday, April 10, 2025, the Beekeeping Center of Slovenia in Brdo pri Lukovici held the 2nd annual Rihar Day, which marked an important milestone in the Slovenian beekeeping community, and featured the ceremonial awarding of the first licenses to lecturers of the Anton Janša Beekeeping School (AJBS).

The event was honoured by the presence of many distinguished guests, including the Minister of Education, Dr Vinko Logaj, and the President of the National Council of the Republic of Slovenia, Mr Marko Lotrič. In their speeches, both emphasised the importance of beekeeping as a tradition with exceptional educational and envi-

ronmental significance. The event was also attended by several mayors, deputy mayors, deputies, and state councillors.

We opened Rihar Day by planting a linden tree, which is a symbol of knowledge, strength, and the Slovenian beekeeping tradition. We presented the Anton Janša Beekeeping School, which, through its work, aims to ensure high-quality beekeeping education in Slovenia and beyond. The school's mission is to preserve and develop beekeeping knowledge, with the aim of increasing the professionalism and efficiency of beekeepers' work, protecting bees, ensuring pollination and food security, as well as preserving biodiversity.

The vision of the Anton Janša Beekeeping School is to become a key European and global leader in the field of beekeeping education. At the forefront of its activities are professionalism, responsibility, a commitment to development and excellence, as well as networking and collaboration. The school encourages lifelong learning and ensures accessibility of education for all.

At the event, the AJBS lecturers were licensed for the first time. We accredited 31 Slovenian lecturers and 5 foreign lecturers from Germany, Spain, Croatia, Bosnia and Herzegovina, and Turkey. The first licence was awarded to the president of the Slovenian Beekeepers' Association, Mr Boštjan Noč, who then awarded licences to the other lecturers and, together with them, signed an oath to the mission, vision, and values of the school. The lecturers also received official badges, licence pins, and clothing featuring the school's distinctive branding.

The event was rounded off by a professional lecture given by Dr Ivana Tlak Gajger, an internationally recognised expert, on the impact of nutrition on bee health, and an educational lecture by Mag. Lidija Dolenc Carotta, MSc, on how to become an inspiring and effective lecturer. The Anton Janša Beekeeping School is also the result of collaboration between the Slovenian Beekeepers' Association and its official sponsor, Nova Ljubljanska Bank (NLB), to whom we express our gratitude for their support and cooperation.

The second annual Rihar Day once again highlighted the importance of knowledge and dedication to the profession and tradition. By connecting generations and spreading high-quality knowledge, the Anton Janša Beekeeping School is laying the foundations for a sustainable future for Slovenian and European beekeeping. We look forward to the third annual Rihar Day next year.

Slovenian Beekeepers' Association

THE ČZS MEN'S CHOIR

The Slovenian Beekeeping Association has had its own chamber men's choir for 10 years. They are a unique choir of their kind and we Slovenian beekeepers are proud of them. On April 6, they celebrated their 10th anniversary with a solo concert.

BEECONN GIFT

Strips, the company that produces BEECONN scales, presented Dr. Urška Ratajc with a brand new scale BeeConn Lite – https://beeconn.net/store/beeconn-lite.html.

Dr. Urška Ratajc received the BEECONN scale in gratitude for the effort and work she puts into the European Beekeeping Association as Head of the Scientific Committee of the EBA.

MEAD MADNESS CUP, HONEY MADNESS CUP, AND THE EUROPEAN MEADMAKERS CONFERENCE

Krakow, March 5, 2025 – On February 27-28 and March 1, 2025, the Hilton Hotel in Krakow became the meeting point for enthusiasts and producers of meads and natural honey. The event featured the European Meadmakers Conference, along with the prestigious Mead Madness Cup and Honey Madness Cup competitions. It provided a unique opportunity for creators, hobbyists, and professionals to test their products in international competition, expand their knowledge, and establish valuable industry connections.

A Celebration of Mead Masters

Since its inception in 2018, the Mead Madness Cup has held a key place in the global calendar of mead-related events. This year's edition saw an impressive 855 meads submitted from 32 countries, including distant locations such as Australia, the USA, Singapore, South Korea, Japan, New Caledonia, and Thailand. The competition spanned numerous categories, culminating in the selection of the very best meads.

In 2025, the title of Grand Champion HOME was awarded to Poland, with Mariusz Szymański winning for his mead "Gryka (Better than Knapa)". Among commercial producers, the highest honor went to the Belgian meadery The Blacksmith's Meadery for its mead "Original Sin IV".

"With each passing year, the quality of meads submitted to the competition continues to rise, which is immensely gratifying. At the same time, this presents an even greater challenge for our judges – this year, over 90 experts from around the world had the difficult task of selecting the winners," noted Krzysztof Jarek, competition director.

A Global Honey Competition

This year also marked the second edition of the International Honey Competition – Honey Madness Cup. This prestigious event is dedicated exclusively to beekeepers and apiary owners who produce their own honey.

The judging panel included experienced honey sommeliers affiliated with the Italian organization Alba del Miel. Honey submissions were evaluated based on their sensory qualities, with awards given based on scoring criteria rather than direct competition between entries. Additionally, all medal-winning honeys underwent pollen analysis at the HoneyLab laboratory.

A total of 135 honey samples from 13 countries were submitted, with an exceptionally high level of quality observed across the board.

European Meadmakers Conference – Knowledge & Networking

The conference provided a unique opportunity for attendees to hear inspiring presentations,

exchange experiences, and establish valuable business relationships. Lectures were conducted in both Polish and English, with sessions for advanced participants held in English and accompanied by simultaneous Polish translation. Separate sessions in Polish catered to beginners and those interested in starting their own meadery.

"In response to participant feedback, this year we introduced special workshops for those just beginning their journey with meadmaking," noted Mateusz Błaszczyk, one of the event's organizers.

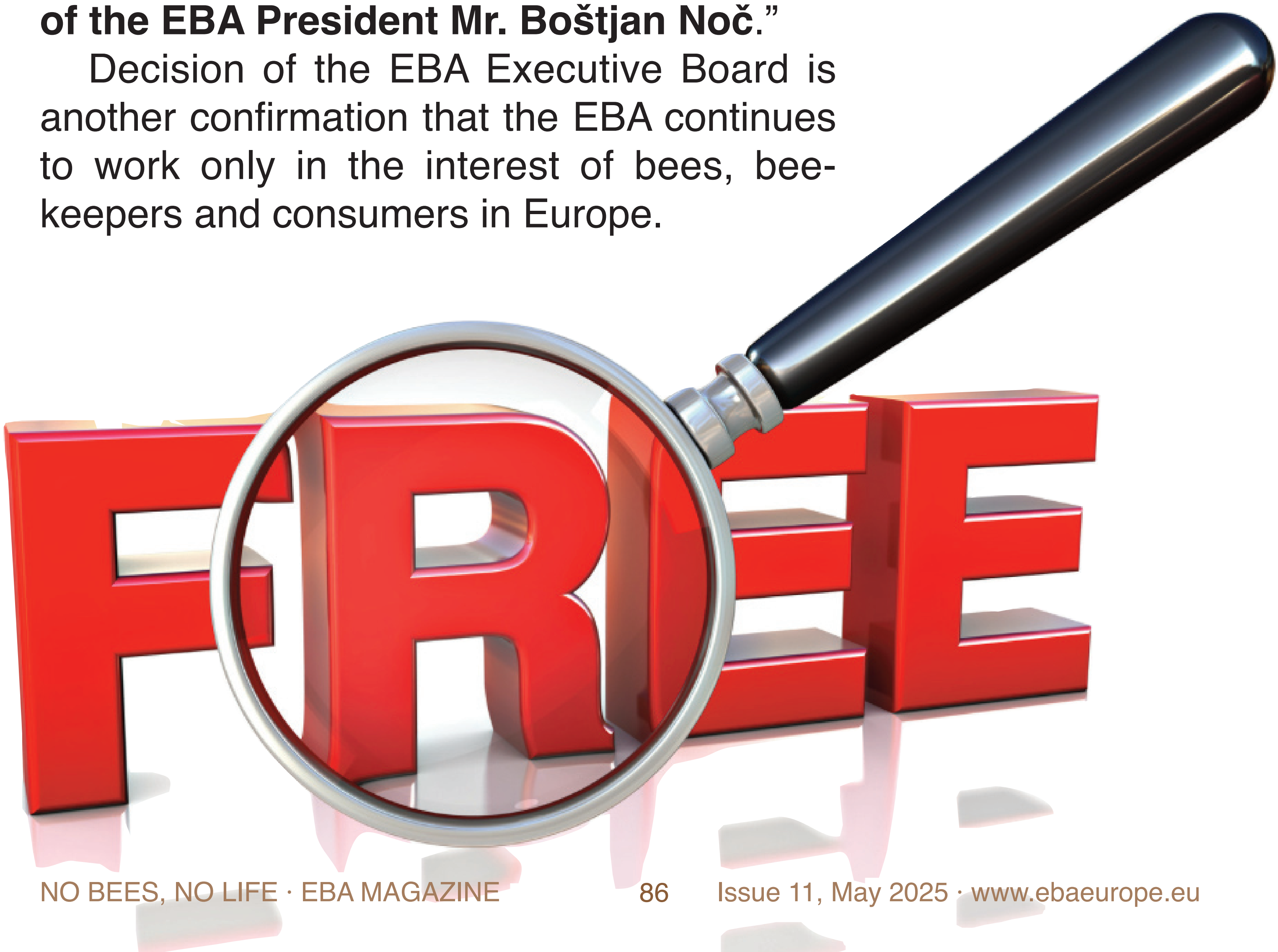
This year's edition attracted great interest and received highly positive feedback from both attendees and speakers. The organizers have already announced the next edition, set to take place February 19-21, 2026, in Krakow.

More information and the full list of winners are available at meadmadnesscup.com and honeymadnesscup.com.

TO THE EBA WITHOUT MEMBERSHIP FEE

At the meeting of the EBA Executive Board, on the proposal of the EBA President Mr. Boštjan Noč, an important decision was made regarding membership in the EBA in the upcoming period: "**Membership in the EBA is free for the duration of the mandate of the EBA President Mr. Boštjan Noč**."

Decision of the EBA Executive Board is another confirmation that the EBA continues to work only in the interest of bees, beekeepers and consumers in Europe.



SPONSORSHIP REQUEST

AND METHOD OF ADVERTISING IN THE MAGAZINE

On behalf of the European Beekeeping Association (EBA),I am writing to seek your support in the form of sponsorship to help ensure the smooth and effective operation of our Association.

The EBA is dedicated to promoting and supporting beekeeping across Europe. The Association was founded out of necessity, as bees and beekeepers are essential for our ecosystem and society. Without beekeepers there are no bees, and whithout bees there is no pollination, leading to a lack of food on planet Earth.

EBA works for bees, beekeepers and consumers.

Our mission is to:

1. Fight against counterfeit honey that flooded the European market;
2. Introduction of incentives per beehive as agro-ecological programme;
3. Fight against the improper use of chemicals that are harmful to bees;

In return for your generous support, we offer various sponsorship benefits. We believe that this partnership would be mutually beneficial and would significantly contribute to the advancement of the european beekeeping sector.

ADVERTISING IN THE MAGAZINE:

1. Through sponsorship packages;
2. It is possible to pay for an ad only for 1/4 page (100 euros), for a larger area by agreement. The entire page cannot be obtained, it belongs only to the General Sponsor.

IT CONTINUES

EBA sponsorship packages

GOLD sponsor - 5.000 euros:

Advertisement on the EBA website
Presentation at all EBA events, logo on all EBA correspondence
12 advertisements in the EBA monthly e-magazine in A4 page size

SILVER sponsor - 3.000 euros:

Advertisement on the EBA website
Presentation at all EBA events, logo on all EBA correspondence
12 advertisements in the EBA monthly e-magazine in half A4 page size

BRONZE sponsor - 2.000 euros:

Advertisement on the EBA website
12 advertisements in the EBA monthly e-magazine in the size of 1/4 A4 page

EBA SUPPORTER - 1.000 euros:

Advertisement on the EBA website
12 advertisements in the EBA monthly e-magazine in the size of 1/8 A4 page

These are basic packages, but we are open to different forms of cooperation, which we agree on individually. We would be delighted to discuss this opportunity further and explore how we can align our goals with your organization's values.

Thank you for considering our request. We look forward to the possibility of working together.

Yours sincerely,

Boštjan Noč
President of the European Beekeeping Association


BEES
LIFE
CONTENT


BEES
LIFE
CONTENT

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The contents of the texts and advertisements are the responsibility of the autors.

The responsibility for the correctness of the English language in the magazine lies with the authors of the texts.

The editor reserves the right to publish a larger advertisement than the size specified by the sponsorship package, if it improves the design of the magazine.

Advertising in the magazine: 1. Through sponsorship packages; 2. It is possible to pay for an ad only for 1/4 page (100 euros), for a larger area by agreement. The entire page cannot be obtained, it belongs only to the General Sponsor.

The total number of pages in the magazine is not fixed.

There are no fees for published texts and photos.

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