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Special Edition and Programme SICAMM Conference 2012

Verein Schweizerischer Mellifera Bienenfreunde VSMB August 2012

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31st of August 2012 to the 4th of September 2012

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Editor	Hans-Ulrich Thomas
Art Work	Karl Sochor
Advertisements	Silvio Hitz, info@imkerhof.ch
Cover	Karl Sochor Visualtransfer
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Organising comittee:

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Cordial Welcome

Dear friends of the Dark Bees

It is my pleasure to welcome you all in the name of the Swiss mellifera bee friends and the organizing committee to this 11th SICAMM conference. This event is a fulfillment of an old dream of mine which I had at my first SICAMM conference in Wierzba in Poland: Bringing this meeting to Switzerland sometime

The meeting in Poland was a turning point for the preservation of the Dark Bee in Switzerland. Thanks to the contacts made there, DNA-analyses were performed for the first time on our Nigra-Bees. The results gave proof of the fact that the Dark Bee was still existent in Switzerland. This silenced the critics and gave us the needed impetus to work towards its care and preservation. Our close international contacts gave us additional support for our efforts.

I hope we will get positive impulses from this conference as well. The conference motto “For a bright future with the Dark Bee“ describes our commitment.

In order to measure up to this motto we succeeded in attracting well-known speakers. They will talk about present and future aspects of breeding the Dark Bee. In addition experienced beekeepers will enrich the conference by sharing their knowledge with us. The core topic of the SICAMM, the conservation and breeding of the Dark Bee, will be dealt with from different perspectives. New at our conference are speakers from Russia and Macedonia. A heartfelt welcome to them.

For the first time this conference will be multilingual with simultaneous translation English/German. With this we hope to address a wider audience, especially local beekeepers, and disseminate our concern. We are thankful to our sponsors who made this possible.

I thank you very much for your coming and wish you a successful conference with many new contacts and good conversations, which is in the spirit of SICAMM.

Balser Fried
Project leader
SICAMM conference 2012

Program SICAMM Conference 2012
Saturday, 1st September 2012

09.00 Uhr **Opening session**
Prof. Dorian Pritchard, Valentin Luzi, Dr. Peter Gallman, Balser Fried

10.00 Uhr **Shared secrets of beekeeping in Switzerland**
Hansueli Thomas mellifera.ch, Swiss Black Bee organization

10.30 Uhr Break

11.00 Uhr **Observations on queen mating behaviour on a small island**
Aleksandar Uzunov Faculty for Agriculture Science and Food, Skopie, Macedonia

11.30 Uhr **Effects of genotype and environmental factors on the survival and productivity of European honey bee colonies**
Ralf Büchler Bee Research Institute Kirchhain, Germany

12.00 Uhr **Conservation of the Nordic Brown Bee**
Lauri Ruottinen MTT Agrifood Research, Finland

12.30 Uhr Lunch

14.00 Uhr **Considering several traits simultaneously in the honey bee - Total breeding value improves selection**
Kaspar Bienefeld, Institute for Bee Research, Hohen Neuendorf, Germany

14.30 Uhr **The society for the Dark Bees, Germany**
Thomas Petermann, Society for the Dark Bee, Germany

15.00 Uhr **Genetic diversity and hybridization of the honeybee**
Gabriele Soland, mellifera.ch, Swiss Black Bee organization

15.30 Uhr Break

16.00 Uhr **Two decades of Progress for the Dark European Honeybee (Apis mellifera mellifera) of Ireland**
M. MacGiolla Coda, Galtee Beebreeding Group, Ireland

16.30 Uhr **The Role of Instrumental Insemination for the Conservation of the Dark Bee: Potential and Pitfalls**
Florian Sutter, mellifera.ch, Swiss Black Bee organization

Program SICAMM Conference 2012
Sunday, 2nd September 2012

09.00 Uhr **A new strategy for honeybee breeding - Genomic selection**
Kaspar Bienefeld, Institute for Bee Research, Hohen Neuendorf, Germany

09.30 Uhr **Dark Bee Apis mellifera mellifera in the United Kingdom**
Philip Denwood (British BKA and BIBBA)

10.00 Uhr **Ecological and genetic consequences of the setup of a black honeybee sanctuary**
Bénédicte Bertrand, National Center for Scientific Reseach, France

10.30 Uhr Break

11.00 Uhr **Breeding of Dark Bees in Germany and details of «moonshine» mating station**
Gerhard Glock & Thomas Ruppel, GEDB association, Germany

11.30 Uhr **How to preserve and develop the native Black Bee in Sweden**
Ingvar Arvidsson, Projekt NordBi, Sweden

12.00 Uhr **Inbreeding problems and their avoidance**
Dorian Pritchard, President of SICAMM

12.30 Uhr Lunch

14.00 Uhr **Comparison of DNA and Morphology: Results of Martina Siller's study on the Austrian Mellifera populations**
Balser Fried, mellifera.ch, Swiss Black Bee organization

14.30 Uhr **Queen Performance Problems**
Roger Patterson, British Beekeeper Association, England

15.00 Uhr **Factors affecting queen quality**
Laurent Gauthier, Swiss Centre for Bee Research

15.30 Uhr Break

16.00 Uhr **The Dark Bee in Austria, a regional ecotype**
Alois Reiter, Austrian Mellifera Beebreeders, Austria

16.30 Uhr **Breeding varroa-resistant bees**
Dorian Pritchard, President of SICAMM

17.00 Uhr **A broodless method for Varroa control**
Laurent Gauthier, Swiss Centre for Bee Research

17.30 Uhr **Little brooks make great rivers**
Yves Elie, Association arbre aux abeilles, France

Program SICAMM Conference 2012
Monday, 3nd September 2012

09.00 Uhr **Perspectives for a sustainable control of European Foulbrood (EFB)**
Balser Fried, mellifera.ch, Swiss Black Bee organization

09.30 Uhr **The Potential of the Dark Bee, Apis mellifera mellifera, for Commercial Honey Production under Irish Climatic Conditions**
Eoghan MacGiolla Coda, Galtee Beebreeding Group, Irland

10.00 Uhr **Queen breeding in Switzerland**
Reto Soland, mellifera.ch, Swiss Black Bee organization

10.30 Uhr Break

11.00 Uhr **Apis mellifera mellifera in Tasmania**
A. Abraham, Commercial Beekeeper, Scotland

11.30 Uhr **The Tyrolian Dark Bee, a subspecies with special characteristics**
Martin Ennemoser, Imkerschule Imst, Österreich

12.00 Uhr **Black bees and traditional log hives in the Cévennes National Park (South of France): conservation of natural and cultural heritage**
A. Lehebel-Péron, CEFE, UMR 5175 CNRS, France

12.30 Uhr Lunch

14.00 Uhr **Vistit of the apiary of the Plantahof**
Honey tasting
Visit Plantahof
Balser Fried, mellifera.ch, Swiss Black Bee organization

16.00 Uhr **SICAMM meeting**
Dorian Pritchard, President of SICAMM

17.00 Uhr **End**

Excursion programme

Programme: Friday (Technical Excursions)
Departure from the "Plantahof", subsequently the people staying at the "Swiss Heidi Hotel"

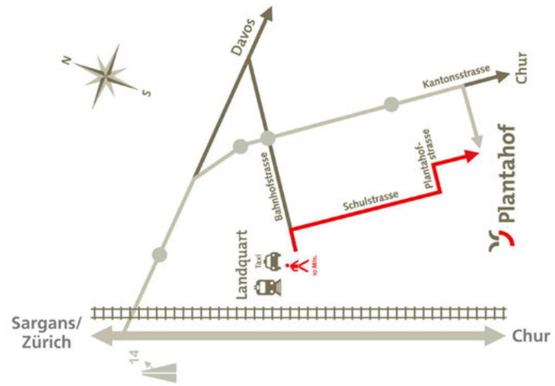
- **Excursion A:** Swiss Bee Research Institute, Liebefeld-Bern and educational bee trail near lake of Biel
- **Excursion B:** Canton Glarus, the first dark bee protected area in Switzerland. Visit to the town of Elm with the oldest Swiss dark bee populations.
- **Excursion C:** Alpine Bee mating station "Säntis" and lunch in a mountain revolving restaurant

Saturday evening
Conference dinner with entertainment

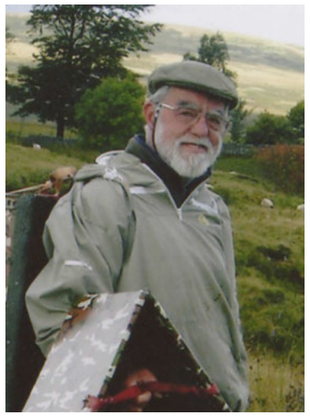
Tuesday
Alpine panorama train ride via Albula (UNESCO world heritage) to Pontresina and up to "Muottas Muragl" mountain restaurant

Programme for accompanying persons
During the sessions days, visits to interesting places in the neighbourhood

Further information and updates: www.sicamm.org



Presidential Welcome



SICAMM (Societas Internationalis pro Conservatione Apis Mellifer-ae Melliferae - the International Association for Protection of the European Dark Bee) was initiated by Nils Drivdal in Norway in the early 1990s, to counter the threat he saw to his own dark bees. At that first conference a protected area was defined, with the cooperation of local beekeepers. Subsequently there have been other significant advances. On the island of Laesø, Andrew Abrahams and I both delivered broadcasts on prime-time television national news, which contributed to the establishment by Ole Hertz, of conservation populations on other Danish islands. At Versailles we assembled representatives of the ten or so French conservation groups, for the first time ever, which led to publication of the first comprehensive publication on French native bees. In Moscow, we initiated collaborative research between the Russians and the French geneticists, which should eventually integrate the Russian bees into Lionel Garnery's evolutionary tree for western Europe. In Britain we have pushed back the probable date of arrival of Apis mellifera by some 7000 years, which could eventually alter its legal status and so allow it legal protection.

Our founding President, Josef Stark, was an outstandingly original scientist. It was his bees passing a radiation monitor at their hive entrance that alerted the world to radioactive fallout from the Chernobyl explosion. Josef's untimely death in 2004 is now commemorated by an award and at this conference we will hear talks by its latest recipient, Eoghan MacGiolla Coda, who is now building strongly on the magnificent achievements of his father, Micheal, in consolidating mellifera in Southern Ireland.

For the first time, we will hear contributions from the Ural Mountains and Tasmania, where mellifera was taken nearly two centuries ago by British settlers and, in a departure from tradition, we welcome a speaker from Macedonia, where the native subspecies is macedonica.

We will also learn to what extent recognisable DNA characteristics underpin wing morphometry, of new approaches to selection and breeding of high performance queens, how to foresee and avoid problems of inbreeding and how to breed bees resistant to varroa. We will also hear of new technical methods to fight varroa and EFB. Perhaps most exciting of all are the research visits and superb excursions through the most magnificent scenery in Europe.

On behalf of SICAMM, I therefore take great pleasure in welcoming you to what promises to be a superb conference, convened by Apisuisse. We hope you will have an enjoyable and truly memorable experience and will return home fired with enthusiasm to conserve and promote that most valued insect, the native Dark Bee of Northern Europe.

Dorian Pritchard
President of SICAMM

Dear Friends of the Dark Bees

Active breeding of honey bee queens together with selection are important keys for successful beekeeping in Switzerland. For a long time public as well as private funding has neglected this reality. As a matter of fact the breeding program at the Swiss Bee Research Institute was cancelled a long time ago and much local knowledge and know-how has been lost since. However, a different attitude towards bees and beekeeping changed this: The honeybee was formally recognized as a farm animal, in addition the Dark Bee was rated an endangered species. This happened in view of the possibility of disease resistances.

We now can offer all bee breeding organizations scientific support for their breeding efforts. For the time being this is: Analyses of traits with classical genetical methods, structure and relatedness of populations as well as genetical diversity. Our efforts go towards genetic selection of small and closed populations and questions around the preservation of endangered populations. This is an urgent concern because of the disappearance of feral honeybees owing to the Varroa mite.

In order to secure access to modern equipment and up to date knowledge we have joined the "Swiss animal Breeding Technology Platform (SABRE-TP). This external expertise joined with our own capabilities makes use of synergies and will be advantageous for the topic of breeding honeybee queens.

The Swiss Bee Research Institute welcomes the efforts of SICAMM and recognizes especially the important role of the Dark Bee Society in Switzerland (VSMB). I am pleased to participate personally at the conference and hope for many contacts and interesting talks with professional colleagues.

Peter Gallmann
Director
Swiss Bee Research Institute

Welcome to Switzerland

With these words I would like to cordially welcome you to the SICAMM conference in Switzerland and wish you many fruitful encounters.

Switzerland is a small country and is characterized by an enormous diversity in all aspects. Four official languages are spoken, a huge selection of different landscapes and 26 different constitutions characterize the political side of the country. These are three examples, representing many others.

Diversity is also present in beekeeping. Numerous hive designs, working methods, and different bee subspecies portray our way of keeping bees. Four breeding groups for the Mellifera, Carnica and Buckfast subspecies, respectively, are actively engaged in breeding and selecting their favoured race.

In 2010, by a change of law, the umbrella organization "apisuisse" was established and is now responsible for the nationwide coordination of all breeding efforts. This organization financially supports mating yards for pure and conventional queen breeding, as well as the operation of testing yards for the evaluation of breeding values under standardized conditions. The calculation of the final breeding values is done in cooperation with the Bee Research Institute in Berlin and published on www.beebreed.eu.

Switzerland has also signed the Rio declaration for biodiversity and commits itself to supportive measures for rare species. It is gratifying that Switzerland still has a natural population of the Dark Bee. This is certainly a good basis for the mutual exchange of ideas and lively discussions.

A cordial welcome and wishing you a successful conference!

Rudolf Ritter
Project leader apisuisse

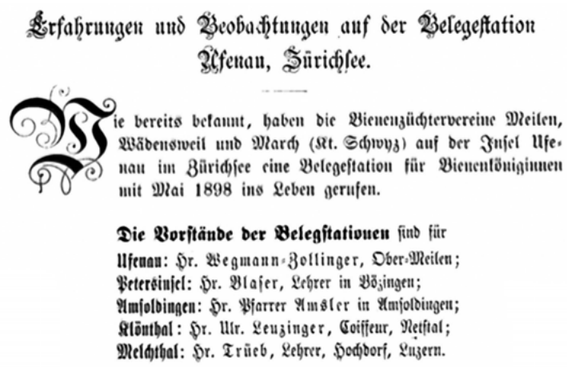
Factual Information on the History of the Dark Bee in Switzerland

The introduction of mobile beekeeping after 1860 brought larger interest in beekeeping in Switzerland and gained a lot of momentum. Numerous foundations of beekeeping societies and pioneering works, like the 1884 system of scales, hives to weigh and record honey yield in different regions or the 1898 establishment of a honey control system is proof of this rise. The activity did not stop there. Foreign bee races from the Mediterranean came in use by some beekeepers. Some liked the swarming zest of the Carnica race, which filled their beehives. Others liked the docile Italian Ligustica bee or crosses. Experiences gained were reported and published in the Swiss beekeeping journal under the title "Seasonal Reports of the State of Beekeeping". Ulrich Kramer, a teacher in Zurich, stated: ... there is one thing our native races are ahead of the hybrid species, they are adapted to our climate and therefore constant and certain in their heredity. Kramer therefore realised that the best results will come most likely from selective breeding of the climatically best adapted bee having a stable heredity trait.

Kramer together with some other queen breeders started a pioneering work that soon became known internationally. In 1897, at the delegation meeting in Schaffhausen, Kramer gave a lecture entitled "A New Queen Rearing Project". This talk turned out to be the foundation for a new approach to queen rearing. In March 1898, there was a call to local beekeeping associations to examine and report bee colonies with excellent performances. Egg stripes (not larvae!) from these chosen colonies were mailed and introduced into a nursing colony, letting it raise the queens. To conclude the process, a mating yard was needed. The world's first mating yards run by beekeepers associations opened in 1898.

Ulrich Kramer,
24. August 1844 - 19. August 1914,
Honorary Doctor, University Bern 1908,
Head of Queen Breeding,
VDRB 1898-1914

Likewise in 1898 Kramer published the first edition of his book "Pure Race Breeding for Swiss Beekeepers". The book underwent eleven editions until 1979. Browsing through it one witnesses Kramers constant search for new and practical solutions to beekeeping. Special mention deserves Kramers system of quality assessments for bee colonies. He was the first who systematically graded bee colonies by assigning them points. His system is still in use today; the best value for an



Erfahrungen und Beobachtungen auf der Belegestation Ufenau, Zürichsee.

Wie bereits bekannt, haben die Bienenzüchtervereine Meilen, Wädenswil und March (Kt. Schwyz) auf der Insel Ufenau im Zürichsee eine Belegestation für Bienenköniginnen mit Mai 1898 ins Leben gerufen.

Die Vorstände der Belegstationen sind für
Ufenau: Hr. Wegmann-Zollinger, Ober-Meilen;
Petersinsel: Hr. Blaser, Lehrer in Bözingen;
Amsoldingen: Hr. Pfarrer Amsler in Amsoldingen;
Klönthal: Hr. Ulr. Leuzinger, Coiffeur, Netstal;
Melchthal: Hr. Trüeb, Lehrer, Hochdorf, Luzern.

attribute is a 4; the worst a 1. In 1914, when Kramer deceased, 48 mating yards were in operation and 318 queen breeders had 2959 queens mated.

Kramer was followed by Meinrad Jüstrich, a teacher in St. Gallen. During his time the highest growth of queen rearing activity was achieved. After 20 years the numbers of mating yards increased from 48 to 150; the number of queen rearers grew from 318 to 1500. Equally impressive were the results. Jüstrich calculated that

between 1915 to 1926 the honey yield of colonies with selected queens was 16% or 4.5kg higher per hive as in hives with no selected queens. The calcu-

Meinrad Jüstrich,
28. December 1867 to 16. October 1940
Head of Queen Breeding,
VDRB 1914-1940

lation was based on 52'000 selected and 10'000 not selected queens. From 1926 to 1935 the difference dropped to 13.5%. Because of selective breeding the difference of the honey yield between bee colonies compared to the mean of the apiary became smaller. Another positive result was to improve winter stores. Taken together one main target was reached: An above average yield together with a surpassing quality.

In 1940 Dr Martin Hunkeler, a veterinarian, took over the job from the deceased Meinrad Jüstrich and under his guidance queen breeding reached its peak. Compared to today these are impressive numbers: 1'500 active queen breeders, 15'000 mated queens and 225 mating yards. However, in the words of Dr Hunkeler:

> "... this describes only the outer boundary of our efforts. Much more important are the inner values. Most queen breeders strive for pure race breeding that satisfy performance and physical appearance. ... Our Nigra bee is known internationally. We are approaching Kramer's ambitious aim. However, there is still a lot to do."

Dr. Martin Hunkeler,
3. September 1892 - 29. August 1963
Head of Queen Breeding,
VDRB 1940-1963

Dr Hunkeler went on to explain what he meant. His accurate words are still valid today and their meaning played an important role in 2008 when the queen breeding program was reorganised.

> "I ask myself why we did not come further and why we have so much difficulty to hold on and to accomplish our task. The answer lies very often in negligence: Queen rearing should be based on extensively graded colonies which are also tested for their performance. However, in reality many queen rearers depend only on their instinct and memory, i.e. not based on written memos and detailed bookkeeping. This haphazard way may work for some time but is not a stable basis for good results in the future. Bad decisions will show their negative results after two to three years when the much acclaimed breeding stock will not live up to expectation and time and efforts are lost. Many breeding groups fall into this self-made trap."

Dr Hunkeler asked from each queen breeding group a systematic strategy: Tenacious grading of colonies together with a correct herd book. Drone colonies for the mating yard and breeding stock should only come from locally adapted strains. Breeding stock from outside should only be used in urgent circumstances.

After 50 years of efforts Mellifera typical breeding stock was widely available and uniform. In 1960 there were 300 active queen breeding groups at work selecting breeding stock and drone colonies for 250 mating yards.

The structure of queen breeding was decisively shaped by these two men. The beekeepers in Switzerland owe them respect for their persistence, organisational as well as educational skills.

After World War II, far reaching discoveries were made. It was proven that drones and queens fly a long distance (> 6km) for mating and that queens mate with up to 20 drones. This questioned the traditional way of queen breeding, and especially the maximum placement of mating yards. To put this new knowledge into practical use was the job of Prof Dr Fritz Kobel, a former director of the National Agricultural Research Station in Wädenswil, Zurich.

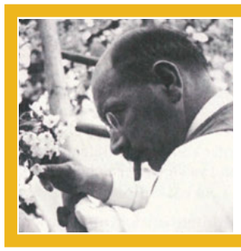
To actualise instruction of the breeders Prof Kobel rewrote the breeding textbook, published in 1968 under a new title "Pure Race Breeding in Honeybees". The content was up to date and included all new discoveries. Prof Kobel was keen in transforming the scientific knowledge into practical use. In a letter he stated factually:

> "It was fatally wrong to ignore the fact that drones and queens fly great distances for mating, even though it was experimentally proven in the USA some time ago. Our mating yards very often are not isolated enough and that's why selection was not as successful as it was meant to be. Nevertheless queen rearing made a lot of progress since Kramers time. A lot of beekeepers learned the skill to raise their own queens, which is very valuable. It is my duty now to convince our beekeepers to change the old habits."

Prof Kobel went to work and declared mating yards in the flat countryside of little use, equivalent to local matings in the apiary. Alternatively he fully recognised the value and results of 70 years of queen rearing with grading and keeping a herd book. Under his guidance isolated mating yards in the mountains were opened. The clear distinction between pure race and common mating yards was introduced, each with its own benefit to beekeeping. Both types are still in use today and are financially supported.

In 1963 -1965 Prof Kobel directed a comprehensive comparison between the Mellifera and Carnica races. The results were inclined towards the Carnica, even though the best Mellifera were as good as the Carnica. On average, the honey yield was 20% less in the Mellifera colonies and 21% Mellifera vs 38% of the Carnica colonies were in the highest ranks of honey yield. The conclusion was that the Mellifera had the same potential as the Carnica. However, the Carnica came from pure mating yards, whereas, most Mellifera did not, demonstrating the result of failed matings with foreign drones. This subject is a current one even today. How do we ensure pure drone mating in order to get bee colonies with even performances?

The 1960s marked the beginning of the introduction of the Carnica to Switzerland. In 1965 the first three Carnica mating yards were recognised. This was in the hope that further introductions would not follow. To no avail! The ban for Carnica advertisements in the Swiss Bee



Prof. Dr. Fritz Kobel,
10. May 1896 - 12. February 1981
Head of Queen Breeding,
VDRB 1964-1976

Journal was lifted a short time later and in 1966 the Carnica Breeders formed their own association.

In 1976, at the age of 80, Prof Dr Fritz Kobel passed on his job to Josef Krieg who took over as new head of queen breeding on the board of the Swiss-German Beekeepers Association. Josef Krieg was an instructor at the Cantonal Institute of Agriculture in Pfäffikon, Zurich. Already in the 1930s Krieg began with breeding and cooperated with the comparative tests of bee strains at the National Institute for Acriculture in Wädenswil, Zurich. In 1960 Josef Krieg became a member of the breeding commission of VDRB and as head of the department he accomplished the comparative tests.

In 1975, new regulations to queen rearing in the Swiss German Beekeepers Association (VDRB) came into being. Breeders and breeding organizations of the Mellifera were supported. The Carnica breeders enjoyed the same rights if they fulfilled the obligations for the Mellifera breeders.

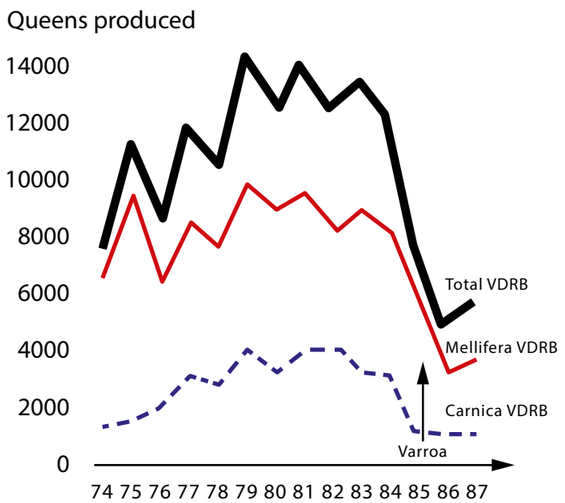
The regulations still had a clear imprint of the old Mellifera breeding system. Financial support, as well as control by the VDRB-breed head was promoted for areas that were important for the maintenance and development of the Swiss Mellifera Breeding.

- Mated queens from mating yards
- Queens of good parentage with mating at apiaries
- Keeping of herd books on the number of records
- Hive testing results with record in the herdbook
- Comparative testing of breeding lines with compensation for test queens and hive testing.

Registration and qualitative assessment of the stock is the basis for any maintenance and development of a breeding population. The regulations of 1975 had placed a clear emphasis here and gave a framework for the activities of the breeders.

In the 1970s and ‘80s there were a number of Carnica mating yards officially recognized and Mellifera breeding was in continual decline. In 1970 there was 13% of all mating yard-bred queens Carnica, 1989 41% and 1995 exceeded the production of Carnica queens the mark of 50%, achieving today the mark of 65%.

Josef Krieg, in 1988, provided a review of the breeding work in the Swiss German Beekeepers Association (VDRB) 1974 to 1987. Thus, the total number of queens around 1985 declined sharply. The beekeepers were in shock after the varroa mite appeared for the first time in 1985. Even small, local yards were closed, and breeding head Josef Krieg tried in vain to dissuade the breeders from these unrefracting closures. In 1987, only 441 breeders were active and Josef Krieg asked:



> “Shouldn’t we be ashamed in front of our fathers and grandfathers? They have taken breeding seriously and thus significantly contributed to the success of our present-day Swiss Mellifera.”

The shift toward the Carnica race took place not only numerically but also had effects on regulations and staffing within the Swiss German Beekeepers Association.

Josef Krieg,
13. September 1919 - 2. Juni 1998
Head of Queen Breeding,
VDRB 1976-1989

In 1990, after Josef Krieg had left his post, the office was no longer occupied and a temporary solution was found. Krieg was the last leader in the VDRB, who really held the executive responsibility for the Mellifera breeding. As late as 1988 one finds the usual, carefully written annual report on the breeding activities in the VDRB. Under the successors in the breeding department VDRB we find Hansjörg Ruegg, Hans-Georg Wenzel and lastly Jakob Künzle. They formally supervised the breeding of the Mellifera and were operating the subsidy flows. Their personal choice however was clearly on the Carnica.

For the Dark Bee, the time was not favorable and if it still existed, was questionable. It is worthwhile to quote Hans-Jörg Ruegg, because he expressed the generally prevailing opinion on this issue:

> “A new concept for breeding”... “must include all streams in the VDRB. This includes the following aspects: First Science: Scientifically, we must assume that in the field of the VDRB only live mixed breeds. Pure breeding is no longer possible. However, it can and should be bred. Correctly, we would have to speak of line breeding. ... ”

The management of the breeding system by the Swiss-German Association was in continuous decay, which can be recognized by the absence of annual reports and the non-existence of Breeding Commission meetings.

An exception was the breeding regulations of 1995, which came into force under breeding head Hans-Georg Wenzel. This is compared to the old regulations of 1975 a clear shift in weight that supported a further shifting of areas to the Carniolan race. Whereas the efforts to maintain indigenous breeds were sidelined. The recognition and subsidies for mating yards with fewer than 100 matings were dropped, as were the means to local herdbooks and hive testing. Instead, the supply of pure breeding material from a few central sources, or by importing was generously subsidized. Hive testing occured only with respect to purebreed mating yards. Breeding groups were only encouraged to achieve an annual minimum of 100 mated queens.

As the subsidies were abolished, the control, promotion and training by the breeding chief also ceased. The concept of breeding VDRB 95 put an end to traditional hive testing and management of herdbooks by local groups.

The consequences were very serious.

Breeding groups that neither manage a herdbook nor test hives, have no overview of the queens of their members and are no longer in a position to make select decisions themselves. So the breeding group ceases to keep and develop its part of the breeding population.

In its place there had been formed a tremendous emphasis on the purebreed mating yards: from here was now “the good breeds” to get, that before had been under local control. What breeding groups failed to maintain, they expected now others to do: The holders of the purebreed mating yard should now run the breeding population. The head of the purebreed mating yard became a service provider producing good breeding material that was provided breeding groups with subsidies from the association. If we asked breeding group representatives to set up a test apiary and be concerned themselves for the production of pure breeding queens, we often received answers as this: “We don’t need this, we can get good breeds from the purebreed mating yards”.

They did not want to see that the head of the pure breeding yard had more and more difficulties to maintain an adequate breeding population. In several cases it came to a narrowing or collapse of the mating yard-based “breeding population.” This change of system was favorable to breeders of the Carnica: what was imported from abroad, could be passed on to pure breeding yards and multiplied by the thousands with financial support of the VDRB. The breeding population was standing in Austria, Germany and Slovenia. Others were concerned for its maintenance.

Around 2005, breeding of the native Dark Bee stood in an existential crisis that was never seen before. Three of six purebreed mating yards had lost their breeding population partially or completely. The European foulbrood destroyed only what would have collapsed with time.

Mellifera.ch takes over control

2007 the committee of mellifera.ch set up a working group “breeding concept“, which worked out, as a first step, a recording


marking of queens

of the current breeding lines. Twenty years before the head of breeding of the VDRB recieved the herdbooks annually and was able to get a picture. In 2007 one was forced to launch a survey. The result was an urgent need. The population of all purebreed mating yards was based only on 10-12 test apiaries with 100-140 hives. A scheduled composition of the test apiaries and a useful performance test could – with a few exceptions – not be observed.

Either the Mellifera had to withdraw into protected areas and shrink over time to a few residues, or the breeders took a new effort, thus securing a freedom of movement for the future.

The technical recommendations on the methods of performance testing of Apimondia 1972 and later the methods of the German Association for Varroa tolerance breeding (AGT), allowed us to develop a decentralized model for test apiaries with central ring exchange for test queens. In principle, the concept is to lead the breeders again to an individual independence. Each breeder is called up to participate in the management and selection of the breeding population, whether as an individual breeder or as member of a breeding group.

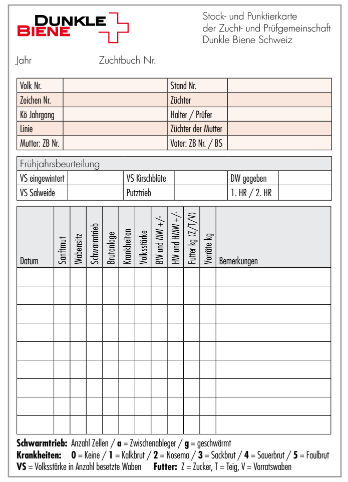
2008 saw the first anonymous exchange of queens when 84 test queens were distributed to seven test apiaries. The functions of the pure breeder, test director and mating yard manager received clear requirements in the context of the Community of the Dark Bee Breeders of Switzerland.

This community had a positive growth in recent years; in 2009 there were 12 test apiaries, in 2010 and 2011, there were 19, and in 2012 there were 21 test apiaries equipped with 252 queens for later grading.

A fortunate circumstance was the reorganization of the Swiss Federal breeding system. In 2010 the Honey Bee was inducted into the stockbreeding Ordinance of the Federal Office of Agriculture, which paved the way for federal funding. Instead of the Swiss German Beekeepers Association there is now “apisuisse“ acting as a neutral corporation. In cooperation with the Federal Office of Agriculture, apisuisse sets breeding guidelines and arranges financial support for grading of beehives, managing of mating yards and the herdbook as well as the breeding value estimation. This is offered by the Institute for Bee Research in Hohen Neuendorf / Berlin. This service includes also herdbook managing, inbreeding calculation and support in selection decisions. The data is freely accessible to the public through www.beebreed.eu, national association 50.

With this highly urgent renewal Mellifera.ch takes up the older tradition from the time of breeding heads Jüstrich and Hunkeler and proves:

Each pure breed breeder and breeding group has the task to manage and develop a part of the breeding population. Through the rearing of test queens and the establishment of test apiaries, as well as the management of breeding lines. It can not be delegated to others, what appears too much for myself. If someone only sees this, he has to import foreign breeding stock, and breeding becomes dependent on foreign sales breeders. Change of bee race is the necessary consequence of it. Salvation does not come from the purebreed mating yards! These are just tools that need to be in the hands of an active partnership when the breeding population should have qualitative and quantitative value. It is therefore required that at least one appropriate organizational and practical breeding effort to set the basis for the following years. Associations of all kinds in all fields show equal performances. Beekeeping associations can not stand back here.



Grading sheet for hives

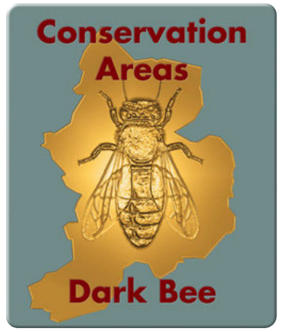
Apisuisse provides the funds of the Swiss Confederation for all breeding activities in accordance with quality requirements. We are in the fortunate position of having today a breeding system as it was before 1990. It provides financial support for the cooperation of pure race breeders, test directors and mating yard managers. Their fields of activity are clearly defined and mellifera.ch actively arranges annual training for them.

The issue of racial purity

What we have today in the breeding population and in the conservation areas, is a sufficient stock of purebreed, indigenous Apis mellifera mellifera. This standard had for a long time been in doubt. Many breeders were disillusioned and breeding work with the Dark Bee was called into question.

However, we can now assume that the import of foreign breeds of 1860-1900 is quantitatively overestimated. The predominantly rural beekeepers in the late 19th Century had neither sense nor purchasing power for mass imports of Carnica and Ligustica. Thus, in our mountainous country, in many places there remained pure stocks. A consistent color breeding had eliminated to a great extent the not indigenous elements. During the years 1898-1960 this native bee population was continued under practically complete exclusion of imports. A maternal tribal breeding was carried out that held together 35 generations of bee queens. The critical years began as

recently as 1970. However, it is known which local beekeepers' associations have decided to move to the Carnica and where there never was a decision to change. Thus, there are places like Glarus, Werdenberg and Sarganserland, parts of the two Appenzell, Obwald, part of the Bernese Oberland, where the importation of Carnica and Buckfast is at best sporadic and if so only in recent years. In an effort to distinguish races in breeding, morphometric wing measurements were made since the early 1990s. The application of wing morphometry was carried out systematically varied and turned out to be insufficient as a method in hybrid situations. So the hybrid influence in the breeding population increased strongly.



Only the use of the genetic hybrid test, that has been available since 2007 and from 2010 became mandatory for breeding mothers, has been the necessary success. This test can detect cross-breeding several generations past. Older crossbreedings, however, have been diluted in the progressive reproduction in Mellifera areas so that they can no longer be detected.

To build up the conservation areas, Münstertal (Grisons) and Diemtigtal (Berne), the genetic hybrid test with molecular markers has been used specifically to exclude hybrids. Another method of analysis which is not able to demonstrate the mixing, but is reliable for an unlimited number of generations back, is the mtDNA analysis. This focuses on the genetic material in the mitochondria. These are like the power stations of the cells. Because of their size, they will only be passed in the egg and do not occur in the sperm. Thus, it can be determined reliably in a long succession of generations back to a primal mother, whether the original queen was Mellifera or Carnica. Both races clearly have a different expression of this genetic material and therefore are clearly distinguishable.

In the 1990s, Prof Bo Vest Pedersen, University of Copenhagen, used mtDNA analysis and demonstrated that the maternal lines of bee populations in Switzerland, England and Scotland are unbroken of mellifera origin. There has been no mistake throughout the generations since the beginning of the importation of foreign breeds in 1860. The mothers always came in a direct line from a mellifera mother.

To the degree of a hybrid influence the mtDNA analysis says nothing, because it analyses only the maternal family tree and does not cover the fathers. Here, this method must be complemented by the hybrid DNA test.

We can assume that in the conservation areas exist for the most part and in the breeding population almost exclusively purebreed stocks. Single, specific crossbreeding events in the past can not be excluded. Recent hybrid influences that are most likely, will be excluded by:

- DNA hybrid testing for each breeding parent
- DNA hybrid testing for the drone hives of pure mating yards

Mixed matings are possible due to inadequate drone security or incidents in mating yards, but are revealed by the continuous analysis of the breeding mothers and deactivated.

Reto Soland breeding head of Mellifera.ch

Beekeeping in Switzerland

Beekeeping in Switzerland has a long tradition dating back to the Romans who probably spread the first knowledge about active beekeeping rather than simple honey hunting. Today about 18'000 beekeepers tend to about 160'000 hives which translates into 4 hives for each km2, mountains and lakes included.

In 2011 the Swiss Beekeeping Association (VDRB, "Verein deutschschweizerischer und rätoromanischer Bienenfreunde") celebrated its 150th anniversary. Established in 1861, it is the oldest, and with 14,000 members, the most important of the 3 language based associations. The French speaking association (SAR, Société Romande d'Apiculture) has 2,500 members and was established in 1876, and the Italian speaking society (STA, Società Ticinese di Apicoltura) has 500 members and was established in 1912. These numbers also indicate that 80 to 90% of all beekeepers in Switzerland belong to a society and receive a journal in their own language. Beekeeping in Switzerland is an occupation for hobbyists, as truly commercial beekeeping is virtually nonexistent.

This fact, the lack of large scale commercial interests, probably explains why bees were not listed in Swiss agricultural laws. This situation changed in 2007 when a parliamentary initiative launched by MP Brigitta Gadient was accepted and the law adapted accordingly. In addition, financial support for beekeeping was also markedly increased.

As a consequence the three societies have been united since 2010 in an umbrella association named "apisuisse" which is taking the nation-wide responsibility for queen breeding, bee health, education and honey marketing. By law, government money cannot be used to support individual beekeepers: it is used solely to support specific activities by apisuisse, like the ones quoted above.

Queen breeding is at the moment the most active area of apisuisse. Breeding activities for the native Mellifera and Ligustica races as well as for the Carnica and Buckfast are supported. In order to receive funding, the breeding has to be done on a scientific basis. This necessitates isolated mating yards, race determination either by wing morphology or DNA analysis, breeding records and evaluation yards for the blind testing of queens. The results are mathematically analysed by the "BLUP method" (Best linear unbiased prediction) for queen breeding and then added to the databank at www.beebreed.eu. The results are publically available and can serve as a basis to one's own breeding efforts.

So far our society is by far the most active in this programme. There is good progress in breeding pure Mellifera bees that meet the demand for well performing bees. During the congress in September 2012, members will give some insights into the progress and work of the society.

Honey with a "Gold Seal"

Swiss honey is high priced; since 2006 its high quality standard has been guaranteed by a special quality programme of apisuisse. To qualify under this regulation in order to receive the special seal of excellence, the "Gold Seal," honey has to be produced by good apiculture practice. This label assures quality levels beyond normal food law and it even includes an inspection of the apiary itself as well as a look at the honey frames in a regular four year cycle!

High Public Interest

Beekeeping in Switzerland picked up at the end of the 19th century when internal structures were organized and made available through the society. These included beekeeping courses, a monthly journal, and formal help and support for beekeepers such as an insurance service for bee losses.

The first basic textbook about keeping bees was published in 1889 by Ulrich Kramer and titled: "Der Schweizerische Bienenvater" (The Swiss Bee Father). This work has been periodically updated over the years. The 19th edition just appeared under a new title "The Swiss Bee Book".

Swiss beekeepers have always had good international contacts and have communicated their knowledge and experience through articles and numerous books. A recent count listed 245 Swiss authors that have written at least one book related to beekeeping!

Public interest in beekeeping has increased markedly in the last few years. Beekeeping classes are booked out quickly with no great promotional efforts needed by the local societies. A pleasant change is that 30% to 60% of the participants are now women. Very soon the picture of an elderly, pipe smoking man occupying himself in the apiary has to be replaced! The problem is not finding new beekeepers, it is finding people to take over responsibility on the boards of beekeeping societies.

Another worry is conflict of interest with nature conservancy laws or groups, as well as the controversial opinions about the influence of honeybees on the population of solitary bees and bumblebees in our environment. Experts agree that intensive agriculture, pesticides, loss of natural breeding places and the disappearance of untouched flower meadows are the main causes for bee losses. There are 11 published international research papers on this subject. One had no clear results, 5 found an influence and 5 did not. Bureaucratic humbug such as the pointless order to move a 60 year old bee house 2.5m to meet a minimum boundary distance does not help in winning beekeepers to the cause of nature conservancy.

The Beehouse - A Swiss speciality

There is one thing that has never changed over the years, especially in the German speaking part of the country, which is hive design. It is a long standing tradition in Switzerland to keep bees in bee houses. Therefore, the "Swiss Hive" evolved for use in these circumstances. It is a wooden box with a fixed size and the following internal dimensions: 30cm width, 76cm height and 58cm depth. The lower half is the brood area which can hold a maximum of 15 brood frames plus a window. The upper half of the box holds the honey frames in two layers. The size of the wax foundation for the brood frames is 335mm x 265mm which is slightly larger than A4 paper size; half of this (155mm x 265mm) for the honey frames. Hive inspection is done from the rear and queen excluders are not used. Due to their size and construction, the hives can be stacked on top of each other, making a perfect use of the available space in a bee house. Time is not standing still and today top loading Swiss hives are becoming more and more popular.

Swiss Bee Research Centre, Liebefeld, Bern (SBRC)

The institute was set up in 1904 in an attempt by the Government to find the cause of the huge colony losses suffered by beekeepers at that time. One year later, Prof. Robert Burri, its first director, was able to report success. It was not foulbrood as expected, but a different bacterial disease which he named sourbrood (European foulbrood, EFB) caused by the bacteria Mellissococcus plutonius. Despite the new findings, the disease could not be eradicated but was under control for almost 100 years with the exception of severe outbreaks in the 1960's when beekeepers experimented with applying antibiotics. In 1999, out of the blue, the disease developed with annually increasing outbreaks. Even today this disease is poorly understood and no easy cure exists. Good results are achieved by making artificial swarms from every hive in an apiary followed by a 3-4 day hunger period. After this waiting time the colonies are started again on the same spot on new foundation inside a cleaned hive body.

A big challenge came with the arrival of the Varroa mite. In anticipation of the predicted resistance problems with acaricides the SBRC was instrumental in developing the "alternative method" for Varroa treatment, i.e. the combination treatment of formic acid or thymol with an oxalic acid treatment later on. Together with some European research partners this method was improved and is an established standard today. For the long term a safer and easier method of Varroa control is needed. Research is going on with new approaches influencing scent orientation, disturbing reproduction of the mite or using parasitic fungi for control.

In 2004, SBRC expanded its activity markedly. Funding from the Swiss Government, private sources and grants awarded for European research projects made this possible. Today about 25 international scientists work constantly on projects like:

- Research on foulbrood and sourbrood diseases.
- Method for early detection of sourbrood with the help of a PCR-test (DNA detection).
- New parasites of honeybees, i.e. tropilaelaps mites, small hive beetle.
- Determination of subspecies or hybridization between carnica and mellifera bees.
- Diagnostic radioentomology using a tomograph. This technique allows a look into a beehive without opening it. A micro tomograph allows the dissection of a bee with a computer mouse rather than with a scalpel and a microscope.
- Host-pathogen interaction with focus on the triangle bee-varroa-virus and the evolution of such interactions.
- The influence of new insecticides (Neonicotinoids) on honeybees and other pollinators.
- Authenticity and quality issues of bee products.

In 2003, Switzerland like many other parts of the world, started to experience massive losses of honeybees. This phenomenon became known as CCD (Colony Collapse Disorder). In 2008, SBRC seized the initiative and started to organize the global network COLOSS (Prevention of Colony Losses). COST (European Cooperation in Science and Technology) made this programme possible. The aim is to coordinate and standardize monitoring and research relating to this phenomenon internationally. About 300 researchers from more than 60 countries are participating in this project. The guidance and coordination work for this project is done by SBRC.

However, not all losses can be attributed to CCD or pesticides. Often, unsuitable Varroa control, pure negligence or improper reaction to EFB by the beekeeper are the source of the problem. Switzerland has a very high density of apiaries and a lone “black sheep” can be the source of troubles for a whole area. Constant efforts in education and on site controls by the bee inspector seem to be necessary in order to see some progress in fighting these diseases. Because of these facts all apiaries must be registered and are listed in an Internet based databank, simplifying this task.

Conclusion

Despite of these problems beekeeping is still a very popular hobby in Switzerland and thanks to the many beginners will stay so. Karl von Frisch, the Nobel prize winner and discoverer of the bee dance communication system, expressed his fascination with honeybees with the following words.

Honeybees are like a magic well. The more you take out of it, the more there is in it.

An earlier version of this article was published in BeeWorld, issue 3, 2011

Hans-Ulrich Thomas
Peter Gallmann

Abstracts

Beekeeping in Switzerland

Hanueli Thomas, mellifera.ch (
Switzerland is a small country and beekeeping is a very popular hobby. In numbers: 18’000 beekeepers tend about 160’000 hives, which translates into 4 hives for each km2, mountains and lakes included.
With the help of pictures, numbers and facts beekeeping in Switzerland will be illustrated. The foray will end with a video about the origin of honeydew honey (forest honey). A process often unknown in details by many beekeepers.

Observations on queen mating behaviour on a small island

Ralph Büchler1), Aleksandar Uzunov2), Hrisula Kiprijnovska2), Sreten Andonov2)
The mating of honey bees depends on open flights, usually over several kilometres of distances. With regard to control the selection of mating partners, we wanted to study the effect of an extremely limited flight range of a small island on the mating behaviour of queens.
The experiment was performed in June 2011 on a Macedonian island in Prespa lake. It has a surface of 21.9 ha and a minimum distance to the mainland of 2.1 km. There is no permanent honey bee population on the island, but we established five colonies with an estimated population of about 10000 adult drones one week before starting the experiment. We studied the behaviour of 34 queens during their natural mating period (day 6-11 after emergence) using mating boxes with transparent front extensions and queen excluders to observe the time and duration of all flights and the presence of mating signs on return.
All flights of queens happened between 12.35 and 15.33 h CEST. Nine queens (26.5%) were lost during their flights. From the 25 surviving queens, one did not perform any flight. The average number of flights per queen was 10.8, spread over 3.2 days, with a maximum of 28 flights for one queen which returned four times with a mating sign. We observed a maximum of ten daily flights per queen. 21 queens (61.8%) returned at least once with a mating sign and on average 2.2 successful mating flights per queen were observed. The flight duration of queens was on average 4 min 55 sec with a gradual increase from the first (2 min 49 sec) to fifth flight (6 min 36 sec). The longest flight duration of a queen returning without mating sign was 23 min, while the shortest and longest flights of queens returning with mating sign were 2 and 38 min respectively. The unusually high flight frequency of the queens indicates a disturbance of the mating behaviour under the specific test conditions although successful matings obviously did happen within the range of the small island. However, some of the successful mating flights lasted long enough to enable those queens.

Effects of genotype and environmental factors on the survival and productivity of European honey bee colonies

Ralph Büchler*1), Stefan Berg2); Malgorzata Bienkowska3), Beata Panasiuk3), Yves Le Conte4), Cecilia Costa5), Winfried Dyrba6), Maria Bouga7), Fani Hatjina8), Leonidas Charistos8), Plamen Petrov 9), Evgeniya Ivanova 10), Nikola Kezic11), Seppo Korpela12), Per Kryger13), Hermann Pechhacker14), Aleksandar Uzunov15), Jerzy Wilde16)
In order to better understand the role of bee genetics for the Europe-wide occurrence of colony losses an experiment on genotype – environment interactions (GEI) was started by COLOSS working group 4 in July 2009. A number of 621 honey bee colonies, representing 18 different genotypes, are comparatively tested in 16 apiaries across Europe. The colonies are kept without any chemical treatments against Varroa destructor and other diseases. Colony and queen survival are registered continuously, besides bee population development, productivity, feed balance, swarming, gentleness, hygienic behavior and the infestation levels of Varroa, Nosema and viruses.
The tested genotypes clearly differ in their honey productivity, gentleness and swarming tendency which can at least partially be explained as a consequence of different breeding intensity for these classical selection characters. However, it is important to note that highly significant genotype – environment interactions can be observed when these characters are taken into account.
To sum up our primary results, we can state a high relevance of interactions between honeybee genotypes and different environmental conditions within Europe. Obviously, the genetic adaption of honeybees to a specific environment influences its population dynamics, health status, and productivity. Consequently, the conservation of European honey bee diversity and the support of local breeding activities should be encouraged.

Conservation of the Nordic brown bee

Lauri Ruottinen, Agrifood Research Finland is Finland, FIN-31600 Jokioinen
NordGen – the Nordic Genetic Resource Center – is a Nordic organization dedicated to the safeguarding and sustainable use of plants, farm animals and forests. NordGen will start an intensive project to clarify the current status of the Apis mellifera mellifera in the Nordic and Baltic countries. Also, the current in situ and ex situ conservation of A. m. mellifera and suggestions for future research activities in Nordic countries will be published. The work will be carried out between May and December 2012. The responsible organization of this work is MTT Agrifood Research Finland. Preliminary results of the work will be presented.

Consortium Dark Bees Germany

Thomas Petermann

The consortium consists of several autonomous groups. As an umbrella organisation we serve beekeepers as a contact point to get them in touch, say, queen breeders. The form of a consortium was choosen because of its flexibility. This way we can welcome ambitous queen breeders as well as beginners. Our bylaws simply state our aim and define the structure.
History
The first regional group was founded in Melchow near Berlin by several beekeepers who got to know each other via an Internet forum. Several more regional groups were founded later on and today the consortium consists of seven groups with a membership of 300, trend upwards. Via our own forum we keep in touch and discuss topics around queen breeding and beekeeping in general.
Aims and results
Our most important aim is to build our own population of the Apis mellifera mellifera in Germany and to provide bee colonies and queens to German Beekeepers. To accomplish this we will build up a systematic breeding program in Germany with the disposal of all native species in Europe. We will work with artificial insemination stations (3 at present) and operate isolated mating yards. A mountain mating yard in the alps may open this year, 2 more are in planning state.
Other objectives are:
- Increased networking with Organisations and Beekeepers in Germany and Europe
- Education of beginning beekeepers and breeders
- Public Relations and promotions

Especially, we try to expand our connections to the “Deutscher Imkerbund” (German Beekeeping Foundation) who has invited our association to its frequent conferences.
We want to thank all German, and especially all European Beekeepers and Breeders who helped us to bring back our domestic Dark Bee to Germany.

Genetic Diversitiy and Hybridisation oft he Honeybee.

Dr. Gabriele Soland, Apigenix
he mating system of the honeybee shows some speciality that makes breeding a true challenge. Especially the control of the mating partners for the high quality queen is a tedious task. When it comes to more than breeding for better quality, that is if the maintenance of a whole subspecies is at stake, the mating behaviour of the honey bee can become a true threat to its own maintenance. In western and central Europe, the indigenous subspecies Apis mellifera mellifera is nowadays threatened not only by

replacement but also by hybridisation. We show the effect of the hybridisation on the breeding population prior to the implementation of the genetic hybrid analysis and its effect on the purity status of the breeding population. Furthermore we introduce its use for the installation and maintenance of a conservation area of the black bee.

Two decades of Progress for the Dark European Honeybee (Apis mellifera mellifera) of Ireland

Micheál C. Mac Giolla Coda (Galtee Bee Breeding Group), Burncourt, Cahir, Co. Tipperary, Ireland
The Galtee Bee Breeding Group (GBBG) was founded in December 1991 with an initial membership of 4 beekeepers based in the Galtee/Vee Valley area of Tipperary, and a breeding zone was immediately established between the Galtee and Knockmealdown Mountains. In its first 5-year programme, the group set up an isolated mating apiary, commenced evaluating and recording the characteristics of colonies in the valley, conducted workshops to educate beekeepers about morphometry, helped organise the first nationwide morphometry study in Ireland, and established an instrumental insemination process. In the second 5-year programme, the GBBG expanded its educational activities, established the Dún Aonghusa Breeding Apiary, participated in international conferences, established a newspaper and website, and, with aid from the Scheme for Genetic Resources, acquired equipment for its bee-breeding activities. For the next 5 years, the group continued its queen-rearing workshops, provided breeder queens to members, created a bee garden, actively participated in national and international conferences, including Apimondia 2005 in Dublin, distributed scale hives to monitor honey productivity, and continued to sponsor morphometry projects. In its most recent program, the GBBG has carried out a comprehensive morphometry study of the honeybees of Ireland, organized queen-rearing workshops and seminars across the country, and hosted an international bee improvement conference. Today, the GBBG has around 100 members from 30 beekeeping associations all over Ireland and continues its work toward the conservation, restoration, study and improvement of native Irish strains of the dark European honeybee. The validity of these objectives is highlighted by morphometric data showing the healthy status of A. m. mellifera across most parts of the island.

The Role of Instrumental Insemination for the Conservation of the Dark Bee: Potential and Pitfalls

Florian KP Sutter, Head Mellifera Breeding Group and Mating Station "Säntis", Ebnetstrasse 12, 9100 Herisau, Switzerland
Instrumental Insemination has been established as a tool for scientific studies and breeding of honey bee queens. In many areas of hybridisation instrumental insemination is the only option for breeding programs of the Dark Bee. While the technology is easily available and the procedure of the insemination itself can be learnt by most people, many challenges remain. The selection and care of the drone colonies, exclusion of foreign drones, harvesting and storage of the semen, maintaining of sterile working area and the care of the queen before and after the insemination are at least as complex as running a natural mating station. Therefore a dedicated and well organised team is needed to enable instrumental insemination quality and safety. The potential and pitfalls of instrumental insemination in the context of a breeding program for the European Dark Bee are presented.

Dark Bee Apis mellifera mellifera in the United Kingdom

Philip Denwood (British BKA and BIBBA)
This paper reviews the history of the controversies surrounding the Dark Bee Apis mellifera mellifera in the United Kingdom, discusses its characteristics and regional variations, and outlines various policy options put forward in recent years for its conservation and propagation.

Breeding the Dark Bee in Germany and details of "moonshine" mating station

Gerhard Glock & Thomas Ruppel, GEDB association, Germany
After the war, Germany almost completely changed over to the Carnica race. The reason was simple: Easy availability of queens, nice handling characteristics and fast population development in spring. The original Carnica did not show any of these features, but became so with the intensive breeding and selection efforts by three Austrian queen breeders: Guid Sklenar, Hans Peschetz and Jakob Wrisnig.
In the last couple of years some engaged beekeepers started to breed the Dark Bee again. However, getting the queens mated in an isolated mating yard is difficult, considering the high Carnica bee density in Germany. Fortunately an old idea was dug out and tried. It is named „Köhler procedure", after a German priest who published this method around 1860. The speciality is that selected drones, workers and a queen ready for mating are kept in a mating nuc. However, the hive entrance is opened after 4pm, when mating the flight activity of the Carnica has ceased already. Unbelievable as it sounds, but it works. Successful pure matings have been achieved with this method. Of course details are important and will be the main subject of the talk..

Inbreeding problems and their avoidance

Dorian Pritchard, Dip Gen, PhD
Oakwood Lodge, Heddon-on-the-Wall, Newcastle-upon-Tyne, NE15 0HZ, UK
The most serious threat to small populations of honeybees is inbreeding, especially due to low fertility associated with the creation of diploid drones. This threat can however be reduced by ensuring the breeding population contains an adequate number of sex alleles.
A method will be outlined for estimating the number of sex alleles in a breeding population, based on the frequency of their vacated worker brood cells. The number of sex alleles necessary to ensure high colony survival rates will be defined and strategies suggested for increasing and maintaining high levels of sex allele polymorphism. Minimal hive stocking levels necessary for maintenance of isolated populations will be proposed and a breeding scheme outlined to maintain genetic diversity and long-term survival of small, threatened populations.

Apis mellifera mellifera conservation project in the Unesco Biosphere in the Val Müstair, Switzerland

Balser Fried, Gelalunga 6, CH-9578 Azmoos, mellifera.ch (VSMB)
The conservation strategy of the black bee Apis Mellifera Mellifera in Switzerland is based on two pillows:
1.Line breeding in the frame of the BLUP breeding concept (www.bebreed.eu)
2.Conservation regions with pure Mellifera bee population
The letter is intended to maintain a population with high genetic diversity as gen pool. The project started 6 years ago and is in ii's final stage. The process of launching, financing and managing of such a project is presented and achieved results are documented.

Queen Performance Problems

Roger Patterson 24 March 2012
I have been keeping bees since 1963, but had a break of about 15 years from active beekeeping although I maintained contact with my local BKA and continued to be a demonstrator.
On returning in 2001 I was given 5 colonies of poor bees, so I decided to improve them by raising queens from the better ones and culling heavily. This meant I was dealing with a fairly large number of young queens. I discovered it was much more difficult to produce queens that performed well and continue to do so.
I made several enquiries and nobody else had noticed any problems. I have written several articles and have lectured regularly on the subject. I now have many beekeepers agree with me that had previously disagreed and it seems to be a problem in other parts of the world.
I have narrowed it down to three main problems:-

1. The early supersedure of young queens. This can often be in their first year, and I regularly see supersedure cells being started before the first brood has emerged. Very often the brood pattern appears good to an experienced beekeeper. The cutting out of these supersedure cells usually results in the queen failing in about 4-6 weeks. It is quite common for bees to swarm on a supersedure cell.
2. Young queens failing, where they may lay drone eggs in worker cells at a high level or lay a lower number of eggs, often in a poor pattern.
3. Queens "disappearing". You can inspect a colony and the queen appears to be laying well, yet at the next inspection she is not there. In about 50% of colonies there will be emergency cells, the other 50% there won't be any.
   I'm certain many beekeepers don't know the state of their colonies so don't realise the problems. In many cases the colony is unable to produce a queen and it will die without help.

These problems affect all beekeepers however good or bad they are. Queens are not living a full term and it is difficult to determine how good they are or if they will supersede naturally. This is one of several problems that will affect the queen breeder and may not be as a result of something they have done wrong.

Factors affecting queen quality

Laurent Gauthier, Swiss Centre for Bee Research
Because the queen is the only reproductive female in the colony, fecundity is a critical issue for the health of honeybee colonies. Any factors affecting the queen's fecundity will stagnate colony development, increasing its susceptibility to opportunistic infections. Queen quality is also a prerequisite for honeybee selection programs as breeding value is generally tested over several years. Troubles affecting the queen quality are frequently reported by beekeepers and include low fecundity and untimely requeening events; cases of drone laying queens are also reported. A review of factors involved in the reduction of the queen fitness will be presented.

The Dark Bee of Austria, a regional ecotype

Alois Reiter
Following the recession of the glaciers at the end of the last ice age Europe was settled again by honeybees. North of the Alps the dark bee Apis mellifera mellifera populated the land, south of the Alps the Ligustica and Carnica races.
Active trading with honeybee colonies at the end of the 19th century with the carnica subspecies pushed back the native dark bee and today is considered an endangered species. In accordance with the saying "Those declared dead live longer" we work towards bringing back this subspecies.
Breeding good queens is essential for winning over beekeepers to keeping the dark bee. Not quantity but quality is essential for the acceptance of the dark bee in Austria. Complaing about the decline of the Dark Bee ist not helpful either, we must endeavor bringing first class queens to the market. The Dark Bee has all the genetic and morphological conditions and the demand for queens is as high as never before.
The Dark Bee queen breeders of Austria teamed up in 2010 and founded the "Austrian Mellifera Breeders (AMZ)". The seat of the society is St.Veit, chairman is Alois Reiter.
Active in the society are 15 members from the Salzburg area, Tyrol as well as Germany.
Aim of the society is to breed pure and tested queens of the Dark Bee in our area. This bee was for centuries the common species and as the local ecotype the pollinator par excellence. This bee is well worth all our breeding efforts, have it mated on our mating station in "Schüttbachgraben" and thus make it available on the market.
Since some years we have the possiblity to genetically check our drone and breeding hives. These DNA checks were performed in 2008 at the Aarhus University in Denmark on 100 hives and in 2010 at the University of Munich on 5 hives. The results were 90-90.6% pure A.mellifera mellifera and were characterized as two breeding lines named "Salzburg Alpenland" and "Nigra Alpenland inner Gebirg". Via artificial insemination we will have in one years time the possiblity to have an additional breeding line available.
Our Society participates in the European databank "beebreed.eu" and is allowed to enter breeding values for 150 queens, more if we pay an additional fee. The program was started in 2000 and so far we have entered 129 queens and have their breeding values determined. Of big importance to us is the inbreeding value, since only a small starting population of pure mellifera queens was available to us. The above mentioned two breeding lines will be complemented with an additional line called "Nordbiene" if their breeding values for gentleness and quietness on the combs turn out all right.
n summary we can say that the Dark Bee in Austria has indeed a bright future. Demand for queens is increasing and we should make use of this trend for the benefit of our local Apis mellifera mellifera.

Breeding varroa-resistant bees

Dorian Pritchard, Dip Gen, PhD
Oakwood Lodge, Heddon-on-the-Wall, Newcastle-upon-Tyne, NE15 0HZ, UK
The A. m. mellifera population of northern England seems to have a natural capacity to develop resistance to the Varroa destructor mite. My own stocks were last treated against varroa in AD 2002, although the mite has been widespread throughout the area since 2000. These stocks harbour so few mites that it is difficult to collect sufficiently large samples for reliable examination, but in 2010 a hybrid colony was recognised that showed a delayed response to infestation. This colony was also left untreated, but was monitored throughout the season in order to ascertain the nature of the resistance it was expected to develop.
In May the colony yielded a natural drop of 23 mites per day, several times that at which treatment is recommended. At the early stages of mite build-up few of those that fell naturally showed physical damage, but as the season progressed the proportion showing severe damage increased, while the total daily mite fall decreased. By the end of the season the mite fall was negligible. Two supers of honey were taken and the colony survived the 2010-2011 winter well, with a low over-winter total mite drop. In 2011 all mite infestation levels in the apiary remained negligible.

A broodless method for varroa control

Laurent Gauthier, ALP
The presence of high mite infestations in summer is a major driver of colony death during winter. Both the mite and its associated viruses can impair the production of winter bees which generally initiate during late summer. Winter bees have a very distinct physiology which allow them to live several months in cold conditions. Therefore the production of winter bees is a critical step which requires an efficient varroa treatment during summer. A method of mite control based on queen caging will be presented.

Title: little brooks make great rivers

Yves Elie
The presentation consists of a black and white relief images PowerPoint which informs about our working orientations. In our region of the South of France, with the scientific support of Lionel Garnery (CNRS) and in contact with other French apiaries, we work on a specific domain, a cultural and biological heritage constituted by hives trunks colonized by black bee colonies which we still find there in abandoned apiaries.
Since the last conference of Versailles in 2006, we began a work which consists in preserving black bees populations identified by local beekeepers. In addition our work consists in providing information about the black bee and in transmitting ancient techniques for manufacturing hives trunks, as well as the various interesting applications which we can benefit from these techniques for designing the modern hives. Our basic idea is that the preservation of the biodiversity is a collective task which involves a

large number of participants. So in addition with our collaborations with the scientists, we invest a lot of energy for informing people on the history of the black bee for a more respectful beekeeping. We wish to increase public awareness of the link between the breeding technique of the bee, the impact on the environment and the consequences on the pleasure to eat honey produced by tradition. It also aims at showing beekeepers for simple black bee breeding practices with a minimum of spent energy and knowledge. Our action becomes a reality by itinerant workshops either during a day in a city showing how to make hives trunks, how to rear black bees, or how to adapt ancient craft techniques to the modern hives design.Because we are persuaded that the future of the black bee depends especially on a multitude of small structures preserving bee black apiaries as they existed formerly in Europe before the agriculture and beekeeping industrialization.

Control of European Foul Brood (EFB)

Balser Fried, Gelalunga 6, CH-9578 Azmoos
E-Mail: balser.fried@bluewin.ch; Tel: +41 81 783 13 51

An epidemic of European Foul Brood (EFB) developed exponentially in Switzerland over the period of 1999 to 2010. By Swiss law, colonies showing visible signs of EFB have to be destroyed. Since the use of antibiotics is forbidden here, no other measures were taken. The disease continued to spread out over the whole country. Thousands of colonies had to be killed and an end was not foreseeable. In the district of Werdenberg, e.g. with initially about 800 colonies, bee keepers lost over 300 colonies within 3 years. Very frustrating was that even in sanitized apiaries the disease could not be stopped. In a rapid project, in cooperation with the Swiss Bee Research Centre, Werdenberg bee keepers found that after having killed affected colonies, the causal agent of EFB, Melissococcus pluton, was still present in some colonies. Its detection was possible by using the DNA Technology with the PCR method. The discovery explained at least why killing ill colonies was not necessarily successful. But how to eliminate the causal agent in apparently sound colonies? Encouraged by literature as old as nearly 100 years, by recent publications [1,2] and by positive reports from other apiaries [3], the Werdenberg bee keepers decided to apply the shook swarm method (SSM) to all colonies of all apiaries which where PCR positive. Therefore, all apiaries within the legally declared prohibited area (colony movements ban in an area of 1 km radius around an affected apiary) underwent a PCR analysis of all colonies.
In order to reduce operational costs, PCR analysis can be performed on pooled samples of up to 10 colonies. In that case, if the result is positive, all the hives in that apiary must be treated by SSM to avoid cross contamination. Following this line, all bee keepers in the infected area whose hives showed positive PCR reactions for M. pluton treated all their colonies at the end of July to beginning of August 2010 by the closed shook swarm method. The shook swarms were established by wiping off all bees of a colony in inexpensive cardboard boxes. After 3 days cellar detention they were placed back in their cleaned and sanitized hive on new frames and foundations only. Feeding for colony build-up and Varroa treatment before capping was performed and then the colonies were fed for wintering [4]. Over 300 colonies in 47 apiaries were treated in this way in autumn 2010. The overwintering of the disinfected colonies was highly successful. Losses were less than usual and the shook-swarm colonies developed very nicely the following spring. After the check-up in spring 2011, only two PCR-positive bee houses in the legally restricted area were found. Sanitation was carried out according to two strategies: In one heavily infected apiary all colonies were killed. The other one had few infected colonies and was sanitized by selectively killing of just the PCR-positive colonies, as identified by single hive PCR-positive analysis. During the summer 2011 we did not suffer from new EFB cases in the sanitized area. The possibility offered by PCR with an area-wide consistent application of the shook swarm method suggests that it may be possible virtually to eliminate EFB from an area within a year without use of antibiotics

Statistic Mating Stations 2012

Statistic: Pure breed mating stations 2012

Mating station	Drone hives			Queen breeders			Bring in			Mated			%		
Year	**12**	11	10	**12**	11	10	**12**	11	10	**12**	11	10	**12**	11	10
M01 Krauchtal ZH	**8**	4	0	**23**	6	0	**687**	160	0	**556**	131	0	**81**	82	0
M02 Schwarzi Flue BE	**7**	8	6	**24**	11	14	**226**	146	113	**155**	104	52	**69**	71	46
M03 Säntis AR	**14**	14	13	**34**	35	29	**1358**	1255	774	**1039**	941	580	**75**	75	73
M04 Gletsch VS	**0**	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	0	0
M05 Rothbach LU	**8**	3	10	**15**	11	29	**397**	271	729	**305**	199	521	**77**	73	72
M06 Schilstal SG	**12**	14	14	**0**	12	18	**0**	263	489	**0**	235	418	**0**	89	86
TOTAL	**41**	43	43	**73**	75	90	**2668**	2095	2105	**2055**	1610	1571	**77**	76.8	74.6

All of these mating stations in the mountains experienced unusual warm weather. March 2012 was the mildest one after 1994 and 1864, allowing an early start for the breeding season. April, however, was without much sun and rainy. The month of May was again sunny and 1.5 to 2.5 degrees warmer than avarage. June was very rainy, especially in the East.

Queen breeding was very successful in the warm period. Critical was the mating which resulted in a lower than average success rate.

Pleasant result for 2012: Both types of mating stations had a higher usuage rate than in the past even though two important ones were closed

For 2013 we hope for growth in the numbers of queen breeders and queens produced.

mellifera.ch

Statistic: Mating stations 2012

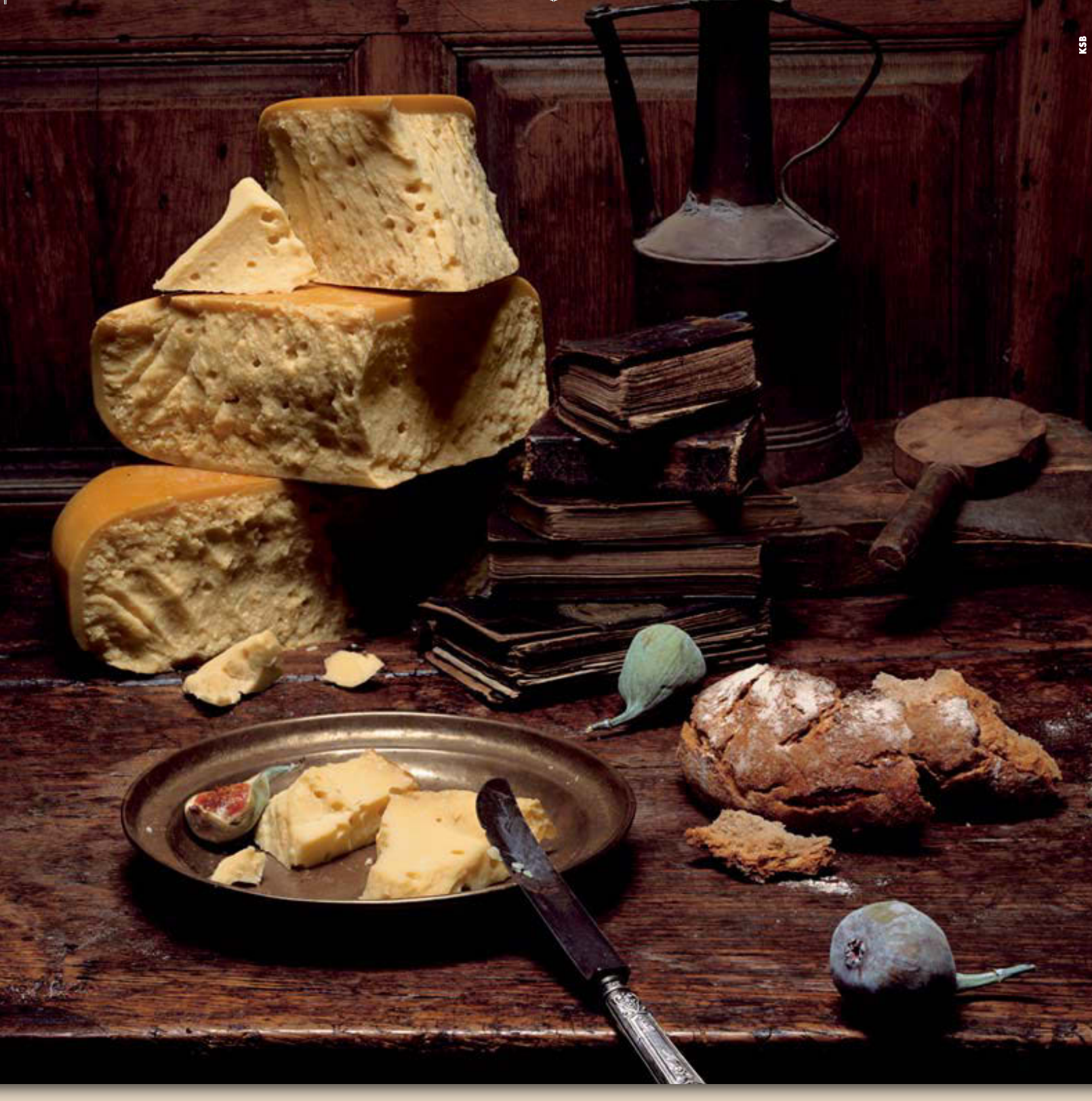
Mating station	Drone hives			Queen breeders			Bring in			%		Comment
Year	**12**	11	10	**12**	11	10	**12**	11	10	**12**	11	
M21 Pfannenstiel	**20**	20	20	**187**	188	454	**148**	154	332	**79**	82	
M22 Eschenberg	**8**	7	0	**104**	118	0	**83**	70	0	**86**	59	
M23 Beret	**5**	5	5	**144**	135	130	**108**	106	98	**75**	79	
M24 Grund	**8**	8	8	**109**	138	95	**53**	105	85	**49**	76	
M25 Twannberg	**24**	16	0	**546**	158	0	**371**	91	0	**68**	58	
M26 Riedbad	**24**	24	22	**412**	438	212	**291**	342	168	**71**	78	
M28 Stalden Kriens	**8**	8	8	**0**	0	227	**0**	0	184	**0**	0	
M29 Wiggernalp	**8**	8	10	**106**	126	115	**79**	95	84	**75**	75	
M31 Klöntal	**0**	14	24	**0**	141	54	**0**	126	47	**0**	89	closed (under the impact of Buckfast)
M34 Neu-Falkenstein	**12**	8	0	**66**	29	0	**57**	24	0	**86**	83	
M35 Potersalp	**5**	5	0	**106**	115	0	**77**	88	0	**76**	77	
M36 Valcup	**15**	15	12	**58**	42	0	**52**	34	0	**90**	80	
M37 Bogmen	**12**	12	12	**87**	115	115	**64**	98	94	**74**	81	
M38 Schildmoos	**10**	0	0	**82**	0	0	**54**	0	0	**66**	0	
M39 Hintervalzeina	**5**	5	4	**44**	153	37	**37**	118	29	**84**	77	
M40 Val Müstair	**9**	9	10	**115**	140	137	**84**	102	99	**73**	73	
M41 Stierenberg	**16**	14	16	**269**	138	163	**205**	96	106	**76**	70	
M42 Teufelskanzel	**12**	12	12	**109**	235	309	**87**	191	249	**80**	81	
M44 Oberholz	**14**	14	14	**115**	109	154	**88**	91	130	**77**	83	
M45 Gerstel	**7**	7	7	**46**	78	50	**36**	59	38	**78**	76	
M46 Melchtal	**38**	6	14	**152**	71	116	**105**	48	90	**69**	68	
M47 Gental	**0**	0	0	**0**	0	0	**0**	0	0	**0**	0	closed
M48 Maderanertal	**6**	6	9	**155**	135	145	**110**	105	105	**80**	78	
M49 Ramseli SZ	**0**	0	8	**0**	0	86	**0**	0	70	**0**	0	closed
TOTAL	**266**	223	215	**3012**	2802	2609	**2189**	2143	2008	**72.7**	76,5	

Verband Schweizerischer Imkergerätehersteller und Imkerfachgeschäfte

Die Branchenprofis in Ihrer Nähe

Bern bis Winterthur

Bern: Bärner Imkerlädeli
Chur: Imkerhof
Diegten: P. Blapp
Erlenbach: Apiline GmbH
Monthey: Rithner & Cie
Müllheim: H. Frei, Imker-Shop
Niederbipp: R. Gabi
Pieterlen: IB Fema GmbH
Sattel: K. Schuler
Sempach-Station: M. Wespi
Schönengrund: L. und A. Büchler
Winikon: Biene AG
Winterthur: M.+R. Ruffner



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