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THE BIBBA-SICAMM ANNIVERSARY CONFERENCE, LLANGOLLEN (WALES) AND SICAMM PERSPECTIVE

Pritchard D.

Societas Internationalis pro Conservatione *Apis melliferae melliferae* (SICAMM)
Newcastle-upon-Tyne, United Kingdom,
E-Mail: dorian.pritchard@btinternet.com

ABSTRACT

The SICAMM (International Association for the Protection of the European Dark Bee) 13th biennial and Bee Improvement and Bee Breeders' Association (BIBBA) 50th Anniversary joint conference at Llangollen, North Wales, was held in September, 2014. BIBBA had already sketched out two parallel streams of lectures, one for beginners, the other for more advanced beekeepers, then SICAMM joined in with another packed programme of international speakers from across Europe. This time it included two Russian scientists, one Czech, two from Latvia and eminent representatives from the Netherlands and Spain. With over 40 lectures and three lecture streams running in parallel I could attend only a selection of what was on offer. The saving grace was a good interval for moving between halls and I hardly heard an adverse comment.

Keywords: SICAMM, BIBBA, Dark European Bee, *Apis mellifera mellifera*, honey bee conservation.

INTRODUCTION

The “castle in the city of ravens”, Castell Dinas Brân, looms over the pleasant town of Llangollen 500 feet below. Built in 1260 by Prince Madoc of Powys, it once housed a beautiful, but frosty princess about whom a poet once wrote it was easier to scale her castle mound than raise a smile on her face. But Llangollen these days is a happy town, astride the old stagecoach road from London to Holyhead, a beautiful route our railway planners happily overlooked. Along that route you still see ravens (Figure 1).



Figure 1. The guardian of Dinas Brân. Photograph by Dorian Pritchard.

Llangollen is renowned as the host of a lively folk festival, the International Eisteddfod, held every year in June, but one weekend in September its pavilion hosted a celebration of a different kind, a super conference to commemorate the 50th anniversary of the founding of BIBBA. SICAMM was struggling to find a venue for its regular biennial conference, so the two joined forces and the result was something outstanding (<http://www.sicamm.org/>).

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advanced beekeepers, then SICAMM joined in with another packed programme of international speakers from across Europe. This time it included two Russian scientists, one Czech, two from Latvia and eminent representatives from the Netherlands and Spain. With over 40 lectures and three lecture streams running in parallel I could attend only a selection of what was on offer. The saving grace was a good interval for moving between halls and I hardly heard an adverse comment (Figure 2).



Figure 2. Some of the new SICAMM Committee. From left to right: Romée van der Zee, Anna Brandorf, Dorian Pritchard (outgoing President), Rustem Ilyasov, [the new Russian Federation], Per Thunman (Vice President), Padruot Fried and Philip Denwood (Secretary General). Photograph by Alla Ilyasova.

By common consent the star presenter was Robert Paxton, now at the University of Halle in Germany, who to the wails of spaghetti western music gave the opening lecture "Hybridization, the good, the bad and the ugly". This was an excellent presentation that set the tone for the whole programme [Pritchard, 2015].

WHAT IS *APIS MELLIFERA MELLIFERA*?

Apis mellifera mellifera, Linnaeus 1758 is a subspecies and northern geographical race of *Apis mellifera*, the western honeybee (Figure 3).

It may be subdivided into many local ecotypes. Its various vernacular names include:

- "Dark European Honeybee" (English),
- "L'abeille noire" (French),
- "Die dunkle Biene" (German) and
- "Det mörka Nordiska Biet" (Swedish).



Figure 3. *A.m.m.* queen and court, Switzerland. Queen mated in apiary with drones of the same strain as those mating with her mother and grandmother, which were certified 100% *A.m.m.* by DNA microsatellite analysis.

Apis mellifera mellifera is distinguished from other subspecies of the honey bee by:

- a) Morphological characters, including colour, size, wing venation, abdominal hair length;
- b) Genetic characters identifiable by DNA analysis;
- c) Behavioural characters, including colony size

and development, longevity, pollen collection.

The indigenous range of *Apis mellifera mellifera* stretches from the Atlantic seaboard of Norway, Britain, Ireland and France eastward across Western, Northern and Central Europe north of the Alps and Carpathians to the Urals and beyond (Figure 4).

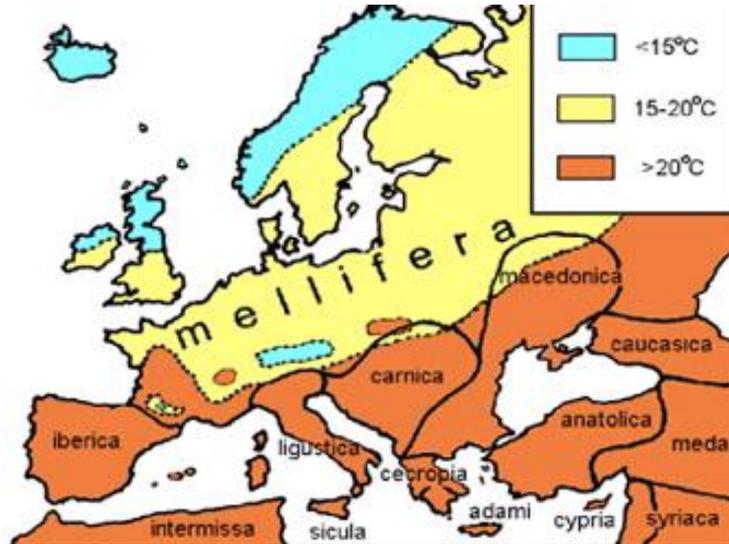


Figure 4. The natural range of *A.m.mellifera* coincides with the 15-20 zone.

CONSERVATION

The great success for British native honeybee conservation at the end of 2013 was the establishment of the first UK dark bee reserve on the adjacent Scottish islands of Colonsay and Oronsay, thanks to the tireless efforts of Andrew Abrahams. Andrew reminded us that this reserve represents a vitally important genetic resource, secured now for future generations, a resource for teaching and, because of Colonsay's virtually disease-free status, a scientific control population. It is already fulfilling its potential in several ways, but the future of the reserve concerns him. One possibility is that it could be owned by a trust comprised of interested parties, in support of a resident manager. He suggests that for long-term survival it should pay taxes, rather than take grants.

Aoife Nic Giolla Coda outlined the establishment and first two years of operation of the Native Irish Honey Bee Society (NIHBS). This boasts representation from the four provinces, its aims being the conservation, study, improvement and reintroduction of *A.m. mellifera* in both northern and southern Ireland. It owns a dark bee honey label and those members who wish to use it must sign up to certain conditions. Their website is at www.nihbs.org.

The Russian scientists were Dr Rustem Ilyasov and Dr Anna Brandorf. There are millions of colonies in Russia including those of 5 native subspecies, the distribution of which was shown in Anna's poster. *Mellifera* has become by far the most widespread, with

at least 8 populations, because of its resistance to long winters, *nosema* and honeydew toxicosis, and efficient use of abundant though short-term nectar flows. Individual foragers carry twice the weight of nectar as *carpatica* foragers so *mellifera* can harvest nearly double the quantity of nectar per day. Moreover, *Mellifera* uses only two-thirds the honey in winter. However, the *mellifera* gene pool is now critically threatened as a result of uncontrolled imports. The "Breeding Center of *Apis m. mellifera* L" in Kirov was set up in 2012 specifically for its identification and propagation.

In the Bashkirian National Parks are around 750 colonies, in artificial nests within living tree trunks, or hollow logs fixed high in trees, out of the reach of bears. The trees are marked with signature signs to show ownership and forest beekeepers need ropes and climbing irons to check their bees. Rustem has identified 10 M group mitotypes (effectively *mellifera* queen lines) in the Ural Mountains, as reported in his book, "Wild Dark European Honey Bees in Ural".

Prof. Pilar de la Rúa outlined the aims and achievements of the BABE dark bee survey, which terminated in 2004, and of EURBEE, founded in the same year. EURBEE holds a biennial conference of bee scientists, this year at Murcia in Spain, the next in 2016 in Romania.

The SICAMM programme included the traditional national reports, delivered at the usual high standard.

Lucja Skonieczna reminded us of the four native populations of Poland, of which the Augustowska line seems most like those in the north of England. These are large bees with low food consumption, white honey cappings and pollen stored close to the brood, although the Augustowska bees are different in tending to hang in a cluster from the bottoms of frames.

As Harry Owns informed us, the Isle of Man climate is superb for bees, with 120-140 beekeepers managing ~400 colonies of essentially dark bees. Importation of foreign subspecies is sensibly banned there.

Norway has a new spokesman in Bjørn Dahle, a professional conservationist representing Norsk Brunbilag, a conservation group established in November 2013. Norway has three populations of dark bees. The conservation area in southern Norway, established by local agreement, with the involvement of SICAMM's founder, Nils Drivdal, acquired legal protection in 1987, banning movement of bees in or out. It is still threatened by hybridization, reduction in the number of beekeepers, insecure funding and latterly EFB. My understanding is that all the former bees in the reserve have been culled, but new mating stations have been set up using local hybrid queens and dark bees imported from Colonsay, Ireland and other external sources.

In France exotic honeybees are widespread, but 15 or so pockets of native *Mellifera* survive under independent, amateur conservation. In general among beekeepers maintaining less than 70 colonies, two thirds of those are of dark bees, but among those with over 70, only one third are dark. Michel Bocquet reporting on this picture, mentioned ApiClass, a French service that can tell you the probability a supplied wing sample is *Mellifera*.

Ingvar Arvidsson reported on the Swedish situation, Project Nordbi and progress since 1984 and the establishment of the Lurö mating station in the far Northeast. This year he and Per Rutt were awarded medals by the Swedish Royal Patriotic Society for their work for the Swedish native honey bee. Ingvar also entertained us with an evening lecture on his efforts to re-introduce the White Backed Woodpecker to Sweden.

Romé van der Zee reported on the 200 colonies of almost pure *Mellifera* on Texel, among the last native survivors in the Netherlands.

LEGAL ASPECTS OF EUROPEAN UNION MEMBERSHIP

Eoghan Mac Giolla Coda, reviewing the legal aspects of honey bee conservation, categorised conservation areas as voluntary, legally mandated and "de facto, the latter arising as the outcome of other circumstances. In Ireland there are now five voluntary dark bee conservation areas. Since they have no legal standing their existence requires unanimity and constant reinforcement by committed, experienced beekeepers. Elsewhere in Europe legally mandated areas are often located on islands, protected by

national, regional or local laws. They sometimes receive support from government agencies and require government control of ingress of exotic bees. However, Eoghan points out that their existence can lead to loss of a realistic perception of the value of bees, or to the idea that nothing need be done elsewhere.

De facto conservation areas exist, for example, where importation is banned to prevent spread of disease, or as in Corsica, where the native subspecies is *Mellifera* and the aim is to protect the quality of the honey. Such areas require supportive input from beekeepers and additional legal measures to prevent importation of foreign bees.

Although Articles 34 and 35 of the EU Treaty, dealing with trade restriction, would seem to facilitate foreign importation, Article 36 allows the banning of imports *if they threaten native subspecies*. Slovenia used this principle for protection of its native honeybee *A.m. carnica*. Eoghan concluded that EU law in fact offers considerable scope for protection of native populations of *A.m.mellifera*.

REPRODUCTIVE BEHAVIOUR

One of my own analyses was of the number of colonies with which my bees could interact during mating. At my home apiary, in good flying weather, remarkably this probably exceeds 1000, whereas at our remote out-apiary, in typical Northumberland weather, the risk of diploid drone production has to be reckoned with due to the paucity of unrelated bees. Establishment of a "drone corridor" linking it to a more populous area seemed like a solution, but exposed an unexpected obstacle, with Buckfast drones of unknown origin now revealing their presence (Figure 5).

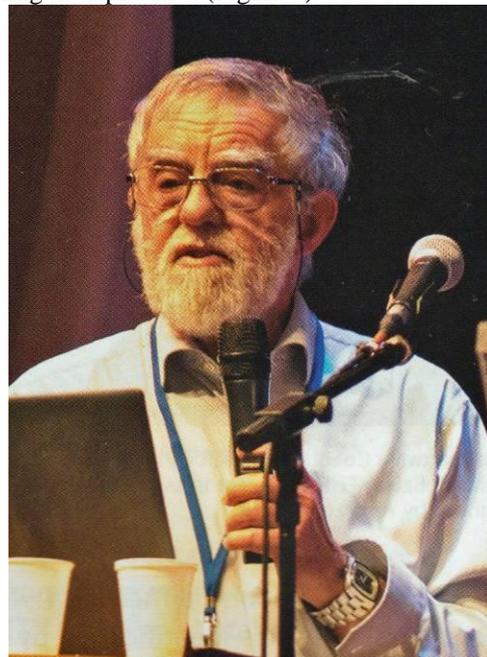


Figure 5. Dorian Pritchard addressing the conference.
Photograph by Ian McLean.

Michel Bocquet introduced a novel 3-part scheme for assessing the value of breeding stock. His first programme evaluates the semen quality of drones, his second the quality of queens, his third, the immune status of haemolymph.

Dr Andrzej Oleksa's analysis of Polish stocks shows a south-north gradation of the *Carnica* material introduced over the last 150 years, imposed on an underlying native *Mellifera* genome. Colonies tend to be predominantly of either one or the other subspecies, with very few hybrids, which inspired the following experiment. Twenty-four *A.m. mellifera* and 24 *A.m. carnica* native queens were allowed to mate naturally in an environment where drones of both races were flying. Eight workers from each colony were then assessed, as were one worker per colony of four local apiaries. All were genotyped at 17 microsatellite loci and it was found that, whereas the *A.m. carnica* queens had mated with drones of both types, *A.m. mellifera* queens mated almost exclusively with drones of their own race.

Explanations for apparent "assortative mating" include the possibilities of reduced fitness of hybrids, differential sperm survival, preferences for mating at different times of day and different siting of drone congregation areas. Other possibilities are differences in the mating sign, in sperm transfer, in anatomy of the copulatory apparatus, in the possibly superior survival rate of conspecific spermatozoa and in selective treatment of conspecific larvae by house bees. A significant feature with respect to the Polish example is that *Carnica* drones search for queens at higher altitudes (~25m) compared to *Mellifera* (~8m).

Robert Paxton's second lecture touched on the same question and suggested that the size of drones is also of significance, as larger drones ejaculate more semen. He told us that sperm ejaculates are initially stratified in the spermatheca of the queen, but get randomized shortly after.

John Hendrie addressed the topic of supersedure. The outcome of "perfect supersedure" is two laying queens, although one gets eliminated before the following spring. In "imperfect supersedure" there is a break in brood rearing and only the new queen is found thereafter. Supersedure can occur in response to injury of an established queen, particularly to the front legs, exposure to chemicals and a variety of other causes, the most common of which is probably a decline in the queen substance she is secreting.

GENETICS

Spain produces some 33.000 tons of honey per annum, from over 2.5 million hives, but recently CCD has accounted for 50% losses. Prof. Pilar de la Rua gave the first report to SICAMM on *A.m. iberiensis*, which, although showing broadly similar wing characters throughout the Iberian Peninsula, shows DNA evidence

of hybridization. The population of the SW Iberian Peninsula therefore has mtDNA of A type, showing origin of its queen lines in North African *A.m. intermissa*, while the bees in the NE have M type mtDNA and look like *Intermissa - Mellifera* hybrids.

There are variant mtDNA haplotypes in the Canary and Balearic islands, where conservation exercises are deemed necessary, but genetic introgression is not recognised as a problem on the mainland.

DNA

Dr Eleanor Jones, standing in for Giles Budge of the DNA team at our National Bee Unit, presented a surprise outcome from their country-wide random apiary survey. This was that the *A.m. mellifera* genome actually dominates those of all other subspecies right across the UK, especially in the NE of England and Colonsay.

However, she made a somewhat unsettling comment on the reliability of DNA evidence. The latest DNA-based approach relates to variation in the length of series of base repeats like ACACACAC or GTGTGT, known for historical reasons as "microsatellites polymorphism". The NBU group tested 39 such series and identified 12 as particularly informative, i.e. which varied in length among the subspecies under investigation. However, Dr Jones reported considerable inter-laboratory or inter-operator divergence between results obtained with the same samples. This should not be, but could derive from the financial restriction of being able to analyze only one or two bees per hive.

The selection of which microsatellites to use may explain the discrepancy between Martina Siller's observations on Austrian samples reported by Balser Fried and those of Andrzej Oleksa. The Austrian study showed generally poor correlation between DNA data and morphometric characters, except for the cubital index, whereas Andrzej concluded that wing morphometry is sufficiently reliable for identifying *Carnica-Mellifera* hybrids, as defined by their microsatellites. Anna Brandorf also drew attention to difficulty in Russian subspecies identification by morphometry, but noted complete coincidence between the results of DNA analysis and abdominal cuticle colour.

RACIAL COMPARISON AND DISEASE

My second lecture reported quantification of Hubert Gueriati's excellent literature based comparison of the relative performances of the major honey bee races. This shows that in northern Europe *Mellifera* wins hands-down. I was also able to confirm that in my hands, our northern strains of *Mellifera* show virtually complete resistance to *Varroa* mites, which seems to involve delivering lethal bites with their mandibles.

Romé van der Zee, reporting on the COLOSS survey observed that colony losses were greater on moorland, but that losses showed no correlation with

type of *Varroa* treatment. There were however, reduced *Varroa* related losses among dark bees on the Dutch island of Texel. Romée assessed the contents of sealed worker brood cells and deduced there may be delayed or reduced reproduction in the Texel colonies, possibly due to temperature differences in Texel *Mellifera* broodnests.

In their survey of British bees, Jones and Budge found no relationship between race and susceptibility to EFB.

SCENIC TOUR

On Monday a party of us visited Snowdonia. We drove west along the old stagecoach route, through the turbulent land and wild woods of the rebel warlord

Owain Glyndwr. We saw ravens and a field of American bison, before passing below the ice-scoured slopes of the Glyders, to Llanberis and the Snowdon Mountain Railway. It was a brilliant blue-skied day and we saw bees near the summit, where we lunched at Hafod Eryri, the shepherd's summer home in the land of eagles. The weepingly beautiful wooded Pass of Aberglaslyn then led us down to the fantasy village of Portmeirion with its phoney architecture, but glorious tranquillity. Then it was for home, skirting the territory once roamed by the Red Bandits of Dinas Mawddwy and back to Llangollen (Figure 6).



Figure 6. Some of the tour party at Ty Hyll (the Ugly House) near Bettws y Coed. From left to right: Philip Denwood, Andrzej Oleksa, Majka Budzynska Bu, Anna Brandorf, Mary Slater, Bob Jackson, Dorian Pritchard, Balser Fried, Rustem Ilyasov, Ingvar Arvidsson, Lucja Skonieczna, John Hendrie, Padruot Fried and Ernst Haemmerli. Photograph by Andrzej Oleksa.

We thank BIBBA, in the persons of Steve Rose, Trisha Marlow and Roger Cullum-Kenyon, but especially Roger Patterson, for generously accommodating us within their plans, and we join BIBBA in thanking South Clwyd Beekeepers and Cadwyn Clwyd for such generous assistance.

It was a super conference, possibly the greatest

ever on honey bee conservation! I think we did Beowulf proud. Well done everyone!

REFERENCES

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**ЮБИЛЕЙНАЯ КОНФЕРЕНЦИЯ BIBBA-SICAMM В ЛЛАНГОЛЛЕНЕ (УЭЛЬС)
И ПЕРСПЕКТИВЫ SICAMM**

Притчард Д.

Международная ассоциация по сохранению темной лесной пчелы (SICAMM)
Ньюкасл-апон-Тайн, Великобритания,
E-Mail: dorian.pritchard@btinternet.com

АННОТАЦИЯ

SICAMM (Международная ассоциация по сохранению темной лесной пчелы) и Ассоциация по улучшению и селекции пчел (BIBBA) провели 50^{ую} совместную юбилейную конференцию в Лланголлене, Северный Уэльс, которая прошла в сентябре 2014 года. Ассоциация BIBBA организовала два параллельных потока лекций, один из которых для начинающих, другой - для продвинутых пчеловодов, тогда как ассоциация SICAMM организовала международные лекции докладчиков из всех стран Европы. В работу были вовлечены два исследователя из России, один из Чехии, два из Латвии, а также видные представители из Голландии и Испании. Из более 40 докладов, распределенных в 3 одновременных потока, можно было посетить только некоторые на выбор. Спасительным моментом для конференции был хороший интервал между докладами, который позволял перемещаться участникам между залами.

Ключевые слова: SICAMM, BIBBA, Темная Европейская пчела, *Apis mellifera mellifera*, сохранение пчел