Why the native bee is the best bee for the British climate

John E.Dews

There is a tendency amongst some beekeepers to believe that the "grass is greener on the other side of the fence", that imported bees are superior to the indigenous bee. In the pre war years of the 20th century many kinds of imported bees were tried, but the ftalian bee found most favour. There was a welcome respite from imported bees during the war years but after the war importation became possible again. Italians, Caucasians, the American Starline and Midnite hybrids, Buckfast hybrids and even Anatolians found enthusiasts for a time. In my experience in Yorkshire they were all found to be inferior to our local bees. Whilst some of the imports survived and produced honey in the few and infrequent hot summers we sometimes have, they were unsuited to, and many of them were unable to survive, the long spells of cold, wet weather we often have to suffer in many of our summers and the long spells of severe cold or damp that occur in our equally unpredictable winters and springs. The winters of 1946-47 and 1962-63 were equally bad for bees as was 1985-86. The effects of the J946-47 winter together with a cluster of three consecutive wet summers in the late 195o·s made it very clear that we needed bees that could survive and produce honey regularly year by year in our harsh and variable climate.

We cannot control the climate, but we can breed from bees that are already adapted to it. Such bees are the descendants. not only of those which survived the "Isle of Wight" disease in the early years of t1le last century, but also of those which have survived in these islands for the last 10,000 years or so when the re-colonisation by plant and animal life took place after the last lee Age. The logic of this statement seems however to be beyond the reasoning powers of those who continue to replace losses of imported bees with further imports of the same kind.

For a fuller understanding of the nature of this subject we need to look back in time to the origins of the geographic races of honeybee that require consideration for our purpose. These are the native British or Dark European, the Italian, the Carniolan and the Caucasian. Current scientific opinion (see Ruttner, 1988) is that the Western honeybee probably originated and developed as a successful species *(Apis mellifera)* in the central part of North Africa. It then spread from this area in three directions: southward, to colonise Africa as far as the Cape, with sub-species evolving in response to differing environmental needs, to the east, to colonise the Middle East and south east Europe, evolving into several sub-species of which the best known are the Italian, the Carniolan, the Greek and the Caucasian; the third migratory route was to me west, across the Sahara which was a savannah before it became a desert, from which evolved the bees of north west Africa, the Iberian peninsula and, to the norm of the Pyrenees and the Alps, the Dark bee. Since northern Europe was covered with ice or under the immediate influence of the ice cap during much of the past two million years, the northern movement of the Dark bee was restricted to the Mediterranean coastal area of France until about 10,000 years ago when the ice cap began to melt, the climate grew nlilder and the vegetation of the tundra was replaced by flora which could suppo.rt bee life and provide suitable nesting places. The Dark bee migrated northwards to colonise me "British Isles" (at the time not islands but a peninsula from the mainland of Europe) and Europe north of the Alps as far as southern Sweden and the Baltic lands, and eastwards across Russia as far as the Urals.

During the course of studies made in preparation for the publication of *The Dark European Honeybee* (Ruttner, Milner and Dews. 1990) we found evidence mat Norway was also colonised at least as far as Oslo. These studies also show mat. despite extensive importations of bees of other races during the past 150 years into the territory of the Dark bee, colonies of unhybridised Dark bees can still be found in many places. The morphometric studies made by Professor Ruttner at the Institute of Bee Research at Oberursel in Germany, found a uniformity of samples from the whole of this vast area. During the course of the above studies I examined samples of bees preserved in several museums in Britain that had been collected before 1859 (the date of the first recorded importation of foreign bees into Britain) and also honeybee fragments from the Viking excavation in York, circa 1000 AD, and from that at Oslo, circa 1200 AD, which confirmed the morphometric standards of the Dark bee. Samples from New Zealand and Tasmania, descended from bees taken from this country more than 150 years ago, also conform exactly. More recently the DNA studies at the University of Copenhagen have provided further confirmation.

Whilst there is morphological uniformity among me indigenous bees of this vast region, mere are physiological and behavioural differences that have developed during the last 10,000 years as the bees became adapted to different environmental demands. The bees that are thus adapted are known as ecotypes. In France at least ten of these have been identified, each with its own seasonal brood rhythm. A Russian ecotype of the Dark bee can survive in areas where "the rivers are not frozen over for more than six months of the year" (Alpatov, quoted by Ruttner, 1988). In Britain, as in other countries bordering the Atlantic or t1le North Sea, a distinct ecotype has evolved in heather areas that is more inclined to swarm late in the season than are bees out of flying distance of me heather. This is a response to the very meagre forage available for most of the year and a sudden abundance for a short period late in the season.

The foregoing information provides evidence that the ecotype of the Dark bee which, over the past 10,000 years has evolved in any particular area, should be best able to withstand the extremes of climate in that area and, with proper management, be more economically viable than other bees adapted to places with a very different climate. It is the experience of many people who keep the Dark bee in this country that the bee wiU produce surplus honey every year, even when the summer is so cold and wet that bees of foreign origin have to be fed sugar to keep them alive. This is a consequence of their character of moderate brood productjon throughout the active season with their compact pattern of brood and always a reserve of stores. A quick reduction of breeding activity in response to adverse weather conditions results. in a lower consumption of food.

These characters, together with a population of long living worker bees, provide an optimum number of foragers ready to take full advantage of any short nectar flows during periods of unsettled weather. There is at such times a high ratio of potential foragers to brood, in contrast to the more prolific and thriftless imported bees which continue to maintain a large brood nest in those conditions and also have shorter-lived workers.

Colin Wood, a former Secretary of the Wakefield and Pontefract BKA in West Yorkshire examined the crop reports of the association over a period of 20 years. Including the good years of 1989 and 1990, there had been five good summers, three indifferent, ten poor and two very poor during that time, yet our local native bees produced surplus honey in every one of those years.

During a considerable part of the last millennium the climate in this country was much less favourable to bees than anything we have experienced during the past hundred years. The Little Ice Age lasted from about 1200 AD to 1850 AD and it is therefore no surprise that the pure form of the native bee came safely through the severe winters mentioned above when losses among foreign bees and their closely related hybrids were very heavy.

The physiological reasons for the survival of the Dark bee in severe winters are given by Ruttner (1988) :-

1. Efficient thermoregulation of the brood nest

a) The Dark bee has the largest body of the whole species with greater metabolic heat production by individual bees when required. .

b) The Dark bee has the longest abdominal overhairs of the European races. The colony forms a 'winter cluster' when the air temperature falls to 2°C. The bees which form the outer layer tuck their heads inwards and the abdominal overhairs interlock from bee to bee, insulating the cluster like the fur of a mammal.

2. In late summer, perhaps because of the diminution of brood rearing, the amount of biopterin in the larval food is greatly increased and 'winter bees' are formed, in which protein and fat accumulate in the 'fat bodies' in the sub-dermal layers of the abdomen. These bees are still physiologically 'young' in spring and so can act efficiently as nurse bees. It is therefore not necessary to produce brood in the depth of winter in order to have nurse bees in spring, as is the case with Italian and other imported bees. The extended winter broodless phase possibly confers the observed very low frequency of AFB and EFB in northern bees

3. There is an increase in the amount of the enzyme, catalase, which enables the rectum to retain greater quantities of faeces during winter. Such bees, confined for long periods in winter without the possibility of a cleansing flight are less liable to develop dysentery. It has been shown that southern bees taken to a cold climate do not increase their production of catalase.

4. The Dark bee has a longer period without brood in winter and consequently consumes less food, with a reduction in the accumulation of waste products. The more efficient thermoregulation also reduces the intake of food which is needed to maintain temperature within the cluster.

5. The Dark bee has greater resistance to nosema

My personal experience of beekeeping goes back some 66 years to May 1943. In that time I have never seen an acarine mite nor the symptoms of acarine disease in any of my hives. In the late 1940's a stray swarm died from a combination of nosema and amoeba disease, but apart from that I have never seen signs of nosema in any of my bees. The response of these bees to the new form of nosema (*Nosema ceranae*) is yet to be seen. If this proves to be more of a threat than *Nosema apis*, selection from surviving colonies will be the only practical solution. The defence mechanism against varroa as manifested in damaged mites has been found to varying degrees in all the native colonies so far sampled in the Whitby area of North Yorkshire. Since the year 2000 selection has been made for this character which has increased from an average of 25 – 30% to 45 – 50% of naturally fallen mites showing physical damage. A monotype area has been established to get pure matings and there is every hope of further improvement that will eventually produce bees that survive without chemical treatment.

Despite all the above facts about the suitability of this bee for our climate and thetestimony of those who have had experience of both native and foreign bees, there are still the cynics who pour scorn on the efforts to conserve and improve the native bee.

They claim that a "modern" bee is now needed that can cope with the environmental changes taking place as a result of agricultural practice, eg. the oil seed rape crop, cereal "deserts" and other major changes such as global warming that may be imminent. These people should take note that the Dark bee is the most adaptable of all the honeybee races, its territory of natural distribution ranging from the Mediterranean coast of France to Southern Scandinavia (and in the care of man as far north as the Arctic Circle) and from the humid and largely temperate climate of the Atlantic seaboard of Western Europe to the extremes of severe cold and dry heat of central Russia as far east as the Urals. There are also regional ecotypes within the British Isles with differing patterns of development and behaviour that enable us to choose a bee "tailor made" for any changes in bee forage either in time or scale that may be imposed on our countryside by economic or political pressures.

It is also claimed that modern beekeeping needs a more prolific bee with a large brood nest. This is based in part on the apparent ability of large colonies to gather a larger crop of honey in a good and sustained nectar flow than smaller colonies. Whilst it is true that a large colony of any one strain of bee will usually produce

Why the native bee is the best bee for the British climate

John E. Dews

more honey in these circumstances than a smaller colony of the same strain, it does not necessarily follow that a large colony of a prolific strain with a large brood nest will do better than a strong colony of a less prolific strain with a smaller brood nest. Indeed, as has been mentioned earlier, the opposite is frequently true in average conditions in this country.

References:
Ruttner F., *Biogeography and Taxonomy of the Honeybee*, 1988, Springer-Verlag.
Ruttner F., Milner E., and Dews J.E., *The Dark European Honeybee*, 1990, BIBBA.

John E. Dews

Discoidal shift

John E. Dews

Soon after I joined BIBBA (VBBA) in 1964 Beowulf Cooper sent me a report on a sample of my bees. In this report he mentioned cubital index (CI) and discoidal index (DI). I enquired of him regarding these indices. He told me that DI was described in a paper by Louis. I also found a brief description of CI in the chapter by Professor Ruttner in *The Hive and the Honeybee* edited by Grout. I obtained a copy of the paper by Louis from IBRA. Since the text was in French I was unable to read it, but the diagrams and graphs gave me sufficient information to understand how to make the measurements and their significance in identifying native honeybees. Louis and Cooper measured DI simply as negative, zero or positive. I borrowed a low power microscope with a cross graticule and a measuring device which enabled me to make the necessary measurements of wings mounted on a microscope slide. A little time later I realised that I could mount the wings in a 35 mm glass slide binder and project them onto a wall. I drew a T shape on a piece of paper to measure DI and measured the length in millimetres of the two cubital veins to produce the CI. I found that the DI of my bees was more negative than the bees that Louis had measured in France. I also noticed that the position of the discoidal point varied considerably. With this discovery I began to record DI as slightly, moderately or strongly negative or positive and again, after a while, I realised that these differences could be measured precisely in degrees. Now that I could put a figure on both CI and DI I used my experience of teaching "modern" maths to eleven year old children to devise a scattergram. The distinctive patterns that were produced were quite exciting at the time. Although I told other local beekeepers about my studies, the work was done entirely for my own interest with no thought of publication.

In 1981 the Rev. Eric Milner, a friend of my aunt since his schooldays, visited me. He had recently attended the BIBBA Conference at Celle in Germany where he had heard about honeybee morphometry. He knew that I had been doing similar work and wanted to know more about it. I told him all that I knew and added that there was much more to learn, but all the information was in German or French. He offered to obtain papers from IBRA and translate them in which task he was later joined by his brother Ashleigh. One of the early papers was by Goetze describing Discoidal Verschiebung. This latter word was translated by the Milner brothers as "displacement" or "shift", a word in common use in Yorkshire with several meanings, one of which was "to move an object". Since that time we have used the term Discoidal Shift" (DS). Goetze used a small magnifying glass to measure DS. This was of the kind normally used to measure the number of threads in fabric, having a grid divided into 0.1 mm squares. I was unable to obtain one of these, so continued to measure DS in degrees.

Professor Ruttner accepted the measurement of DS in degrees and the scattergram of CI and DS as useful aids in *The Dark European Honeybee* and in his last book to be published *Naturgeschichte der Honigbienen*.

John E Dews
28th October 2002

This article was originally published in Bee Improvement & Conservation Magazine issue 30 Winter 2008-9