APPARENT DECLINING POPULATIONS AND DISORIENTATION BEHAVIOUR OF HONEYBEES (*APIS MELLIFERA*) IN SOUTHERN ENGLAND AND FRANCE

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A beekeeper always keeps an eye out for bees. The sight and sound of bees is a natural part of the countryside and when that disappears we should all be worried.

I first experienced a motionless honeybee on a flower head in August 2008 in southern France. Other un-reactive honeybees were later seen in late April 2009, small, perfectly formed, hairy, young bees on the ground and also on flowers, as if disorientated. This was totally out of character. Honeybees are usually busy at all times. The weather was warm and sunny and they had not been caught out by a sharp shock of rain. They just sat there without doing anything, proboscis stowed, all energy drained from their young bodies; their abdomens very slightly pulsating indicating they were actually alive. So what had got into them? What had caused this breakdown in their usual behaviour?

Sudden mortality of bees had already been experienced in parts of France in July 1994 and had been written about by Benjamin and McCallum (2009) who explored the involvement of the contact and systemic insecticide imidacloprid. Foraging bees were seen to be "taking long periods of rest on the sunflower heads and appeared agitated, constantly cleaning their antennae and scratching their bodies with their hindlegs" (p. 133). This was different from my own observations where the honeybees were motionless and unresponsive.

Field observations were made on honeybees throughout my travels (wherever I happened to be) in the UK and France in 2009 looking for signs of odd behaviour, or simply recording presence or absence. In the spring of 2009 in southern France (Cévennes) honeybees were active pollinating apple (*Malus domestica*), but not in large numbers. They were easily outnumbered by true flies (Diptera), long-horned beetles (Coleoptera: Cerambycidae) and other species of beetle. The local nectar sources here included tree heath (*Erica arborea*) in the wild and rosemary (*Rosmarinus officinalis*), the latter, as a hedgerow being the most visited by honeybees.

May

Returning to the UK, reports stated that the countryside was being overrun by dandelions (*Daily Mail*, 18th May 2009). My own garden had a large swathe of dandelions, but not a single honeybee on them. I had photographed honeybee on dandelion in France earlier, but insects sometimes have different behaviours in southern France than they do in Britain, probably as a result of temperature influencing nectar flows.

Hawthorn (*Crataegus monogyna*) blossom was at its peak in Week 19 (May 4th) in parts of East Sussex (a week or so later than the warmer towns and cities in the south) but not a single honeybee was on it. By the 14th May just a few honeybees were seen on the blossom but wind and rain ravaged most of the blossom that then deteriorated as a nectar source. In the garden honeybees were to be found nectaring at knapweed (*Centaurea montana*) and *Rosa* 'Scarlet Fire' as usual.

In London, honeybees were completely absent from a long wall of blue *Ceanothus* in the Embankment Gardens next to the Houses of Parliament on the 15th May. This was surprising as the flowers are often a good nectar source.

In Hampshire the next day (16th May) honeybees were working the inflorescences of bistort (*Persicaria bistorta*), and the almost impossible tiny yellow centres of the blue

flowers of water forget-me-not (*Myosotis scorpioides*) – a European native species – but were nowhere else to be seen in the floriferous gardens (including herbaceous borders) of Hinton Ampner which was a surprise. Bumblebees were more in evidence than honeybees, especially on the reliable *Centaurea montana* cultivars. None was seen in a garden in Forest Row (East Sussex border with West Sussex) on the 18th May.

In Yapton and Girling Beach (West Sussex) on 21th May no honeybees were present on usual wayside favourites such as white deadnettle (*Lamium album*), black mustard (*Brassica nigra*), red clover (*Trifolium pratense*), Broad-leaved everlasting pea (*Lathyrus latifolius*), and a large patch of late-flowering hawthorn (*Crataegus monogyna*), and none on a fly-tipped waste pile on red campion (*Silene dioica*), columbine (*Aquilegia vulgaris*), or opium poppy (*Papaver somniferum*), or foxglove (*Digitalis purpurea)*; only hymenopteran relatives the Common carder bee (*Bombus pascuorum* (Scopoli)) and Red-tailed bumblebee (*Bombus lapidarius* (L.)). Overall honeybees were in short supply in this agricultural and glasshouse area – where large fields of potatoes and corn are the major habitats present.

At Scotney Castle (West Kent) gardens on 24th May honeybees were only at one particular rhododendron variety (out of the many hundreds) and also at a tall stemmed wallflower (*Erysimum* cultivar), though surprisingly nowhere else in this flower-rich garden.

June

Few honeybees were in the Oxford Botanic Garden on 1st June, which was extraordinary despite the diversity of nectar sources available. Just one or two were on *Nepeta* × *faassenii* 'Six Hills Giant' (if ever there was a bumblebee attractant this is it – grown as a hedge like lavender), several on *Crataegus*, some on wild mignonette (*Reseda lutea*), and some were working the dangly stamens of Jacob's ladder (*Polemonium brandegeei*) obliging honeybees to hover without alighting to gather pollen. There were, as usual, plenty more bumblebees present than honeybees in the garden, including the new noughties arrival, the distinctive Tree bumblebee *Bombus hypnorum* (L.) (working the white flowers of the large dense-headed tree of *Crataegus* × *lavallei*) but overall one had to work hard to find honeybees where one expected them most.

On the following day honeybees were absent from a crop of field beans in the Hertfordshire countryside, though they were probably not far away in the fading fields of oilseed rape.

Buttercups covered a lot of my garden by 5th June but were completely ignored by honeybees. It was reported in the press that populations of buttercups were exploding (*Daily Mail*, 4th June, 2009). It was a very rare occasion that I tracked a honeybee on a buttercup but that was close to a hive and may have been exploratory.

I thought The Royal Horticultural Society Garden at Wisley (Surrey) would be a honey-pot for honeybees (it has been in the past) but it was very difficult finding any bees in the garden on the 5th June. The herbaceous border was very much behind that of Oxford, but still did not harbour any honeybees. One or two were found in fresh rose flowers (particularly *Rosa* 'Cornelia') and some were 'frozen' on *Philadelphus* 'Belle Etoile' – a casualty of a recent bout of rain and cold snap. Numerous bumblebees and cuckoos were transfixed on *Nepeta*.

No honeybees at all were present in the extensive and colourful garden of Ston Easton Park (Somerset) on 6th June, with none to be seen along the herbaceous border. Again plenty of bumblebees, especially on comfrey (*Symphytum* × *uplandicum* cultivar), an occasional nectar source for honeybees. None were seen in a white clover (*Trifolium repens*) field in Langridge (Somerset) on the same day.

Buddleja globosa was out by 7th June in my own garden (much later than in towns) and honeybees were at last on one reliable nectar source available to make observations.

A visit to Sissinghurst (26th June) restored my faith in finding honeybees at regular and fairly predictable nectar sources, i.e. in gardens, where they were present on *Phacelia, Eryngium, Malva* and *Epilobium* but then Sissinghurst was doing its bit for bees by having two active hives in the orchard.

July

Honeybees were hard to find in Walland Marsh (Kent) on 16th July along the roadside verges and hedgerows of this much improved landscape, but just a few were on late flowering bramble (*Rubus* complex).

On 26th July in the gardens of Belvoir Castle (Leics) there were just a few honeybees on Prairie mallow (*Sidalcea* sp.) and St Peter Port daisy (*Erigeron karvinskianus*). There were more honeybees drinking from sugary soft drink bottles on tables at the Game Fair than in any garden display. This is an artificial habit not now exclusively held by wasps (*Vespula* sp.) in car parks in the UK and on the continent. Honeybees have become scavengers too. Bumblebees were abundant at Belvoir, over 300 on a 20 m stretch of Lavender (*Lavendula officinalis*) in full bloom – all incapacitated due to summer showers – but not a single honeybee.

In the evening of the 27th July in my Sussex garden late returners (i.e. after 2100 h when it was still warm) to the hive were lugubrious and disinclined to enter, some alighting and waiting to enter, others tumbling over each other to get in, in a kind of intoxicated manner. Where had they been? What had they been imbibing?

July was very much a wet month and this can put an end to the main foraging period of honeybees as they can be confined to the hive during periods of bad weather. Such a condition was noted by one Edward Jesse who wrote in 1818 that "Bees almost entirely confine themselves to their hives during the finest days of the latter part of this month, owing to the want of flowers".

On 29 July 2009 honeybees in my garden were active in the morning, but confined to the hive, despite some nectar sources being available (*Rubus, Lonicera*, *Buddleja*). Jesse had said that in 1818 on 26th July that "Flowers of every description have entirely disappeared".

Discussion

The apparent lack of honeybees is worrying. Quite whether the absence of bees and their disorientation observed are due to poisoning or some other factor is impossible to determine without careful study.

The many reasons posited for the demise of honeybees – Colony Collapse Disorder (CCD) – vary from viruses transmitted by mites (including *Varroa* sp., Fig. 1) that leave the bees paralysed (Planet Earth, 2009) as well as bacteria, fungi, stress, mobile 'phone transmitters, insecticides and genetic fitness. Buglife – The Invertebrate Conservation Trust reported on the plight of honeybees in their Press Release of 9 September 2009 (Buglife, 2009).

Honeybees should be active most of the time, but sleep and the effects of poisoning or disorientation could be confused. Sleep "can be by a posture reflecting a lack of muscle tonus, in which the antennae hang down, and the legs are folded beneath the body." (Tautz, 2008). Johansen (1979) was certain that . . . "bees behaving as if they are chilled, crawling around in front of the hive, is an almost sure sign of carbaryl (Sevin) poisoning. Bees exposed to this chemical quickly lose the ability to fly . . .".

Also, the honeybees' disorientation behaviour should not be confused with the ordinary behaviour of returning honeybees, a small proportion do not alight first of

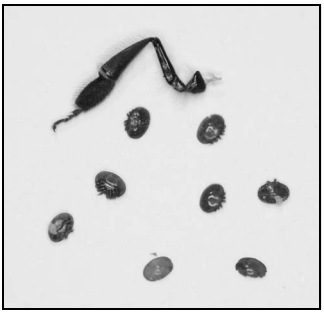

Fig. 1. *Varroa* sp. (Acari: Varroidae), displayed in relation to the hindleg of the honeybee for size comparison; now an established ectoparasitic pest of honeybees in the UK.

all on the alighting board, some come to rest within half a metre of the entrance and then make the extra effort to fly again at the entrance when they are ready. As was said as early as 1609 "when Bees come laden and weary home, they maie fettle quietlie." (Butler, 1609).

It is worth pointing out that a solitary Hornet (*Vespa crabro* L.) was seen on the ground on 11th August in Hailsham (East Sussex). This was displaying the same un-responsive symptoms as seen in the UK and France for honeybees – a fresh specimen, motionless and totally un-reactive to anything in its close proximity (most unusual for a hornet). One wonders whether this un-known affliction is also having an effect on hornets. This would be a pity since that species has enjoyed a steady increase in numbers in this part of East Sussex during the last decade.

What can be gleaned from this very small, un-quantitative snapshot of the state of honeybees is that they are becoming hard to find when previously they were widespread. Although honeybees are not always present in gardens as they used to be, gardens are probably a better place to find them than the countryside. This is almost certainly due to the biodiversity within gardens being far superior to that of the countryside. Honeybees will perhaps be saved in the long term by garden biodiversity.

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