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Scientific note

A scientific note: migration of tracheal mites (*Acarapis woodi*) to old winter honey bees

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The tracheal mite, *Acarapis woodi*, has been widely studied since it was first discovered in 1919 (Rennie et al. 1921). It is generally accepted that the mite migrates from an old host bee to a young bee less than 4 days old (Morgenthaler 1931; Bailey 1958; Gary et al. 1989). During winter months, however, there is evidence in temperate areas of mite prevalence levels increasing in infested colonies (Otis et al. 1988; JBMcM, unpublished data). In many cases, the levels have been observed to increase dramatically, and this at a time when there is no brood or young bees in the colony. While this may be explained by the unlikely event of uninfested bees dying, and at a greater rate than infested bees, a more likely explanation is that old bees are becoming infested.

There has been only one reported experiment to demonstrate that the tracheal mites will migrate to old bee hosts (Smith et al. 1991). However, the rate of migration was zero in one colony and only three out of 86 bees in a second colony despite high infestation of resident bees. The evidence for migration during the winter period is therefore not particularly robust. An experiment to test for stronger evidence of winter migration is described here.

At the end of 2007, a heavily tracheal-mite-infested colony was located in North County Dublin, Ireland. The mite prevalence level in the colony increased from 63% in September 2007 to 77% in early January 2008 (Figure 1). Bees in this colony had one or more yellow/gold tergites on their abdomen. Another colony was located in a different apiary where no tracheal mites had been found throughout 2007 despite regular testing. This colony was largely of the dark North European subspecies *Apis mellifera mellifera* (as identified by wing morphometry) where all the bees had dark tergites. The bees in the first colony will be referred to as the 'yellow bees' and the bees in the second colony as the 'dark bees'. On 6 January 2008, the queen was removed from the colony of dark bees and the colony united with the colony of yellow bees. To measure mite prevalence, samples of bees were removed from the landing board of the united colonies at intervals up to the end of April 2008. Both yellow and dark bees were collected at the landing board using a vacuum sampler. All samples dissected throughout the study contained 30 bees with the exception of the yellow bee samples, after uniting the colonies, which due to a reduction in the numbers of yellow bees on the landing board was limited to 15 bees. The temporal profiles of the mite prevalence in the yellow and dark bees are given in Figure 1. Mite infestation in the yellow bees increased to 100% after uniting and remained high up to mid-April. Infestation within the dark bees rose from 0% to over 50% by the end of March 2008, but by the end of April, no dark bees remained in the colony.

There was no brood present in either colony on 30 November 2007 and also at time of uniting on 6 January 2008. The emerging callow bees in the period 6 January to mid-March would have all been of the yellow strain. The dark bees in the united colony were bees that

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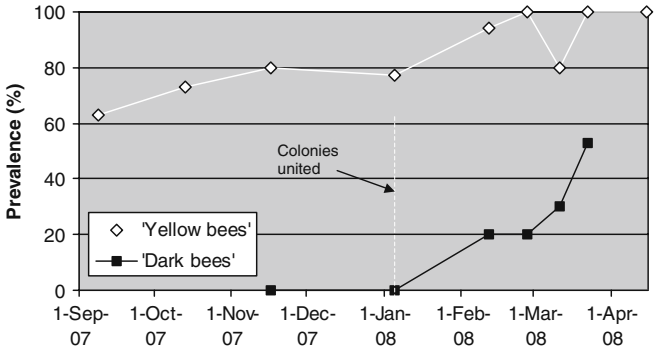

Figure 1. Prevalence levels of the tracheal-mite-infested 'yellow' bees before and after uniting on 6 January 2008 with uninfested 'dark' bees that had their queen removed.

emerged prior to the end of November 2007 (per local brood patterns), and the age of the youngest bees would therefore have been over 5 weeks old when the bees were united. It was also apparent during the dissections that the initial infestations in the dark bees contained few mite offspring, indicating recent infestation. Also, many of the infested black bees had worn wings signifying old bees.

It is concluded that the old honey bees, > 5 weeks old, were infested with tracheal mites. Also, a high level of infestation occurred with a prevalence of over 50% being achieved within 10 weeks of initial contact with infested bees. This study taken in conjunction with Smith et al. (1991) provides further evidence that tracheal mites can migrate to old honey bee hosts during winter conditions.

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Scientifique note: migration des acariens des trachées (*Acarapis woodi*) vers les abeilles âgées d'hiver.

Eine wissenschaftliche Notiz über die Migration von Tracheenmilben (*Acarapis woodi*) auf alte Honigbienen

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