

NOTES AND COMMENTS



Association of *Cryptophagus hexagonalis* (Coleoptera: Cryptophagidae) with honey bee colonies (*Apis mellifera*).

Nizar Haddad¹, Jens Esser² and Peter Neumann^{3,4,5*}

¹Bee Research Unit, National Centre for Agricultural Research and Extension, Baqa', Jordan.

²Dietzgenstr. 57, 13156 Berlin, Germany.

³Swiss Bee Research Centre, Agroscope Liebefeld-Posieux Research Station ALP, CH-3033 Bern, Switzerland.

⁴Eastern Bee Research Institute of Yunnan Agricultural University, Kunming, Yunnan Province, China.

⁵Department of Zoology and Entomology, Rhodes University, Grahamstown 6140, South Africa.

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*Corresponding author. Email: peter.neumann@alp.admin.ch

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The small hive beetle, *Aethina tumida* Murray, 1867 (Coleoptera: Nitidulidae), is endemic to sub-Saharan Africa (El-Niweiri *et al.*, 2008). It has recently become an invasive species in populations of European derived honey bees, *Apis mellifera*, (Hassan and Neumann, 2008; Neumann and Ellis, 2008) and can cause considerable damage to local apiculture (Neumann and Elzen, 2004). A range of other beetles may, however, be harmless associates of honey bee colonies (Neumann and Ritter, 2004; Ellis *et al.*, 2008), creating a need for distinguishing between harmful and harmless beetle associates. Here we report for the first time the association of *Cryptophagus hexagonalis* Tournier, 1869 (Coleoptera: Cryptophagidae) with honey bee colonies.

In an apiary at Baqa', Jordan, adult beetles were first found in March 2005 on the bottom boards of two *A. m. ligustica* colonies. The beetles were identified as *Cryptophagus hexagonalis* based

on definitive morphological characteristics (Bruce, 1936; Fig. 1). A member of the silken fungus beetle family Cryptophagidae, both adults and larvae appear to feed exclusively on fungi and are often found on moulds associated with damp plaster, in decaying or dried plant material and on shed fur or feathers (Watson and Dallwitz, 2003). *Cryptophagus hexagonalis* has been described from Europe, parts of Asia, and North America where it has probably been introduced (Johnson *et al.*, 2007).

In order to clarify whether this beetle species is widespread and may cause damage, a survey was initiated of all colonies (N = 90) at seven apiaries within a distance of 3 km. All hives were investigated by pulling out each frame and carefully examining the bottom boards and hive walls. Although the *A. m. ligustica* (N = 64) and *A. m. syriaca* colonies (N = 26) were of similar size (5–10 frames of bees and 3–5 frames of brood each), adult *C. hexagonalis* (N = 89) were only found in 11 *A. m. ligustica* colonies (mean = 8.09 ± 6.44, range: 1–24). All the adult beetles were found in corners of the bottom boards, where *A. tumida* also hides (Neumann and Elzen, 2004). Larvae of *C. hexagonalis* (N = 11; identified by morphometrics, see above) were found only in the debris of six colonies which also contained adult beetles. The remaining five colonies with adult *C. hexagonalis* showed neither debris nor any beetle larvae, suggesting that debris may be important as an environment in which fungi find good conditions for development. No eggs were found in the debris of any colony. Likewise, no infected colonies showed any signs of comb damage or fermented honey as is caused by mass reproduction of *A. tumida* (Neumann and Elzen, 2004). *Cryptophagus hexagonalis* reproduction in the debris of honey bee colonies thus appears to be similar to the cryptic low level reproduction of *A. tumida* (Spiewok and Neumann, 2006). In May



Fig 1. Adult of *C. hexagonalis*.

to June 2005, an identical survey was carried out, but no *C. hexagonalis* adults or larvae were found in any colony, suggesting a seasonal association of this beetle with honey bee colonies.

To investigate the reproductive potential of *C. hexagonalis* on bee products, 60 adults were introduced into six small plastic containers (N = 10 beetles each; 15 cm x 15 cm x 5 cm). Three containers were provided with small pieces of comb (10 cm x 10 cm) with sealed honey bee brood, pollen and honey, similar to laboratory rearing of *A. tumida* (Neumann and Elzen, 2004). The other three containers were only provided with pollen pellets (25 g each). All containers were incubated in a dark climate chamber at 25°C and 60% relative humidity, which appears to be as a suitable rearing environment for the species and local conditions, and examined after one, two and three weeks. In the comb group, some beetles (3, 4 and 3 respectively) were alive after one week but none after two. In the pollen group, beetles survived for up to three weeks (1st week: 4, 6, 7; 2nd week: 3, 3, 4; 3rd week: 1, 0, 1). No damage or beetle offspring were found in any of the containers. Although survivorship was low, the rearing attempt indicates that *C. hexagonalis* does not as readily mass reproduce on bee brood and hive products as does *A. tumida*.

In conclusion, our observations show for the first time that *C. hexagonalis* occurs in Jordan and that it can be found to live and also reproduce in honey bee colonies. In sharp contrast to *A. tumida*, damage to colonies is probably very small if not completely absent. *Cryptophagus hexagonalis* seems therefore to be a harmless associate of honey bee colonies.

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