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SHORT NOTE

First detection of small hive beetle *Aethina tumida* Murray (Coleoptera: Nitidulidae) infesting eastern honeybee, *Apis cerana* Fabricius (Hymenoptera: Apidae), in China

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Abstract

We report the infestation of small hive beetle, *Aethina tumida*, in a honeybee, *Apis cerana*, in South China. This is the first record for domestic Chinese honey bee infested with small hive beetle.

The Asiatic honeybee (*Apis cerana*) is an important pollinator to wild plants and crops and plays a critical role in the agricultural ecology system in China (Su & Chen, 2009). Nevertheless, Chinese honeybee colonies have recently suffered heavy losses due to the effects of biotic and abiotic factors (Diao et al., 2018). The small hive beetle (*Aethinatumida* Murray, Coleoptera: Nitidulidae) (SHB) is an invasive species which has been identified in *Apis mellifera* colonies from several regions around the world (Hood, 2004; Neumann & Elzen, 2004; Cervancia et al., 2016; Al Toufalia et al., 2017; Muli et al., 2018), and in spite of this, little is known about SHB in *A. cerana* in China.

Suspected SHB was first found in the front of beehive by beekeepers in Guangdong province on October 25, 2017. Then, we collected SHB samples from three apiaries with similar symptoms to further confirm SHB infected *A. cerana*

colonies (Fig 1). The three honeybee apiaries were located in Luhe county, Shanwei City, Guangdong Province, China (23°11' N, 115°33' E). We collected these samples and identified them using morphologic characteristics as described by Neumann et al. (2013). DNA was extracted from SHB samples using DNA Kit (TianGen Biotech Co., Ltd., BJ, China) following the manufacturer's instructions. PCR amplifications were carried out in 25 µL volume containing a pair primer: Forward, 5' GGTGGATCTTCAGTTGATTTAGC 3' and Reverse, TCAGCTGGGGGATAAAATTG 3' (Neumann et al., 2013). The PCR products were run in 1.2% agarose gel stained with GVII (Biomec, BJ, China) and then were sent to sequence by Shanghai SangonBio-Tech (Shanghai, China).

All colonies from three apiaries were visually observed through classical SHB infection symptoms (Neumann & Elzen, 2004). Any possible SHB including larvae and adults



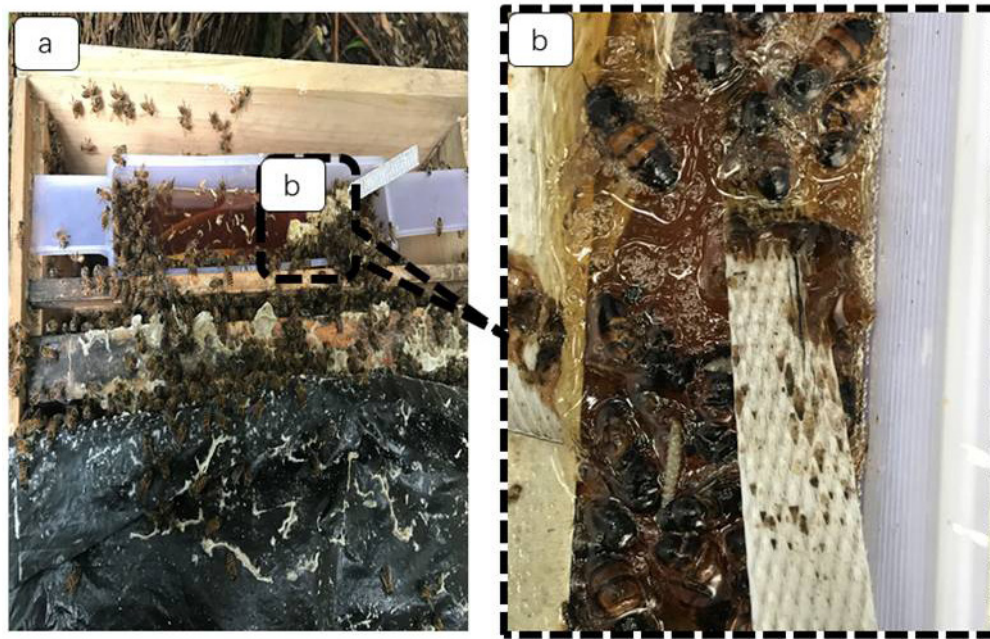


Fig 1. SHB larvae aggregating on the honeybee (*A. cerana*) comb. a, SHB invading honey bee colony (*A. cerana*); b, magnification of the area indicated in a.

were collected and brought to our laboratory for taxonomic and molecular identification. As shown in Fig 2a-2d, the morphologic characteristics of the larvae and adult SHBs were consistent with those of *Aethina tumida* as demonstrated by Neumann et al. (2013). In order to further confirm SHB at the molecular level, we amplified a target fragment with known primer-pair and found it was in accordance with expected size, 1009 bp (Fig 2e).

Our study indicates that SHB has invaded *A. cerana* colonies in China and this result was in accordance with that of Cervancia et al. (2016), which found SHB in *A. cerana* colonies in the Philippines. However, the origin of SHB associated to *A. cerana* colonies in China is still unknown.

Here, we provided the first report of SHB infesting *A. cerana* colonies in China and the second record in Asia after the Philippines in 2014. This demonstrated that SHB is expanding

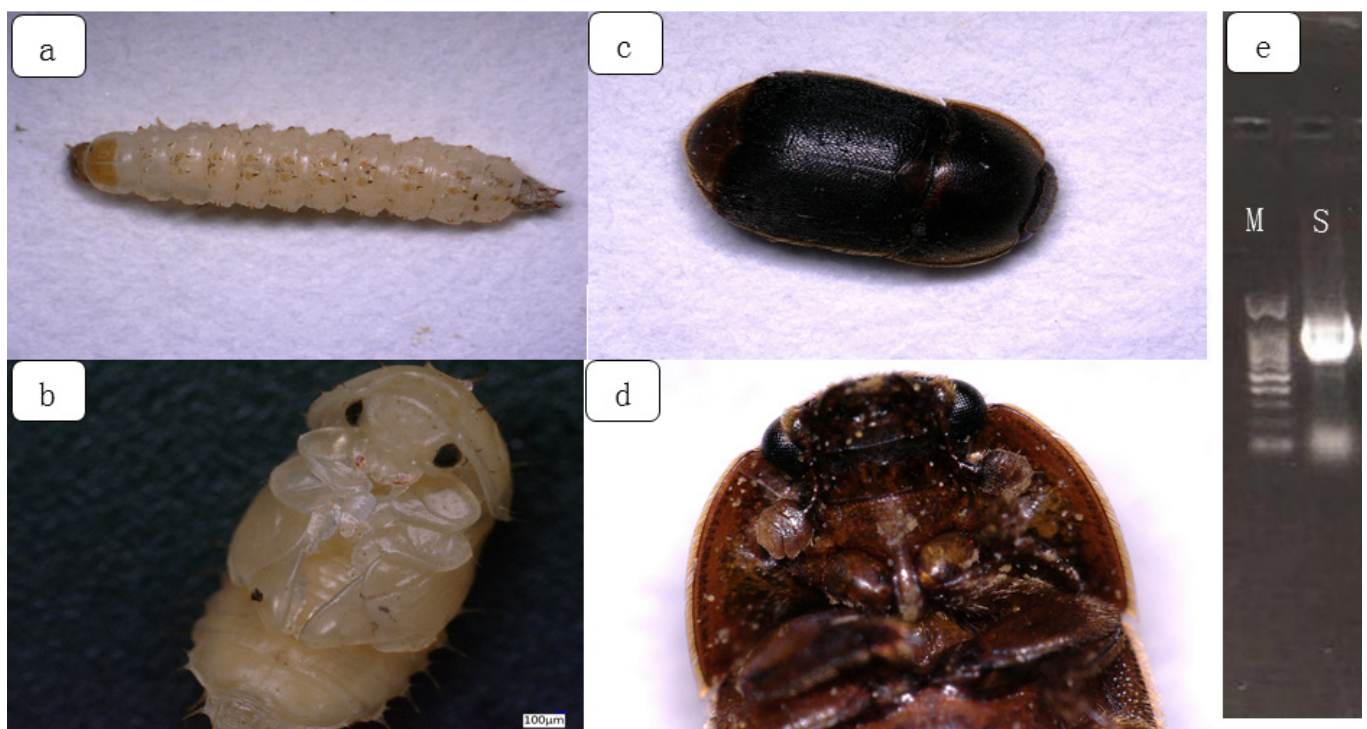


Fig 2. Identified the SHB using morphologic characteristics and molecular method. a, larva SHB; b, pupae SHB; c, adult SHB; d, ventral view of SHB; e, Molecular identification of SHB.

its host range, bringing as a likely result in the reduction of colony population. Thus, China must be in alert state and look for ways to prevent the diffusion of this invasive pest.

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Disclosure

The authors declare no conflict of interest.

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