

## GUEST EDITORIAL



# The small hive beetle (*Aethina tumida* Murray, Coleoptera: Nitidulidae): distribution, biology and control of an invasive species.

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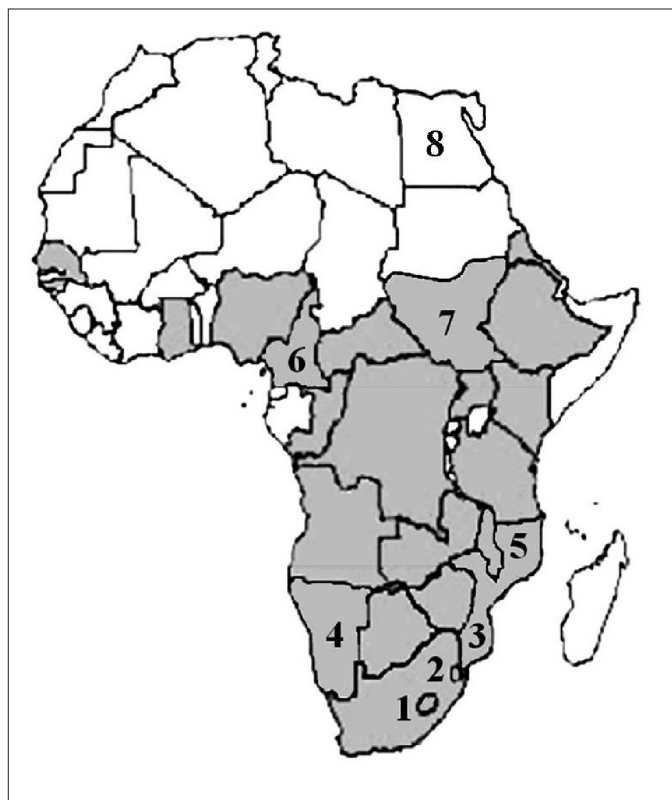
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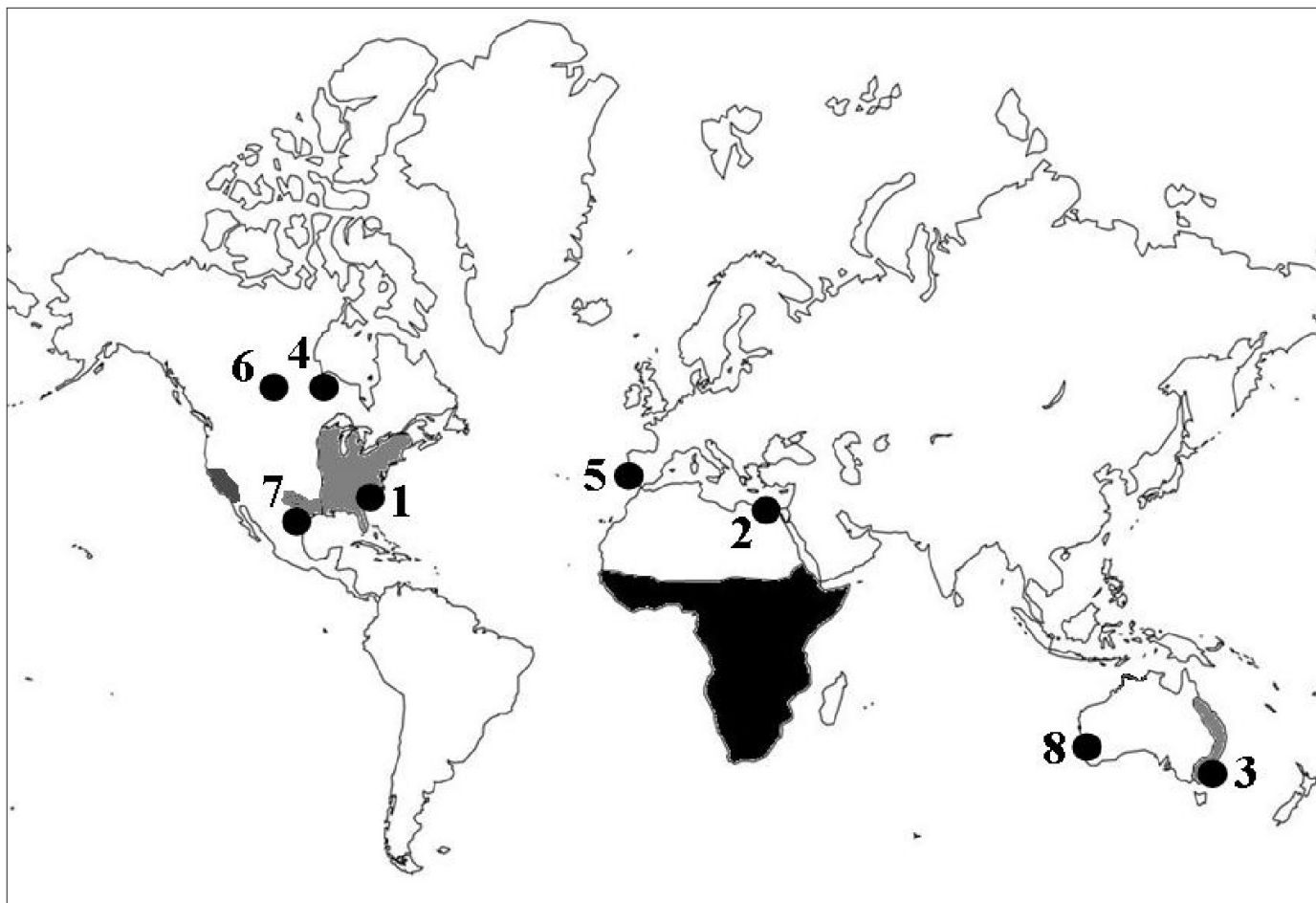
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Invasive species are a major threat to biodiversity and agriculture globally (Nentwig, 2007). It is not surprising that this is true for apiculture as well. For example, the ectoparasitic mite *Varroa destructor* (Anderson and Truman, 2000), an invasive species from Asia now present in most countries (Ellis and Munn, 2005), is the major worldwide threat to beekeeping. Due to the globalization of apiculture, other pest species associated with honey bees are likely to become invasive. In 1996, this became true for the small hive beetle (*Aethina tumida* Murray, Coleoptera: Nitidulidae).

The small hive beetle is a parasite and scavenger of honey bee, *Apis mellifera*, colonies native to sub-Saharan Africa (Fig. 1.), where it usually is considered a minor pest of local subspecies of honey bees (Lundie, 1940; Schmolke, 1974; Hepburn and Radloff, 1998; Neumann and Elzen, 2004; Ellis and Hepburn, 2006). In 1996, small hive beetles were discovered outside of their native range in colonies of European subspecies of honey bees in the southeastern U.S. (Hood, 2004; Fig. 2). Since then, small hive beetle introductions have been reported from a number of other countries (Neumann and Elzen, 2004; Ellis and Munn, 2005; Fig. 2). To date, small hive beetles have managed to establish populations in the eastern and westernmost U.S. and in Australia (Spiewok et al., 2007; Fig. 2.), suggesting that late recognition of this pest in an area prevents its eradication. Indeed, it was not recognized in the U.S. until 1998, two years after the earliest samples of the beetle had been collected (Hood, 2004). Similarly, local beekeepers alerted the New South Wales Department of Primary Industries of the potential existence of this pest twelve to eighteen months before it was officially recognized in October 2002 (Australian Honey Bee Industry Council, 2008). In the U.S., small hive beetles and beetle-associated problems have been reported by beekeepers from California and Texas suggesting that the invasion front has reached the Pacific Ocean. However, differences in beetle dynamics between the eastern half of the U.S. and California remain unclear thus far (J S Pettis, personal communication).



**Fig 1.** Updated records for the small hive beetle in Africa (July 2008). Please refer to Neumann and Elzen (2004) for references up to March 2003. Adult beetle specimens were collected from local honey bee field colonies and determined to be *A. tumida* using definitive morphometric characteristics: 1) Lesotho; 2) Swaziland; 3) Mozambique; 4) Namibia; 5) Malawi; 6) Cameroon; 7) Southern Sudan (El-Niweiri et al., 2008); 8) Egypt: no small hive beetles were found, suggesting that it is not well established (Rushdy and Neumann, 2008) after its introduction in 2000 (Mostafa and Williams, 2000).



**Fig 2.** Global distribution and reported introductions of small hive beetles (July 2008). Please refer to Ellis and Munn (2005) for references up to December 2005. Endemic distribution range in sub-Saharan Africa (black area), well established new populations in the U.S. and Australia (grey areas) and introductions (black circles): 1) 1996, Charleston, South Carolina, USA (Hood, 2004); 2) 2000, Etai-Al-Baroud, Egypt (Mostafa and Williams, 2000); 3) 2001, Richmond, NSW, Australia (Michael Duncan, personal communication; Australian Honey Bee Industry Council, 2008); 4) 2002, Manitoba, Canada (Dixon and Lafreniere, 2002); 5) 2004, Lisbon, Portugal (Murilhas, 2004); 6) 2006, Alberta and Manitoba, Canada (Clay, 2006), 7) 2007, Coahuila, Mexico (Del Valle Molina, 2007); 8) 2007, Kununurra, West Australia (Anonymous, 2007; Annand, 2008).

Since 1998, scientific interest in the small hive beetle has risen considerably, owing to its new status as a major pest of honey bees in its introduced range. In this special issue of the *Journal of Apicultural Research*, researchers address the current distribution, biology and control of the small hive beetle in a series of Original Articles and Notes and Comments.

The distribution of small hive beetles in the Sudan and Egypt is addressed as Notes and Comments by El-Niweiri *et al.* (2008) and Hassan and Neumann (2008) respectively. The occurrence and possible associations of other sap beetles from the family Nitidulidae with honey bee colonies in North America are reported by Ellis *et al.* (2008), whilst Haddad *et al.* (2008) report on the occurrence of *Cryptophagus hexagonalis* in honey bee colonies in Jordan. The Note and Comment by Cuthbertson *et al.* (2008) deals with the problem of how small hive beetles can be reared safely under quarantine conditions. The authors also report preliminary observations on small hive beetle behaviour. Benda *et al.* (2008) discuss the detection and characterization of *Kodamaea ohmeri*, a yeast symbiont of small hive beetles. The

degree of opportunism and potential of alternative food sources for small hive beetles is addressed by Buchholz *et al.* (2008). Ellis and Delaplane (2008) discuss small hive beetle oviposition behaviour in sealed brood cells and include notes on the removal of the cell contents by European honey bees. De Guzman *et al.* (2008) investigate the hygienic responses of Russian honey bees to small hive beetle eggs and larvae in bee brood. Concerning small hive beetle control, Levot (2008) discusses an insecticidal refuge trap to control adult beetles in commercial hives. Finally, Nolan and Hood (2008) compare the efficacy of apple cider vinegar and pollen dough inoculated with *K. ohmeri* as small hive beetle attractants used in an in hive trap. Many of the papers contained in this Special Issue were presented in a symposium dedicated to small hive beetles at the 40<sup>th</sup> International Apicultural Congress in Melbourne in 2007.

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