Journal of Apicultural Research and Bee World 47(3): 184–185 (2008)
DOI: 10.3827/IBRA.1.47.3.02

NOTES AND COMMENTS

Filling the Sudan gap: the northernmost natural distribution limit of small hive beetles.

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Received 10 July 2007, revised manuscript received 4 October 2007, accepted for publication 4 October 2007.

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Keywords: *Aethina tumida, Apis mellifera*, honey bee, small hive beetle

The small hive beetle, *Aethina tumida*, has become an invasive species (Neumann and Ellis, 2008) and was first detected in Egypt in Etai-Al-Baroud (~110 km North-West of Cairo) in Summer 2000 (Mostafa and Williams, 2000). Since then, small hive beetles (SHB) were found in other apiaries along the Nile Delta (Neumann and Elzen, 2004). However, in a recent extensive survey SHB were not found, suggesting that they is not well established in Egypt (Hassan and Neumann, 2008). To clarify whether SHB are native to Egypt or have been introduced, an investigation of its distribution in Upper Egypt, which closer to the sub-Saharan endemic region, is necessary (Hepburn and Radloff, 1998; Neumann and Elzen, 2004). Data from Sudan, which borders Upper Egypt, thus far are, however, lacking and may indicate SHB endemism in the area. Herein we report the results of the first systematic survey of honey bee colonies for SHB in Sudan.

In 2002-2003, a total of 117 local honey bee colonies in modern and traditional apiaries (N = 81) and wild colonies (N = 36) were inspected in 14 northern states of Sudan (Fig. 1). The Northern State and the Red Sea State were not included, because they are comprised almost exclusively of desert habitat that does not support honey bee colonies. The southern states were not included, because local beekeepers had already reported SHB there during the rainy season (see similar reports by Mutsaers (1991) for Nigeria). All colonies were carefully screened by removing and inspecting every frame (or natural combs), followed by an inspection of the hive walls and bottom boards. Adult SHB were collected, preserved in ethanol and brought to the laboratory for taxonomic identification. Adult SHB were found in low numbers in two out of 25 colonies screened in Southern Darfur State (5 and 8 SHB respectively) and in two out of 18 colonies in Blue Nile State (13 and 17 SHB respectively, Fig. 1).

Our observations demonstrate for the first time that SHB occurs in Sudan. This distribution appears, however, to be very limited both in its geographic coverage and in population because 3.42 % of colonies were infested at a low level in two of 14 investigated states (Fig. 1). We did not find SHB in the central states (N = 48 colonies) or in the most northern state bordering Egypt (N = 26 colonies). This absence of SHB is likely to be due to the northern part of River Nile State being very dry and the river itself being mostly bordered by solid rock. Consequently, available pollen and nectar sources attractive to honey bees are exceptionally limited there. This lack of suitable feeding substrata certainly constrains the number of both wild colonies and those kept by beekeepers, thereby minimising available host colonies for SHB. Moreover, very dry conditions are also likely to constrain SHB reproduction on alternative food sources (Buchholz *et al*., 2008) as well as pupation success (Ellis *et al*., 2004), making the Sahara uninhabitable for the beetle. These observations support the view that the Sahara is the natural northernmost distribution limit of SHB. In conclusion, SHB are most likely to be endemic to sub-Saharan Africa only and to have been introduced into Egypt. Our data could be further verified if other countries just south of the Sahara (such as Chad, Niger, Mali, etc.) were also shown to have limited SHB distribution.

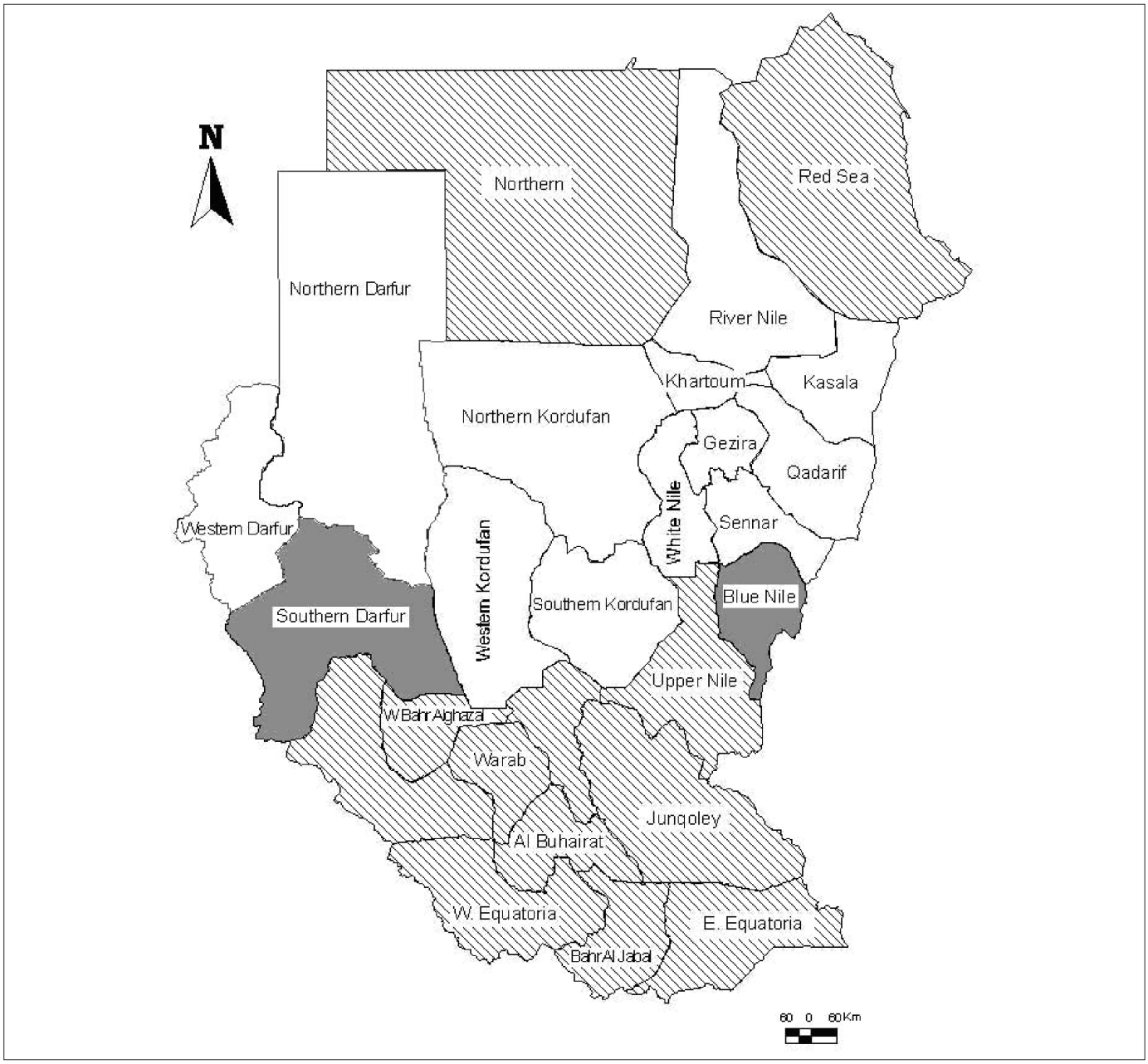

Fig 1. Distribution of the small hive beetle in Sudan (grey = states where SHB were found, white = states where no SHB were found, stripes = states not included in the survey).

Acknowledgements

Financial support was granted to Mogbel Ahmed Abdalla El-Niweiri by the National Centre for Research, Khartoum, Sudan and a DAAD fellowship.

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