Absence of *Tropilaelaps* infestation from recent swarms of *Apis dorsata* in Thailand

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Received 22 April 2002, accepted subject to revision 24 June 2002, accepted for publication 9 June 2003

Keywords: *Tropilaelaps clareae*, *Apis dorsata*, honey bees, parasitic mites, Thailand

Tropilaelaps clareae is a brood parasite of *Apis dorsata*. *A. dorsata* colonies tend to migrate during dearth periods and stop brood rearing in preparation for migration. This means that during migrations there is a period of broodlessness. *T. clareae* cannot survive more than 3 days on adult bees of *A. dorsata* (Rinderer *et al.*, 1994), thus the origin of infestations in colonies that have recently undergone migration is as yet unknown. Presumably populations of *T. clareae* gradually build up in new *A. dorsata* nests after re-infestation. To test this hypothesis, we evaluated *Tropilaelaps* infestations in new and established nests of *A. dorsata* in Samut Songkhram, Thailand.

Five new (swarms or colonies with the first generation of brood) and five established (with more than the first generation of brood) colonies of *A. dorsata* were examined for the presence of *Tropilaelaps* between April 2000 and September 2002. For the new colonies, the whole nests (adult bees and brood combs containing unsealed and sealed brood) were collected and examined. We inferred the age of the new colonies from the stage of the brood present. Colony 1 was a swarm (without comb), which had arrived at the site about eight days before being sampled. Colonies 2 and 3 were nine- and 13-days-old respectively, while colonies 4 and 5 were both 14-days-old. The established colonies were all more than two months old. The presence of *Tropilaelaps* in these established colonies was determined by cutting a brood comb section (about 10×18 cm) from each of the colonies. Both unsealed and sealed brood within the cut sections was examined (table 1). The entire nest of colonies 4 and 5 were collected and examined for the presence of mites.

A sample of adult bees (n = 57–9782) was obtained from each colony. These were washed in 70% ethanol to remove any mites present. The bees were then removed with a sieve, and mites counted in the alcohol.

T. clareae was not found in the five newly founded colonies (table 1). This observation suggests that *A. dorsata* colonies start with uninfested bees. This mite-free condition is probably due to broodlessness during the swarming events that interrupt the mite's life cycle. This period can be very lengthy. Koeniger & Koeniger (1980) reported that *A. dorsata* swarms fly in several

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TABLE 1. Numbers of *Tropilaelaps clareae* adults in new and established colonies of *Apis dorsata* in Samut Songkhram, Thailand.

Colony type	Colony number	No. of unsealed brood examined	No. of sealed brood examined	No. of adult bees examined
New	1	No comb	No comb	9 782 (0)
	2	1 262 (0)	No sealed brood	5 055 (0)
	3	1 440 (0)	620* (0)	5 181 (0)
	4	1 281 (0)	425* (0)	3 767 (0)
	5	394 (0)	No sealed brood	3 930 (0)
Total		**4 377 (0)**	**1 045 (0)**	**27 715 (0)**
Established	1	200 (0)	241 (16)	57 (0)
	2	173 (0)	313 (15)	521 (0)
	3	133 (0)	443 (13)	167 (0)
	4	341 (0)	3 366 (10)	1 232 (0)
	5	529 (0)	3 413 (5)	5 056 (9)
Total		**1 376 (0)**	**7 776 (59)**	**7 033 (9)**

Numbers inside ( ) indicate numbers of detected mites. * Sealed larvae

stages and often rest between stages of the flight. They showed that swarms often rest one to three days without building any comb and can spend more than one month on their migration. In our study, colony 1 did not commence comb building for eight days after its arrival at the nest site, providing a further period of broodlessness. The extensive period of broodlessness suggests that any mites travelling phoretically on a swarm are likely to die during swarming events before having the chance to enter brood cells of the new nest. This suggestion is supported by the absence of *T. clareae* in the new colonies. In Borneo, Koeniger *et al.* (2002) observed infestations of *T. clareae* in a newly settled swarm that had originated from an infested colony nearby. This shows that *T. clareae* can spread via reproductive swarms, but probably not, as we have shown, in migratory swarms.

We confirmed that *T. clareae* populations gradually build up in new *A. dorsata* nests after re-infestation. The five established colonies had 5–16 mites in the sampled sealed brood, and nine mites were collected from adult bees of colony 5 only. Most often uninfested colonies must acquire *T. clareae* from other *Apis* species or nests of *A. dorsata* present in the area. In south-east Asia *T. clareae* has proved to be a more serious pest of *A. mellifera* than either *Varroa destructor* or *V. jacobsoni*. Since brood production in *Apis mellifera* colonies is year-round in Thailand, these and non-migrating *A. dorsata* colonies may serve as constant reservoirs of *Tropilaelaps* for new colonies. *T. clareae* is also known to reproduce in *A. cerana* drone brood, and to be phoretic on adult bees of *A. dorsata, A. laboriosa, A. mellifera, A. florea* and *A. cerana* (Aggarwal 1988). In Samut Songkhram, all of these bee species except *A. laboriosa* coexist. *A. cerana* and *A. dorsata* have been reported to forage simultaneously on the same inflorescence of king palm in Thailand (Oldroyd *et al.*, 1992). In Malaysia, *A. cerana* adult bees have been observed to rob *A. dorsata* colonies (Koeniger *et al.* 2002). Thus, foraging of different bee species in the same flower or robbing must be considered as a potential source of *T. clareae* infestation for uninfested colonies.

Acknowledgements

We thank the Thailand Research Fund for the Royal Golden Jubilee PhD Program and National Science and Technology Development Agency of Thailand (grant number CO-B-07-22-09-005) for financial support. We also thank Associate Prof. Penrat Hongvitayakorn and Surachai Leephitakrat for their assistance on research techniques and sample collection. This research was completed in co-operation with the Louisiana Agricultural Experiment Station.

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