

First Record of the Predator, *Pahabengkakia piliceps* Miller, 1941 (Reduviidae, Harpactorinae) in the Stingless Bee, *Trigona collina* Smith, 1857 (Apidae, Meliponinae) in Thailand

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ABSTRACT.– This is the first record of an assassin bug, *Pahabengkakia piliceps* Miller, 1941 (Hemiptera; Reduviidae; Harpactorinae) as a predator of the stingless bee, *Trigona collina* Smith, 1857. *Pahabengkakia piliceps* appears to be a specialized predator of *T. collina*. The early stage nymphs mimic the host in appearance, and this may assist *P. piliceps* in infiltrating the host's nest.

KEY WORDS: predator, assassin bug, *Pahabengkakia piliceps*, *Trigona collina*

INTRODUCTION

The nests of highly eusocial stingless bee attract several predators because they are rich in food resources and provide many sites for reproduction. Stingless bees lack defensive organs, i.e. they do not have stings, increasing the risk of invasion from predators (Velthuis, 1997; O'Toole & Raw, 1999). The stingless bee, *Trigona collina* Smith, 1857, is found throughout Thailand, especially in northern and northeastern Thailand (Boonthaworn et al., 2005). These bees play an important role in pollination of natural ecosystems (Buchmann & Nabhan, 1996), but their biology is poorly understood. Here we investigate the parasites and predators found in *T. collina* nests in northern and northeastern of Thailand.

MATERIALS AND METHODS

We investigated the predators associated with fifty stingless bee, *T. collina* nests in northern and northeastern Thailand. A variety of birds, insects and spiders were observed catching and eating workers, and these species were recorded. Forty nests were cut open at the nest entrance and another ten colonies were completely dissected to observe evidence of parasites and predators within the nests. If predators were found, they were then collected and preserved in 70% ethyl alcohol for further identification.

RESULTS

Of fifty colonies investigated, we observed a total of ten colonies in which predators were consuming adult workers: one colony from each of Chiang Mai,

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FIGURE 1. A golden garden spider, *Argiope* sp. is a predator of *T. collina*

Maha Sarakham, Sukhothai, Sakon Nakhon provinces, and three colonies from Tak province and Mae Hong Son province. Predators observed included four species of bird: the bee-eater (*Merops leschenalti*), the asian palm-swift (*Cypsiurus balasensis*), the black drongo (*Dicrurus macrocercus*) and the greater racket-tailed drongo (*D. paradiseus*); two species of ant: the weaver ant (*Oecophylla smaragdina*) and the fire ant (*Solenopsis geminata*); and two species of spider: the golden orb web spider (*Nephila maculata*) and the golden garden spider (*Argiope* sp.) (Fig. 1).

An assassin bug, *Pahabengkakia piliceps* Miller, 1941 (Fig. 2B) (Hemiptera: Reduviidae: Harpactorinae), was found in six of the ten colonies that were exhaustively dissected (Appendix 1). Nymphs of the bug occupied the nest entrance and killed returning forager bees. Male and female adult and nymphal *P. piliceps* show a curious behavior that involves the capture, immobilization and feeding on the prey. Bugs use their legs to capture and immobilize returning foragers. They use their rostrum (beak) to pierce the



FIGURE 2. Dorsal view of adult specimens, *Trigona collina* (A) and *Pahabengkakia piliceps* (B).

thorax; mesoscutellum or abdomen of their prey in order to access the hemolymph.

Dissections of the nest entrance revealed eggs of *P. piliceps* in four colonies (Fig. 3). *Pahabengkakia piliceps* was also found in the brood nest of six colonies where they were observed feeding on all life stages of the host (eggs, larvae, pupae and adults). In four colonies, all bees had presumably been killed, and the nest site was occupied solely by the bugs.

Biology of *Pahabengkakia piliceps*

The body length of adult specimens varies from 1.00 to 1.20 cm (1.08 ± 0.08 cm). The body is brownish to blackish in color. Fore wing and hind wing are bicolor; distinctly darker towards the base, contrasting to milky white in the apical half. The back of the head is narrower than the front. The compound eyes are large and located at the back of the head. The antennae have four segments. This assassin bug has piercing-sucking mouthparts (collectively called a beak) that are used to remove body fluids from prey. The beak has four segments and lies within a prosternal groove between the front legs when it is not in use. The abdomen is



FIGURE 3. Eggs of *Pahabengkakia piliceps* found with in the entrance tube of *Trigona collina* nests.

widened in the middle, exposing the lateral margins of the segments beyond the wings (Fig. 2B).

The body length of a nymph varies from 0.20 to 1.00 cm depending on developmental stages. The color of both the head and the thorax are similar to those observed in the adults. The lateral margins of the abdomen are deep orange to reddish. There is no wing development in nymphal stages (Fig. 4). One interesting observation is that the body shape of early stage of nymphs mimics that of the adult stingless bee, *T. collina* (Fig. 4), and the morphology of the adult's wing is similar to that of the host. This may be a mechanism for concealing the predator form its host.

CONCLUSION AND DISCUSSION

We conclude that Thai *T. collina* have many generalized predators including birds, ants and spiders. *Pahabengkakia piliceps*, is a specialized predator that shows a variety of morphological and behavioral adaptations that apparently increase its ability to prey on the nests of

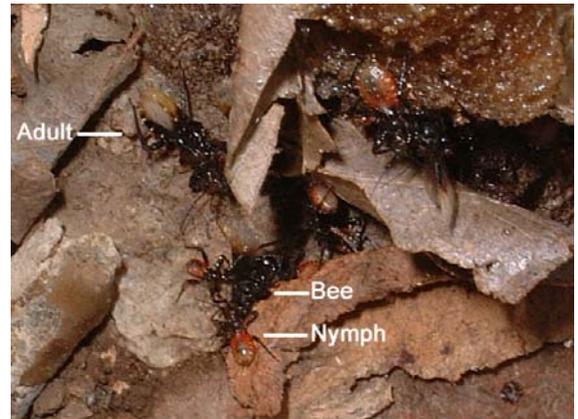


FIGURE 4. An adult and nymphs of *Pahabengkakia piliceps* feeding on *Trigona collina*.

T. collina. To date we can find no evidence of the presence of *P. piliceps* in the nests of other stingless bees including *T. apicalis*, *T. fimbriata*, *T. nitidiventris*, *T. terminata*, *T. ventralis* and *T. itama*.

Silva and Gil-Santana (2004) reported that females of the assassin bug *Apiomerus pilipes* (Reduviidae; Harpactorinae), are predators of worker bees of the genus *Melipona* in Brazil.

This study has shown that the stingless bee, *T. collina* is prey for a large number of abundant species in northern and northeastern Thailand. In addition it is prey for a specialist predator, *P. piliceps*. *Trigona collina* been proposed for domestication. Successful domestication may be impeded if domestication favours the spread of *P. piliceps*.

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APPENDIX 1. The locations of *T. collina* nests infested by assassin bugs, *P. piliceps*.

Provinces	Locations	Coordinates at 47Q (UTM)	
		N	E
Chiang Mai	Doi Suthep-Pui	2080016	494312
Kamphaeng Phet	Historical Park	1824346	554849
Mae Hong Son	Muang District	2133730	391612
Sakon Nakhon	Muang District	1887420	413726
Sukhothai Si	Samlong District	1898809	564786
Tak	Bhumiphol Dam	1906149	502366