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The Honey Bees of Thailand (Hymenoptera: Apidae)

The honey bees (genus *Apis* Linnaeus) native to Thailand were revised nearly 30 years ago but continued work on the genus has reinstated some species previously not considered. These changes in honey bee classification have made existing identification keys to the species unreliable. Herein a dichotomous key is presented for the identification of the native *Apis* occurring in Thailand as well as the adventive Western honey bee, *Apis mellifera* Linnaeus.

The honey bees are the most important of beneficial insects owing to their effectiveness as pollinators in agriculture and for the honey they produce. Although certain species of stingless bees (tribe Meliponini) are increasingly being recognized for their important role in tropical ecosystems and in many cases are far more beneficial pollinators than *Apis*, the honey bees still dominate agroecology at the present time. The genus *Apis* is native to the Eastern Hemisphere except Australia and some islands, but today occurs in almost all regions of the world owing to the importation of the Western honey bee (*A. mellifera*) to most continents and countries. The systematics of this group has been remarkably confused due to the dramatic variation within each species. During the past half century anywhere from 4 to 24 species have been recognized by various authors (e.g., MAA, 1953; RUTTNER, 1988). The genus has recently been taxonomically monographed (ENGEL, 1999) with 7 living species recognized along with a further 6 fossil species [although at least 2 undescribed fossil species are known (ENGEL, in prep.), and while *A. longtibia* Zhang may be a synonym of *A. miocenica* Hong, and *A. petrefacta* (Řiha) may be a synonym of *A. henshawi* Cockerell] (Table 1). Phylogenetic relationships among honey bees and their general evolution have been investigated by ENGEL & SCHULTZ (1997) and ENGEL (1998, 1999, in prep.).

In 1972 MALAIPAN produced a wonderfully detailed, regional monograph for the honey bees in Thailand and at the time recognized only 3 native species: *A. cerana* Fabricius, *A. dorsata* Fabricius, and *A. florea* Fabricius. Authors continuing to work on the genus over the past 28 years, however, have reinstated the black dwarf honey bee, *A. andreniformis* Smith (e.g., WU & KUANG, 1986, 1987; WONGSIRI *ET AL.*, 1989, 1997), a species which also occurs in Thailand (e.g., MAA, 1953; RUTTNER, 1992; OTIS, 1996). WONGSIRI *ET AL.* (2000) have presented an overview of beekeeping with both native species and *A. mellifera* in Thailand. Although not occurring in Thailand, 2 additional Asian honey bees are currently recognized—*A. nigrocincta* Smith and *A. koschevnikovi* Enderlein (Table 1). *Apis nigrocincta* is presently known only from Sulawesi while *A. koschevnikovi* occurs in Malaysia and Indonesia. Although it is distributed in wet primary forests on the Malay Peninsula, *A. koschevnikovi* is not known from southernmost Thailand (OTIS, 1996; ENGEL, 1999). There are reports of *A. nigrocincta* from the Philippines (e.g., OTIS, 1996; DAMUS & OTIS, 1997), but these are perhaps specimens of *A. cerana* (ENGEL, 1999).

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The purpose of the present contribution is to supplement the regional monograph of MALAIPAN (1972) by providing a new key to the species of *Apis* occurring in Thailand, inclusive of the adventive Western honey bee, *A. mellifera*. All 3 castes (workers, queens, and drones) can be identified using the dichotomous key presented below. For detailed taxonomic histories as well as descriptions of the genus and subgenera refer to ENGEL (1999). It must be noted, however, that in the subgeneric descriptions presented by ENGEL (1999) the character *"Angle of posteroapical margin of first submarginal cell less than 45°"* is in error. This character should have read as *"Angle of posteroapical margin of third submarginal cell less than 45°."* This correction should be kept in mind when utilizing the descriptions presented there. Furthermore, some authors have chosen not to recognize subgenera within *Apis* (e.g., MICHENER, 2000) and perhaps the use of subgenera in honey bees should be abandoned (ENGEL, in prep.). Morphological terminology follows MICHENER (2000) and ENGEL (in press).

Key to the Honey Bees of Thailand

1. Distal abscissa of vein M in hind wing present (Fig. 1) 2
– Distal abscissa of vein M in hind wing absent 3

2. Forewing hyaline; scutellum yellow-brown, rarely black; drone with tarsi unmodified; worker size moderate, forewing length 7–9 mm; cavity-nesting species ..... *A. cerana* Fabricius
– Forewing fuscous; scutellum black; drone with dense frond-like setae on mesotarsi and metatarsi; worker size large, forewing length 12–15 mm; open-nesting species ..... *A. dorsata* Fabricius

3. Scutellum black; drone with metabasitarsal process (Fig. 2); worker size small, forewing length 6–7 mm; open-nesting species 4
– Scutellum light to dark brown; drone without metabasitarsal process; worker size moderate, forewing length 7.5–10 mm; cavity-nesting species (not native to Thailand) ..... *A. mellifera* Linnaeus

4. Metatibia and dorsolateral margin of metabasitarsus with black setae; metasomal terga 1–2 black, infrequently with reddish brown tints apically on first tergum or basally on second tergum; drone metabasitarsal process short, less than one-half metabasitarsus length ..... *A. andreniformis* Smith
– Metatibia and dorsolateral margin of metabasitarsus with white setae; metasomal terga 1–2 reddish brown; drone metabasitarsal process long, more than two-thirds metabasitarsus length ..... *A. florea* Fabricius

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Table 1. Hierarchical classification of the honey bees (after ENGEL, 1999); asterisks (*) indicate species native to Thailand; daggers (†) indicate fossil species. The Western honey bee (*Apis mellifera*) has been introduced into Thailand. Infraspecific taxa are excluded.

Genus *APIS* Linnaeus

subgenus *Apis* Linnaeus
- **A. cerana* Fabricius
- *A. koschevnikovi* Enderlein
- *A. mellifera* Linnaeus
- *A. nigrocincta* Smith

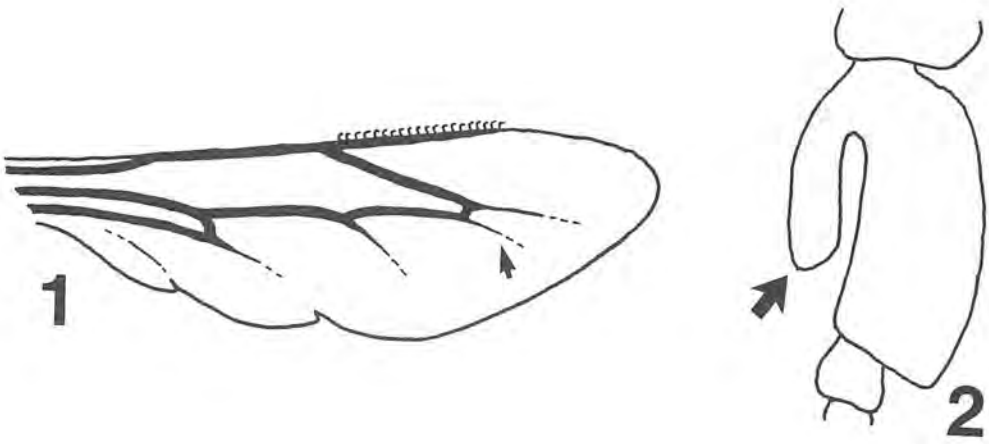
subgenus †*Cascapis* Engel
- †*A. armbrusteri* Zeuner

subgenus *Megapis* Ashmead
- **A. dorsata* Fabricius

subgenus *Micrapis* Ashmead
- **A. andreniformis* Smith
- **A. florea* Fabricius

subgenus †*Priorapis* Engel
- †*A. vestuta* Engel

subgenus †*Synapis* Cockerell
- †*A. henshawi* Cockerell
- †*A. longtibia* Zhang
- †*A. miocenica* Hong
- †*A. petrefacta* (Říha)



Figures 1–2. Schematics of honey bee morphological features. 1, Worker hind wing of *Apis dorsata* Fabricius (arrow indicates distal abscissa of vein M). 2, Drone metabasitarsus of *Apis florea* Fabricius (arrow indicates process)

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