The Taxonomy of Recent and Fossil Honey Bees (Hymenoptera: Apidae; Apis)

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Abstract.—An attempt is made to clarify the complicated and error fraught taxonomic history of the honey bees (genus Apis Linnaeus) by cataloguing the numerous names proposed for Apis. The 178 species- and 10 genus-group names (including those proposed herein) are brought for the first time into accord with the modern classification of the honey bees. The results of this synthesis reveal a number of names in current usage to be taxonomically confused. The authorship of the species Apis koschevnikowi is established as Enderlein and not Buttel-Reepen. The correct names for four subspecies of the Western honey bee, A. mellifera, are established as A. mellifera remipes Gerstäcker (not A. mellifera armeniaca Skorikov), A. mellifera siciliana Grassi (not A. mellifera sicula Montagano), A. mellifera jenenticata Ruttner (not A. mellifera jenenticata Ruttner), and A. mellifera caucasia Pollmann (not A. mellifera caucasia Gorbachev). The correct authorship of the subspecies A. mellifera iberica is established as Ruttner and not Goetz, of A. mellifera syriaca as Skorikov and not Buttel-Reepen, and of A. mellifera intermissa as Maa and not Buttel-Reepen. Three replacement names are proposed for preoccupied subspecific taxa: A. mellifera artemisia Engel (new name for A. mellifera acervorum Skorikov, nec Linnaeus), A. mellifera iberiensis Engel (new name for the aforementioned A. mellifera iberica Ruttner, nec Skorikov), and A. mellifera sossinitai Engel (new name for A. cerifera Gerstäcker, nec Scopoli). The previously confused Himalayan honey bee (infrrequently associated with A. cerana skorikovi Maa, nomen nudum or A. cerana “Himalaya race”) is proposed and validated as A. cerana skorikovi Engel (new subspecies). Similarly the large black race of China (Aba race) is proposed as A. cerana heimifeng Engel (new subspecies). A lectotype and 11 paralecotypes are designated for A. mellifera ruthneri (by Sheppard et al.), a lectotype is designated for A. koschevnikovi, and a neotype is designated for A. mellifera iberica Ruttner. Apis cuenoti Théobald is newly synonymized under A. henshawi Cockerell, A. mellifera rodopica Petrov is synonymized with A. mellifera macedonica Ruttner, while Hauffiapis scheeri Armbuster, H. scharmanni Armbuster, H. scheeri gallaunii Armbuster, H. scheeri rahdei Armbuster, H. scheuthleii seemanni Armbuster, and H. scheuthleii zeunerii Armbuster are all synonymized under A. armbrusteri Zeuner (new synonyms). The name A. vetustus Engel for a fossil from the Oligocene of Europe is emended to A. vetusta Engel. All genus-group taxa are characterized on the basis of adult and larval morphology and ethology. Two new subgenera are proposed to accommodate fossil honey bee species: Cascapis Engel new subgenus (type: A. armbrusteri Zeuner) and Priorapis Engel new subgenus (type: A. vetusta Engel).

The honey bees (genus Apis Linnaeus) are the most famous of all insects owing to their import for the pollination of crops, their social organization, and the honey they produce. There has been a long association between Apis and man as is attested by the Paleolithic Arana Cave paintings near Valencia, Spain which depict early humans collecting honey combs. Similarly, the honey bees figure prominently in human cultures, mythologies, and religions (e.g., see Ransome 1937). Numerous world revisions have been attempted for the genus (Gerstäcker 1862, 1863, Smith 1865, Ashmead 1904, Buttel-Reepen 1906, Enderlein 1906, Skorikov
Table 1. Classificatory structure of major honey bee revisions since Gerstäcker (1862); living species only. Subspecies and varieties omitted so as to save space. Species are in alphabetical order and do not necessarily correspond in rows from one column to the next. I have replaced uses of mellifica by some of these authors with mellifera. Although Maa (1953) observes that Skorikov (1929b) recognized 14 species, the later author left one unnamed (the ”Egyptian bee”) and I have therefore listed only 13 here. G = genus, sg = subgenus.

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1929b, Maa 1953) as well as an unpublished faunal revision from Thailand (Malaiapan 1972). Since the first detailed study by Gerstäcker (1862), anywhere from 3 to 24 species have been recognized while the four subgenera have at times been treated as distinct genera (Table 1). Despite the consistent and concentrated effort on Apis taxonomy for well over a century, a clear picture of the species and the numerous names associated with each has yet to be achieved. It is hoped that this paper (although mostly an exercise in “bookkeeping”) will make a small step towards achieving these goals.

The primary objective of this paper has been to pull together the extensive literature pertaining to the taxonomy of honey bees and to associate the long lists of junior synonyms with their valid counterparts. The last catalogue of Apis names was undertaken by Maa (1953); however, his list of names contains a number of errors and his rather extreme classification is not easily reconcilable with current usage. Moreover, Maa did not treat the numerous fossil honey bees and at least 60 names have either been discovered or were proposed since his study (approximately one-third of the total number of names). Below I have compiled a listing of all names applied to honey bees, both liv-
ing and extinct. This compilation contains 178 species- and 10 genus-group names. Although Maa (op. cit.) and Rutner (1988) noted that over 600 species-group names have been proposed for *Apis*, this does not mean that 600 names have been proposed for honey bees. Many of these names were proposed under a Linnean concept of the genus which included all bees. Thus, most of the 600+ names pertain to species now placed in other genera and families (e.g., *Anthophora, Bombus, Megachile, Trigona,* &c.). Interestingly most of the names applicable to honey bees have been proposed during this century. A breakdown of the list reveals eight names appearing between 1758 and 1799, 17 from 1800 through 1849, 26 between 1850 and 1899, 66 in the period 1900 to 1949, and 61 names between the years 1950 and 1999. Of these names 146 are applicable to the living species (90 associated with *Apis mellifera* alone!), 25 for the fossil species, and seven names are of dubious taxonomic status.

Included with this catalogue I have provided descriptions of all genus-group taxa now included in *Apis*, thereby adding to this work a subgeneric revision of the genus. Table 2 summarizes the hierarchical classification of *Apis* as it is proposed herein.

Phylogenetic studies on the genus have recently been undertaken by Alexander (1991a,b), Engel (1998a), and Engel and Schultz (1997: see also works cited therein). The current hypothesis of relationships among the subgenera and species is depicted in Figure 1 (modified from Engel 1998a). General works on honey bee anatomy, biology, behavioral ecology, and diversity have been presented by Snodgrass (1956), Winston (1987), Seeley (1985, 1995), and Smith (1991a) respectively. The distribution of the various species and subspecies has been thoroughly treated by Rutner (1988, 1992), Otis (1996), and Hepburn and Radloff (1998). The position of the Apini among the other tribes of corbiculate bees has been considered most recently by Chavarria and Carpenter (1994), Engel (1998b, unpubl. data), Noll (1998, in prep.), and Schultz et al. (1999).

**FORMAT**

Standard formats for taxonomic histories are used. Comments provided for each taxon give information on the assignment of authorship to certain names, subspecific classifications, studies of the recognition of difficult taxa, and occasionally historical information on the biogeography or biology of the species. Several honey bee names were used in publications as *nomina nuda* and in those cases where no description was later provided they are indicated as such. However, whenever a name was later made available by an associated description I have only listed the publication making the name available under the rules of the I.C.Z.N. (1985) and not the original paper in which it appeared as a *nomen nudum*.

For those species in which subspecies are currently recognized (*A. cerana, A. dor-
vetusta
henshawi
petrefacta
longtibia
miocenea
armbrusteri
florea
andreniformis
dorsata
mellifera
nigrocincta
cerana
koschevnikovii

Fig. 1. Phylogeny of the honey bees (genus Apis Linnaeus) with subgenera indicated (modified from Engel 1998a).

sata, and A. mellifera) I have associated each junior synonym with its corresponding subspecies. Names in brackets at the end of each entry indicate which subspecies the name corresponds to. In some cases (e.g., *nomina nuda*) this decision cannot always be made with certainty and so are accordingly noted with an interrogative mark.

Descriptions are provided for genus-group taxa and are based on information from all adult castes, the mature larva (of workers), and ethological information. Too little information exists at this time on *Apis* pupae to know whether additional character data can be gleaned from this life-stage. Characters given for workers also apply to drones and queens (except when indicated), although characters given for drones and queens do not necessarily occur in the worker caste. The abbreviations T1, T2, ..., T8 are used for the corresponding metasomal terga (S for sternum).

Since the literature on honey bees is vast, some names may have been inadvertently overlooked. Researchers discovering names (*nomina nuda*, *nova*, &c.) omitted here or of earlier usage than the dates cited are urged to contact me and, if possible, to send a copy of the relevant paper(s). All in all, however, this list should prove a reasonable starting point for future research.

**RECENT HONEY BEES**

**Genus Apis Linnaeus**

*Diagnosis.*—Modified and updated from Michener (1990: as Apinae). **WORKER:** Labral apex gently and often weakly concave; labrum three to four times broader than long (median width). Malar space as long as, or longer than basal width of mandible. Mandible without dentition
(workers only). Metatibial spurs absent (Fig. 3); metatibia without penicillum; inner surface of metabasitarsus with setal comb rows (worker only: referred to as *brush combs* in Michener 1990). Claws cleft; aralia present. Distal wing venation strong and complete; 1r-m and 2r-m strongly angled respective to M (Fig. 3). Marginal cell long (Fig. 3) and bluntly rounded at apex, not gently tapering over its length. Jugal lobe present. Sting straight (worker only). DRONE: Mandible usually bidentate, frequently only weakly. Holoptic (compound eyes meeting at top of head). S8 reduced to transverse bar, without spiculum. Spa-tha and volsella absent. QUEEN: Mandible bidentate. Inner surface of metabasitarsus unmodified. Sting curved. MA-TURE LARVA: Without small dorsal tubercles on segments 1–4. Mandible weakly sclerotized, bluntly pointed, without concavity on inner surface. ETHOLOGY: Nest a vertical comb of cells made of wax. Dance language communication system present. Highly eusocial (with morphologically distinct castes). New colonies founded by fission and include the old queen. Brood and storage cells similar. Immatures progressively provisioned.

**Biogeography.**—Honey bees are predominantly a tropical group and arose in the Indo-Malayan region during the early Oligocene (Engel 1998a). The genus is native to Europe, Africa, Madagascar, Arabia, the Near East, as well as Central and Southern Asia inclusive of most Southeast Asian Islands. Honey bees are not native to the Australian or American continents having been moved to these regions by humans. Species radiated from southern Asia perhaps being limited only by temperature extremes. The clade of living species (sub-genera Apis, Megapis, and Micrapis: Fig. 1) arose sometime in the latter half of the Miocene (Engel 1998a). The development of cavity-nesting behavior in the earliest Pliocene (perhaps in the latest Miocene) enabled at least two of the species, *A. cerana* and *A. mellifera*, to extend their ranges.
into more temperate areas. In the case of *A. mellifera* this was into Europe and northwestern Asia while for *A. cerana* this was into northeastern China, and the eastern regions of the former Soviet Union. The fossil species were presumably open-nesting (refer to Engel 1998a for a cladistic reconstruction of this behavior) and the slightly warmer temperatures in the Miocene would have partly allowed species such as *A. armhusteri* to exist in Europe even in the absence of well developed thermoregulatory capabilities. As the temperatures continued to cool (e.g., by the Pliocene) open-nesting species would have been forced from these areas and the cavity-nesting species would be free to colonize.

**Subgenus Apis Linnaeus**


*A. Rafinesque 1814: 29. Unjustified replacement name for *Apis* Linnaeus 1758.*

*A. Rafinesque 1815: 123. Unjustified replacement name for *Apis* Linnaeus 1758.*

*A. (Sigmatapis) Maa 1953: 556. Type species: *A. cerana* Fabricius 1793, original designation.

**Diagnosis.**—**WORKER:** Forewing length 7–10 mm. Basal vein frequently gently curved, strongly distad cu-a (Fig. 4). Angle of posteroapical margin of first submarginal cell less than 45°. Distal abscissa of vein M in hind wing variable (present [Fig. 5] or absent). **DRONE:** Hind basitarsus without thumb-like process. Vertical arm of T8 longer than horizontal arm; S7 and S8 fused mesally. Gonobase absent. Ventral gonocoxa membranous; dorsal gonocoxa reduced. Ventral cornua of endophallus recurved ventrally. **MATURE LARVA:** Labrum with peg-like setae restricted to apical surfaces and tubercles. Galea smaller than maxillary palpus. Labial palpus not spicate. Epipharynx with or without setae. Atrial inner walls smooth. **ETHOLOGY:** Nest constructed in a cavity. Dance language performed on vertical surface; wagging metasoma positioned parallel to dance surface; recruits positioned next to dancer’s metasoma (within a near field sound range). Drone cell cap variable (present or absent).

**Apis (Apis) cerana Fabricius**

The Eastern or Asian Honey Bee

*Apis cerana* Fabricius 1793: 327. [cerana Fabricius]

*Apis indica* Fabricius 1798: 274. [indica Fabricius]

*A. socialis* Latreille 1804a: 390. [indica Fabricius]

*A. peroni* Latreille 1804b: 173. [? indica Fabricius: see treatment of *jaavana* subspecies]

*A. gronovii* Guiliou 1841: 323. [? indica Fabricius: see treatment of *jaavana* subspecies]

*A. perrotetti* Guérin-Méneville 1844: 461. [indica Fabricius]

*A. delesserti* Guérin-Méneville 1844: 461. [indica Fabricius]

*A. sinensis* Smith 1865: 380. [cerana Fabricius]

*A. mellifica* variety *japonica* Radoszkowski 1887: 436. [japonica Radoszkowski]

*A. delesserti* Buttel-Reepen 1906: 168. Unjustified emendation. [indica Fabricius]

*A. indica* variety *jaavana* Enderlein 1906: 337. [jaavana Enderlein]

*A. indica* Rauhdaalsperger 1928: 173. Lapsus calami. [indica Fabricius]

*A. johni* Skorikov 1929b: 251. [johni Skorikov]

*A. indica philippina* Skorikov 1929b: 252. [indica Fabricius]

*A. indica skorikovi* Maa 1944: 4. Nomen nudum. [skorikovi Engel]

*A. mellifera* candhiana Muttoo 1951: 153. Nomen nudum. [indica Fabricius]

*A. (Sigmatapis) lieftincki* Maa 1953: 572. [johni Skorikov]

*A. (Sigmatapis) samarensis* Maa 1953: 580. [indica Fabricius]


Figs. 4-6. Honey bee wing venation. 4, Apis (Apis) cerana Fabricius, worker, forewing. 5, A. (A.) cerana, worker, hind wing. 6, A. (Synaps) heimifeng Cockerell, worker, forewing reconstruction. In the forewing M indicates an abscissa of vein M that is called the basal vein, while in the hind wing a distal abscissa is indicated which is referred to as the indica vein by some authors; cu-a is the cubital-anal crossvein, also called cu-v by some authors.

Apis cerana heimifeng Engel 1999: see below. [heimifeng Engel]
Apis cerana skorikovi Engel 1999: see below. [skorikovi Engel]

Comments.—The name gandhiana Muttoo (1951) was also used by Muttoo (1956) for an invalid variety of A. cerana. The name nuluensis was synonymized by myself in Schultz et al. (1999) and therefore appears here for the first time as a subspecific entity of A. cerana (see treatment of subspecies below).

Distribution.—Refer to treatment of individual subspecies below.

Apis (Apis) koschevnikovi Enderlein, corrected authorship
The Sundaland Honey Bee

Apis indica variety koschevnikovi Enderlein 1906: 335. First available usage.
Apis (Sigmatapis) vechti Maa 1953: 572.
Apis (Sigmatapis) vechti indica Maa 1953: 574.

Comments.—The authorship of this name has almost universally been given to Buttel-Reepen who first proposed it in 1906. However, Buttel-Reepen used the name infrasubspecifically and thus according to the I.C.Z.N. (1985: Art. 10c) does not become available until it is first used as a species or subspecies, and then the authorship is assigned to the author who used the name in such a sense (Arts. 23j and 50c). Enderlein (1906) was the first to use the name koschevnikovi subspecifically and he must therefore be considered as the author.

This species was only recently reinstated although under the junior synonym A. vechti (Koeniger et al. 1988, Tingek et al. 1988). Ruttner et al. (1989) recognized that the correct name for this species was A. koschevnikovi. There are presently no subspecific forms recognized.

Distribution.—Apis koschevnikovi occurs on the Malay Peninsula, Borneo, Brunei, Java, Sabah, Sarawak, and Sumatra.

Lectotype.—Worker; BORNEO: Kinabalu, Sibugbe, John Worterstradt, L. [leg.]; now with an additional label reading, “Lectotype, Apis koschevnikovi Enderlein, desig. M. S. Engel” (deposited in the Museum für Naturkunde, Berlin). The original series of A. koschevnikovi used by Buttel-Reepen is located in the Museum für Naturkunde, Berlin. The type series consists of one worker from northern Borneo and eight labeled as from Cameroon. No cerana-like bees are natively known from the African continent, yet the specimens from “Cameroon” are clearly conspecific with the one from Borneo, and all correspond to the species widely recognized as A. koschevnikovi today. The specimens from Cameroon are very likely mislabeled; something even Buttel-Reepen (1906) suspected. Although Maa (1953) chose Cameroon as the type locality, this cannot be considered a type fixation since there are eight specimens from this locality and none are labeled as the type (in fact, Maa admits having never seen any specimens of A. koschevnikovi). I therefore have selected the single specimen from Borneo to serve as the lectotype.

Apis (Apis) mellifica Linnaeus

The Western Honey Bee

Apis mellifica Linnaeus 1758: 576. [mellifica Linnaeus]
Apis mellifica Linnaeus 1761: 421. Unjustified emendation. [mellifica Linnaeus]
Apis gregaria Geoffroy 1762: 407. [mellifica Linnaeus]
Apis cerifera Scopoli 1770: 16. [mellifica Linnaeus]
Apis unicolor Latreille 1804b: 168. [unicolor Latreille]
Apis fasciata Latreille 1804b: 171. Preoccupied (nec Linnaeus 1767, Scopoli 1770). [lamarckii Cockerell]
Apis adansonii Latreille 1804b: 172. [adansonii Latreille]
Apis ligustica Spinola 1806: 35. [ligustica Spinola]
Apis capensis Eschscholtz 1822: 97. [capensis Eschscholtz]
Apis scutellata Lepeletier de Saint Fargeau 1836: 404. [scutellata Lepeletier de Saint Fargeau]
Apis nigritarum Lepeletier de Saint Fargeau 1836: 406. [adansonii Latreille]
Apis daurica Fischer von Waldheim 1843: 1. [mellifica Linnaeus]
Apis mellifica variety cecropia Kiesenwetter 1860: 315. [ceccropia Kiesenwetter]
Apis australis Kiesenwetter 1860: 317. Unjustified replacement name for Apis ligustica Spinola 1806. [ligustica Spinola]
Apis cerifera Gerstäcker 1862: 60. Preoccupied (nec Scopoli 1770). [sossimai Engel]
Apis mellifica variety remipes Gerstäcker 1862: 61. [remipes Gerstäcker]
Apis liguria Smith 1861b: 14. Nomen nudum. [? ligustica Spinola]
Apis mellifica germanica Pollmann 1879: 1. [mellifera Linnaeus]
Apis mellifica carnica Pollmann 1879: 45. [carnica Pollmann]
Apis mellifica hymettea Pollmann 1879: 50. Unjustified replacement name for *Apis mellifica carnica* Pollmann 1879. [carnica Pollmann]
Apis mellifica cyprica Pollmann 1879: 52. [cyprica Pollmann]
Apis siciliana Grassi 1881: 1. [siciliana Grassi]
Apis mellifica variety nigrita Lucas 1882: 62. [mellifera Linnaeus]
Apis mellifida Pollmann 1889: 90. Lapsus calami. [mellifera Linnaeus]
Apis mellifida [sic] variety caucasia Pollmann 1889: 90. [caucasia Pollmann]
Apis ligurica Dalla Torre 1896: 602. *Nomen nudum* (nec Tegetmeier 1859, 1860: see below). Corrected authorship. [ligustica Spinola]
Apis mellifica carniolica Koschevnikov 1900: 1. Unjustified emendation. [carnica Pollmann]
Apis mellifica cyprica Koschevnikov 1900: 1. Unjustified emendation. [cyprica Pollmann]
Apis mellifica variety siziliana Buttel-Reepen 1906: 168. Unjustified emendation. [siciliana Grassi]
Apis mellifera lamarckii Cockerell 1906: 166. Replacement name for *Apis fasciata* Latreille 1804b. [lamarckii Cockerell]
Apis mellifica Enderlein 1906: 331. Lapsus calami. [mellifera Linnaeus]
Apis mellifica unicolor variety frisei Enderlein 1906: 335. Lapsus calami. [frisonii Latreille]
Apis mellifica sicula Montagano 1911: 26. [siciliana Grassi]
Adamsoni Meunier 1915: 210. Lapsus calami. [adamsoni Latreille]
Apis fuscata Meunier 1915: 210. Lapsus calami. [lamarckii Cockerell]
Apis mellifica kafra Jack 1916: 397. Lapsus calami. [scutellata Lepeletier de Saint Fargeau]
Apis mellifica caucasica Gorbachev 1916: 39. Unjustified emendation. [caucasica Pollmann]
Apis mellifica variety banatica Grozdanic 1926: 57. [carnica Pollmann]
Apis fiscata Baldensperger 1928: 173. Lapsus calami. [lamarckii Cockerell]
Apis eurasatica Skorikov 1929a: 14. Unjustified replacement name for *Apis mellifera variety remipes* Gerstäcker 1862. [remipes Gerstäcker]
Apis meda Skorikov 1929b: 253. [meda Skorikov]
Apis mellifera natio acervorum Skorikov 1929b: 253. Preoccupied (nec Linnaeus 1758). [artemisia Engel]
Apis remipes transcaucasica Skorikov 1929b: 254. [remipes Gerstäcker]
Apis remipes transcaucasica natio absuana Skorikov 1929b: 254. Lapsus calami. [remipes Gerstäcker]
Apis remipes armeniaca Skorikov 1929b: 254. [remipes Gerstäcker]
Apis mellifera banata Skorikov 1929b: 263. Unjustified emendation. [carnica Pollmann]
Apis (Apis) syriaca Skorikov 1929b: pl. 1. First available usage. [syriaca Skorikov]
Apis mellifica variety sahariensis Baldensperger 1932: 829. [sahariensis Baldensperger]
Apis niger Baldensperger 1932: 830. Nomen nudum. [mellifera Linnaeus]
Apis mellifera mingrelica Lavrezhin 1935: 656. Nomen nudum. [remipes Gerstäcker]
Apis (Apis) intermissa Maa 1953: 591. First available usage [intermissa Maa].
Apis (Apis) mellifera anatoliaca Maa 1953: 599. [anatoliaca Maa]
Apis mellifera siriaca Kerr and Amaral 1960: 12. Lapsus calami. [siriaca Skorikov]
Apis mellifera lamarchii Smith 1961b: 148. Lapsus calami. [lamarchii Cockerell]
Apis millifica Goethe 1964: 9. Lapsus calami. [millifica Linnaeus]
Apis mellifica intermissa tellica Goetz 1964: 25. Nomen nudum. See also below. [intermissa Maa]
Apis mellifica mellifica silvarum Goethe 1964: 26. Nomen nudum. See also below. [mellifica Linnaeus]
Apis mellifica lamarchki Ruttner 1968: 41. Unjustified emendation. [lamarchki Cockerell]
Apis mellifica adami Ruttner 1975: 271. Proposed as new again in Ruttner (1980) with the species called mellifera. [adami Ruttner]
Apis mellifera major Ruttner 1976a: 354. [intermissa Maa]
Apis mellifera nubica Ruttner 1976a: 359. [jemenitica Ruttner]
Apis mellifera litorrea Ruttner 1976a: 361. Lapsus calami. [litorrea Smith]
Apis mellifera jemenitica Ruttner 1976a: 366. [jemenitica Ruttner]
Apis mellifera carpatica Barac 1977: 270. [carnica Pollmann]
Apis mellifera anatolica Winston 1987: 12. Lapsus calami. [anatoliaca Maa]
Apis mellifera yemenitica Ruttner 1988: 212. Unjustified emendation. [jemenitica Ruttner]
Apis mellifera sudanensis Ruttner 1988: 214. Nomen nudum (see below). [jemenitica Ruttner]
Apis mellifera iberica Ruttner 1988: 236. Preoccupied ( nec Skorikov 1929b, Goetz 1964: see treatment of A. mellifera subspecies below); corrected authorship. [iberiensis Engel]
Apis mellifera macedonica Ruttner 1988: 249. [macedonica Ruttner]
Apis mellifera logustica Kugler 1988: 268. Lapsus calami. [logustica Spinola]
Apis mellifera Petrov 1993: 36. Lapsus calami. [mellifera Linnaeus]

Apis mellifera capratica Petrov 1996: 58. Lapsus calami. [carnica Pollmann]
Apis mellifera bandasi Radloff and Hepburn 1997: 57. Nomen nudum (see below). [jemenitica Ruttner]
Apis mellifera artemisia Engel 1999: see below. Replacement name for Apis mellifera acerorum Skorikov 1929b ( nec Linnaeus 1758). [artemisia Engel]
Apis mellifera iberiensis Engel 1999: see below. Replacement name for Apis mellifera iberica Ruttner 1988 ( nec Skorikov 1929b). [iberiensis Engel]
Apis mellifera sossimai Engel 1999: see below. Replacement name for Apis cerifera Gerstäcker 1862 ( nec Scopoli 1770). [sossimai Engel]

Comments.—The term “natio” as used by Skorikov (1929a, b) appears to be synonymous with “variety” as used by other authors.

Both Maa (1953) and Goetz (1964) include the name A. domestica Ray (1710) in their taxonomic treatment of the western honey bee. This is a pre-Linnean name and it is therefore excluded from zoological nomenclature (I.C.Z.N. 1985: Art. 3) and my treatment above.

It might be interpreted from my treatment of Pollmann’s names above that A. mellifida as used by this author was not a lapsus calami but in actuality an unjustified emendation due to the fact that it appears to have been used twice (under mellifida and mellifida caucasia). This is not the case. The name mellifida was only used once in Pollmann’s (1889) work in the proposal of the variety caucasia. It appears twice in my list since two taxonomic entities are involved in this one action by Pollmann; one as the lapsus calami mellifida and the second for the proposal of the variety (now subspecies) caucasia.

Maa (1953) and Dalla Torre (1896) both cite the name A. ligurica with one author attributing it to Tegetmeier (1859) and the other to that paper as well as to Tegetmeier (1860). Interestingly enough neither
of Tegetmeier's contributions use this name. Tegetmeier's 1859 paper, the purported first usage of the epithet, is merely an untitled note about an exhibition of Apis specimens at a meeting of the Entomological Society of London and simply reads, "Mr. Tegetmeier exhibited specimens of Apis ligustica, of which he had lately received living examples of the queen and workers from the Continent, where it is considered a more profitable species to the owner than the common honey bee; he hoped, during the next season, to test the correctness of this opinion." Tegetmeier (1860), a similarly untitled note from a societal meeting, is merely a follow up to his 1859 notice and uses the name A. ligustica as well (not A. ligurica). A perusal of other issues of the Proceedings of the Entomological Society of London failed to find any usage of A. ligurica, and it would therefore appear that the first appearance of such a name was in Dalla Torre's catalog (1896).

The name mingrelica was used by Lavrezhin (1935) and attributed to Skorikov (1929a); however, Skorikov did not propose such a specific epithet. Skorikov (1929a: 32, 41, 44) used the name

мингрельская

only in Russian and as part of a vernacular name (it even has a Russian adjectival ending which changes in the text as the case of the noun it modifies changes), never once proposing it as a latinized taxonomic entity with a description. The same can be said for several of the nomina nuda listed by Goetze (1964); these being silvarum attributed to Alpatov (1935), tellica attributed to Buttel-Reepen (1906), and ussuriensis attributed to Lawrjochin (1960). These names, as used by Goetze (op. cit.), are also excluded from nomenclature owing to the fact that they are infrasubspecific names proposed after 1960 (I.C.Z.N. 1985: Art. 1b and 45e–g).

Radloff and Hepburn (1997) employ the subspecific names bandasii (attributed to Mogga) and sudanensis (attributed to Rashad) both of which are nomina nuda. I failed to find in publications of Rashad available to me any official proposal of a subspecies with the latinized name sudanensis that would satisfy the rules of nomenclature, although many of his papers mention the Sudanese bees as variable and distinctive (e.g., Rashad and El-Sarrag 1978). Ruttner (1988) also employs the name sudanensis (attributing it to an unpublished manuscript by Rashad) and thus it is a nomens nudum with Ruttner apparently being the correct author. The name bandasii, however, was proposed by Mogga (1988) and would meet the appropriate criteria except that this name was only treated in his unpublished Master's thesis, is therefore excluded from zoological nomenclature [I.C.Z.N., 1985: Art. 9(11)], and means that its use by Radloff and Hepburn (op. cit.) is a nomens nudum. Both of these names were once again used by Hepburn and Radloff (1998) although they were only mentioned as synonyms of jemenitica in their consideration of African races, a synonymy considered amply justified by both Ruttner (1988) and myself (above).

This seems an appropriate venue to comment on the apparent confusion of the valid name for this species. The persistent use of the unjustified replacement name A. mellifica by some modern authors is distressing and either demonstrates a general ignorance of taxonomic rules or a flagrant dismissal of the International Code of Zoological Nomenclature. Ignorance of the Code is understandable as not all biologists are intimately familiar, or even have an express need to be so familiar, with its rules and nuances. Dismissal of the Code is, however, a more serious situation. The criticism that the name mellifica is more descriptive than mellifera is beside the point and, if the argument of Benton (1904) is followed, vastly incorrect anyway. Suffice to say, the use of A. mellifera versus A. mellifica is not a matter of
personal choice. *Apis mellifera* is the only valid name for this species and authors should abide by this.

**Distribution.**—The western honey bee presumably arose in the Near East or Pontocaspian regions at some point during the early Pliocene. This species subsequently dispersed throughout Africa and Madagascar (entering via the Arabian Peninsula), into Europe, and into Northwestern Asia as far as the Russian Steppes. Localized adaptation gave rise to the numerous subspecies which are recognized today. Spread of this species elsewhere in the world has been through the action of human interference. Refer to treatment of individual subspecies for further details.

*Apis mellifera* was introduced into the New World by European settlers during their colonization of the western hemisphere. Although some early authors felt that that North American honey bees were specifically distinct from the European honey bees (e.g., Belknap 1792) it was quickly recognized by naturalists of the time that *Apis* was not native to the New World (e.g., Barton 1793), a belief confirmed by their discussions with the Native American populace. In fact, President Thomas Jefferson commented that the Native Americans referred to the honey bees as “the white man’s fly” (Jefferson 1787) and signaled to them the advance of colonists. Early reports that honey bees occurred in the New World (Hernandez 1648) were based on misidentifications with species of *Melipona* (Gerstäcker 1863). Most early authors correctly referred to the transport of honey bee colonies from Europe by colonists (e.g., Josselyn 1674). Despite the arguments raging in the late 1700’s over the “distinctiveness” and nativity of *A. mellifera* in the Americas, no names were proposed for them.

**Apis (Apis) nigrocincta** Smith

The Sulawesian Honey Bee

*Apis nigrocincta* Smith 1861a: 93.


*Apis (Sigmatapis) nigrocincta marginella* Maa 1953: 575.

**Comments.**—Although I have previously been hesitant to recognize this species as distinct from *A. cerana* (e.g., Engel 1998a), I here correct this following the excellent work of Hadisoesilo et al. (1995), Hadisoesilo and Otis (1996, 1998), and Hadisoesilo (1997). The absence of a pore in the drone cell cap is a plesiomorphic feature of *Apis* in general and for the *cerana-*clade in particular (Fig. 1). *Apis nigrocincta* is the only member of the *cerana-*clade to lack this feature. The apomorphic presence of such a pore unites *A. cerana* and *A. koschevnikovii*. No subspecies are recognized in *A. nigrocincta*.

**Distribution.**—This species only occurs on the island of Sulawesi except in the extreme southwest corner in a lower elevation band from a bit northwest of Ujung Padang around to Bulukumba and beyond (G. W. Otis pers. comm.). Previous records of this species on Mindanao (Otis 1996, Damus and Otis 1997) are probably *A. cerana* as revealed by the development of the drone cell which had a hard cap with a pore (G. W. Otis pers. comm.), this being a feature of *A. cerana* and not *A. nigrocincta* (Hadisoesilo and Otis 1998). Populations of Mindanao are certainly distinctive from typical *A. cerana* and need to be investigated further.

**Subgenus Megapis Ashmead**


**Diagnosis.**—**WORKER:** Forewing length 12–15 mm. Basal vein frequently gently curved, strongly distad cu-a (similar to Fig. 4). Angle of posteroapical margin of first submarginal cell less than 45°. Distal abscissa of vein M in hind wing present (similar to Fig. 4). DRONE: Hind basitar- sus without thumb-like process. Vertical
arm of T8 as long as horizontal arm; S7 and S8 not fused mesally. Gonobase absent. Ventral gonocoxa membranous; dorsal gonocoxa reduced. Ventral cornua of endophallus not recurved ventrally. MATURE Larva: Labrum with peg-like setae scattered over surface. Galea larger than maxillary palpus. Labial palpus spiculate. Epipharynx without setae. Atrial inner walls ridged. ETHOLOGY: Nest constructed in the open. Dance language performed on vertical surface; wagging metastoma held above dance surface; recruits potentially far from dancer’s metastoma (potentially outside a near field sound range). Drone cell cap without pore.

Apis (Megapis) dorsata Fabricius

The Giant Honey Bee

Apis dorsata Fabricius 1793: 328. [dorsata Fabricius]
Apis nigripennis Latreille 1804b: 170. [dorsata Fabricius]
Apis bicolor Klug 1807: 264. Preoccupied (nec Fabricius 1781, Villers 1789). [dorsata Fabricius]
Apis testacea Smith 1858: 49. [dorsata Fabricius]
Apis laboriosa Smith in Moore et al. 1871: 249. [laboriosa Smith]
Apis testacea Smith 1871: 396. Lapsus calami. [dorsata Fabricius]
Megapis zonata (Smith); Ashmead 1904: 121. [binghami Cockerell]
Megapis dorsata (Smith); Ashmead 1904: 121. [dorsata Fabricius]
Apis dorsata binghami Cockerell 1906: 166. Replacement name for Apis zonata Smith 1859. [binghami Cockerell]
Apis binghami sladeni Cockerell 1914: 13. [laboriosa Smith]
Apis dorsata Baldensperger 1928: 173. Lapsus calami. [dorsata Fabricius]
Apis himalaiana Maa 1944: 4. Nomen nudum. [laboriosa Smith]
Megapis breviligula Maa 1953: 563. [breviligula (Maa)]
Megapis binghami (Cockerell); Maa 1953: 564. [binghami Cockerell]
Megapis laboriosa (Smith); Maa 1953: 570. [laboriosa Smith]

Apis dorsatao Ruttner 1988: 118. Lapsus calami. [dorsata Fabricius]

Distribution.—Refer to treatment of individual subspecies below.

Subgenus Micrapis Ashmead


Diagnosis.—WORKER: Forewing length 6–7 mm. Basal vein frequently gently curved, strongly distad cu-a (similar to Fig. 4). Angle of posteroapical margin of first submarginal cell less than 45°. Distal absissa of vein M in hind wing absent. DRONE: Hind basitarsus with thumb-like process. Vertical arm of T8 as long as horizontal arm; S7 and S8 not fused mesally. Gonobase represented by isolated fragments. Ventral gonocoxa sclerotized as transverse bar; dorsal gonocoxa not reduced. Ventral cornua of endophallus not recurved ventrally. MATURE Larva: Labrum with peg-like setae scattered over surface. Galea larger than maxillary palpus. Labial palpus spiculate. Epipharynx with setae. Atrial inner walls ridged. ETHOLOGY: Nest constructed in the open. Dance language performed on horizontal surface; wagging metastoma held above dance surface; recruits potentially far from dancer’s metastoma (potentially outside a near field sound range). Drone cell cap without pore.

Apis (Micrapis) andreniformis Smith

The Black Dwarf Honey Bee


Micrapis andreniformis (Smith); Maa 1953: 601.

Comments.—This species was reinstated just over a decade ago by Wu and Kuang (1986, 1987) with additional evidence for this decision provided by Wongsiri et al.
(1989). Its common name comes from the nearly black T1-2 while in *A. florea* these structures are reddish brown. No subspecies are recognized.

**Distribution.** — *Apis andreniformis* occurs as far north as southern-most Yunnan Province in China, south into Malaysia, eastward on the mainland to the coast of Vietnam, and westward as far as northwestern India along the eastern border of Nepal. Although specimens are not recorded from Bhutan, Cambodia, Myanmar, or Nepal the records of *A. andreniformis* in the Bengal, Sikkim, and Assam regions of India suggest that it will eventually be found in these countries (Otis 1996) unless it has since become locally extinct.

**Apis (Micrapis) florea Fabricius**

The Red Dwarf Honey Bee

*Apis florea* Fabricius 1787: 305.
*Apis semiura* Hoffmannsegg 1818: 60.
*Apis lobata* Smith 1854: 416.
*Apis testacea* Bingham 1898: 129. Preoccupied (nec Smith 1858).
*Micrapis florea* (Fabricius); Ashmead 1904: 122. [see Comments below]
*Apis florea* variety *reficenitris* Friese in Buttel-Reepen 1906: 167, 170.
*Apis florea* *flore* variety *fuscat* Enderlein 1906: 338. Unavailable (I.C.Z.N. 1985: Arts. 10c, 23j, 50c).
*Apis nursei* Cockerell 1911a: 319. Replacement name for *Apis testacea* Bingham 1898.
*Apis florea nasicana* Cockerell 1911b: 241.

**Comments.** — Although when proposing the genus *Micrapis* Ashmead (1904) did not explicitly transfer the type species, *A. florea*, into this genus (he still referred to the species as *A. florea* and not *Micrapis florea*) he is to be consider as having made the combination as the proposal of *Micrapis* was done prior to 1961 [I.C.Z.N. 1985: Art. 51c(ii)]. There are presently no subspecies recognized in *A. florea*.

**Distribution.** — This species is distributed from the eastern regions of the Arabian Peninsula, through southern Iran and Iraq to Pakistan and India as far north as the Himalayan uplift. The species extends eastward as far as Vietnam, north to Yunnan Province, China, and south into Indonesia. Refer to Otis (1996) for more precise locality records. *Apis florea* was introduced into Sudan a little over a decade ago from Pakistan and has become established (Lord and Nagi 1987, Mogga and Ruttner 1988).

**SUBSPECIES**

Owing to both the high visibility and dramatic geographic variation of the honey bees, the more common species have been heavily divided infraspecifically. Below I have attempted to outline the presently recognized subspecies. There are no valid subspecies of *A. andreniformis*, *A. florea*, *A. koschevnikovi*, or *A. nigrocinata* and I have not recognized any subspecies among the fossil forms. A few of the names treated below are used incorrectly under the rules of zoological nomenclature (I.C.Z.N. 1985) and are therefore treated in further detail, otherwise I have not given detailed taxonomic histories for each subspecies. I have tried to provide common names for these morphs as well as historical, geographical, or important biological comments for some taxa.

As far as I have been able to ascertain, holotypes or neotypes have not been designated for certain subspecies. This will be necessary to assure stability in nomenclature. The general problems with the recognition of subspecies have been discussed by several authors, the best critique being that by Wilson and Brown (1953). My recommendation is a complete cessation of proposals of new subspecies in *Apis* (primarily *A. mellifera*) until the taxonomy has been more thoroughly examined (something which I hope this paper will facilitate).
**Apis (Apis) cerana Fabricius**

The populations of *A. cerana* in the Philippines are somewhat distinctive (e.g., Ruttner 1988, Smith 1991b, Smith and Hagen 1996, Damus and Otis 1997) and could possibly be elevated to subspecific status. If this is done the name of this race would become *A. cerana philippina* Skorikov with *A. samarensis* Maa as a junior synonym.

1. **Apis cerana cerana Fabricius**: The Eastern Honey Bee

   **Distribution.**—This subspecies occurs as far east as Afghanistan and south along the central deserts and mountain ranges. Along the Himalayan uplift in Tibet it is replaced by *A. cerana skorikovi* and further south in India it is replaced by *A. cerana indica*. The subspecies then ranges across most of central and southern China although not in the high regions of central China where the black bee (*A. cerana heimifeng*) occurs. *Apis cerana cerana* then ranges along the eastern edge of Asia up to Korea and the southern-most areas of the former Soviet Union (Ussuria) and south to the northern reaches of Vietnam.

2. **Apis cerana heimifeng Engel, new subspecies**: The Black Chinese Honey Bee


   **Diagnosis.**—Distinguishable from typical *A. cerana cerana* in China by the dark brown to black scutellum and T3-4 (these are yellow in *A. cerana cerana*). In this respect it resembles the Tibetan Honey Bee, *A. cerana skorikovi*, from which it differs in the larger body size (body length 12.5–13.7 mm; forewing length 8.8–9.3 mm) and low tendency to swarm (very strong in *A. cerana skorikovi*). This is the largest *A. cerana* race in China and is a relatively dark bee (hence its common name) with a dark metasoma, scutellum, and legs. This dark coloration is partly owing to the very narrow to completely absent bands of orange on T3-5. Peng *et al.* (1989) provide several morphometric measures for this bee (as "Aba race").

   **Distribution.**—This is a distinctive race in central China and occurs in relatively high elevation areas (although certainly not at the highest points for this region) mostly near river valleys. Its general distribution is in northern Sichuan Province, southwestern Gansu Province, and eastern Qinghai Province.

   **Holotype.**—Worker; CHINA: [Northern Sichuan Province], Nanping, 21 April 1920 (deposited in the American Museum of Natural History, New York).

   **Etymology.**—The specific epithet is derived from the Mandarin words *hei* (meaning "dark") and *mifeng* (meaning "honey bee") and refers to the dark coloration of this race. The name is a noun in apposition.

3. **Apis cerana indica Fabricius**: The Indian Honey Bee

   **Distribution.**—This race occurs through most of India except in the higher regions towards the north where it is replaced by *A. cerana cerana* or in Tibet by *A. cerana skorikovi*.

4. **Apis cerana japonica Radoszkowski**: The Japanese Honey Bee

   **Distribution.**—This race occurs on the islands of Japan.

5. **Apis cerana javana Enderlein**: The Javanese Honey Bee

   **Comments.**—The taxa described as *A. peroni* by Latreille (1804b) and *A. gnovovii* by Guillon (1841) may be the same as Enderlein's *A. cerana javana*. Owing to this uncertainty I have for now retained *A. cerana javana* as the name of this taxon and considered *A. peroni* and *A. gnovovii* to be *A. cerana indica*. Researchers, however, should be aware of this uncertainty and if the consubspecific nature of these taxa is confirmed in the future, then the name of the subspecies would have to be changed to *A. cerana peroni* with *gnovovii* and *javana*
as junior synonyms. This situation was also noted by Maa (1953: 580). If this unfortunately turns out to be the case, then it would probably be advisable to petition the I.C.Z.N. to suppress A. peroni and A. gronovii in favor of A. cerana javana although such a case would not be a very strong one owing to the fact that A. peroni has been in use within the last 50 years (e.g., Maa 1953).

_Distribution._—This subspecies is presently known from Java and as far east as Timor.

6. *Apis cerana johni* Skorikov: The Sumatran Honey Bee

_Distribution._—This subspecies only occurs on the island of Sumatra.

7. *Apis cerana nuluensis* Tingek, Koeniger, and Koeniger: The Malaysian Mountain Honey Bee

_Distribution._—This morph occurs in the mountains of Sabah, Malaysia. Otis (1996) provides details of various collection locales in Malaysia.

8. *Apis cerana skorikovi* Engel, _new subspecies_: The Himalayan Honey Bee

*A. cerana skorikovi* Maa 1944: 4. _Nomen nudum_.
*Apis cerana*, Himalaya race, Ruttner 1988: 121, 158.
*Apis cerana himalaya* Smith 1991b: 154. _Nomen nudum_.

_Diagnosis._—This race is fairly gray in overall body coloration, some areas being slightly more yellow while others are closer to black (e.g., T4 is entirely black) and with paired yellow spots on S3. There are distinctive white hairs on the terga which contribute to the overall grayish appearance. *A. cerana skorikovi*, like *A. cerana heimifeng*, also differs from *A. cerana cerana* (as well as *A. cerana indica* and other subspecies) in the dark scutellum and slightly larger size (body length around 12.2 mm; forewing length around 8.75 mm). Additional morphometric values are provided by Peng _et al._ (1989).

_Comments._—The Himalayan race of *A. cerana* (sometimes called the Tibetan race) was referred to as *A. cerana skorikovi* by Maa (1944); however he never provided a description for this subspecies. Many authors have subsequently recognized this race as distinctive but never associated a name with the numerous descriptions simply referring to this taxon as the Tibetan honey bee (among other common names). Peng _et al._ (1989) have done the best to characterize and describe this taxon referring to it as the Xizang race (Xizang is Chinese for Tibet, sometimes spelled Sitsang). I here validate the name _A. cerana skorikovi_ for this taxon, referring readers to the diagnosis provided above as well as the descriptive comments given by Peng _et al._ (1989: as “Xizang race”) and Ruttner (1988: as _A. cerana_ “Himalaya race”). Smith (1991b) referred to this race as _A. cerana himalaya_ making a Latin name out of Ruttner’s “_A. cerana_ Himalaya race”. Ruttner’s name was not used as, nor intended as, a scientific name and _A. cerana himalaya_ as used by Smith (1991b) is a _nomen nudum_.

_Distribution._—This subspecies occurs along the Himalayan uplift at elevations of 1900–4000 meters.

_Holotype._—Worker; NEPAL: Ko Pasi near Panauti, 19 March 1982, B. A. Underwood (deposited in the Cornell University Insect Collection, Ithaca).

_Paratypes._—Three workers, same collection data as holotype, deposited in the same collection as the holotype; two workers, same collection data as holotype, deposited in the American Museum of Natural History, New York.

_Etymology._—I have retained the specific epithet used by Maa (1944) for this race. The epithet is a patronymic honoring Dr. A. S. Skorikov who did much work on the classification of bees; honey bees and bumble bees in particular.
**Apis (Apis) mellifera Linnaeus**

The western honey bee, *A. mellifera*, is remarkable for its geographic variation and, for this reason, has been broken into a plethora of taxonomic entities over the past two centuries. In earlier studies these forms were often treated as distinct species; however, today they are recognized as subspecies of a single variable species.

1. **Apis mellifera adami Ruttner**: The Cretan Honey Bee

   **Comments**.—No type has been designated for this race. Ruttner's specimens are among the collection of the Institut für Bi enenkunde in Oberursel, Germany. A single worker from this material should be selected as the lectotype and the others designated as paralectotypes.

   **Distribution**.—This race occurs on the island of Crete in the Mediterranean Sea.

2. **Apis mellifera adansonii Latreille**: The West African Honey Bee

   **Distribution**.—This subspecies has a wide distribution in western Africa ranging from Niger in the north, east to Senegal, and as far south as Zaire.

3. **Apis mellifera anatoliaca Maa**: The Anatolian Honey Bee

   **Distribution**.—This race occurs throughout Turkey, bordering with *A. mellifera macedonica* in the European portion of that country. In the east, *A. mellifera anatoliaca* borders with *A. mellifera caucasia* and *A. mellifera remipes* in the area of Azerbaijan, Armenia, and Georgia and with *A. mellifera meda* in the southeastern-most regions of Turkey.

4. **Apis mellifera artemisia Engel, new name**: The Russian Steppe Honey Bee


   *Apis mellifera acervorum* Skorikov 1929b: 253. Preoccupied (nec Linnaeus 1758).

   **Etymology**.—Named for Artemis (Greek; Diana in Roman mythology), the goddess for whom the honey bee was a symbol and whose temple at Ephesus, the Artemisium, was listed by Callimachus of Cyrene and Philo of Byzantium as one of the seven wonders of the world.

   **Distribution**.—This race occurs in the central Russian Steppes.

5. **Apis mellifera capensis Eschscholtz**: The Cape Honey Bee

   **Comments**.—This subspecies is biologically distinctive for its ability to undergo parthenogenetic reproduction when deprived of a queen (Jack 1916, Anderson 1963, Ruttner 1977).

   **Distribution**.—As is indicated by the name of this race, it occurs in the Cape region of South Africa.

6. **Apis mellifera carnica Pollmann**: The Carnolian Honey Bee

   **Distribution**.—This European race occurs south of the Alps, east into northern Italy, and west into Yugoslavia and Romania.

7. **Apis mellifera caucasia Pollmann, reinstated name**: The Caucasian Honey Bee

   *Apis mellifida* [sic] variety caucasia Pollmann 1889: 90.


   **Distribution**.—This race occurs in the Caucasus Mountains. It is sometimes referred to as the "grey" Caucasian honey bee.

8. **Apis mellifera cecropia Kiesenwetter**: The Greek Honey Bee

   **Distribution**.—This race occurs throughout most of Greece and surrounding Aegean islands. It borders *A. mellifera macedonica* in the northeast regions of Greece and *A. mellifera carnica* in the northwest corner of the country.
9. *Apis mellifera cypria* Pollmann: The Cyprian Honey Bee

**Distribution.**—This race is presently known only from the island of Cyprus.

10. *Apis mellifera iberiensis* Engel, new name: The Iberian Honey Bee

*Apis mellifica intermissa iberica* Goetze 1964: 25.  
Infra-subspecific name proposed after 1960 and therefore unavailable (I.C.Z.N. 1985: Art. 1b); preoccupied (nec Skorikov 1929b).  
*Apis mellifera iberica* Ruttner 1988: 236. Corrected authorship (first available usage); preoccupied (nec Skorikov 1929b).

**Comments.**—Goetze (1964) proposed this form as a variety of the subspecies *intermissa*. Since this is a varietal name (i.e., infrasubspecific) proposed after 1960 it is unavailable and does not enter into zoological nomenclature (I.C.Z.N. 1985: Arts. 1b and 45e-g). The first correct application of this name as a subspecies was by Ruttner (1988) which thereby validates the name to that author. Unfortunately, a further complication arises as the name is a primary junior homonym of an available name proposed by Skorikov (1929b) for another type of honey bee from Azerbaijan. Since no type exists for Ruttner’s subspecies I here designate a neotype for *A. mellifera iberica*, the name of which will be replaced by *A. mellifera iberiensis*.

**Neotype.**—Worker; SPAIN: Córdoba, Andalusia, September 1986, D. Smith and R. Hagen; now with additional labels reading “*Neotype, Apis mellifera iberica* Ruttner, desig. M. S. Engel, 1999” and “*Apis mellifera iberiensis* Engel” (deposited in the Snow Entomological Collection, Natural History Museum, University of Kansas, Lawrence). Three additional workers, identical to the neotype, have also been deposited with the University of Kansas and the American Museum of Natural History, New York.

**Etymology.**—The new subspecific epithet refers to the distribution of this subspecies on the Iberian Peninsula.

**Distribution.**—This race natively occurs on the Iberian Peninsula in Europe. Colonies were transferred to the South American tropics several decades ago, prior to the introduction of *A. mellifera scutellata*, but populations never became established.

Two ecotypes of *A. mellifera iberiensis* occur in Spain as shown by Santiago et al. (1986) as well as two mitochondrial types as demonstrated by Smith et al. (1991) and Smith and Glenn (1995). The neotype selected above comes from the Córdoba populations sampled by Smith and Glenn (1995: their colony 1-1).

11. *Apis mellifera intermissa* Maa, corrected authorship: The Tellian Honey Bee

**Comments.**—As was noted in the taxonomic history of *A. mellifera*, the name *intermissa* as used by Buttel-Reepen (1906) is unavailable for the same reasons as presented for Buttel-Reepen’s name *koschevnikovi* (see Comments for *A. koschevnikovi*). The name of this subspecies was first made available by Maa (1953).

**Distribution.**—This race has a tight distribution along the northern coast of Africa as far west as Morocco, into Tunisia in the east, but bordered by the Atlas range in the south.

12. *Apis mellifera jemenitica* Ruttner, reinstated name: The Arabian or Nubian Honey Bee


**Comments.**—Ruttner (1988) synonymized *A. mellifera jemenitica* with *A. mellifera nubica* and acting as first reviser (I.C.Z.N. 1985: Art. 24) gave *jemenitica* priority over *nubica*. In addition, the name je-
menitica was unnecessarily emended from its original spelling. The correct name of this taxon should be *A. mellifera* menitica, not *yemenitica*.

No type has been designated for this race. See comments under *A. mellifera adami* for location of Ruttner's original material.

**Distribution.**—This subspecies of small bees occurs in hot arid zones of eastern Africa and the Arabian Peninsula. Countries in which it occurs include Chad, Oman, Saudi Arabia, Somalia, Sudan, and Yemen.

13. *Apis mellifera lamarckii* Cockerell: The Egyptian Honey Bee

**Distribution.**—This honey bee race occurs in a narrow range along the Egyptian Nile Valley.

14. *Apis mellifera ligustica* Spinola: The Italian Honey Bee

**Distribution.**—This subspecies occurs along the Italian Peninsula although it has been commercially transported throughout the world. The bees currently distributed in Italy have hybridized much with *A. mellifera mellifera* and *A. mellifera carnica* in the north. In fact, untainted populations of *A. mellifera ligustica* appear to be confined to Kangaroo Island, Australia where they are being maintained as an unhybridized strain (Ruttner 1976b). I recently (January 1999) had the opportunity to visit Kangaroo Island and to see one of these colonies.

15. *Apis mellifera litorea* Smith: The East African Honey Bee

**Comments.**—This name was originally proposed by Smith (1961a) but was also proposed as new by Smith (1961b). No type appears to have been designated for this subspecies.

**Distribution.**—This subspecies is distributed along the eastern coast of tropical Africa occurring from Kenya (perhaps even the southern-most portions of Somalia) south to Mozambique.

16. *Apis mellifera macedonica* Ruttner: The Macedonian Honey Bee


**Comments.**—No type has been designated for this race. See comments under *A. mellifera adami* for location of Ruttner’s original material. The name *rodopica* was proposed again as new by the same author five years later (Petrov 1996). There appears to have been no type designated for Petrov’s race either.

**Distribution.**—This subspecies occurs as far north as southern Romania, east to Yugoslavia, and south to northern Greece where it borders *A. mellifera cecropia*. In the Carpathian Mountains and in Yugoslavia it borders *A. mellifera carnica*.

17. *Apis mellifera meda* Skorikov: The Median Honey Bee

**Distribution.**—This race is most common in Iran and Iraq but does range into southeastern Turkey and northern Syria.

18. *Apis mellifera mellifera* Linnaeus: The Western or European Honey Bee

**Distribution.**—This subspecies originally ranged throughout central Europe north of the Alps, as far south as southern France in the west, southern Sweden in the north, central Russia in the east, and on the British Isles. In the Ukraine there is a transition over the steppe region to *A. mellifera sossimai*.

19. *Apis mellifera monticola* Smith: The East African Mountain Honey Bee

**Comments.**—The name was first proposed by Smith (1961a) but was designated as new a second time in Smith (1961b). No type appears to have been designated for this subspecies.

**Distribution.**—This race occurs within the mountains of eastern Africa (e.g., in
Kenya and Tanzania). The occurrence of *A. mellifera monticola* in the mountains of Cameroon should be checked carefully.

20. *Apis mellifera remipes* Gerstäcker, reinstated name: The Yellow Armenian Honey Bee

*Apis remipes* Gerstäcker 1862: 61.
*Apis mellifera armeniaca* Skorikov 1929b: 254.

Comments.—The name *armeniaca* was subjectively chosen by Ruttner (1988: 192) over *remipes*. This decision is invalid because *remipes* has priority and the senior synonym must be recognized as the name for the subspecies.

Distribution.—This race occurs in Armenia and may be the same as *A. mellifera anatoliaca*, in which case Gerstäcker’s name has priority for the subspecies.

21. *Apis mellifera ruttneri* Sheppard, Arias, Grech, and Meixner: The Maltese Honey Bee

Comments.—No type was originally designated for the subspecies but this is here corrected by the original authors thereby stabilizing the name of this taxon.

Lectotype.—Worker; MALTA: St. Julians, 10 August 1995, W. S. Sheppard; designation of W. S. Sheppard, M. C. Arias, A. Grech, and M. D. Meixner. The lectotype now bears a label indicating it as such and is deposited in the M. T. James Entomological Museum, Washington State University.

Paralectotypes.—Nine workers; same collection data as lectotype; deposited in the same collection as the lectotype. A further two paralectotype workers are deposited in the American Museum of Natural History, New York. All paralectotypes designated by W. S. Sheppard, M. C. Arias, A. Grech, and M. D. Meixner.

Distribution.—This race is only distributed on the island of Malta in the Mediterranean Sea.

22. *Apis mellifera sahariensis* Baldensperger: The Saharan Honey Bee

Comments.—Ruttner (1988) attributed this name to Baldensperger (1923). He has, however, unfortunately confused recognition of the subspecific entity with taxonomic proposal of the subspecies. Although Baldensperger (1923) notes the distinctive character of the Saharan honey bees he does not provide a latinized name for them (in fact, nowhere in his work does he even mention the name *Apis*, let alone *sahariensis*). Instead Baldensperger (1923) only uses the vernacular name “l’abeille saharienne”. Thus, as far as I have been able to determine, the name is first made taxonomically available by Baldensperger in his later paper (1932) where he uses the latinized name and provides a diagnosis.

This is one of the races for which I know that no type was ever designated; however I have not been able to confirm whether any material survives of Baldensperger’s original colony which he brought back to France. I have therefore hesitated to designate a neotype. This race is markedly lighter in coloration, particularly on T1-3, than the more common *A. mellifera intermissa* (which has a noticeably shiny, dark brown to black integument with more sparse pubescence). See Ruttner (1988) for further descriptive details. It is possible that this race is synonymous with *A. mellifera lamarckii* in which case the name *lamarckii* has priority for the subspecies. This possibility should be closely examined in the future.

Distribution.—This race, like *A. mellifera intermissa*, has a tight range in northwestern Africa. It occurs along the southern side of the Atlas range.

23. *Apis mellifera scutellata* Lepeletier de Saint Fargeau: The African Honey Bee

Comments.—This is the race introduced into Brazil in the 1950’s which has capti-
vated the apicultural world as well the imagination of the public; popularly
known as the "Africanized Honey Bee" or "Killer Bee". An account of the transport
of African bees to Brazil and their accidental release is given by Kerr (1957, 1967: see
also Michener 1975, Spivak et al. 1991, Taylor 1977, 1985 for information on the
introduction, spread, and effect of this race in the western hemisphere and for di-
rection to other literature sources).

Distribution.—This subspecies also has a
large distribution in Africa and ranges
from South Africa northward along the
eastern half of the continent to about So-
malia, it apparently does not occur along
the eastern coastal plain where *A. mellifera
litorea* is found.

24. *Apis mellifera siciliana* Grassi,
reinstated name: The Sicilian Honey Bee

*Apis siciliana* Grassi 1881: 1.
*Apis mellifera mellifera* variety *siciliana* Buttel-

Comments.—Ruttner's (1988) arbitrary
choice of the epithet *sicula* over *siciliana* for
the Sicilian race of honey bees does not
meet the criterion of priority and thus the
name *siciliana* must be reinstated for this
morph.

Distribution.—This subspecies occurs on
the island of Sicily in the Mediterranean Sea.

25. *Apis mellifera sossimai* Engel, new
name: The Ukrainian Honey Bee

*Apis cerifera* Gerstäcker 1862: 60. Preoccupied
(nec Scopoli 1770).

Etymology.—The new specific epithet is
derived from St. Sossima, patron saint of
beekeeping in the Ukraine. St. Sossima
may be a Christian version of the bee-god
Zosim of some early pagan tribes of Rus-
sia.

Distribution.—This race occurs along the
eastern borders of *A. mellifera carnica*'s
range. It occurs mostly in the Ukraine and
easterly over to the northern regions of the
Caucasus Mountains where it borders *A.
mellifera caucasia*. South in the Crimea it is
replaced by *A. mellifera taurica*.

26. *Apis mellifera syriaca* Skorikov,
corrected authorship: The Syrian Honey Bee

Comments.—As was noted in the taxo-
nomic history of *A. mellifera*, the name *syri-
aca* as used by Buttel-Reepen (1906) is un-
available for the same reasons as present-
ed for Buttel-Reepen's name *koschevnikovi*
(see Comments for *A. koschevnikovi*). The
name of this subspecies was first made
available by Skorikov (1929b).

Distribution.—*Apis mellifera syriaca* oc-
curs along the eastern shores of the Med-
iterranean Sea; north from Syria to the Ne-
gev Desert in the south. It is sometimes
known as the Palestine honey bee.

27. *Apis mellifera taurica* Alpatov: The
Crimean Honey Bee

Distribution.—This race occurs along the
north-central shores of the Black Sea; in
the Crimea.

28. *Apis mellifera unicolor* Latreille: The
Malagasy Honey Bee

Distribution.—The distribution of this
race in Madagascar is discussed by Brooks
and Michener (1988).

*Apis (Megapis) dorsata* Fabricius

Some authors prefer to recognize one or
more of the *A. dorsata* races as distinct spe-
cies. This is most often done with *A. dor-
sata laboriosa* followed by *A. dorsata brevi-
ligula* and to a much lesser degree with *A.
dorsata binghami*.

1. *Apis dorsata binghami* Cockerell: The
Giant Sulawesi Honey Bee

Distribution.—This race of giant honey
bees occurs on the island of Sulawesi.
2. *Apis dorsata breviligula* (Maa): The Giant Philippine Honey Bee

*Comments.*—Since Maa (1953) originally proposed the name *breviligula* in the genus *Megapis* his name should be written in parentheses (I.C.Z.N. 1985: Art. 51c).

*Distribution.*—This morph of giant honey bees occurs in the Philippines. The species status of this race is often argued based on nest site characteristics as reported by Morse and Laigo (1969; as *A. dorsata*) and Starr et al. (1987).

3. *Apis dorsata dorsata* Fabricius: The Common Giant Honey Bee

*Distribution.*—This subspecies has the largest distribution of the group; ranging from India, east to the coast of Vietnam, and into the southeast Asian islands where it is sometimes replaced by other subspecies (see accounts for *binghami* and *breviligula*).

4. *Apis dorsata laboriosa* Smith: The Giant Himalayan Honey Bee

*Comments.*—I currently do not recognize the subspecific form *laboriosa* as a separate species (see also Engel 1998a; but see Sakagami *et al.* 1980, Roubik *et al.* 1985, McEvoy and Underwood 1988, Underwood 1990a, b). Growing evidence, however, suggests that the distinction may be valid and my decision to place *laboriosa* within *dorsata* should be examined more closely. Sakagami *et al.* (1980) provided a detailed account of the morphology of *laboriosa* versus typical *dorsata*. Many of the characters they use to justify specific status are, however, quite variable (e.g., protuberance of the ocelli, general pubescence patterns, &c.) and across a large range of specimens blend naturally into one another except some measures of body size which I presently feel are more indicative of a subspecies rather than of a separate species. One character which appears to me to be somewhat reliable is the minute, broad medioapical extension of the grad-

ulus on S3 in *dorsata* while this is completely absent in *laboriosa*.

*Distribution.*—This subspecies is distributed at high altitudes (1,200 to 4,000 m) on the slopes of the mountains from northernmost India to the northernmost boundary of Laos. Further details of its distribution are provided by Otis (1996).

**FOSSIL HONEY BEES**

More paleontological work has focused on the honey bees than on any other group of bees. Recently I have treated some of these extinct species and attempted to place them into a phylogenetic framework with the living species (Engel 1998a: Fig. 1). Petrov (1992, 1997) also discussed *Apis* evolution with reference to the fossil record, in particular focusing on the origin of the Bulgarian honey bee (*A. mellifera rodopica = A. mellifera macedonica* in my system). Hong (1984) described a compression fossil from the Early Cretaceous of China as the oldest fossil bee and as a relative of *Apis*. Hong’s *Palaeapis beiziansis* is in actuality a speciﬁc wasp (Michener 1997, Engel 1998a) and has no bearing on apine evolution. Lastly, Nel *et al.* (1999) presented a small review of fossil *Apis* specimens but overlooked the species presented by myself, recent treatments of Apini (e.g., Michener 1990), as well as the numerous synonymies within the group, instead simply regurgitating the classiﬁcation of Zeuner and Manning (1976) which is fraught with errors (e.g., refer to Engel 1998a). Nel *et al.* (op. cit.) have also followed Zeuner and Manning (1976) and other authors in over splitting “species” of honey bees based on minor morphometric differences in wing venation and size (e.g., their unnamed species A-J: Nel *et al.* 1999); characters which distinguish mere subspecies in *Apis* at best. These authors concluded (p. 31) that the fossil honey bees could not be studied from a phylogenetic perspective; however, such an attempt had already been successfully undertaken at least three times previously (e.g., Buttel-
Reepen 1906, Statz 1931, Engel 1998a). I am presently involved in a monographic study of the fossil bees, particularly those from Baltic amber, and cladistic analyses have been successfully completed for the living and fossil corbiculate bees, including Apini (Engel 1998b, in prep.).

In order to maintain the monophyly of the generally recognized subgenera (recent and fossil) it seems appropriate to propose two new subgenera thereby breaking up the paraphyletic subgenus Synapis. One of these new groups was called Hauffapis by Armbruster (1938), but he failed to designate a type species for the genus, thereby making this name unavailable according to the I.C.Z.N. (1985: Art. 13c) (see also discussions in Michener 1990, 1997). None of the fossil species belongs to the living subgenera Apis, Megapis, or Micrapis.

Subgenus Cassapis Engel, new subgenus


Type species.—Apis armbrusteri Zeuner 1931.

Diagnosis.—WORKER: Basal vein gently curved, strongly distad cu-a (similar to Fig. 4). Angle of posteroapical margin of first submarginal cell greater than 45°. Distal abscissa of vein M in hind wing present (similar to Fig. 5). Drone, mature larva, queen, and ethology all unknown.

Etymology.—The new genus-group name is a combination of cascus (L. old) and apis (L. bee).

Comments.—The subsequent designation of Hauffapis scheuthlei by Zeuner and Manning (1976) as the type species was in the synonymy of Hauffapis with Apis and is therefore invalid (I.C.Z.N. 1985: Art. 11c) (see also Michener 1990).

Apis (Cassapis) armbrusteri Zeuner

Armbruster’s Honey Bee


Comments.—The species and subspecies of Hauffapis proposed by Armbruster (op. cit.) were all described from the Miocene of Randecker Maar and were based on minor wing variations. None of these variations justifies subspecific status even under the extreme criteria used for splitting morphs of extant species (e.g., A. mellifera). The species is presently known from the Miocene of Germany.

Subgenus Synapis Cockerell


Diagnosis.—WORKER: Basal vein gently curved, only slightly distad cu-a (Fig. 6). Angle of posteroapical margin of first submarginal cell greater than 45°. Distal abscissa of vein M in hind wing present (as in Fig. 5). Drone, mature larva, queen, and ethology all unknown.

Apis (Synapis) henshawi Cockerell

Henshaw’s Honey Bee

Synapis kaschkei Statz 1931: 50.  
Apis henshawi kaschkei (Statz); Zeuner and Manning 1976: 243.  

Comments.—This species is perhaps the most famous of the fossil honey bees. The type was redescribed and new synonymies presented by Engel (1998a). This species is from the Oligocene of Europe (in Germany, France, and Spain).

Apis (Synapis) longtibia Zhang  
The Long-legged Honey Bee  
Apis longtibia Zhang 1990: 85.  

Comments.—Engel (1998a) gave some characters to support the recognition of this species, although far much work remains to be done on the fossil honey bees of Asia. This fossil is from the Miocene of Shandong Province, China.

Apis (Synapis) miocenica Hong  
The Chinese Miocene Honey Bee  
Apis miocenica Hong 1983: 10.  

Comments.—This species was briefly treated by Engel (1998a) and reasons for the synonymy of A. fotia and A. shandongica were given. The species is from the Miocene of Shandong Province, China.

Apis (Synapis) petrefacta (Říha)  
The Petrified Honey Bee  
Apis petrefacta (Říha); Engel 1998a: 275.  

Comments.—A fossil form from Miocene strata of the České Stredhorší Mountains of the Czech Republic.

Subgenus Priorapis Engel, new subgenus  

Type species.—Apis vetusta Engel 1998a.  

Diagnosis.—WORKER: Basal vein straight, confluent with cu-a. Angle of posteroapical margin of first submarginal cell greater than 45°. Distal abscissa of vein M in hind wing present. Drone, mature larva, queen, and ethology all unknown.  

Etymology.—The new subgeneric name is derived from prior (L. earlier) and apis (L. bee).  

Apis (Priorapis) vetusta Engel, emended name  
The Aged Honey Bee  

Comments.—Through a lapse on my part I failed to adjust the gender of the specific epithet to match that of the genus (which is feminine). I here correct this error. The species occurred in the Oligocene of Germany.

NOMINA DUBIA AND UNASSOCIATED NOMINA NUDA  

Apis aenigmatica Rayment, nomen dubium  

Apis aenigmaticus Rayment 1925: 67.  

Comments.—As pointed out by Cardale (1993), this name was based on the drawing of a comb and anecdotal reports of the insect in the absence of any specimens. Rayment (1935) gives another lively account of this elusive “species” which still had not been found at that time (nor has it been found since). See also discussion in Michener (1965: 232).

Apis catanensis Roussy, nomen dubium  

Apis catanensis Roussy 1960: 8.  

Apis catanensis avolii Roussy 1960: 8.  

Comments.—Judging from the original
description, which is exceedingly incomplete, this may not be a honey bee at all. The subspecific name *avolii* is unnecessary and invalid since no subspecific forms were recognized; besides, any subspecies based on the type specimen would have to take the nominate specific epithet and would therefore become *A. catanensis catanensis*, with *A. catanensis avolii* being an invalid synonym. This is reportedly a fossil species from Miocene Sicilian amber.

**Apis melisuga Zeuner and Manning, nomen dubium**


Comments.—The original proposal of this epithet by the great paleontologist Anton Handlirsch (1907) was not in accord with the principles of zoological nomenclature and is therefore unavailable under Article 11h (iii) (I.C.Z.N. 1985). Zeuner and Manning (1976) made the name available through their monograph by publishing this name is combination with a genus-group name and a diagnosis; although these authors attributed the name to Handlirsch. Neither Prof. Zeuner nor Dr. Manning had seen the type and their diagnosis of the species was a mere regurgitation of Handlirsch’s original descriptive comments that the specimen resembled *A. mellifera*. In the absence of the type (which is presumably lost) and any real character information it is impossible to confidently place this as a species of *Apis*. The specimen was reportedly from the Miocene of Italy. Refer to Engel (1998a) for a more thorough treatment of this name.

**Apis postadamatica** Buttel-Reepen, nomen nudum

*Apis postadamatica* Buttel-Reepen 1906: 163.

Comments.—Buttel-Reepen (op. cit.) considered this as the hypothetical direct ancestor of *A. mellifera* and postulated its occurrence in the Pliocene. No specimen for this species exists, and it was a mere hypothesis of Buttel-Reepen’s that this species existed and would someday be discovered. The fact that this name is for a hypothetical taxon means that it is also excluded from zoological nomenclature (I.C.Z.N. 1985: Art. 1b).

**Apis styriaca** Pongrácz, nomen nudum

*Apis styriaca* Pongrácz 1931: 105.

Comments.—A supposed fossil species from the Miocene of Germany represented by a wing fragment. No description or figure was provided and the whereabouts of this material is unknown.

**Apis trigona** Rayment, nomen nudum


Comments.—The decision to place this as a nomen nudum was made by Cardale (1993) and is followed here.

**HONEY BEE VERSUS HONEYBEE**

In closing I should like to make a brief comment on common names for this group of bees. The great arthropod morphologist Robert E. Snodgrass presented a short discussion on the common name for honey bees in the preface to his work concerning the anatomy of *A. mellifera* (Snodgrass 1956). His brief discussion advocating the use of the two word common name (honey bee) over a single word (honeybee) does not appear to have been widely accepted since apiculturists still commonly use “honeybee.” Although there are no absolute rules for the use of this and other common names, I agree with Snodgrass’ preference for a two word name and the logic by which he justified this position. Since I cannot hope to word his position more eloquently, I quote here his short argument: “Regardless of dictionaries, we have in entomology a rule for insect common names that can be followed. It says: If the insect is what the
name implies, write the two words separately; otherwise run them together. Thus we have such names as *house fly*, *blow fly*, and *robber fly* contrasted with *dragonfly*, *caddisfly*, and *butterfly*, because the later are not flies, just as an *aphid* is not a lion and a *silverfish* is not a fish. The honey bee is an insect and is preeminently a bee; ‘honeybee’ is equivalent to ‘Johnsmith.’”

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This work is dedicated in memory of Prof. Dr. Friedrich Ruttner (1914–1998), leading authority on *Apis* classification who did much to clarify honey bee systematics (as well as contributing enormously to many other fields of apiculture). A lovely account celebrating Prof. Ruttner’s life was given by Koeniger (1998).

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