

A guide to some bees and wasps of Indonesia

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ABSTRACT

This paper describes a handful of bee and wasp species of Indonesia that are likely distinct enough to be identified by non-specialists. For kinds that are not identified, I suggest information you might include in a dictionary entry in order to move beyond simply glossing 'a kind of bee' or 'a kind of wasp.'

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VERSION HISTORY

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Introduction

Okay, so you've just held a Dictionary Development Workshop and have come up with a dozen or more local terms for bees and wasps. Now what? Here's a guide which can help you sort through your muss.

First of all, let's be clear on the difference between bees and wasps. Bees and wasps are closely related. The main difference is that bees are adapted for nurturing their brood on nectar and pollen. So bees go around visiting flowers.¹ Another tip-off is that bees tend to be hairy, as those hairs help them in collecting pollen. On the other hand, if you see a buzzing 'bee,' and its body appears completely smooth, it is very likely a wasp.² Wasps feed on prey, mostly other insects (including other wasps), spiders, or other arthropods. Most species of wasps are parasitic, laying their eggs on a host.³ Females have an ovipositor at the end of their abdomen, used for injecting the egg into the host. In some (but only a minor number of) wasp species, this has developed into a stinger used to inject poison.

As far as I can tell, the Indonesian term *lebah* corresponds well to 'bee,' and *tabuhan* (and its variant *tebuan*) to 'wasp.' Indonesian *penyengat* is sometimes used synonymously with *tabuhan*, but can also be used more generally as a cover term for any stinging bee or wasp. The term *tawon* is used synonymously with *lebah*, but is perhaps regionalized to Sumatra.⁴ Some very small bees or wasps may fall under the category of *agas*.

Because of the myriad kinds of bees and wasps that are out there, identification—beyond the distinctive types listed below—is best left to entomologists. However, in the conclusion to this article, I suggest information you might include in a dictionary entry in order to move beyond simply glossing 'a kind of bee' or 'a kind of wasp.'

¹ Not every flower-visiting insect will be a bee, however, as some adult wasps feed themselves (but not their young) on nectar. There is even one subfamily of wasps (Masarinae), known as pollen wasps, which are unusual in that they actually provision their young with pollen. The pollen is carried in the crop, rather than on the body, and regurgitated at the nest.

² As with almost all the 'generalizations' in this article, this one also has exceptions. Some bees are cleptoparasitic, that is, they lay their eggs in places provisioned by other bees. Cleptoparasitic bees, not needing to collect pollen, may be relatively hairless.

³ As with some bees, some wasps are cleptoparasitic. See the preceding footnote.

⁴ Curiously, Indonesian *tawon* 'bee' is borrowed from Javanese, in which language it means 'wasp.' Both *tawon* and *tabuhan* trace back to a Proto-Malayo-Polynesian term reconstructed as *tabuq-an 'wasp.'

Honey bees

I begin with honey bees,⁵ because these well-known bees are an easy entry point for the lexicographer. All honey bees belong to the genus *Apis*. (As emerges below, however, not all bees which produce honey are honey bees.)

As late as the 1950s, specialists counted as many as eighteen honey bee species worldwide (Maa 1953).⁶ In the second half of the twentieth century, this list was reduced to only four species: the common honey bee (*Apis mellifera*), the oriental honey bee (*Apis cerana*), the giant honey bee (*Apis dorsata*), and the dwarf honey bee (*Apis florea*). Within the past twenty years, entomologists realized that they had oversimplified, and that the oriental honey bee actually comprised four species, and the giant and dwarf honey bees two species each. In order to set the record straight, here then are the nine currently recognized (in some cases re-recognized) species of honey bees in their natural groupings. Brief descriptions follow.

closed-cavity honey bees – nest is built in a closed space (rock crevice, hollow tree, etc., or man-made hive), and contains a series of parallel combs:

Apis mellifera (Linnaeus 1758)

Apis cerana (Fabricius 1793) (subspecies: *cerana*, *indica*, *japonica*, *himalaya*)

Apis koschevnikovi (Buttel-Reepen 1906)

Apis nuluensis (Tingek, Koeniger & Koeniger 1996)

Apis nigrocincta (Smith 1861)

dwarf honey bees – nest consists of a small, single comb built in the open on a slender branch (subgenus *Micrapis*):

Apis (Micrapis) florea (Fabricius 1787)

Apis (Micrapis) andreniformis (Smith 1858)

giant honey bees – nest is built in the open on the underside of overhanging rocks or tree branches, and consists of a large, single comb (subgenus *Megapis*):

Apis (Megapis) dorsata (Fabricius 1793)

Apis (Megapis) laboriosa (Smith 1871)

Apis mellifera – *European honey bee, African honey bee, common honey bee – lebah madu* – The best known and most widely distributed honey bee species worldwide is *Apis mellifera*, the so-called common honey bee. It is thought that people first started keeping hives of *Apis mellifera* in ancient Egypt, and from there the practice spread to Europe and

⁵ In this article I follow my (entomological and bee journal) sources in writing ‘honey bee’ with a space in between. Writing it without a space is also acceptable.

⁶ For a helpful chart comparing people’s thoughts on the classification of honey bees up until Maa (1953), see particularly Hadisoesilo (1997:155).

to the rest of the world. The more aggressive, so-called Africanized honey bees are a subspecies of *Apis mellifera*.

Apis mellifera has been introduced on a small scale into Indonesia, where it is generally considered a better honey producer than the native *Apis cerana*, and has the added benefit that colonies are less likely to abscond, that is, abandon their man-made hive in search of a new home. However, efforts to introduce *Apis mellifera* have been hampered in recent decades, particularly by the spread of mites and diseases from other honey bee species. The Apiservices website (<http://www.beekeeping.com/>) estimates there may be 1,000 hives of *Apis mellifera* in Indonesia. Even if this estimate is off by several factors, it is still relatively minor, compare this figure to an estimated three *million* hives in the U.S.

Apis cerana – *Asian honey bee, oriental hive bee – lebah lokal, lebah lalat* – (disused synonym *Apis indica*) – The native range of this bee is from Afghanistan to Japan and southward into Indonesia, and it has recently been introduced into New Guinea. It is variable in size throughout its range, but in the tropics it tends to be smaller in size (with smaller colonies) than *Apis mellifera*. *Apis cerana* is the most widely domesticated (*diternakkan*) honey bee in Indonesia. All *Apis cerana* in Indonesia belong to the subspecies *Apis cerana indica*.

Apis koschevnikovi – *red honey bee, Borneo honey bee – lebah merah* – (disused synonym: *Apis vechti*) – This bee is so named because of a reddish hue which the bees have when clustering. Its original range was restricted to Sabah, but it has recently been introduced for commercial purposes into Sumatra and Kalimantan.

Apis nuluensis – *mountain honey bee – lebah gunung* – This bee is known only from the highlands of Sarawak, Malaysia, at elevations exceeding 1700 m (Tingek, Koeniger & Koeniger 1996, reported in Hadisoesilo 1997:79) but it could possibly also be found in Kalimantan. Because of its remote mountain habitat, this species is probably not important to lexicographers.

Apis nigrocincta – *Sulawesi honey bee, Philippine honey bee – lebah lokal Sulawesi* – This bee is found only on Sulawesi and on Mindanao island in the Philippines. For the layman, the most notable characteristic of this bee is that it has a yellow femur—the long section of its hind leg closest to its body—versus the brown-black femur in *Apis cerana*. In addition, *Apis nigrocincta* is also said to have a more yellowish face. Entomologists believe that *Apis nigrocincta* predominates throughout Sulawesi, with *Apis cerana* restricted to the Palu valley and the extreme southwestern part of South Sulawesi (both of these areas have prominent dry seasons). The Palolo valley above Palu is a zone of overlap where both species are present.

Apis florea – *dwarf honey bee – lebah kerdil* – As with most other honey bee species, this bee is thought to have originated in Southeast Asia. It is found from Oman to Indonesia, but it is not found on Sulawesi or further east. It builds single comb nests in the open (though often ‘hidden’ in dense foliage), usually suspended from a slender branch. An

entire nest may be no larger than a man's hand, and covered three or four layers deep in bees. Honey from this bee is of little commercial importance beyond a very local level.

Apis andreniformis – *small / dwarf honey bee – lebah kecil / kerdil* – This species is very similar to *Apis florea* in appearance and habit. It is restricted to mainland SE Asia (Thailand, Malaysia and southern China peninsula), Sumatra and Borneo.

Apis dorsata – *giant honey bee – lebah hutan, lebah tualang* – As its English name suggests, this bee is larger than the common honey bee. These bees build single-comb nests in protected places under overhanging rocks or tree branches. Because of its nesting habit it is never kept in hives, but people either harvest its honey from the wild or—in a practice called ‘raftering’ or ‘rafter beekeeping’—hang out specially carved pieces of wood in hopes of attracting colonies of this bee. In parts of Central Sulawesi, this man-made nest support (‘honey board’ or ‘bee rafter’) is called a *tingku*; in parts of Kalimantan *tikung*; and in the Belitung and Bangka islands *sunggau* (de Jong 2000, Hadisoelilo 2002). Colonies migrate seasonally (hence the name *lebah tualang*) to take advantage of honey flows at different elevations, but usually return to the same nesting sites, sometimes forming dense aggregations where a single large tree may host over a hundred colonies. In Indonesia, *Apis dorsata* is the most aggressive of the honey bees in defending its nest.

Apis dorsata is widely distributed across Indonesia west of the Wallace line. The subspecies *Apis dorsata binghami* is found in Sulawesi,⁷ the subspecies *Apis dorsata dorsata* occurs elsewhere in Indonesia.

Apis laboriosa – This is the largest of all honey bees, found only in the high Himalayas. It is similar to *Apis dorsata*, and in fact at one time was considered a subspecies thereof.

Some other honey bee terms, for which you may find equivalents in the local language, include:

honey – *madu lebah* or simply *madu*, also *air lebah*, *manisan lebah*

honeycomb, comb honey, honey which is still in the comb – *madu bersarang*

beeswax – *lilin lebah*

brood (larvae and pupae), in some locales considered edible⁸ – *lebah muda*

propolis, a kind of sticky resin colloquially called ‘bee glue’ – *propolis*, *getah lebah*

pollen, also ‘bee bread’ – *serbuk sari*, *roti lebah*

⁷ Some people believe that the giant honey bee on Sulawesi also deserves to be recognized as a separate species (*Apis binghami*), but this has yet to be (re-)established.

⁸ But generally not among Muslims, for whom ants, bees and flies are *ḥarām* (forbidden). One preparation method is to wrap brood comb in leaves and roast it (Bodenheimer 1951:235–236).

royal jelly, a milky-white substance fed to worker larvae, and in greater quantities to queen larvae – *susu lebah, jeli raja*

queen bee – *lebah ratu*

drones (male bees) – *lebah pejantan, lebah jantan*

worker bees – *lebah pekerja*

Honey bees may swarm (*mengerumuni*, stem *kerumun*) a perceived attacker. When worker bees leave a hive with the existing queen to look for a new home (as a way of propagating colonies), in English this is also called swarming, but in Indonesian is called *meroyak, meruyak*. Such a swarm will eventually come to rest and may be found clustered in the open, *lebah bergantung*. In any case, a swarm of bees can be called a *kawanan, sekawan* or simply a *sekelompok lebah*. Indonesian *sarang* is a general word covering English ‘comb,’ ‘nest’ and ‘hive.’ For an established hive or colony of honey bees, often the English word is simply transliterated: *koloni*.

Stingless bees (meliponids, meliponid bees)

Whilst stingless bees (also known as meliponid bees) are diverse in size and appearance, they can be identified by a process of elimination. First, in the entire world there are only four kinds of bees with well developed pollen sacs on the ends of their hind legs, the so-called corbiculate bees: (a) honey bees; (b) bumblebees; (c) orchid bees; and (d) stingless bees. Second, all the species of honey bees have been described above; bumblebees are distinguished by their large size and furthermore are limited to high elevations in Sumatra and Java (see below); while orchid bees are strictly New World species, which don’t occur at all in Indonesia. So, if you see a bee with a pollen sac, and it’s not a honey bee or a bumblebee, it must be a stingless bee!

Most of the hundreds of species of stingless bees found worldwide are solitary (each female building its own nest). The better known stingless bees, however, are social, building colonies of up to several thousand members and even making a kind of harvestable honey. The honey is not stored in the kind of honeycomb we are used to, with regular six-sided cells, but rather in clusters of small, egg-shaped wax ‘honey pots.’ Because of the small size of these bees, the yield of honey per colony is never very great.

As the name suggests, stingless bees lack stingers (to be precise, they have atrophied, unusable stingers which are not visible to the naked eye). To make up for this lack, they are experts at making well-protected nests, first of all choosing locations which have narrow openings, and then cementing up that opening with a thick wall which may consist of mud, stone, propolis and/or wax until only a very narrow entrance remains. Their second defense is to swarm and bite, but their bites seldom penetrate human skin. Third, they may flee; a colony may abandon a disturbed nest, sometimes within a few hours.

Stingless bees all belong to the tribe Meliponini, and the ones in Indonesia known for making honey belong either to the genus *Melipona* or *Trigona*. The *largest* stingless bees are about the size of the *smallest* honey bees (*Apis florea* and *Apis andreniformis*). In Indonesia, stingless bees are colored either brown, black, orange, or a combination of black and orange.

In Indonesian, stingless bees can be called *lebah tanpa sengat*, a direct calque from the English. Apart from that, Wilkinson (1959:s.v.) and *Kamus Besar* 2nd ed. support names for two particular species (whether these terms also have a more general use is unknown to me):

lebah lilin *Trigona iridipennis*
kelulut *Melipona minuta*

The material with which *M. minuta* bees seal up crevices is called *gala-gala*, a term which in Minangkabau Malay is applied to the bees themselves (Wilkinson 1959:s.v.).⁹

Sweat bees (halictids, halictid bees)

Sweat bees are so named because of their (seeming) attraction to human sweat. If you grew up in Europe or America, you are probably already familiar with sweat bees. However, whilst common throughout most of the world, sweat bees are only a ‘minor faunistic element’ in Southeast Asia and Australia. Because of their potential confusion with stingless bees (which can also be attracted to sweat), here is a novice’s quick guide to the most prominent differences:

stingless bees (tribe Meliponini)	sweat bees (family Halictidae)
cannot sting (lacks stinger), but can bite	can sting if provoked (but usually sting is only mildly irritating)
usually with pollen sacs on the lower hind leg	without pollen sacs on the lower hind leg
brown, black, orange, or combination of orange and black	generally black with metallic colors (e.g. metallic green), some may have yellow bands
some species known for making honey	do not make honey
??	leading edge (and basal vein) of forewing is arched

⁹ In Malaysian, *kelulut* refers instead to the lac insect, *Kerria lacca*, which is not a bee but rather a kind of scale insect which was formerly commercially cultivated throughout much of Asia for its resinous secretions (called lac) that were collected and processed into dye and shellac.

Most sweat bees are solitary, though in a few species they are communal (females nest together, but tend their own eggs). Nests are located in the ground or in rotting wood.

That much said, it will probably remain beyond the ability of most of us to distinguish sweat bees from *other* types of small bees which are out there. Therefore I suggest that even for specimens which meet all of the above criteria for sweat bees, you still define it as ‘a kind of small bee, possibly a sweat bee...’ (or even omit the ‘possibly a sweat bee’ part).

Carpenter bees

In Indonesia the carpenter bees are represented by two genera, which—though similar in a number of respects—are easily distinguished by size. Large carpenter bees (genus *Xylocopa*) are two centimeters or more in length, while small carpenter bees (genus *Ceratina*) are always less than one centimeter.

Large carpenter bees somewhat resemble bumblebees, but are distinguished in having relatively shiny abdomens (in bumblebees, the abdomen is completely covered with hair). They nest in dry wood, including beams or wood of houses, and are more likely to be noticed than their smaller cousins. Large carpenter bees are usually solitary, though in some species mother and daughters cohabit, and individuals may build nests in close proximity to each other.

Small carpenter bees are black, blue, or bluish-green, and often have whitish markings on the face and/or legs, and may not be recognized as ‘belonging with’ their larger cousins—and in fact may be more difficult to distinguish from other types of bees. Small carpenter bees are usually found nesting in plant pith or broken off plant twigs or stems.

Where I grew up in West Virginia, people like to say that carpenter bees don’t sting. I was never brave enough to test this out for myself, but it turns out there is a grain of truth in the matter. Male carpenter bees, which guard the hive and are likely to come buzzing at you if you get too close, cannot sting (their abdomens are outfitted for a different purpose). However, female carpenter bees, which do not guard the hive, *do* have a stinger and can sting in self-defense.

In Indonesian, carpenter bees are called *lebah pelubang kayu*, or simply *lebah kayu*. Where there is a need to distinguish, large carpenter bees can be called *lebah kayu besar*, and small carpenter bees *lebah kayu kecil*.

Bumblebees

Bumblebees are bees primarily of northern temperate climates. Only a handful of bumblebee species are found at high elevations (> 1500 m) in Sumatra and Java, and none at all in Sulawesi or anywhere else east of the Wallace line. Terms for ‘bumblebee’ which I have encountered in the Indonesian context are *lebah besar*, *lebah gendut* and *bangrara*,

but I have not been able to confirm any of these in the Indonesian dictionaries available to me.

All bumblebees belong to the genus *Bombus*. Species are identified by color pattern and/or by morphology of the male genitalia. Both methods are well supported at the website “Bombus: Bumblebees of the World,” maintained by the Natural History Museum in London (<http://www.nhm.ac.uk/research-curation/projects/bombus/>).

Leaf-cutter bees and mason bees (megachilids, megachilid bees)

The megachilids (family Megachilidae) are a family of industrious bees, which include:

leaf-cutter bees (genera *Trachusa*, most *Megachile*, some *Hoplitis*), which are known for their handiwork of cutting crisp-edged circles and ovals out of leaves, with which they line their nests;

mason bees (genus *Osmia*), which line their nests with mud, chewed up leaves or other material;

carder bees, so named because they line their nests with animal hair or plant fibers.

In most cases these bees do not excavate their own nests, but use existing holes (e.g. made by other insects) or the hollow stems of certain plants. All megachilids are solitary bees, and do not form colonies.

Besides their nest construction, megachilids can also be recognized by size: in Indonesia megachilids are the size of honey bees or larger. In fact the largest bee in the world, *Megachile pluto*—the so-called ‘Indonesian resin bee’ discovered by Alfred Wallace—is a megachilid known only from the island of Bacan in the Moluccas. Despite its size, it lives relatively inconspicuously, making its nest inside of active termite mounds.

Finally, megachilids also lack pollen sacs and carry pollen on the underside of their abdomens rather than their hind legs. The pollen-carrying spots (called scopae) are often brightly colored, leading to the colloquial name ‘jelly-belly bees.’

In recent years, some species of megachilids have come into prominence as alternative pollinators for crops such as alfalfa, oilseed rape and fruit trees.¹⁰ One of the reasons they are good pollinators is that they are actually inefficient pollen collectors, requiring up to ten times more visits to flowers than their honey bee cousins to supply their brood. A useful starting place to learn about pollinators for crops—including tropical plants such as

¹⁰ My parents, who have several apple trees on their property in West Virginia, tried attracting orchard bees (*Osmia lignaria*) by hanging out pieces of wood, each with dozens of pencil thin holes drilled through their length. They must have been successful in attracting some bee or insect, because later the boards became riddled with woodpecker holes! In general, above-ground nesters are easier to manage than those which make their nests below ground.

avocado, coffee, durian, rambutan and vanilla—is McGregor’s *Insect Pollination of Cultivated Crop Plants* (originally published 1976, and currently maintained by the United States Department of Agriculture as a virtual resource, <http://gears.tucson.ars.ag.gov/book/index.html>).

As in English, so also in Indonesian there is no cover term for megachilid bees, and perhaps a transliteration of the Greek would be appropriate: *lebah megacilid*.

Social wasps (hover wasps, paper wasps, hornets)

I now turn from bees to wasps. Among wasps, I treat here only a handful of types, all of which can sting, and ignore the far greater proportion of wasps without stingers.

Among wasps, the best known are the social wasps, if for no other reason than that they live in colonies which can comprise up to several hundred members, which can inflict painful stings. There are three kinds of social wasps in Indonesia, which are easily identified by *nest architecture*.

hover wasps – (subfamily Stenogastrinae, from Greek *steno* ‘narrow’ and *gastēr* ‘stomach,’ also known as stenogastrine wasps) – Hover wasps are small- to medium-sized with very thin waists.¹¹ All species are ‘primitively’ social (colonies have only a few members), and build delicate, single-comb nests in unobtrusive locations out of mud or mud mixed with plant fibers. They have only a mild sting, and are non-aggressive, preferring flight over fight when disturbed. Of all the social wasps, hover wasps are the most likely to go unnoticed.

paper wasps – (subfamily Polistinae) – Paper wasps are named after their single-comb nests which are built out of masticated plant material, and unlike the ‘muddy’ nests of hover wasps, are much more papery and resilient (as well as larger). Nests of paper wasp nests are always built in the ‘open,’ that is, without any protective envelope.

hornets – (subfamily Vespinae, genus *Vespa* or *Provespa*) – Like paper wasps, hornets build papery nests. However, hornet nests are multi-combed, and surrounded by a protective envelope. Hornets can be very aggressive in protecting their nests.¹²

All three *Provespa* species and most of the twenty or so *Vespa* species are Asian, including one species (*Vespa fervida*) which is endemic to Sulawesi. Fortunately for the novice, most hornets of Indonesia can be readily identified by taking *careful* note of body color. One of the best websites I have come across is maintained by an unnamed

¹¹ Technically, the narrow waist of all bees, wasps and ants is called a ‘petiole.’

¹² Yellow jackets (also subfamily Vespinae, genus *Vespula* or *Dolichovespula*) are closely related to hornets, sometimes with very similar nest construction (particularly the ‘aerial yellow jackets’), but differ in coloration: yellow jackets have an alternating yellow and black (in some species white/cream and black) pattern. However, yellow jackets apparently do not occur in Indonesia, therefore we need not concern ourselves with them in our research.

Singaporean (and thus has an emphasis on Asian species). This website, which can be accessed at <http://www.vespa-bicolor.net/main/vespid/main.htm>, gives nearly complete coverage to *Vespa* species (there is no identification key, but each species has its own page), and even has a separate page devoted to hover wasps.¹³

Since hornets are a type of wasp, if you are unsure whether to call a particular insect a hornet, you'd always be safe to simply call it a wasp.

Wasps that build mud nests

Wasps which build mud nests (as well as mason bees; see above) go by the general Indonesian term *angkut-angkut*, in reference to the small loads of mud which they can be seen carrying to their nests. In addition to the hover wasps covered above, there are at least two other kinds of wasps which *build* mud nests,¹⁴ and perhaps there are more. Again, these types are most easily recognized by nest architecture.

potter wasps – (subfamily Eumeninae) – Potter wasps are solitary wasps which build nests out of mud. (Other members of this subfamily, the so-called mason wasps, utilize existing holes, but line their nests with mud.) From pictures I have looked at, potter wasps appear to be small to medium size. Some species have a prominently thin waist, but others do not. The nests look like small clay pots.

mud daubers – (certain species of family Crabronidae or Sphecidae) – like hover wasps, mud daubers have a prominently thin waist. They are solitary wasps which lay an egg in a paralyzed prey. In some (all?) species, nests are elongated ('pipe shaped'), containing several cells.

Digger wasps (*Sphex* spp., family Sphecidae) are similar in appearance to mud daubers, but they dig nests in the ground (or use pre-existing holes). With knowledge only of the wasp, and not nest architecture, you may have to resort to a more general descriptive term such as 'thin-waisted wasp' (*tabuhan pinggang ramping*).¹⁵

Sand wasps

I watched a wasp land on the ground, then quick as a wink it disappeared into the sandy soil. Because loose grit near the surface closed in behind it, the place where it had entered was barely visible, just a small depression in the sand. Later, using the midrib of a palm leaflet, we prodded the underground tunnel and found that the nest angled gently downward and was more than a foot long. Its adult inhabitant had a mostly black body

¹³ A companion website is the "Checklist of the Species in the Subfamily Vespinae," available at: <http://www.sci.ibaraki.ac.jp/~jkrte/wasp/vespinae/top.html>. Although lacking in pictures, it includes greater detail concerning geographic distribution.

¹⁴ Abandoned mud nests, however, may be re-used by other kinds of bees or wasps.

¹⁵ Or 'thread-waisted wasp,' but some prefer to restrict this term to wasps of family Sphecidae.

with a black-and-cream striped abdomen. When pinned down, it tried very aggressively to sting.

Sand wasps (Indonesian *penyengat pasir*) belong to the tribe Bembicini. As their name suggests, these wasps nest in sand. Although the individual I observed had built a lone nest, in places where soil conditions are favorable multiple nests may be dug in close proximity to one another. In addition to their nesting habit, sand wasps are identifiable from their relatively stout bodies and striped abdomens (yellow and black in most species, but ranging to white and black in others).

Hover flies

Finally, in an article of this scope, hover flies deserve at least a brief mention. Hover flies (family Syrphidae, order Diptera) are medium to large-sized *flies* which superficially resemble bees and wasps. Hover flies, however, can be easily recognized because they only have one pair of wings (versus bees and wasps which have two pairs) and lack a narrowed waist. Hover flies, of course, also lack stingers. The Indonesian term I have seen for hover flies is *lalat apung*.

Conclusion

Because of the myriad varieties of wasps and bees—an estimated 75,000 and 16,500 species respectively—it stands to reason that only a small number will be separately named in the indigenous languages where we work. And for those which *are* named, we will be successful if we can provide accurate identification for even a handful of them. Nonetheless, I hope it has become apparent from the above discussions that we can write better definitions than simply ‘a kind of bee’ or ‘a kind of wasp.’ The following is a summary of other kinds of information, some of which you may find worthwhile or informative to include in a dictionary entry:

- (a) size of the insect
- (b) coloration
- (c) presence (or absence) of a stinger
- (d) other distinctive morphological feature(s)
- (e) preferred nesting site
- (f) nest architecture, including how the nest may be lined
- (g) whether the insect is solitary (building its own nest), gregarious (solitary, but individual nests tend to be located in close proximity), or social (one nest with a queen that lays eggs and workers that take care of them)
- (h) for a wasp, the type of prey used to provision its young
- (i) relationship to the human sphere

Provided the nesting site is located, usually a moment’s observation will tell you whether the bee or wasp is solitary or social. A solitary nest will have just one individual going in

and out of the opening. If the bee or wasp is social, you will see a number of different individuals coming and going, and maybe even several guards near the entrance.

Appendix

The following is a list of families and superfamilies in the suborder Apocrita of the order Hymenoptera. The Apocrita include all wasps (except the horntails or so-called wood wasps), bees, and ants. I include this list here for two reasons: first, as a reminder to the reader as to how much has *not* been covered in this article; second, as a framework for those who would like to pursue their own, further investigations of other wasp and bee species. Maybe it can also serve as a challenge for someone else to provide a useful guide to the ants.

SUPERFAMILIES AND FAMILIES IN THE ORDER APOCRITA ('BEES, ANTS AND WASPS'), WITH SPECIAL DETAIL GIVEN TO THE FAMILY VESPIDAE. (from <http://bugguide.net/>)

Apoidea (superfamily) – *bees*

Formicoidea (superfamily) – *ants*

Chalcidoidea (superfamily) – *chalcid wasps*

Cynipoidea (superfamily)

Ichneumonoidea (superfamily)

Ampulicidae – *cockroach wasps*

Aulacidae

Bethylidae

Bradynobaenidae

Chrysididae – *cuckoo wasps*

Crabronidae – (some species are considered mud daubers)

Diapriidae

Dryinidae – *dryinids*

Evaniidae – *ensign wasps*

Gasteruptiidae – *gasteruptiids*

Mutillidae – *velvet ants*

Pelecinidae – *pelecinids*

Platygasteridae

Pompilidae – *spider wasps*

Proctotrupidae – *proctotrupids*

Rhopalosomatidae

Sapygidae – *sapygid wasps*

Scelionidae

Scoliidae – *scoliid wasps*

Sphecidae – *thread-waisted wasps* (includes digger wasps and some mud daubers)

Tiphiidae – *tiphiid wasps*

Trigonalidae

Vespidae – true wasps

 Polybiinae (subfamily) – *umbrella wasps*

Masarinae (subfamily) – *pollen wasps*
 Eumeninae (subfamily) – *potter and mason wasps*
 Stenogastrinae (subfamily) – *hover wasps*
 Polistinae (subfamily) – *paper wasps*
 Vespinae (subfamily) – hornets and yellow jackets, comprising four genera:
 Vespa – *true hornets*
 Provespa – *hornets*
 Vespula – *yellow jackets*
 Dolichovespula – *aerial yellow jackets*

FAMILIES IN THE SUPERFAMILY APOIDEA ('BEES'), WITH SOME DETAIL GIVEN TO THE FAMILY APIDAE. (from "Bee Genera of the World" at <http://cache.ucr.edu/~heraty/beepage.html>)

Adrenidae – *sand bees or miner bees*
 Colletidae – *plasterer bees*
 Halictidae – *sweat bees*
 Megachilidae – *leaf-cutter and mason bees*
 Melittidae – *andreniform short-tongued bees*
 Stenotritidae – *stenotritids*
 Apidae

 Apinae (subfamily) – *honey bees, bumblebees & their relatives*
 Apini (tribe) (includes only one genus, *Apis*) – *honey bees*
 Bombini (tribe) (includes only one genus, *Bombus*) – *bumblebees*
 Eucerini (tribe) – *digger bees*
 Euglossini (tribe) – *orchid bees*
 Meliponini (tribe) – *stingless bees*
 etc. (15 other tribes)
 Nomadinae (subfamily) – *cuckoo bees*
 Xylocopinae (subfamily) – *carpenter bees & their close relatives*
 Allodapini (tribe) – *allodapine bees*
 Ceratinini (tribe) (genera *Ceratina*, *Megaceratina*) – *small carpenter bees*
 Manueliini (tribe)
 Xylocopini (tribe) (includes only one genus, *Xylocopa*) – *large carpenter bees*

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