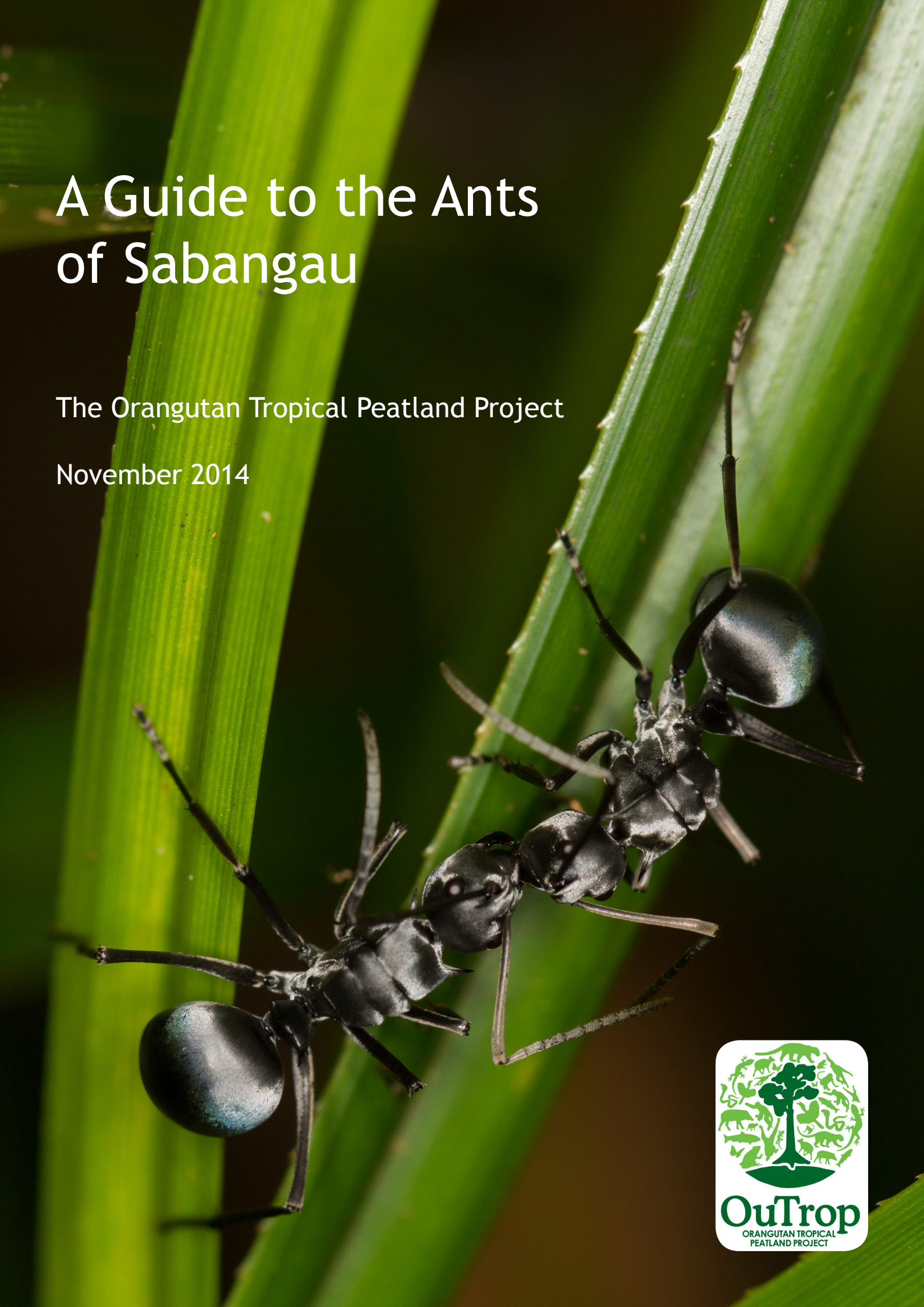
A Guide to the Ants of Sabangau

The Orangutan Tropical Peatland Project

November 2014



All original text, layout and illustrations are by Stijn Schreven (e-mail: stijn.schreven@gmail.com), supplemented by quotations (with permission) from taxonomic revisions or monographs by Donat Agosti, Barry Bolton, Wolfgang Dorow, Katsuyuki Eguchi, Shingo Hosoishi, John LaPolla, Bernhard Seifert and Philip Ward. The guide was edited by Mark Harrison and Nicholas Marchant.

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Front cover photo: Workers of *Polyrhachis (Myrma) sp.*, photographer: Erik Frank/ OuTrop.
Back cover photo: Sabangau forest, photographer: Stijn Schreven/ OuTrop.

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Contents

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* The source publications are: Bolton 1975a, 1977, 1994, 2007, Brown 2000, Dorow 1995, Eguchi 2001, Hosoishi & Ogata 2009, LaPolla et al. 2010, Seifert 2003, Ward 2001.

Introduction

Although ants are a relatively well-studied insect group, very little is known about them in tropical peat-swamp forests, and this is the first guide to ant species in this habitat. However, as anyone can tell who has visited such a forest, they are as ubiquitous here as they are anywhere else. Due to their high diversity and abundance in many ecosystems, ants have been frequently used in ecological monitoring programmes (Underwood & Fisher 2006). This means that ant surveys can give insights into the health of an ecosystem (Kremen et al. 1994) and indicate disturbances or signs of post-disturbance recovery in an area. If their responses are representative of the majority or the whole of the ecosystem, then ants can be used as ecological indicators (McGeoch 1998).

The global and regional importance of tropical peat-swamp forests for carbon storage and biodiversity conservation, and the alarming rate at which these forests are being cleared in recent decades, have highlighted the importance of protecting and restoring these forests (Page et al. 2009). Indonesia has the largest extent of tropical peatlands in the world, mostly in Borneo, Sumatra and Irian Jaya (Indonesian Papua) (Rieley et al. 1996), covering 20.7 million hectares and storing 65% of all tropical peat carbon (Page et al. 2011). The peat-swamp forest in the Sabangau catchment, Central Kalimantan, Indonesia, comprises the largest remaining continuous lowland forest in Borneo, and supports the world's largest populations of Bornean orangutan (Morrogh-Bernard et al. 2003) and Southern Bornean gibbon (Cheyne et al. 2008), and populations of many other threatened animals and plants (Posa et al. 2011).

Most current research on Bornean ants comes from a handful of sites in Sabah and Sarawak, with an emphasis on dipterocarp forests (Pfeiffer et al. 2011). The ant fauna of Kalimantan (Indonesian Borneo) and its extensive peat-swamp forests has remained largely unknown (Pfeiffer et al. 2011). Peat-swamp forests differ greatly from other forest types in Borneo. Lowland dipterocarp forests are known for their irregular periods of mass flowering and mast fruiting (Cannon et al. 2007), which can influence the population dynamics of pollinating insects (Corlett 2004) and vertebrates (Cannon et al. 2007). Peat-swamp forests do not experience such large-scale masting events and provide more continuous flowering and fruiting (Cannon et al. 2007). Assuming that such phenological differences influence the dynamics of ant food resources, it is likely that these differences also affect the ant communities specific to peat-swamp forests.

In addition, environmental characteristics of peat-swamp forests, such as a peaty soil (Mezger & Pfeiffer 2010), an extensive litter layer (Clay et al. 2010) and annual flooding for at least six months of the year, are likely to provide a challenging environment for ant species to become established. Such selection pressures can be expected to result in different and possibly more specialised ant communities than those of other forest types.

In order to provide a baseline for ecological monitoring programmes in peat-swamp forest, the Orangutan Tropical Peatland Project (OuTrop) together with the Centre for the International Cooperation in Sustainable Management of Tropical Peatlands (CIMTROP) at the University of Palangka Raya have conducted biodiversity surveys of birds, fruit-feeding butterflies and ants in the National Laboratory for the Study of Peat Swamp Forest (NLPSF), Sabangau and the heavily-degraded forests in Block C of the former Mega-Rice Project, Kalampangan (Harrison et al. 2012; Houlihan et al. 2013; Marchant et al., in prep.; Schreven 2013; Schreven et al., in prep.; Boyd et al., in prep.). The butterflies of Sabangau have recently been presented in an online guide (Houlihan et al. 2012).

This guide provides an outline of the diversity of ants that we have recorded to date in the Sabangau and Kalampangan forests. It includes a key to identify worker ants to subfamily, genus and species / morphospecies and presents ecological data and pictures of each species. We hope this guide can facilitate ant monitoring projects in the region and will be supplemented in the future to be of increasing value. To that end, we welcome comments and contributions from any readers working with ants in Borneo, and would be willing to collaborate on future research projects.

Study sites

The research was conducted in the 500 km^2 National Laboratory for Peat Swamp Forest (NLPSF), situated in the Sabangau catchment, Central Kalimantan, Indonesia (Page et al. 1999). Between 1970 and 1997 the majority of the area was selectively logged as part of the Setia Alam logging concession, and several parts (particularly near the river and along the logging railways) were intensively logged. Following the cessation of the timber concession, intensive illegal logging occurred between 1997 and 2004. During this period, the majority of riverine forests were clear-felled and the peat eroded or burned, leaving a climax community dominated by sedges and dwarf shrubs (Page et al. 1999).

Between May 2011 and April 2012, monthly samples were undertaken at five plots, which included primary mixed-swamp forest, secondary edge forest and small man-made clearings. In addition to these plots, other habitats were surveyed at irregular intervals, including tall-pole forest, low-pole forest, degraded mixed-swamp forest, burned deforested areas and sedge-dominated swamp (former riverine forest).

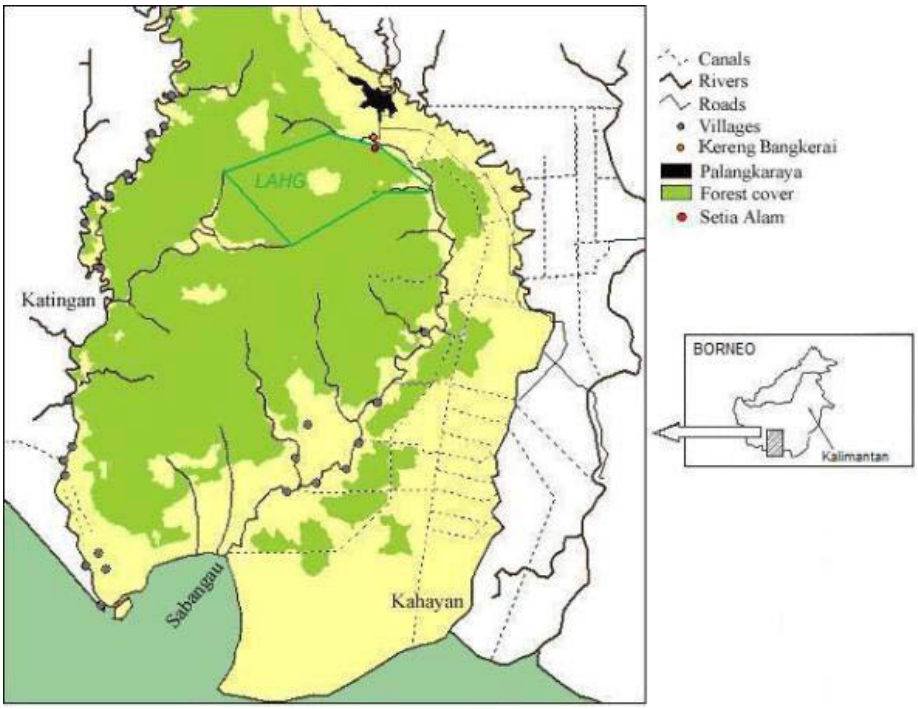


Figure 1. Map of the Sabangau (west) and Kalampangan (east) forests, showing the location of the NLPSF (indicated here using its Indonesian name of LAHG: *Laboratorium Alam Hutan Gambut*).

The survey method

Surveys were conducted using honey-baited pitfall traps positioned on the ground and attached to the stem of a sapling or shrub. Hence, the ants listed in this guide will be biased towards generalist species that forage on the ground or at a low level in vegetation, or that travel along trees and shrubs to get to their nest. Subterranean and arboreal species, as well as dietary specialists and solitary foragers will have been under-sampled (Agosti et al. 2000). For detailed methods, see Schreven (2013).

Figure 2. Adding bait solution to an ant trap. Andrew Walmsley Photography/ OuTrop.

Habitat subtypes

Within the Sabangau catchment, different habitat subtypes are recognized (based on Shepherd et al. 1997 and Page et al. 1999):

Tall-pole forest - Interior forest on deep peat at the highest elevations of the Sabangau dome, over 12 km from the forest edge. The peat water-table is below the surface throughout the year, allowing trees to grow much taller than elsewhere in the dome (max. heights of 45 m).

Low-pole forest - Interior forest on deep peat 6-11 km from the edge of the peat dome. Flooded for most of the year. The forest floor is very uneven and most trees grow on pronounced hummocks or have specialised features, such as pneumatophores or stilt-roots. Trees are stunted and dense, typically of less than 20 m in height. Pandans and pitcher plants are abundant.

Mixed-swamp forest (MSF)

- **Intact** - Relatively undisturbed MSF near the margins of the Sabangau dome on peat 2-6 m deep. The forest is seasonally flooded, and forms a complex of hummocks and hollows. Trees are relatively tall, with taller trees around 35 m and a denser lower canopy of 15-25 m height. Suffered some past logging disturbance, but relatively light and considered the closest to truly undisturbed MSF occurring in the area.
- **Edge** - Pioneer vegetation that has recolonised an area of deforested former MSF or riparian forest (see sedge swamp below). Peat is relatively thin and the habitat is flooded for much of the year. Trees are typically around 15 m in height and ground vegetation is dense.
- **Degraded** - MSF that was subject to the most intensive selective logging in the area (although not clear-felled) more than ten years ago. Regenerating, with trees ca. 15-20 m in height and ground vegetation dense in places.
- **Clearings** - Man-made clearings in MSF of around 20 m diameter that were created by local fruit bat hunters. These areas have been regenerating for over 5 years, and are dominated by dense seedling and sapling growth and dead wood.

Figure 3. Mixed-swamp forest floor with hummocks and hollows during rainy season. Photographer: Stijn Schreven/ OuTrop.

Burned deforested - Former MSF that was destroyed by forest fires in 2006. All larger trees have been lost, and the ground layer is characterised by ferns, bare degraded peat, standing water, and localised patches of seedling and sapling pioneers.

Sedge swamp - Former riparian forest that was clear-fell logged approximately 40 years ago and has suffered sporadic repeated fires since. The peat is degraded, the former seed-bank has been lost, and the area is covered by deep floodwaters for most of the year, which has prevented natural regeneration in the area. Now dominated by a climax community of pandans (Pandanaceae) and sedges (Cyperaceae).

Figure 4. The sedge swamp, with Ari and Sebastiaan carrying seedlings for the reforestation project which aims to identify and implement methods to restore this degraded habitat. Photographer: Stijn Schreven/ OuTrop.

Identification

Ants can be classified into different castes: queens, males and workers. Males and queens are fertile and have wings, but workers are sterile and wingless. Queens lose their wings when they found a colony, but can often be distinguished from workers by their larger size and their more complex alitrunk (fused thorax and propodeum) with more segmentation and several small scales on their shoulders to which the wings were attached. Within the worker caste there can be huge variation in size, with either large and small workers – called "majors" (or soldiers) and "minors" respectively – or a continuum of sizes. Majors have a disproportionately large head.

This guide will focus on the worker caste because workers are most numerous, are best described in literature, and indicate the presence of a reproductive unit (i.e. a colony with a queen). Identification of males and queens is often problematic, because these castes are much rarer and literature is therefore scarce.

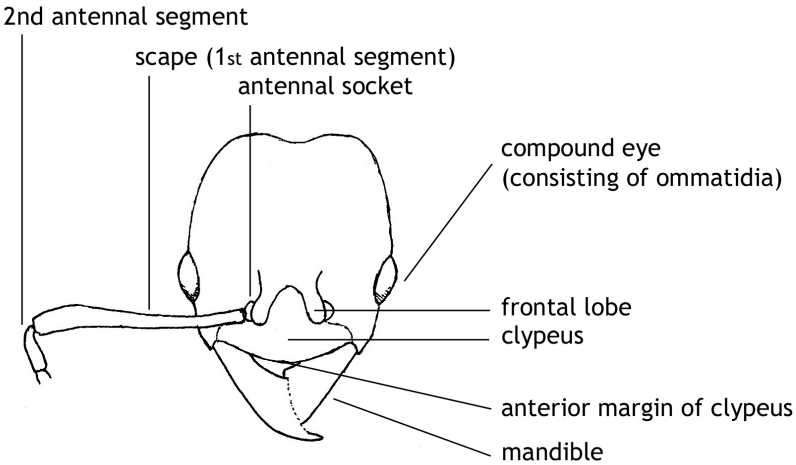


Figure 5. Detail of the head of a worker ant (*Pheidole rugifera*). Illustration by Stijn Schreven.

As with most insects, worker ants have three main body parts: the head, the alitrunk and the gaster (abdomen). Between the alitrunk and the gaster are often one or two small, hinged waist segments, the first one called petiole (closest to alitrunk), the second called postpetiole. Within the ants, subfamilies can be distinguished by counting the number of waist segments (petiole and postpetiole) and looking at the tip of the abdomen for the presence of a sting. Ants in the subfamily of Formicinae do not have a sting, but instead have a semi-circular opening with a projecting acidopore – a small pore or tube through which they spray formic acid. The Dolichoderinae lack any structure, sting or acidopore, at the tip.

In Figure 5-6, the main anatomy of a worker ant is shown. For more terminology and figures on anatomy, we recommend that you refer to the glossary in Bolton's 1994 "Identification guide to the ant genera of the World", pages 191 to 201 (online at AntWiki.org: http://www.antwiki.org/wiki/Morphological_Terms, and more terms at http://www.antwiki.org/wiki/Morphology_and_Terminology).

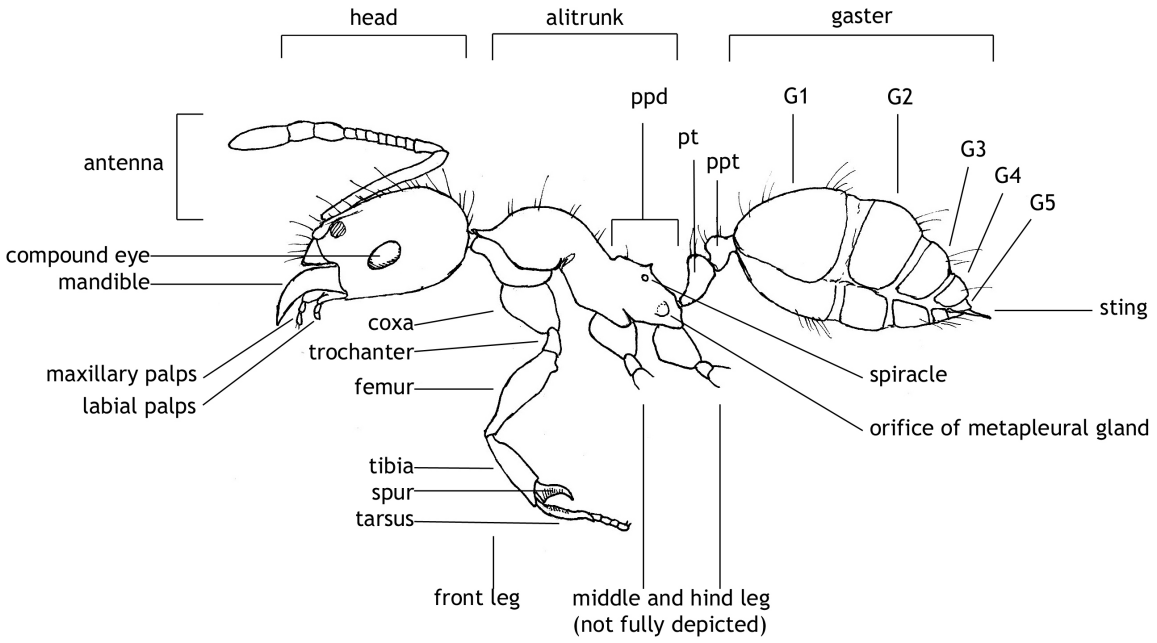


Figure 6. Anatomy of a worker ant (*P. rugifera*). Abbreviations: ppd = propodeum, pt = petiole, ppt = postpetiole, G = gastral segment. Illustration by Stijn Schreven.

Equipment and literature

It is best to store and examine ants in ethanol (at least 70% volume), so that hairs and soft tissues stay intact and are clearly visible. In order to see enough details of the ant, it is necessary to use a high-quality stereo microscope, with a magnification ranging from 10x to 100x. For the majority of species, a 10x-40x magnification will suffice, but for smaller samples it is necessary to use higher magnification. Good illumination (particularly from above) will greatly improve the visibility under the microscope. It is also good to have a range of tools to manipulate the ant specimen, e.g. to move a leg that conceals other features, open the mandibles or dissect the sting apparatus. Useful tools are a forceps (e.g. a Leonard forceps), a brush, a pipette and a pair of dissection needles with hooked tips (these can easily be made from insect pins and chopsticks).

Before starting the identification of samples, it is best to familiarize yourself with ant anatomy, terminology and the morphological variation within and between species. Therefore, first take some time studying the reference collection and consulting literature. Expert supervision during the start-up can also improve the quality of later work and identification. The tricky part in monitoring peat-swamp forest ants at present is not only recognising the documented species, but also being able to identify individuals of different morphology that belong to an undocumented species.

For this guide, a range of taxonomic books and articles has been used. Identification of subfamilies and genera was conducted with reference to Bolton (1994), supplemented with recent genus-group revisions (LaPolla et al. 2010, Baroni Urbani & De Andrada 2007). For the identification of species and classification of morphospecies, regional genus-level taxonomic reviews were used where available; alternatively reviews of other geographical regions were used to derive diagnostic features for distinction of morphospecies. The taxonomic reviews referred to are given at the specific subfamily and genus pages. Online ant databases (AntWeb.org, Antbase.net) were also consulted.

Figure 7. Stijn Schreven working with a stereo microscope at UNPAR. Photographer: Thea Powell/ OuTrop.

Species list

At present, 81 species have been recorded in the NLPSF (Sabangau) and MRP Block C (Kalampangan) combined. Species are listed by subfamily and then by genus (* = species known only from casual records, not from systematic surveys).

Dolichoderinae

Ochetellus sp. 1
Philidris sp. 1
Tapinoma melanocephalum
Tapinoma sp. 1
Tapinoma sp. 2
Technomyrmex kraepelini
Technomyrmex lisae
Technomyrmex rotundiceps
Technomyrmex sp. 1
Technomyrmex sp. 2

Formicinae

Camponotus gigas
Camponotus sp. 1
Camponotus sp. 2
Camponotus sp. 3
Camponotus sp. 4
Camponotus sp. 5
Camponotus sp. 6
Euprenolepis procera
Nylanderia sp. 1
Nylanderia sp. 2
Nylanderia sp. 3
Oecophylla smaragdina
Polyrhachis (Hedomyrma) sp. 1
Polyrhachis (Myrma) sp. 1
Polyrhachis (Myrmhopla) sexspinosa-group *sp. 1*
Polyrhachis (Polyrhachis) ypsilon
Prenolepis sp. 1

Undetermined:
Formicinae *sp. 1*
Formicinae *sp. 2*

Myrmicinae

*Acanthomyrmex ferox**
Cardiocondyla sp. 1
Cardiocondyla sp. 2
Cardiocondyla wroughtonii-group *sp. 1*
Cardiocondyla wroughtonii-group *sp. 2*
Carebara sp. 1
*Crematogaster (Physocrema) inflata**
Crematogaster (Physocrema) cf. onusta
Crematogaster (Physocrema) sewardi
Crematogaster sp. 1
Crematogaster sp. 2
Crematogaster sp. 3
Crematogaster sp. 4
Crematogaster sp. 5
Crematogaster sp. 6
Crematogaster sp. 7
Mayriella sp. 1
Meranoplus malaysianus
Monomorium cf. floricola
Monomorium sp. 1
Pheidole aglae
Pheidole cf. aglae
Pheidole aristoteles
Pheidole hortensis / clypeocornis
Pheidole orophila
Pheidole plagiaria
Pheidole quadrensis
Pheidole quadricuspis
Pheidole rugifera
Pheidologeton cf. affinis
Pheidologeton cf. pygmaeus
Rhopalomastix sp. 1
Solenopsis sp. 1
Solenopsis sp. 2
Strumigenys sp. 1
Strumigenys sp. 2
Tetramorium pacificum
Tetramorium scabrosum-group *sp. 1*
Tetramorium sp. 1
Tetramorium cf. "Triglyphothrix" sp. 1
Tetramorium tonganum-group *sp. 1 (nr. laparum)*
Tetramorium tortuosum-group *sp. 1*
Vollenhovia sp. 1

Undetermined:
Myrmicinae *sp. 1*

Ponerinae

Gnamptogenys gabata
Hypoponera sp. 1
Leptogenys sp. 1
Odontomachus rixosus
*Pachycondyla cf. tridentata**

Pseudomyrmecinae

Tetraponera attenuata
Tetraponera extenuata / modesta
Tetraponera nitida

How to use the identification keys

In the following sections, we provide identification keys and descriptions of the subfamilies, genera and species that we encountered in the study area. If you have no previous expertise in ants and want to get started with identification, we recommend that you should read the general sections on identification, equipment and literature.

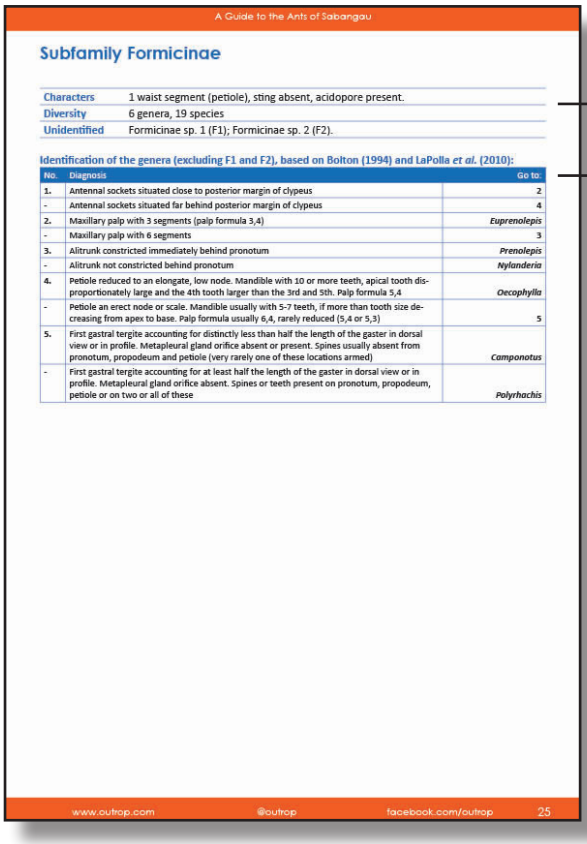
The identification keys

This guide uses dichotomous keys. This means that a key is divided into a series of numbered couplets, each of which describes a pair of contrasting diagnostic features. To progress with the key you need to choose one of the two options based on the features of the specimen you want to identify, and proceed to the next couplet (indicated to the right of the diagnosis) until you reach a subfamily, genus or species.

The keys follow a hierarchical structure based on taxonomic levels, so the first key will direct you to the appropriate subfamily, a second to the genera within that subfamily, and a third to the species / morphospecies within a genus. At each stage of the process you should check the summary page of the relevant taxon, where you will find a description and a list of key diagnostic features to verify your identification. If you find a conflict between your specimen and the description of the taxon, you may have gone wrong somewhere in the key, so you can back-track to a higher taxonomic level and follow another branch of the key. Alternatively, your specimen may belong to a taxon that is not included in the guide, in which case you may need to refer to the original taxonomic revisions or look for additional literature for more details (see References section for suitable sources).

Layout of taxon pages

Subfamily page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Subfamily Formicinae

Characters	1 waist segment (petiole), sting absent, acidopore present.
Diversity	6 genera, 19 species
Unidentified	Formicinae sp. 1 (F1); Formicinae sp. 2 (F2).

Identification of the genera (excluding F1 and F2), based on Bolton (1994) and LaPolla *et al.* (2010):

No.	Diagnosis	Go to:
1.	Antennal sockets situated close to posterior margin of clypeus	2
-	Antennal sockets situated far behind posterior margin of clypeus	4
2.	Maxillary palp with 3 segments (palp formula 3,4)	*Euprenolepis*
-	Maxillary palp with 6 segments	3
3.	Alitrunk constricted immediately behind pronotum	*Prenolepis*
-	Alitrunk not constricted behind pronotum	*Nylanderia*
4.	Petiole reduced to an elongate, low node. Mandible with 10 or more teeth, apical tooth disproportionately large and the 4th tooth larger than the 3rd and 5th. Palp formula 5,4	*Oecophylla*
-	Petiole an erect node or scale. Mandible usually with 5-7 teeth, if more than tooth size decreasing from apex to base. Palp formula usually 6,4, rarely reduced (5,4 or 5,3)	5
5.	First gastral tergite accounting for distinctly less than half the length of the gaster in dorsal view or in profile. Metapleural gland orifice absent or present. Spines usually absent from pronotum, propodeum and petiole (very rarely one of these locations armed)	*Camponotus*
-	First gastral tergite accounting for at least half the length of the gaster in dorsal view or in profile. Metapleural gland orifice absent. Spines or teeth present on pronotum, propodeum, petiole or on two or all of these	*Polyrhachis*

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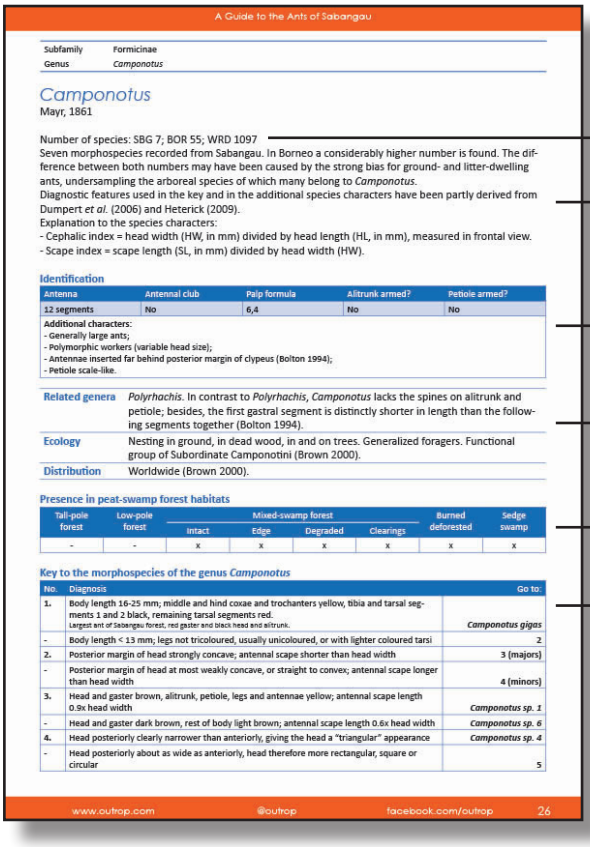
A description of the main characters of the subfamily, its recorded diversity in the study area and a list of unidentified morphospecies in the subfamily.

Identification key to the recorded genera in this subfamily. The left column shows the number of the couplet (2nd option of each couplet indicated with "-"), the middle column shows the diagnostic features and the right column indicates the next couplet or the name of the taxon.

Genus page



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Subfamily	Formicinae
Genus	*Camponotus*

Camponotus
Mayr, 1861

Number of species: SBG 7; BOR 55; WRD 1097
Seven morphospecies recorded from Sabangau. In Borneo a considerably higher number is found. The difference between both numbers may have been caused by the strong bias for ground- and litter-dwelling ants, undersampling the arboreal species of which many belong to *Camponotus*.
Diagnostic features used in the key and in the additional species characters have been partly derived from Dumpert *et al.* (2006) and Heterick (2009).
Explanation to the species characters:
- Cephalic index = head width (HW, in mm) divided by head length (HL, in mm), measured in frontal view.
- Scape index = scape length (SL, in mm) divided by head width (HW).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	6,4	No	No

Additional characters:
- Generally large ants;
- Polymorphic workers (variable head size);
- Antennae inserted far behind posterior margin of clypeus (Bolton 1994);
- Petiole scale-like.

Related genera	*Polyrhachis*. In contrast to *Polyrhachis*, *Camponotus* lacks the spines on alitrunk and petiole; besides, the first gastral segment is distinctly shorter in length than the following segments together (Bolton 1994).
Ecology	Nesting in ground, in dead wood, in and on trees. Generalized foragers. Functional group of Subordinate Camponotini (Brown 2000).
Distribution	Worldwide (Brown 2000).

Presence in peat-swamp forest habitats

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	x	x	x	x

Key to the morphospecies of the genus *Camponotus*

No.	Diagnosis	Go to:
1.	Body length 16-25 mm; middle and hind coxae and trochanters yellow, tibia and tarsal segments 1 and 2 black, remaining tarsal segments red. Largest ant of Sabangau forest, red gaster and black head and alitrunk.	*Camponotus gigas*
-	Body length < 13 mm; legs not tricoloured, usually unicoloured, or with lighter coloured tarsi	2
2.	Posterior margin of head strongly concave; antennal scape shorter than head width	3 (majors)
-	Posterior margin of head at most weakly concave, or straight to convex; antennal scape longer than head width	4 (minors)
3.	Head and gaster brown, alitrunk, petiole, legs and antennae yellow; antennal scape length 0.9x head width	*Camponotus sp. 1*
-	Head and gaster dark brown, rest of body light brown; antennal scape length 0.6x head width	*Camponotus sp. 6*
4.	Head posteriorly clearly narrower than anteriorly, giving the head a "triangular" appearance	*Camponotus sp. 4*
-	Head posteriorly about as wide as anteriorly, head therefore more rectangular, square or circular	5

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The number of species within this genus in Sabangau (SAB), Borneo (BOR) and the World (WRD). The number of valid species in Borneo is taken from Pfeiffer et al. (2011), the World diversity from AntWeb (2014).

Remarks on the taxonomy, diversity and identification of the genus. Abbreviations specific for the genus that are used in the key are explained here.

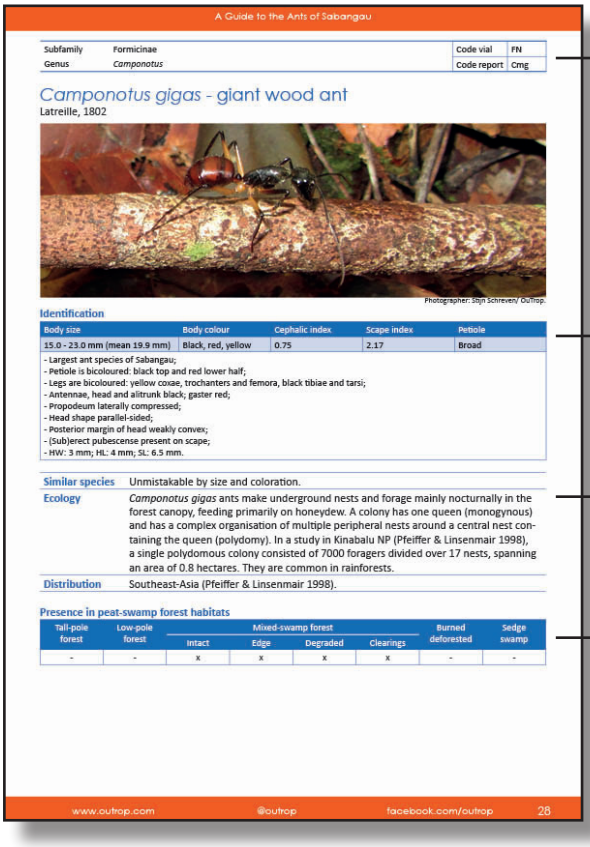
Overview of the diagnostic features of the genus. The top two rows give features for quick comparison of genera within the subfamily.

Discussion of differences with related genera, ecology and distribution in the world.

Table indicating presence of the genus in the habitat subtypes.

Identification key to the recorded species of the genus.

Species page



A Guide to the Ants of Sabangau

Subfamily	Formicinae	Code vial	FN
Genus	*Camponotus*	Code report	Cmg

Camponotus gigas - giant wood ant
Latreille, 1802

Photographer: Stijn Schreven/ OuTrop.

Identification

Body size	Body colour	Cephalic index	Scape index	Petiole
15.0 - 23.0 mm (mean 19.9 mm)	Black, red, yellow	0.75	2.17	Broad

- Largest ant species of Sabangau;
- Petiole is bicoloured: black top and red lower half;
- Legs are bicoloured: yellow coxae, trochanters and femora, black tibiae and tarsi;
- Antennae, head and alitrunk black; gaster red;
- Propodeum laterally compressed;
- Head shape parallel-sided;
- Posterior margin of head weakly convex;
- (Sub)erect pubescense present on scape;
- HW: 3 mm; HL: 4 mm; SL: 6.5 mm.

Similar species	Unmistakable by size and coloration.
Ecology	*Camponotus gigas* ants make underground nests and forage mainly nocturnally in the forest canopy, feeding primarily on honeydew. A colony has one queen (monogynous) and has a complex organisation of multiple peripheral nests around a central nest containing the queen (polydomy). In a study in Kinabalu NP (Pfeiffer & Linsenmair 1998), a single polydomous colony consisted of 7000 foragers divided over 17 nests, spanning an area of 0.8 hectares. They are common in rainforests.
Distribution	Southeast-Asia (Pfeiffer & Linsenmair 1998).

Presence in peat-swamp forest habitats

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	x	x	-	-

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Code vial: species code on the vial in the OuTrop reference collection. Code report: species code in OuTrop reports and articles (first two letters indicate genus, third for species).

Overview of the diagnostic features of the species. The top two rows give features for quick comparison of species within the genus. Capital letters in square brackets [] at the end of a feature refer to the letters in the picture(s) on the page.

Discussion of differences with similar species, and - if known - of the ecology and global distribution of the species.

Table indicating presence of the species in the habitat subtypes.

Key to the subfamilies of ants

This key is a simplified version of Bolton (1994), filtered only to include subfamilies that have been recorded in the Southeast-Asian region. Subfamilies marked with * have been recorded in the Sabangau or Kalampangan forests.

No.	Diagnosis	Go to:
1.	Body with a single reduced or isolated segment, i.e. petiole	**2**
-	Body with two reduced or isolated segments, i.e. petiole and postpetiole	**7**
2.	Hypopygium with a (semi)circular acidopore (i.e. an opening at the tip, with or without a fringe of hairs); without a sting	**Formicinae***
-	Hypopygium without an acidopore; with or without a sting	**3**
3.	Pygidium or hypopygium armed with teeth or short spines	**4**
-	Pygidium and hypopygium both unarmed	**6**
4.	Gastral spiracles 3-5 exposed, not covered by the tergites of the preceding segments; metapleural gland orifice overhung and concealed from above by a cuticular lip or flange; helcium sternite convex and bulging ventrally, visible in profile	**5**
-	Gastral spiracles 3-5 concealed by the tergites of the preceding segments; metapleural gland orifice not overhung nor concealed from above by a cuticular lip or flange; helcium sternite reduced and retracted, not visible in profile	**Ponerinae**
5.	Propodeal spiracle high on side and situated far forward on the sclerite, the spiracular orifice subtended by a longitudinal impression; propodeal lobes absent; pygidium with a single pair of short spines; promesonotal suture always distinct	**Dorylinae**
-	Propodeal spiracle low on side and usually behind midlength of the sclerite, the spiracular orifice not subtended by a longitudinal impression; propodeal lobes present; pygidium armed with an apical row or marginal rows of short teeth or spines; promesonotal suture usually completely absent.	**Cerapachyinae**
6.	Sting absent (or vestigial; not visible without dissection)	**Dolichoderinae***
-	Sting present, often projecting in dead specimens. Frontal lobes present and more or less concealing antennal sockets.[a]	**Ponerinae***
7.	Pygidium transversely flattened or impressed and armed with a row of short spines or teeth	**Cerapachyinae**
-	Pygidium transversely rounded and unarmed	**8**
8.	Frontal lobes either absent or reduced and vertical, leaving the antennal sockets completely exposed in full-face view	**9**
-	Frontal lobes present, horizontal to somewhat elevated, partially or completely covering the antennal sockets in full-face view	**12**
9.	Eyes present and conspicuous, with many distinct ommatidia	**10**
-	Eyes absent or at most represented by a single ommatidium or small, featureless blister	**11**
10.	Promesonotal suture present; hind tibia with a conspicuous pectinate apical spur	**Pseudomyrmecinae**
-	Promesonotal suture vestigial to absent; hind tibia either with a simple apical spur of without spur	**Myrmicinae**
11.	Promesonotal suture present and very conspicuous in dorsal view, usually deeply impressed and always freely flexible	**Leptanillinae**
-	Promesonotal suture vestigial to absent; suture never impressed nor flexible. Antenna with 8-10 segments; first gastral segment with narrow neck-like constriction behind articulation with postpetiole.	**Aenictinae**
12.	Premesonotal suture absent	**Myrmicinae***
-	Premesonotal suture present	**Pseudomyrmecinae***

[a] Descriptions in smaller font refer to secondary identification characters that may assist with the identification but may not be diagnostic in all cases. They distinguish the taxon from other taxa in the original key that have not been recorded in Sabangau to date, or they are based on the personal experience of the lead author.

Subfamily Dolichoderinae

Characters	1 waist segment (petiole), sting absent, acidopore absent. Alitrunk and petiole unarmed (true for recorded species so far).
Diversity	4 genera, 10 species
Unidentified	None

Identification of the genera, based on Bolton (1994):

No.	Diagnosis	Go to:
1.	Petiole transversely flattened, at most swollen anterodorsally; petiole overhung by first gastral segment, such that it is concealed in dorsal view	**2**
-	Petiole surmounted with a distinct scale or node, somewhat inclined forward; petiole not or partly overhung by first gastral segment, usually visible in dorsal view	**3**
2.	Gaster in dorsal view with 5 visible tergites	***Technomyrmex***
-	Gaster in dorsal view with 4 visible tergites	***Tapinoma***
3.	Propodeum in profile with concave declivity	***Ochetellus***
-	Propodeum in profile with flat to convex declivity. Head in full-face view with markedly concave occipital margin.	***Philidris***

Subfamily	Dolichoderinae
Genus	*Ochetellus*

Ochetellus

Shattuck, 1992

Number of species: SAB 1; BOR 0; WRD 7

Identification

Antenna	Antennal club	Palp formula	Petiole shape	Propodeal declivity
12 segments	No	6,4	Scale	Concave

Additional characters (Bolton 1994):
- Metanotal groove impressed;
- Metathoracal spiracles located dorsally.

Related genera	*Philidris*, for distinction see generic key. Some *Camponotus* species resemble *Ochetellus*, but *Camponotus* has an acidopore at the tip of the gaster (Bolton 1994).
Ecology	Generalist foragers; nest on the ground. Functional group: Opportunists (Brown 2000).
Distribution	Oriental to Australia, introduced in North America (Brown 2000).

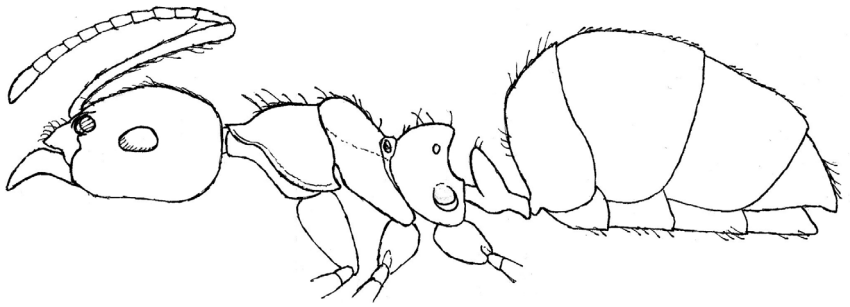
Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	-	x	x	x
-	-	x	-	-	-	-	-

The upper row represents compromised distribution data of *Ochetellus sp. 1* and *Camponotus sp. 5*; the lower row represents revised data from Feb-Apr 2012, including only *Ochetellus sp. 1*

Ochetellus sp. 1

Code vial	FAF
Code report	Oc1



Identification

Body size	Body colour	Location eyes	Alitrunk sculpture
2.1 - 4.5 mm (mean 2.9 mm)	Dark brown to black	At midlength of sides of head	Reticulate - rugulose

- Petiole node has a high scale;
- Propodeum with prominent angle separating dorsal part and declivity;
- Petiole in lateral view rounded at tip;
- Scape extending beyond posterior margin of head by slightly more than length of 2nd antennal segment;
- Head and 1st and 2nd gastral segment shagreenate, and with appressed pubescence.

Similar species	*Camponotus sp. 5* is very similar, but *Camponotus* has an acidopore at the tip of the gaster. Detailed differences can be found in the Identification sections of each species. The two morphospecies have only been distinguished after revision, so the distribution records are compromised.

Subfamily	Dolichoderinae
Genus	*Philidris*

Philidris

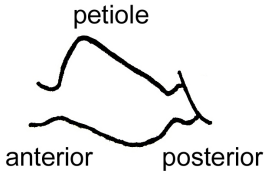
Shattuck, 1992

Number of species: SAB 1; BOR 2; WRD 9

Identification

Antenna	Antennal club	Palp formula	Petiole shape	Propodeal declivity
12 segments	No	6,4	Scale	Flat

Additional characters (Bolton 1994):
- Metanotal groove impressed;
- Metathoracal spiracles located dorsally;
- Occipital margin strongly concave;
- Polymorphic species;
- Eyes relatively anteriorly on head;
- Petiole dorsum strongly inclined anteriorly.



Related genera	*Ochetellus*, *Technomyrmex*. *Ochetellus* has a concave propodeal declivity, which is flat in *Philidris*. *Technomyrmex* has a flat petiole, covered by the gaster in dorsal view.
Ecology	Mainly arboreal, most nesting in plants; foragers. Functional group: Dominant Dolichoderinae (Brown 2000).
Distribution	Indo-Melanesian (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Distribution data refer to *Philidris sp. 1*.

Philidris sp. 1

Code vial	FAQ
Code report	Pi1

Identification

Body size	Body colour	Petiole shape	
3.0 mm	Reddish brown	Low scale	

- Mandible with 13 teeth.
- Antennal scape about as long as length of head;
- Pronotum with numerous short hairs.

Similar species	*Technomyrmex* species. Difference in petiole shape (see generic key).

Example of *Philidris* habitus: *Philidris my02*. Photographer: Noel Tawatao (from www.AntWeb.org).

Subfamily	Dolichoderinae
Genus	*Tapinoma*

Tapinoma

Foerster, 1850

Species: SAB 3; BOR 3; WRD 71
For species identification and the simplified key, information was used from Clouse (2007), Wetterer (2009) and Antweb (2012).

Identification

Antenna	Antennal club	Palp formula	Petiole shape	Propodeal declivity
12 segments	No	6,4	Simple, low	Flat

Related genera	*Technomyrmex*. Difference in number of dorsally visible tergites (4 in *Tapinoma*, 5 in *Technomyrmex*) (Bolton 1994).
Ecology	Generalized foragers. Functional groups: Opportunists and Dominant Dolichoderinae (Brown 2000).
Distribution	Worldwide in tropics and temperate regions (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	x	x	x	x	x

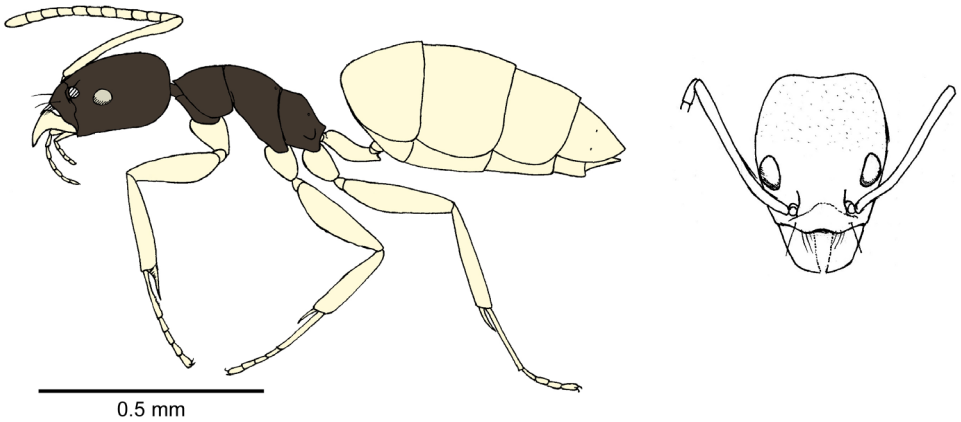
Key to the morphospecies of the genus *Tapinoma*

No.	Diagnosis	Go to:
1.	Colour of head and alitrunk dark brown, contrasting with yellowish gaster, legs, antennae and mandibles	***Tapinoma melanocephalum***
-	Head and alitrunk not contrasting with rest of body, either because rest of body is darker pigmented than in previous species (brown) or because body and alitrunk are not dark brown	**2**
2.	Colour of head and alitrunk dark brown, rest of body light brown	***Tapinoma sp. 1***
-	Colour of head and alitrunk brown (lighter than previous), rest of body slightly lighter brown, giving the body a unicoloured impression	***Tapinoma sp. 2***

Subfamily	Dolichoderinae	Code vial	FBB
Genus	*Tapinoma*	Code report	Tam

Tapinoma melanocephalum

(Fabricius, 1793)



Identification

Body size	Colour of head and alitrunk	Colour of gaster	Colour of legs
1.3 - 4.3 mm (mean 1.9 mm)	Dark brown	Yellow to light brown	Yellow
- Yellow antennae, mandibles and legs.			

Similar species	Unmistakable by body colour.
Ecology	The species is mainly known from disturbed habitats, but also inhabits natural sites such as primary rainforest. Colonies are polygynous and frequently move their nests. *Tapinoma melanocephalum* can tend aphids and other homopterans (Wetterer 2009).
Distribution	Worldwide tramp species, distributed by humans. Outside (sub)tropics mainly living inside buildings (Wetterer 2009).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	-	x	x	-	-

Photographer: April Nobile (from www.AntWeb.org).

Subfamily	Dolichoderinae	Code vial	FDK
Genus	*Tapinoma*	Code report	Ta1

Tapinoma sp. 1

Identification

Body size	Colour of head and alitrunk	Colour of gaster	Colour of legs
1.2 mm	Brown	Lighter brown	Lighter brown
- Head and alitrunk brown, other parts slightly lighter brown, but seems unicoloured.			

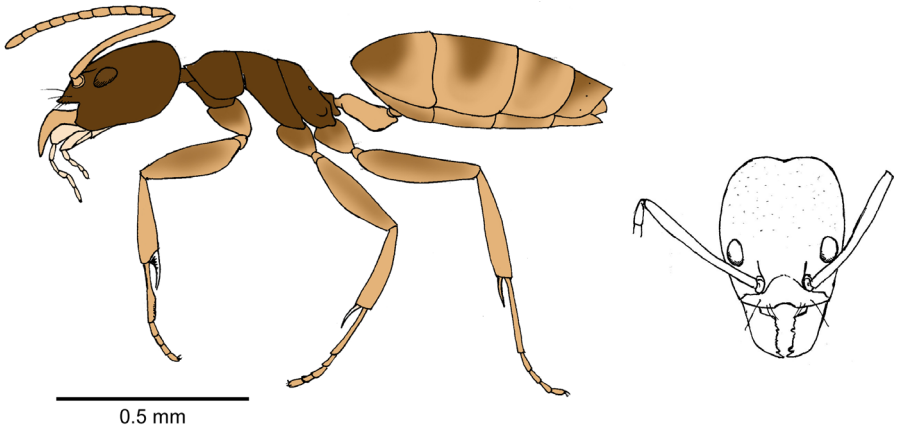
Similar species *Tapinoma sp. 2*. Head and alitrunk of *Tapinoma sp. 1* lighter brown than of *Tapinoma sp. 2*. Whereas *Tapinoma sp. 2* has a contrast between head+alitrunk and gaster+legs, this is not or less so in *Tapinoma sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	x	-	-	-	-

Subfamily	Dolichoderinae	Code vial	FAY, FCB
Genus	*Tapinoma*	Code report	Ta2

Tapinoma sp. 2



Identification

Body size	Colour of head and alitrunk	Colour of gaster	Colour of legs
1.4 - 2.1 mm (mean 1.6 mm)	Dark brown	Light brown	Light brown
- Head and alitrunk dark brown, rest of body light brown.			

Similar species See *Tapinoma sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	x	-	x	x	x

Subfamily	Dolichoderinae
Genus	*Technomyrmex*

Technomyrmex

Mayr, 1872

Number of species: SAB 5; BOR 27; WRD 97
Species identification and simplified key based on Bolton (2007).

Identification

Antenna	Antennal club	Palp formula	Petiole shape	Propodeal declivity
12 segments	No	6,4	Simple, low	Flat

Additional characters:
- 5 tergites visible in dorsal view (Bolton 1994);
- Some species polymorphic (larger workers with larger head and strongly concave occipital margin) (Bolton 2007).

Related genera	See *Tapinoma*.
Ecology	Most species are arboreal and forage in the higher forest strata (Bolton 2007). As generalized foragers (Brown 2000), their main diet is honeydew, but they also scavenge for dead or live arthropods (Bolton 2007). Functional group: Opportunists (Brown 2000).
Distribution	(Sub)tropics of Afrotropical, Oriental and Malesian regions; also in Madagascar and Australia, two species in South Palearctic; one endemic species in Neotropics (Bolton 2007).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	x	x	x	-	-

Key to the morphospecies of the genus *Technomyrmex*

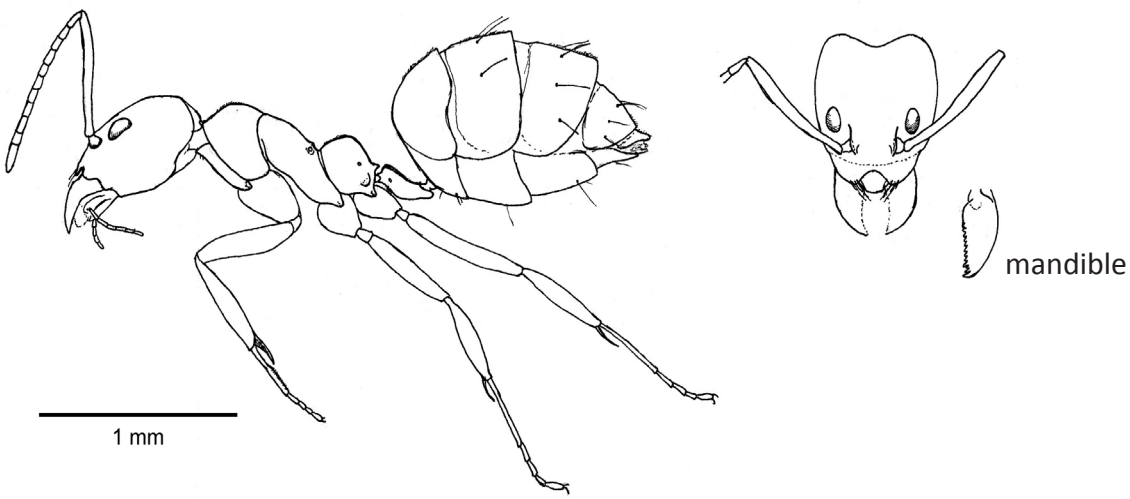
No.	Diagnosis	Go to:
1.	Gaster with (many) setae on first to third tergites. Body black to dull brown, 2 pairs of setae on dorsum of head; eyes relatively posterior on head.	***Technomyrmex rotundiceps***
-	Gaster without setae on first tergite. No setae on dorsum of head.	**2**
2.	Body black to dull brown	***3***
-	Body light brown to yellow	***4***
3.	Anterior margin of clypeus only weakly dented, with shallow concavity; propodeum with distinct angle separating dorsal and declivitous part; gaster with short, white setae on 4th and 5th tergite. Eyes at midlength of sides of head (*T. rotundiceps* has eyes behind midlength of sides of head). Setae on gaster are white, also in *T. rotundiceps*. This may be an artifact of storage in ethanol and may not be diagnostic of the species.	***Technomyrmex sp. 1***
-	Anterior margin of clypeus strongly dented, with semicircular concavity; propodeum with rounded angle separating dorsal and declivitous part; gaster with setae only on 3rd and 4th tergite. So far only larger workers in collection, indicating this is likely a polymorphic species.	***Technomyrmex sp. 2***
4.	Second gastral tergite without setae, third tergite with 6-8 setae; clypeus with deep U-shaped incision (angles with anterior clypeal margin sharp, especially in large worker); middle and hind legs uniformly light brown to yellow. Strongly polymorphic species: large workers have cordate head shape and wider head than small workers.	***Technomyrmex lisae***
-	Second gastral tergite with two pairs of setae, third tergite with 8 setae; clypeus with a semi-circular incision (angles with anterior clypeal margin blunt); middle and hind coxae and tarsi off-white to yellow, contrasting with much darker tibiae, femora and mesosoma	***Technomyrmex kraepelini***

N.B.: the setae can break off the tergites, in which case a scar is left (a round small dot where the seta was inserted). So when setae are lacking, check for scars to be sure.

Subfamily	Dolichoderinae	Code vial	FG
Genus	*Technomyrmex*	Code report	Tck

Technomyrmex kraepelini

Forel, 1905



Identification

Body size	Body colour	Setae: head dorsum	Setae: tergite 1	Clypeal notch
3.2 - 3.9 mm (mean 3.5 mm)	Light brown	None	None	Semicircular

Additional characters (Bolton 2007):
- 2nd gastral tergite with 2-3 pairs of setae, 3rd gastral tergite with 3-4 pairs of setae;
- Propodeum without indentation;
- Propodeum: length of dorsum equals depth of declivity;
- Middle and hind coxae off-white to yellow, contrast strongly with alitrunk.

Similar species

Technomyrmex lisae looks similar but lacks setae on 2nd gastral tergite, its clypeus has a U-shaped notch (semicircular in *T. kraepelini*), and the middle and hind legs are entirely yellow to light brown (Bolton 2007). In past records both species have been mixed up, so the distribution data may not be accurate yet.

Distribution

Thailand, West Malaysia, Borneo, Singapore, Java, Sulawesi, Palau, Micronesia (Bolton 2007).

Presence in peat-swamp forest habitat subtypes

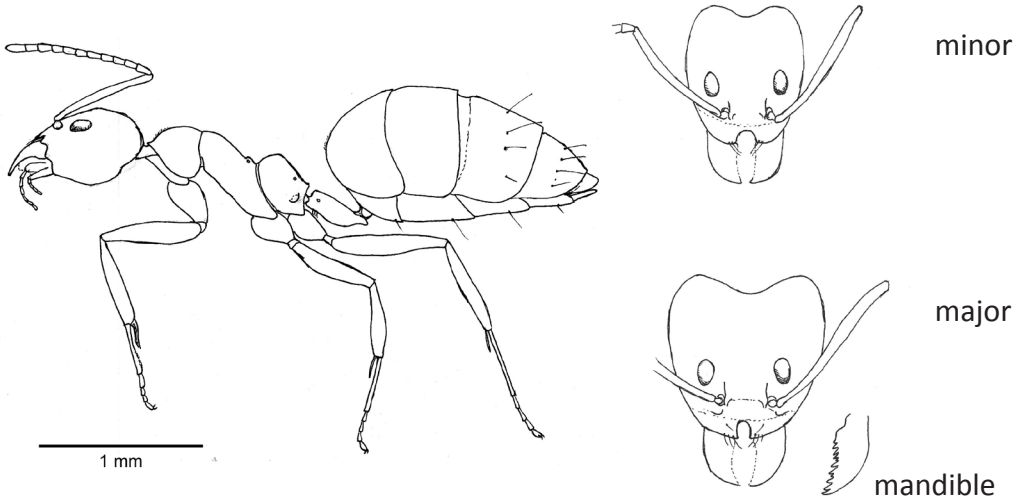
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	x	-	-	-	-

Photographer: April Nobile (from www.AntWeb.org).

Subfamily	Dolichoderinae	Code vial	FL, FCC, FCI
Genus	*Technomyrmex*	Code report	Tcl

Technomyrmex lisae

Forel, 1913



Identification

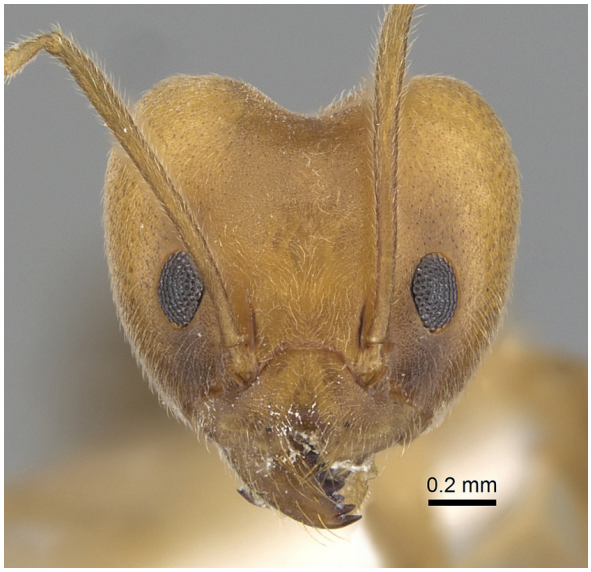
Body size	Body colour	Setae: head dorsum	Setae: tergite 1	Clypeal notch
4.2 - 4.7 mm (mean 4.4 mm)	Yellowish brown	None	None	U-shaped

Additional characters (Bolton 2007):
- Polymorphic species;
- 2nd gastral tergite without setae, 3rd and 4th gastral tergites with 3-4 pairs of setae;
- Hind margin of head strongly concave in small workers, deeply cleft in large workers (cordate head);
- Body yellowish brown (head and gaster often darker than alitrunk), legs entirely yellow to light brown.

Similar species	See *Technomyrmex kraepelini*. In past records both species have been mixed up, so the distribution data may not be accurate yet.
Distribution	West Malaysia, Sumatra, Borneo (Bolton 2007).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	x	-	-

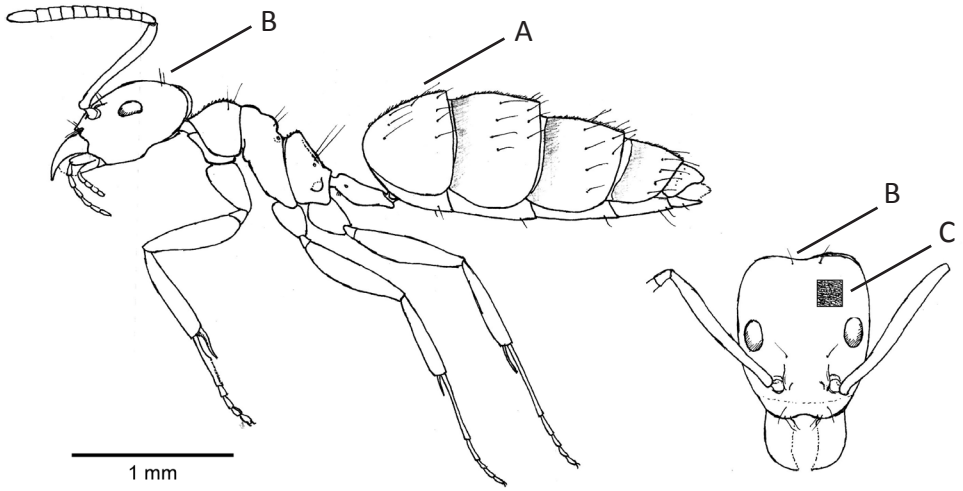


Major worker. Photography: Shannon Hartman (from www.AntWeb.org).

Subfamily	Dolichoderinae	Code vial	FX
Genus	*Technomyrmex*	Code report	Tcr

Technomyrmex rotundiceps

Karavaiev, 1926



Identification

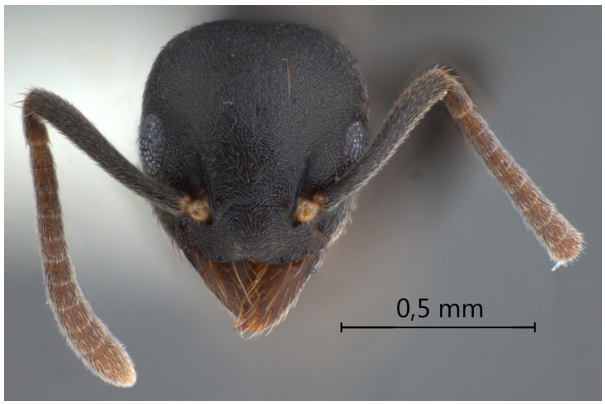
Body size	Body colour	Setae: head dorsum	Setae: tergite 1	Clypeal notch
3.9 mm	Black to dark brown	1 pair	Many [A]	Shallow concavity

Additional characters (Bolton 2007):
- Also 1 pair of setae above antennae (is not dorsum) [B];
- Dorsal surface of head with fine sculpture (reticulate - shagreenate) [C];
- Propodeum dorsum shorter than declivity, dorsum meets declivity in a marked angle;
- Eyes located relatively posteriorly on head;
- Middle and hind tibiae and scapes without (sub)erect setae.

Similar species	*Technomyrmex sp. 1* and *Technomyrmex sp. 2*, but *T. rotundiceps* has setae on the dorsum of head and the first gastral tergite.
Distribution	West Malaysia, Java, Borneo (Bolton 2007).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-



Photographer: Hans Peter Katzmann (from www.Antbase.net).

Subfamily	Dolichoderinae	Code vial	FDA
Genus	*Technomyrmex*	Code report	Tc1

Technomyrmex sp. 1

Identification

Body size	Body colour	Setae: head dorsum	Setae: tergite 1	Clypeal notch
2.0 - 2.8 mm (mean 2.4 mm)	Black	None	None	Shallow concavity

Additional characters (after Bolton 2007):
- Body black, legs uniformly dark brown;
- 1 pair of setae above antennae (not on head dorsum);
- Propodeum with marked angle between dorsum and declivity, dorsum shorter than declivity;
- Gaster with short setae on 4th and 5th tergite;
- Eyes at midlength of sides of head.

Similar species See *Technomyrmex rotundiceps* and *Technomyrmex sp. 2*. Differences with the latter are in the species key (clypeal margin, propodeum and setae on gaster).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	x	-	-

Subfamily	Dolichoderinae	Code vial	FDP
Genus	*Technomyrmex*	Code report	Tc2

Technomyrmex sp. 2

Identification

Body size	Body colour	Setae: head dorsum	Setae: tergite 1	Clypeal notch
3.0 mm	Dark brown to black	None	None	Semicircular

Additional characters (after Bolton 2007):
- Propodeum with rounded angle separating dorsal and declivitous part;
- Propodeum dorsum is shorter than declivity;
- Gaster with setae only on 3rd and 4th tergite;
- So far only larger workers collected, suggesting this is a polymorphic species.

Similar species See *Technomyrmex rotundiceps* and *Technomyrmex sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	x	-	-	-

Subfamily Formicinae

Characters	1 waist segment (petiole), sting absent, acidopore present.
Diversity	6 genera, 19 species
Unidentified	Formicinae sp. 1 (F1); Formicinae sp. 2 (F2).

Identification of the genera (excluding F1 and F2), based on Bolton (1994) and LaPolla *et al.* (2010):

No.	Diagnosis	Go to:
1.	Antennal sockets situated close to posterior margin of clypeus	**2**
-	Antennal sockets situated far behind posterior margin of clypeus	**4**
2.	Maxillary palp with 3 segments (palp formula 3,4)	***Euprenolepis***
-	Maxillary palp with 6 segments	**3**
3.	Alitrunk constricted immediately behind pronotum	***Prenolepis***
-	Alitrunk not constricted behind pronotum	***Nylanderia***
4.	Petiole reduced to an elongate, low node. Mandible with 10 or more teeth, apical tooth disproportionately large and the 4th tooth larger than the 3rd and 5th. Palp formula 5,4	***Oecophylla***
-	Petiole an erect node or scale. Mandible usually with 5-7 teeth, if more than tooth size decreasing from apex to base. Palp formula usually 6,4, rarely reduced (5,4 or 5,3)	**5**
5.	First gastral tergite accounting for distinctly less than half the length of the gaster in dorsal view or in profile. Metapleural gland orifice absent or present. Spines usually absent from pronotum, propodeum and petiole (very rarely one of these locations armed)	***Camponotus***
-	First gastral tergite accounting for at least half the length of the gaster in dorsal view or in profile. Metapleural gland orifice absent. Spines or teeth present on pronotum, propodeum, petiole or on two or all of these	***Polyrhachis***

Subfamily	Formicinae
Genus	*Camponotus*

Camponotus

Mayr, 1861

Number of species: SAB 7; BOR 55; WRD 1097
Seven morphospecies recorded from Sabangau. In Borneo a considerably higher number is found. The difference between these figures may have been caused by the strong bias for ground- and litter-dwelling ants, undersampling the arboreal species of which many belong to *Camponotus*.
Diagnostic features used in the key and in the additional species characters have been partly derived from Dumpert *et al.* (2006) and Heterick (2009).
Explanation to the species characters:
- Cephalic index = head width (HW, in mm) divided by head length (HL, in mm), measured in frontal view.
- Scape index = scape length (SL, in mm) divided by head width (HW).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	6,4	No	No

Additional characters:
- Generally large ants;
- Polymorphic workers (variable head size);
- Antennae inserted far behind posterior margin of clypeus (Bolton 1994);
- Petiole scale-like.

Related genera	*Polyrhachis*. In contrast to *Polyrhachis*, *Camponotus* lacks the spines on alitrunk and petiole; besides, the first gastral segment is distinctly shorter in length than the following segments together (Bolton 1994).
Ecology	Nesting in ground, in dead wood, in and on trees. Generalized foragers. Functional group: Subordinate Camponotini (Brown 2000).
Distribution	Worldwide (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	x	x	x	x

Key to the morphospecies of the genus *Camponotus*

No.	Diagnosis	Go to:
1.	Body length 16-25 mm; middle and hind coxae and trochanters yellow, tibia and tarsal segments 1 and 2 black, remaining tarsal segments red. Largest ant of Sabangau forest, red gaster and black head and alitrunk.	***Camponotus gigas***
-	Body length < 13 mm; legs not tricoloured, usually unicoloured, or with lighter coloured tarsi	**2**
2.	Posterior margin of head strongly concave; antennal scape shorter than head width	**3 (majors)**
-	Posterior margin of head at most weakly concave, or straight to convex; antennal scape longer than head width	**4 (minors)**
3.	Head and gaster brown, alitrunk, petiole, legs and antennae yellow; antennal scape length 0.9x head width	***Camponotus sp. 1***
-	Head and gaster dark brown, rest of body light brown; antennal scape length 0.6x head width	***Camponotus sp. 6***
4.	Head posteriorly clearly narrower than anteriorly, giving the head a “triangular” appearance	***Camponotus sp. 4***
-	Head posteriorly about as wide as anteriorly, head therefore more rectangular, square or circular	**5**

Subfamily	Formicinae
Genus	*Camponotus*

No.	Diagnosis	Go to:
5.	Body brown (head, gaster) and yellow (alitrunk, petiole, legs and antennae)	***Camponotus sp. 1***
-	Body largely black to dark brown	**6**
6.	Petiole in lateral view broad, its apex truncate; eyes situated just before posterior corners of head, a distance of 0.5x its diameter removed from posterior corner. Head circular-oval, propodeum with prominent angle, alitrunk constricted after pronotum.	***Camponotus sp. 2***
-	Petiole in lateral view slender and high, its tip pointed; eyes situated less posteriorly, about 1-1.5x its diameter away from posterior corner of head	**7**
7.	Propodeum strongly convex relative to pro- and mesonotum; metanotal groove deeply impressed; propodeum laterally only weakly compressed	***Camponotus sp. 5***
-	Propodeum with an angle, but not raised relative to the rest of the alitrunk; metanotal groove not impressed; propodeum laterally clearly compressed	***Camponotus sp. 3***

Subfamily	Formicinae	Code vial	FN
Genus	*Camponotus*	Code report	Cmg

Camponotus gigas - giant wood ant

Latreille, 1802

Photographer: Stijn Schreven/ OuTrop.

Identification

Body size	Body colour	Cephalic index	Scape index	Petiole
15.0 - 23.0 mm (mean 19.9 mm)	Black, red, yellow	0.75	2.17	Broad

- Largest ant species of Sabangau;
- Petiole is bicoloured: black top and red lower half;
- Legs are bicoloured: yellow coxae, trochanters and femora, black tibiae and tarsi;
- Antennae, head and alitrunk black; gaster red;
- Propodeum laterally compressed;
- Head shape parallel-sided;
- Posterior margin of head weakly convex;
- (Sub)erect pubescense present on scape;
- HW: 3 mm; HL: 4 mm; SL: 6.5 mm.

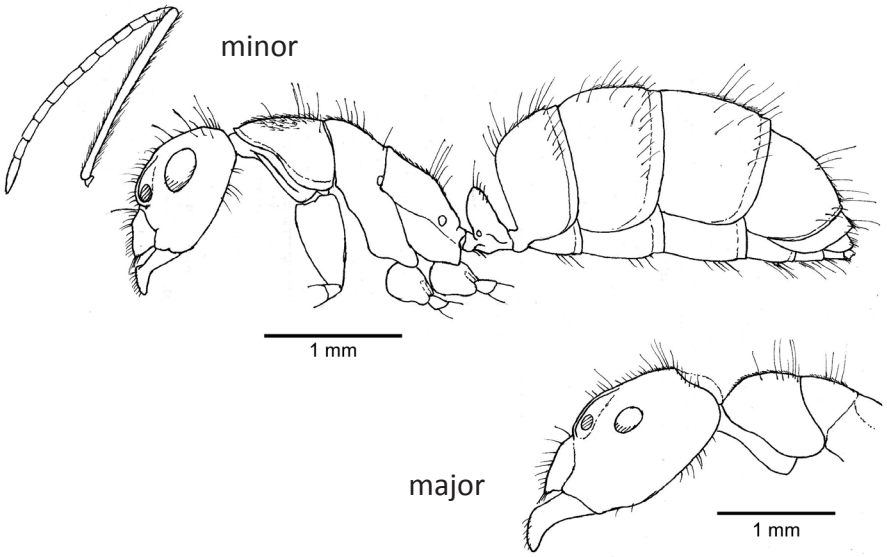
Similar species	Unmistakable by size and coloration.
Ecology	*Camponotus gigas* ants make underground nests and forage mainly nocturnally in the forest canopy, feeding primarily on honeydew. A colony has one queen (monogynous) and has a complex organisation of multiple peripheral nests around a central nest containing the queen (polydomy). In a study in Kinabalu NP (Pfeiffer & Linsenmair 1998), a single polydomous colony consisted of 7000 foragers divided over 17 nests, spanning an area of 0.8 hectares. They are common in rainforests.
Distribution	Southeast-Asia (Pfeiffer & Linsenmair 1998).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	x	x	-	-

Subfamily	Formicinae	Code vial	FC, FM
Genus	*Camponotus*	Code report	Cm1

Camponotus sp. 1



Identification

Body size	Body colour	Cephalic index	Scape index	Petiole
2.1? - 12.8 mm (mean 7.7 mm) Minimum questionable.	Brown, yellow	Minor: 0.58 - 0.67 Major: 0.88	Minor: 1.88 - 2.43 Major: 0.91	Narrow

Minor worker:
- HW: 0.7 - 0.8 mm; HL: 1.2 mm; SL: 1.5 - 1.7 mm;
- Head shape parallel-sided;
- Posterior margin of head straight to weakly convex.

Major worker:
- HW: 2.2 mm; HL: 2.5 mm; SL: 2 mm;
- Head heart-shaped;
- Posterior margin of head strongly concave.

Both minors and majors:
- Head and gaster brown, rest (alitrunk, petiole, legs and antennae) yellow;
- Propodeum laterally compressed;
- No (sub)erect pubescence on scape.

Similar species

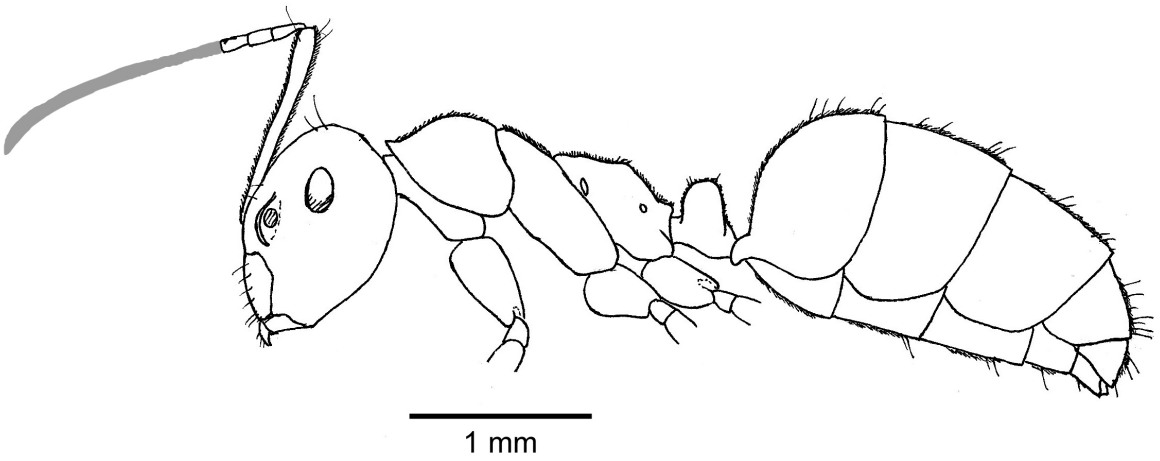
Major workers resemble those of *Camponotus sp. 6*, but majors of *Camponotus sp. 1* have lighter body colours and have a higher scape index. Also, the posterior margin of the head is less strongly concave than in *Camponotus sp. 6* and less clearly heart-shaped. It may be, however, that this variation fits within a species and *Camponotus sp. 1* and *sp. 6* in fact belong to one species, but for the moment they are treated as separate morphospecies.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	x	x	x	x	x

Subfamily	Formicinae	Code vial	FAA
Genus	*Camponotus*	Code report	Cm2

Camponotus sp. 2



Identification

Body size	Body colour	Cephalic index	Scape index	Petiole
5.7 mm	Black	0.85	-	Broad

- Body entirely black to dark brown;
- Head shape oval to circular;
- Head shiny;
- Posterior margin of head weakly convex;
- Propodeum only weakly compressed laterally;
- Propodeum with a prominent angle separating it into a clear dorsal part and a down-sloping posterior part;
- Head and alitrunk sparsely covered with only several erect dark, short setae;
- Gaster covered regularly with erect dark, short setae;
- Head, alitrunk and gaster largely covered with appressed short silvery pubescence;
- Eyes situated posterior on the sides of the head;
- HW: 1.1 mm; HL: 1.3 mm.

[Scape length and scape index unknown, not measured]

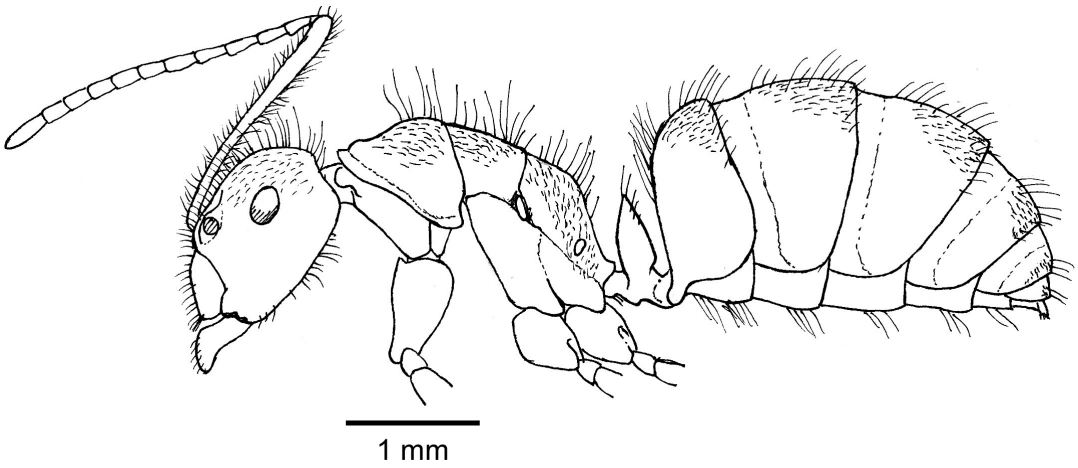
Similar species *Camponotus sp. 5*, which differs by the shape of propodeum and petiole, the cover of setae on the body and the colour of the tarsi. Also similar to *Camponotus sp. 3*, but different by the shape of head and petiole, the body coloration and the cover of setae on the body.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	x	-	-	-

Subfamily	Formicinae	Code vial	FAR
Genus	*Camponotus*	Code report	Cm3

Camponotus sp. 3



Identification

Body size	Body colour	Cephalic index	Scape index	Petiole
10.2 mm	Black, dark redbrown	0.80	1.25	Narrow

- Head, antennae, petiole and gaster black to dark brown, alitrunk and legs dark redbrown;
- Head shape parallel-sided;
- Head opaque, very fine shagreenate sculpture;
- Posterior margin of head straight;
- Propodeum laterally compressed;
- (Sub)erect pubescence present on scape;
- HW: 2.0 mm; HL: 2.5 mm; SL: 2.5 mm.

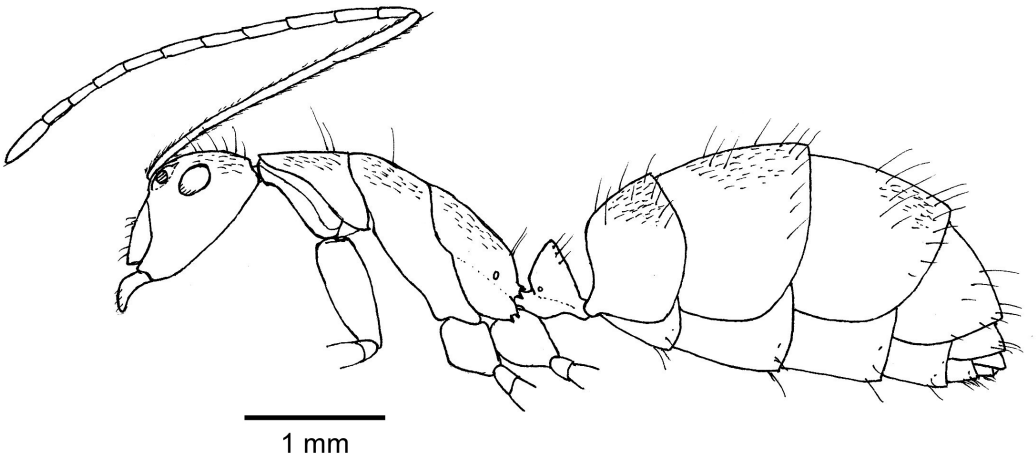
Similar species *Camponotus sp. 2* (see there) and *Camponotus sp. 5*. The latter differs mainly by the shape of head and propodeum.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Subfamily	Formicinae	Code vial	FBC
Genus	*Camponotus*	Code report	Cm4

Camponotus sp. 4



Identification

Body size	Body colour	Cephalic index	Scape index	Petiole
2.0? - 11.0 mm (mean 7.0 mm) Minimum questionable.	Brown, yellow	0.50	3.5	Broad

- Head brown (antennal scape brown with yellow tip, rest yellow), alitrunk, petiole, gaster and legs yellow;
- Head shape “triangular” in frontal view (i.e. head widest anteriorly, narrower posteriorly);
- Posterior margin of head weakly concave;
- Propodeum laterally compressed;
- Pubescense present on scape, short appressed to suberect;
- All parts of alitrunk together forming a single gradual convexity;
- Head and alitrunk with only several long erect setae, gaster with more setae (but still relatively sparse);
- Eyes situated posterior on head;
- Petiole slightly pointed in transverse view;
- HW: 1.0 mm; HL: 2.0 mm; SL: 3.5 mm (very long scape).

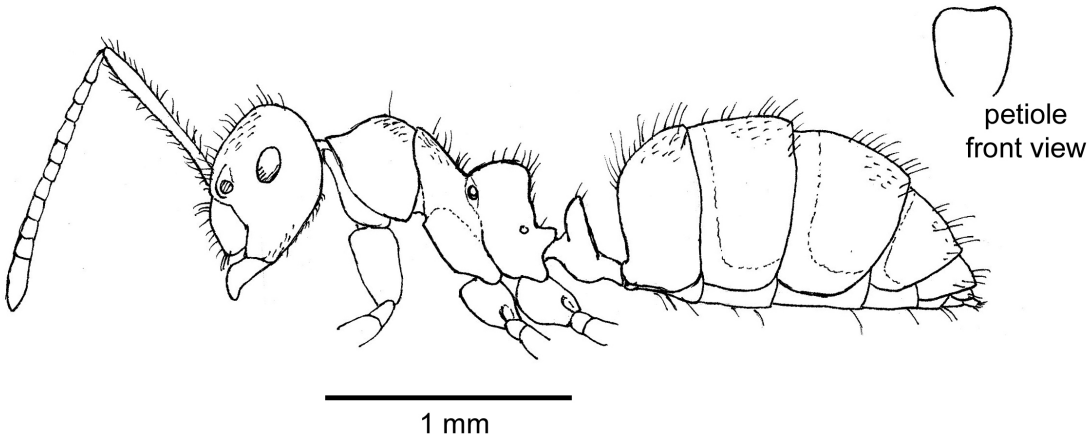
Similar species None. Easily recognisable by the head shape.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	-	-	-	-

Subfamily	Formicinae	Code vial	FCG, FCX
Genus	*Camponotus*	Code report	Cm5

Camponotus sp. 5



Identification

Body size	Body colour	Cephalic index	Scape index	Petiole
4.0 mm	Black	0.71	1.8	Narrow

- Body entirely black, except for the reddish brown tarsi;
- Head shape oval to circular in frontal view;
- Head shiny;
- Posterior margin of head straight;
- Propodeum only weakly compressed laterally;
- Petiole in transverse (front) view angular;
- (Sub)erect pubescence present on scape;
- Pro- and mesonotum form a single strong convexity;
- Metanotal groove distinct and deep;
- Propodeum with a strongly convex dorsal part and a concave posterior part;
- HW: 0.5 mm; HL: 0.7 mm; SL: 0.9 mm.

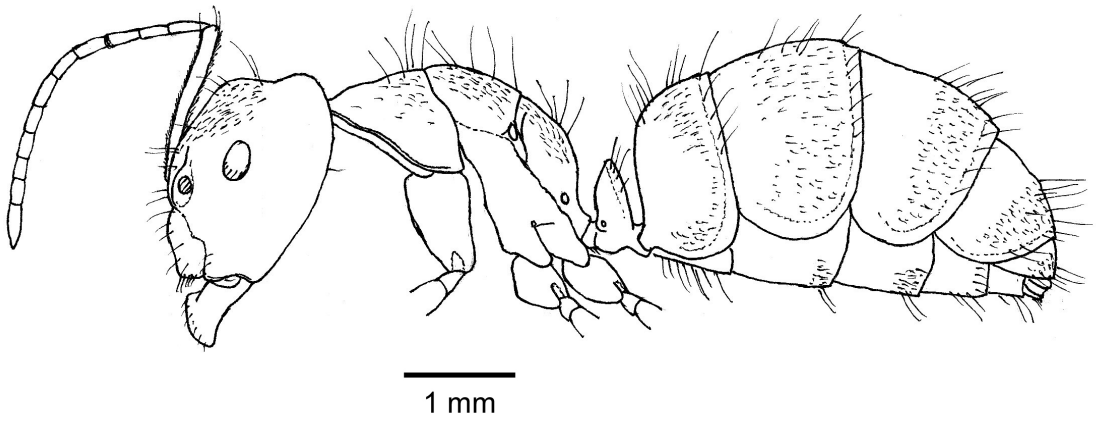
Similar species See *Camponotus sp. 2*, *Camponotus sp. 3* and *Ochetellus sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-
Previous compromised distribution data under *Ochetellus sp. 1*							

Subfamily	Formicinae	Code vial	FCY
Genus	*Camponotus*	Code report	Cm6

Camponotus sp. 6



Identification

Body size	Body colour	Cephalic index	Scape index	Petiole
10 mm	Brown, dark brown	0.89	0.60	Narrow

[morphospecies only concerns 1 major worker individual]
- Head and gaster dark brown, alitrunk, petiole, legs and antennae brown;
- Head heart-shaped;
- Posterior margin of head strongly concave;
- Propodeum laterally compressed;
- No (sub)erect pubescence on scape;
- HW: 2.5 mm; HL: 2.8 mm; SL: 1.5 mm.

Similar species See *Camponotus sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
Exact locality unknown.							

Subfamily	Formicinae
Genus	*Euprenolepis*

Euprenolepis

Emery, 1906

Number of species: SAB 1; BOR 7; WRD 8
The morphospecies recorded from Sabangau was identified using LaPolla (2009) as *Euprenolepis procera* (Emery, 1900).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	3,4	No	No

Additional characters:
- Antennae inserted close to posterior margin of clypeus (Bolton 1994);
- Polymorphic workers (variable head size) (LaPolla 2009);
- Petiole scale-shaped.

Related genera *Pseudolasius*, *Prenolepis* and *Nylanderia*. Besides the 4-segmented labial palps that distinguish *Euprenolepis* from all three related genera, *Euprenolepis* differs from the close *Pseudolasius* by the larger eyes and the constriction directly after the pronotum (LaPolla *et al.* 2010).

Ecology Little is known about the biology of *Euprenolepis*, but at least two species are nomadic fungivores (LaPolla 2009). Functional group: Tropical Climate Specialist (Brown 2000).

Distribution Indomalayan (Brown 2000). Southeast Asia: Peninsular Malaysia, Sumatra, Borneo (Sabah) (LaPolla 2009).

Presence in peat-swamp forest habitat subtypes

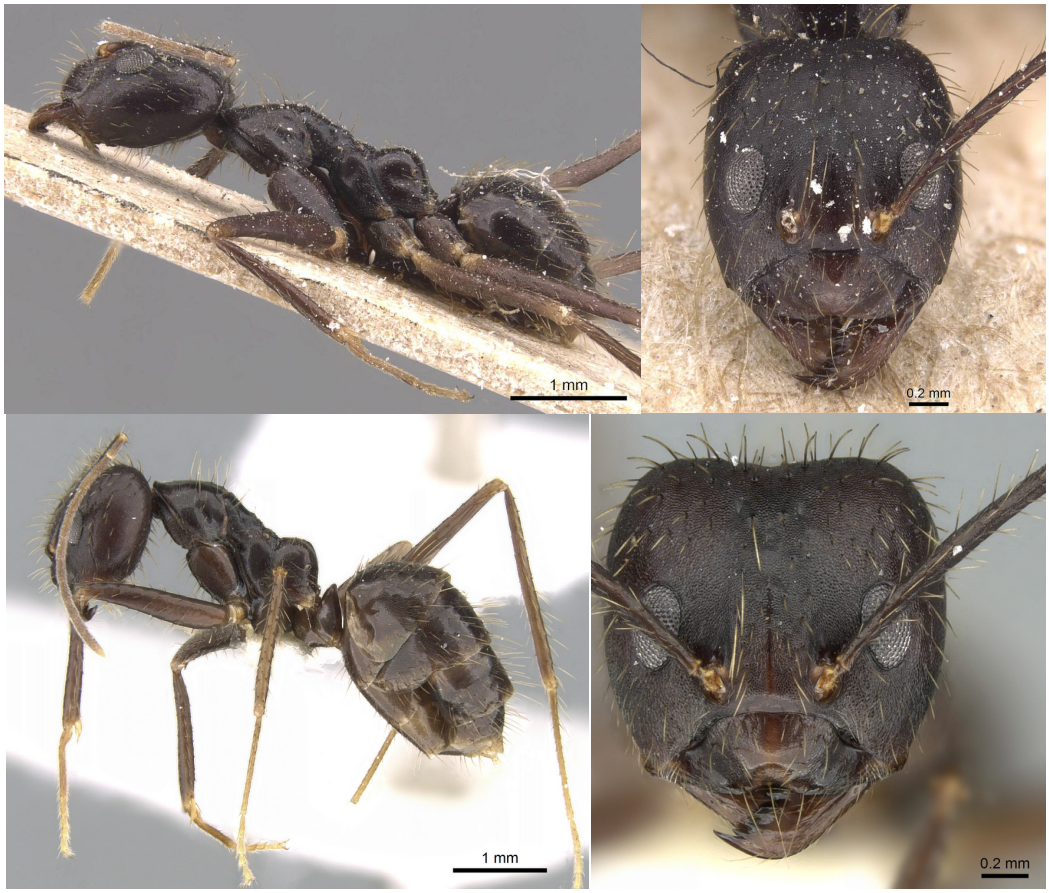
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	-	x	x	-

Distribution data refer to *Euprenolepis procera*.

Subfamily	Formicinae	Code vial	FE
Genus	*Euprenolepis*	Code report	Eup

Euprenolepis procera

(Emery, 1900)



Euprenolepis procera. Top: minor worker, photographer: Will Ericson (www.AntWeb.org); bottom: major worker, photographer: Estella Ortega (www.AntWeb.org).

Identification

Body size	Body colour	Eyes	Head and dorsum of alitrunk
3.5 - 7.5 mm (mean 5.4 mm)	Dark brown	Not reduced	With shagreenate sculpture

Additional characters (LaPolla 2009):
- Polymorphic species;
- Antennal scape long, but surpasses the hind margin of the head by much less than the entire funicle length;
- Body with long black setae.

Similar species See **Related genera** of *Euprenolepis*. Distinct from other *Euprenolepis* species by the dark body colour and the conspicuous microsculpture covering the body (LaPolla 2009).

Ecology *Euprenolepis procera* is the only known ant species relying solely on mushrooms, as discovered by Witte and Maschwitz (2008). Since this food source is scattered and unpredictable, *E. procera* has a nomadic lifestyle, frequently moving the nest to new cavities. A colony can harbour over 20,000 workers with one to several queens. Experimentally, honey and dead insects were also eaten. In our own study, *E. procera* workers were captured in honeybait traps mostly during May-August in intact mixed-swamp forest.

Distribution West Malaysia, Sumatra, Borneo (LaPolla 2009).

Subfamily	Formicinae
Genus	*Nylanderia*

Nylanderia

Emery, 1906 (*gen. rev.* LaPolla *et al.* 2011)

Species: SAB 3; BOR 2; WRD 110

Diagnostic features for distinction of morphospecies derived from Heterick (2009, under *Paratrechina*, pp. 104-106) and LaPolla et al. (2011a). Explanation to the species characters:
- Scape index = scape length (SL) divided by head width (HW).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	6,4	No	No

Additional characters:
- Antennal sockets situated close to posterior clypeal margin (Bolton 1994);
- Pairs of setae on head and alitrunk.

Related genera	*Prenolepis*, *Euprenolepis*. Distinction see generic key, more details in LaPolla *et al.* (2010, 2011b).
Ecology	Ants of the *Prenolepis* genus-group (to which *Nylanderia* belongs) live and nest in soil, leaf litter or rotten wood near the ground and can form large colonies of over 1000 workers. They appear to be generalist omnivores, in some cases tending aphids (LaPolla *et al.* 2010). Functional group: Opportunists (Brown 2000, under *Paratrechina*).
Distribution	Worldwide, highest diversity in tropics. Some species are adventive worldwide and no native species appear to be found in Europe (LaPolla *et al.* 2010).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	x	x

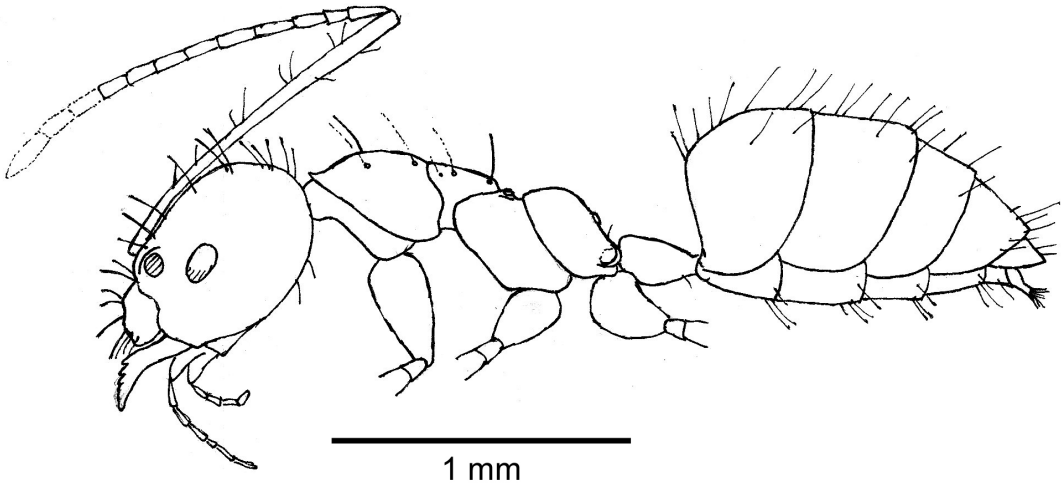
Key to the morphospecies of the genus *Nylanderia*

No.	Diagnosis	Go to:
1.	Dorsum of propodeum with a pair of strong dark setae. Antennal scape longer than width of head, body dark brown.	***Nylanderia sp. 3***
-	Dorsum of propodeum without setae	**2**
2.	Dorsum of head clearly with dense rugulose sculpture; antennal scape about as long as width of head; setae on body transparent, fine. Generally smaller species, 1.5mm.	***Nylanderia sp. 2***
-	Dorsum of head with weak indistinct sculpture; antennal scape almost 2x as long as width of head; setae on body dark brown to black, strong	***Nylanderia sp. 1***

N.B.: the setae can break off the tergites, in which case a scar is left (a round small dot where the seta was inserted); so when setae are lacking, check for scars to be sure.

Subfamily	Formicinae	Code vial	FA, FAI, FBI
Genus	*Nylanderia*	Code report	Ny1

Nylanderia sp. 1



Identification

Body size	Body colour	Setae on propodeum	Colour of setae	Scape index
1.3 - 4.0 mm (mean 2.2 mm)	Light - darker brown	None	Dark brown to black	Circa 2

Additional characters:
- Setae on body stout;
- Dorsum of head with a weak, indistinct sculpture;
- Scape with a number of setae (14-19 setae in 3 individuals counted);
- Mesopleuron without pubescence;
- Legs and antennae have the same colour as the body;
- 4 setae on pronotum, 4 setae on mesonotum, none on propodeum.

Due to the lack of a regional taxonomic revision and key for *Nylanderia*, species identification is difficult. Within the previously recognized three morphospecies of FA, FAI and FBI there is minor variation in size, colour, setae length and number of setae on alitrunk, but overall they are very similar. They are therefore lumped into one morphospecies *Nylanderia sp. 1*, which could either indeed represent a variable or polymorphic species, or represent a cluster of closely related species.

Similar species

Nylanderia sp. 2 is generally smaller, has a distinct sculpture on the head, a shorter scape and lighter setae. *Nylanderia sp. 3* has a pair of setae on the propodeum (absent in *Nylanderia sp. 1*).
Previously, the other two *Nylanderia* species may have been mixed up with this species, so the current presence data may be compromised (although it is certain that *Nylanderia sp. 1* is at least present in all four subtypes of mixed-swamp forest).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	x	x
-	-	x	x	x	x	-	-

The upper row represents compromised distribution data;
the lower row represents revised data from Feb-Apr 2012, including only *Nylanderia sp.1*

Subfamily	Formicinae	Code vial	FDD
Genus	*Nylanderia*	Code report	Ny2

Nylanderia sp. 2

Identification

Body size	Body colour	Setae on propodeum	Colour of setae	Scape index
1.0 - 2.0 mm (mean 1.5 mm)	Yellow to light brown	None	Transparant	Circa 1

Additional characters:
- Setae on body fine;
- Dorsum of head with distinct dense rugulose sculpture;
- Many setae on first gastral segment, more than *Nylanderia sp. 1*.

Similar species Generally smaller than both other *Nylanderia* species. Difference with *Nylanderia sp. 3* is the lack of setae on the propodeum. Also see *Nylanderia sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	x	x	-	-
Previous compromised distribution data under *Nylanderia sp. 1*							

Subfamily	Formicinae	Code vial	FDL
Genus	*Nylanderia*	Code report	Ny3

Nylanderia sp. 3

Identification

Body size	Body colour	Setae on propodeum	Colour of setae	Scape index
2.5 mm	Dark brown	2	Dark	> 1 (but not exactly measured)

Additional characters:
- Setae on body stout;
- Dorsum of head clearly with dense rugulose sculpture (same as in *Nylanderia sp. 2*);
- No setae on antennal scape.

Similar species

Different from the other *Nylanderia* species by having a pair of setae on the propodeum. The body is dark brown (the other two species are generally lighter). Besides, the overall habitus resembles *Technomyrmex rotundiceps*, but *Nylanderia* has a conspicuous acidopore projecting from the tip of the gaster, fringed with hairs. *Technomyrmex* species have neither a sting nor an acidopore (Dolichoderinae).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	-	x	-	-
Previous compromised distribution data under *Nylanderia sp. 1*							

Subfamily	Formicinae
Genus	*Oecophylla*

Oecophylla - weaver ants

Smith, 1860

Number of species: SAB 1; BOR 1; WRD 2
The only *Oecophylla* species in Southeast-Asia is *O. smaragdina* (Fabricius, 1775) (Azuma *et al.* 2006).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	5,4	No	No

Additional characters:
- Very long antennae (3rd segment 3-4 times as long as wide, 2nd segment twice as long as 3rd) and legs;
- Antennal sockets situated far behind posterior margin of clypeus (Bolton 1994);
- Mandible with 10 or more teeth, apical tooth very large, 4th tooth larger than 3rd and 5th (counted from apex) (Bolton 1994);
- Petiole an elongate, low node (Bolton 1994).

Related genera	Unmistakable, because of the low petiole node (Bolton 1994), mandibles and long antennae and legs.
Ecology	Nests are made in trees by weaving leaves together with the silk excretion of the larvae. Weaver ants are predators and are known to tend aphids (Brown 2000). Functional group: Tropical Climate Specialists (Brown 2000).
Distribution	African tropics (*O. longinoda*), Oriental to Northern Australia (*O. smaragdina*) (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	-	x	-	x

Distribution data refer to *Oecophylla smaragdina*.

Subfamily	Formicinae	Code vial	weaver ant
Genus	*Oecophylla*	Code report	Oes

Oecophylla smaragdina - Asian weaver ant

(Fabricius, 1775)

Photographer: Erik Frank/ OuTrop.

Identification

Body size	Body colour	Petiole shape
9.0 - 10.0 mm (mean 9.5 mm)	Amber	Elongate, low node
- Mandible with 11-12 teeth; - Long legs and antennae.		

Similar species Unmistakable, see account of genus.

Subfamily	Formicinae
Genus	*Polyrhachis*

Polyrhachis - spiny ants

Smith, 1857

Species: SAB 4; BOR 98; WRD 645

Four species found in Sabangau. The large difference between the number of species from Sabangau and the total number of species in Borneo, may partly be ascribed to the selective sampling method in the ant surveys, resulting in an undersampling of arboreal species, similar to that in *Camponotus*. Species identification and simplified key are based on Hung (1970), Bolton (1975a) and Dorow (1995).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	6,4	2-4 spines	2 spines

Additional characters:
- Large, spiny ants;
- First gastral tergite as long as, or longer than, remaining tergites together (Bolton 1994)*;
- Antennal sockets situated far behind posterior margin of clypeus (Bolton 1994).

*N.B.: hard to judge if gaster is swollen, look only at the darkened (normally exposed) surface of the tergites.

Related genera	*Camponotus*. In general, *Polyrhachis* has spines and *Camponotus* does not. Some *Camponotus* species can, however, have one pair of spines (not recorded in Sabangau so far). Another difference is in the length of the first gastral tergite, which is much larger in *Polyrhachis* than in *Camponotus* (Bolton 1994).
Ecology	Many species are arboreal, others nest on the ground. Generalized foragers. Functional group: Subordinate Camponotini (Brown 2000).
Distribution	South Palearctic, Afrotropical, Oriental to South Australia (Brown 2000).

Presence in peat-swamp forest habitat subtypes

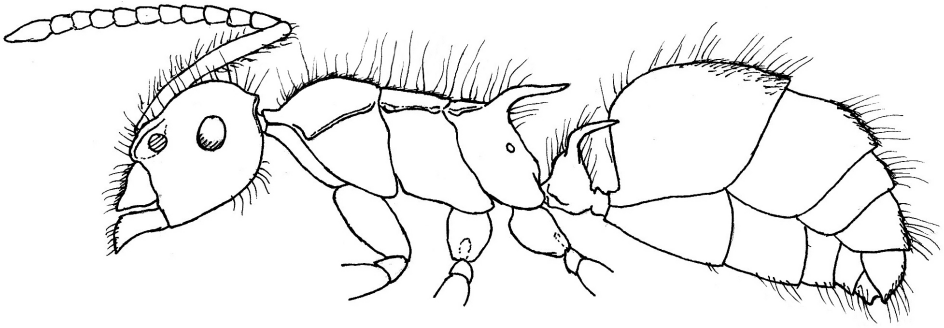
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	-	-	x	-

Key to the morphospecies of the genus *Polyrhachis*

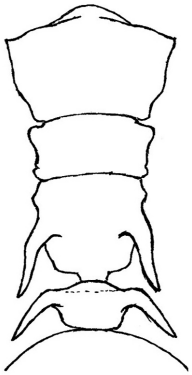
No.	Diagnosis	Go to:
1.	Mesothorax (middle segment of alitrunk) armed with spines	***Polyrhachis (Polyrhachis) ypsilon***
-	Mesothorax without spines, at most with lobed margination	**2**
2.	Alitrunk entirely immarginate. Petiole in lateral view rectangular; alitrunk and petiole with alveolate sculpture; anteroventral corners of mesopleuron produced into teeth; pilosity scattered; no short pubescence on dorsum of gastral tergites.	***Polyrhachis (Myrmhopla) sexspinosa*-group *sp. 1***
-	Alitrunk partly or completely marginated, spines originating from extensions of this ridge. Petiole in side view scale-like; sculpture finer, not alveolate; mesopleural corners angled but not produced into teeth; pilosity abundant; short pubescence present on gastral tergites.	**3**
3.	Propodeal spines smaller than pronotal spines	***Polyrhachis (Myrma) sp. 1***
-	Propodeal spines larger than pronotal spines (teeth)	***Polyrhachis (Hedomyrma) sp. 1***

Subfamily	Formicinae	Code vial	FAH
Genus	*Polyrhachis*	Code report	PrH

Polyrhachis (Hedomyrma) sp. 1



alitrunk
dorsal view



Identification

Body size	Body colour	Alitrunk marginate?	Spines alitrunk	Spines petiole
5.0 - 6.0 mm (mean 5.4 mm)	Dark brown to black	Yes	2 on propodeum	2

Additional characters after Dorow (1995):
- Pronotum and mesothorax without spines;
- 1st gastral segment not concave, without transverse ridge;
- Head not disproportionately large;
- Alitrunk elongated;
- Propodeal spines larger than pronotal spines (latter are only pointed corners);
- Petiole with 2 spines, projecting laterally to posterior, straight;
- Propodeal spines acute, orientated backwards;
- Pronotum with short acute teeth;
- Petiole with almost horizontal plateau between spines.

Other characters:
- Appressed golden pubescence on gaster (best visible when dry);
- Thin setae on body (yellow/amber on alitrunk, transparent on gaster).

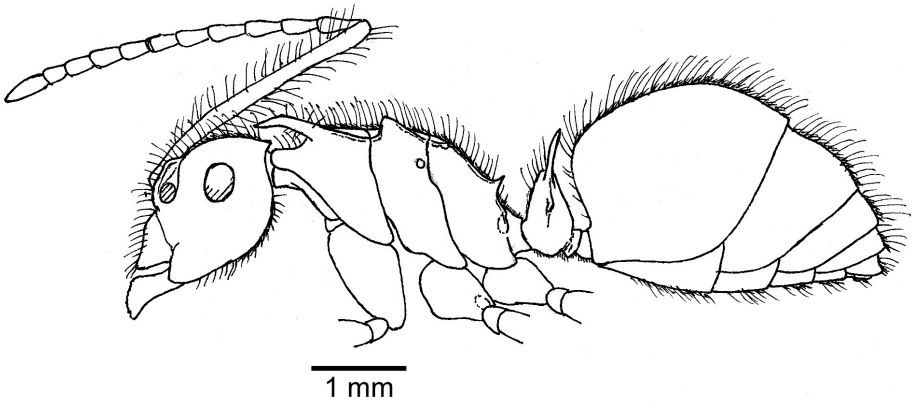
Similar species *Polyrhachis (Myrma) sp. 1*, difference see the species key.

Presence in peat-swamp forest habitat subtypes

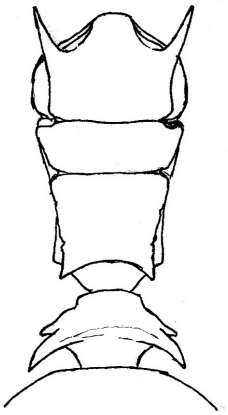
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	-	-	x	-

Subfamily	Formicinae	Code vial	FI
Genus	*Polyrhachis*	Code report	PrM

Polyrhachis (Myrma) sp. 1



alitrunk
dorsal view



Identification

Body size	Body colour	Alitrunk marginate?	Spines alitrunk	Spines petiole
7.0 - 20.0 mm (mean 10.3 mm)	Black	Yes	2 on pronotum 2 on propodeum	4

Additional characters after Dorow (1995):
- Mesothorax with dorsolateral teeth (not spines);
- 1st gastral segment proximally weakly concave, no transverse ridge on top;
- Head not disproportionately large;
- Alitrunk elongated;
- Pronotal spines larger than propodeal spines.

Similar species

Polyrhachis (Hedomyrma) sp. 1, difference see the species key.

Notice that *Polyrhachis (Myrma) sp. 1* is covered with numerous long hairs. There may be another species of the *Myrma* subgenus present in Sabangau with silver pubescence and without so many hairs, see e.g. the ants on the front picture of this guide. These ants seem to visit pitcher plants (*Nepenthes*) and are frequently seen in the forest, and may belong to the species *Polyrhachis pruinosa* Mayr, 1872. The species does not seem to have been sampled by the survey so far. It is therefore unknown whether this silver ant and the *Polyrhachis (Myrma) sp. 1* described here are different species.

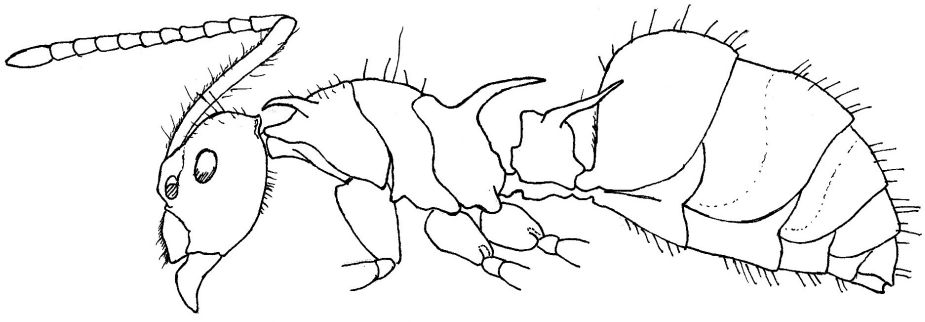
Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	-	-	x	-

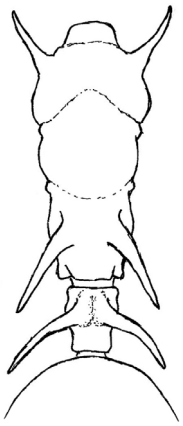
A spiny ant in Sabangau, likely to be *Polyrhachis (Myrma) sp. 1*. Notice the numerous long hairs on the body. Photographer: Stijn Schreven/ OuTrop.

Subfamily	Formicinae	Code vial	FAZ
Genus	*Polyrhachis*	Code report	PrS

Polyrhachis (Myrmhopla) sexspinosa-group sp. 1



alitrunk
dorsal view



Identification

Body size	Body colour	Alitrunk marginate?	Spines alitrunk	Spines petiole
6 mm	Dark reddish brown	No	2 on pronotum 2 on propodeum	2

Additional characters after Dorow (1995) and Bolton (1975a):
- No spines on mesothorax;
- 1st gastral segment not concave, without transverse ridge on top;
- Head not disproportionately large;
- Alitrunk elongated, without margination;
- Petiole in side view rectangular;
- Petiole without subconical prominence between spines;
- Antennal scapes and legs with erect hairs.

Similar species No similar species: body colour and immarginate alitrunk distinguish this species from the other recorded *Polyrhachis* species of Sabangau.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
Exact locality unknown.							

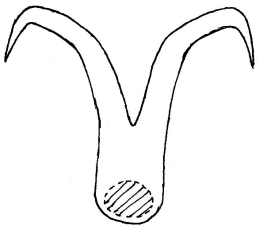
Subfamily	Formicinae	Code vial	Fα (alpha)
Genus	*Polyrhachis*	Code report	Pry

Polyrhachis (Polyrhachis) ypsilon

Emery, 1887

Photographer: Estella Ortega (www.AntWeb.org).

petiole
frontal view



Identification

Body size	Body colour	Alitrunk marginate?	Spines alitrunk	Spines petiole
12.8 mm	Black	No	2 on pronotum 2 on mesothorax	2

Additional characters after Dorow (1995) and Hung (1970):
- Mesothorax armed with 2 spines;
- Alitrunk more or less rounded dorsally, sides without margin along the whole length;
- Petiolar spines diverge widely from their base (Hung 1970), height 3.5 mm;
- Pronotal spines stout and entirely black (Hung 1970).

Other characters:
- Appressed golden pubescence on gaster and other body parts (best visible when dry).

Similar species No similar species: the stout, curved spines on mesothorax distinguish this species from the other recorded *Polyrhachis* species in Sabangau.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	x	-	-	-	-

Photographer: Erik Frank/ OuTrop.

Subfamily	Formicinae
Genus	*Prenolepis*

Prenolepis

Mayr, 1861

Number of species: SAB 1; BOR 1; WRD 17

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	6,4	No	No

Additional characters:
- Alitrunk constricted directly behind pronotum (LaPolla et al. 2010);
- Antennal sockets situated close to posterior margin of clypeus (Bolton 1994).

Related genera	*Nylanderia*, *Euprenolepis*. For distinctions see key, more details in LaPolla *et al.* (2010).
Ecology	Ants of the *Prenolepis* genus-group live and nest in soil, leaf litter or rotten wood near the ground and can form large colonies of over 1000 workers. They appear to be generalist omnivores, in some cases tending aphids (LaPolla *et al.* 2010). Functional group: Cold Climate Specialists (Brown 2000).
Distribution	Highest diversity in Southeast-Asia and South China; outside this region only six species occur (LaPolla et al. 2010).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	x	-	-	-

Distribution data refer to *Prenolepis sp. 1*.

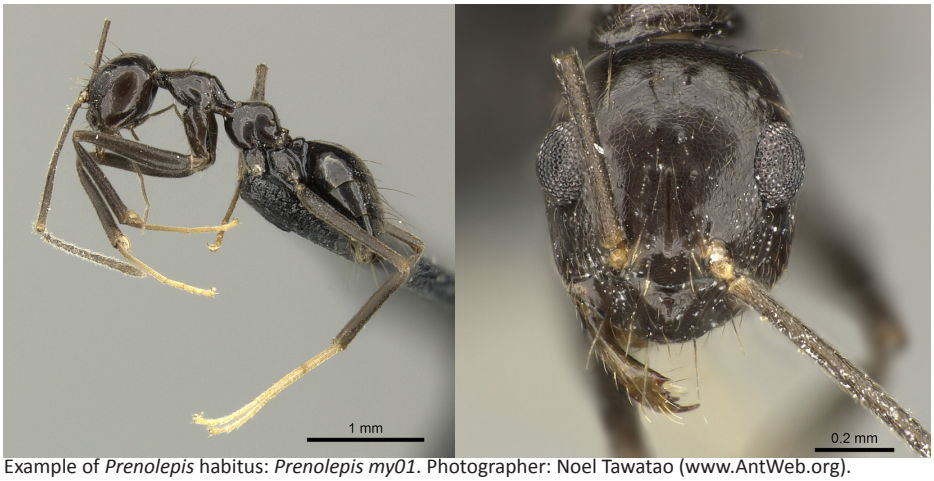
Prenolepis sp. 1

Code vial	FDO
Code report	Pl1

Identification

Body size	Body colour			
3.0 - 3.5 mm (mean 3.3 mm)	Dark brown to black			
- No erect setae on antennal scapes.				

Similar species	See genus account.



Example of *Prenolepis* habitus: *Prenolepis my01*. Photographer: Noel Tawatao (www.AntWeb.org).

Subfamily	Formicinae
Genus	*indet.*

Unidentified

Formicinae sp. 1

Code vial	FAG
Code report	F1

Identification

Body size	Body colour	Antenna	Palp formula	Alitrunk armed?
3.8 - 4.8 mm (mean 4.3 mm)	Dark brown	12 segments	6,4	No

Identification using Bolton (1994) lead to the genus *Lasius*, but this genus is only known from mainland Asia and does not reach so far south.

Additional characters (Bolton 1994):
- Antennal sockets close to posterior clypeal margin;
- Mandible with 12 teeth (6 teeth + 6 denticles);
- Orifice of propodeal spiracle (sub)circular;
- Acidopore present? Likely, but difficult to see (if absent, the specimens key out as *Iridomyrmex* (Dolichoderinae));
- Petiole with scale-like node;
- Metapleural gland orifice present;
- Eyes behind midlength of sides of head;
- Mesothorax not constricted immediately behind pronotum;
- Not in *Prenolepis* genus-group (LaPolla et al. 2010), e.g. because there are too many teeth on the mandible.

Similar species In habitus somewhat resembling *Philidris sp. 1*, but eyes behind midlength of sides of head.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	x	-	-	x	x

Formicinae sp. 2

Code vial	FDQ
Code report	F2

Identification

Body size	Body colour
> 2.5 mm (incomplete specimen, gaster missing)	Light brown

One specimen collected in survey so far, probably a *Pseudolasius* major worker.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	x	-	-	-

Subfamily Myrmicinae

Characters	2 waist segments (petiole and postpetiole), sting present, promesonotal suture absent.
Diversity	14 genera, 44 species
Unidentified	Myrmicinae sp. 1 (M1)

Identification of the genera (excluding M1), based on Bolton (1994):

No.	Diagnosis	Go to:
1.	Postpetiole articulated on dorsal surface of first gastral segment; gaster in dorsal view heart-shaped; petiole dorsoventrally flattened, without a node	***Crematogaster***
-	Postpetiole articulated on anterior surface of first gastral segment; gaster in dorsal view not heart-shaped; petiole with a node of some form, not dorsoventrally flattened	**2**
2.	Antennal tip forming a club of 2 segments, i.e. apical and pre-apical segments much larger than other segments of funiculus	**3**
-	Antennal tip forming a club of 3 or more segments	**9**
3.	Antenna with 6 segments	***Strumigenys***
-	Antenna with 9-12 segments	**4**
4.	Antenna with 9-10 segments	**5**
-	Antenna with 11-12 segments	**8**
5.	Antenna with 9 segments. Propodeal spines slightly lamellate below.	***Solenopsis***
-	Antenna with 10 segments	**6**
6.	Antennal scrobes absent	**7**
-	Antennal scrobes present above the eyes. Frontal lobes and frontal carinae broad, clypeus bidentate process which projects over mandibles.	***Mayriella***
7.	Postpetiole broadly attached to gaster. Frontal lobes touching each other; head and alitrunk longitudinally striate.	***Rhopalomastix***
-	Postpetiole narrowly attached to gaster	***Carebara***
8.	Antenna with 11 segments	***Pheidologeton***
-	Antenna with 12 segments	***Cardiocondyla***
9.	Antenna with 9 segments. Promesonotum sharply marginate laterally; petiole sessile; frontal lobes widely separated.	***Meranoplus***
-	Antenna with 11-12 segments	**10**
10.	Antenna with 11 segments	**11**
-	Antenna with 12 segments	**12**
11.	Petiole (sub)sessile and with a large ventral process; petiole not enormously more voluminous than postpetiole in dorsal view and in profile	***Vollenhovia***
-	Petiole pedunculate and at most with a small, tooth-like ventral process on the peduncle; if peduncle short and stout than petiole enormously more voluminous than postpetiole in dorsal view and in profile. Propodeum unarmed, evenly rounded.	***Monomorium***
12.	Sting with an apicodorsal appendage (lamellate or pennant-shaped) projecting from the shaft at an angle to its axis; lateral portions of clypeus raised into a sharp-edged ridge or shield wall on each side, in front of the antennal sockets. Propodeal lobes pointed. Eyes usually at or in front of the midlength of the sides of the head. Palp formula 4,3, rarely reduced	***Tetramorium***
-	Sting without an appendage; lateral portions of clypeus without ridge	**13**
13.	Apical masticatory margin of mandible with 3-6 sharply defined teeth or denticles in total, decreasing in size from apex to base. Midpoint of anterior clypeal margin with an unpaired median seta, usually elongate and stout and projecting forward over the mandibles	**14**
-	Apical masticatory margin of mandible with 7 or more teeth or denticles; dentition decreasing in size or (more often) with ill-defined crenulations or denticles between the main teeth or in a series near basal angle; sometimes teeth alternating in size along the length of the margin	**15**

Subfamily Myrmicinae

No.	Diagnosis	Go to:
14.	Propodeum unarmed and rounded, at most with a pair of minute denticles (in the latter case eyes consist of only a single ommatidium). Maxillary palp with 1-2 segments.	***Monomorium***
-	Propodeum armed with a pair of teeth or spines; eyes always with many ommatidia. Maxillary palp with 5 segments; lateral portions of clypeus dorsoventrally flattened and thin, strongly prominent over the mandibles.	***Cardiocondyla***
15.	Tergite of first gastral segment medially overlapping onto the anteroventral surface, the suture between its tergite and sternite basally in the form of a rounded M-shape and the postpetiole articulated in the base of the M; in profile the postpetiole attached on the apparent anteroventral surface of the gaster. Palp formula 4,3; a pair of spines on pronotum, propodeum and petiole.	***Acanthomyrmex***
-	Tergite of first gastral segment medially not overlapping onto the anteroventral surface, the suture basally transverse; postpetiole not attached anteroventrally on the gaster. Palp formula 2,2 (or 3,2); alitrunk with 2-4 spines, petiole without spines.	***Pheidole***

Subfamily	Myrmicinae
Genus	*Acanthomyrmex*

Acanthomyrmex

Emery, 1893

Number of species: SAB 1; BOR 6; WRD 17
One morphospecies recorded from Sabangau. Species identification using Moffett (1986) classified this morphospecies as *Acanthomyrmex ferox* Emery, 1893.

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	3 segments	4,3	4 spines	2 spines

Additional characters (Moffett 1986):
- Dimorphic workers (minors and majors);
- Paired spines on pronotum, propodeum and petiole.

Related genera	*Pheidole*. Besides the differences in the key, *Acanthomyrmex* has spines or points on the petiole, which are absent in *Pheidole*.
Ecology	*Acanthomyrmex* ants are omnivores that primarily forage on seeds (Moffett 1986), especially the seeds of figs (Brown 2000). The small colonies can be found in rainforests, but because of their tiny size are rarely encountered (Moffett 1986, Brown 2000). Functional group: Tropical Climate Specialists (Brown 2000).
Distribution	*Acanthomyrmex* is endemic to Southeast Asia (Moffett 1986).

Presence in peat-swamp forest habitat subtypes

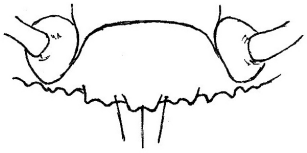
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
Exact locality unknown							

Distribution data refer to *Acanthomyrmex ferox*.

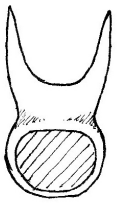
Subfamily	Myrmicinae	Code vial	FP
Genus	*Acanthomyrmex*	Code report	Acf

Acanthomyrmex ferox

Emery, 1893



clypeus



petiole
posterior view

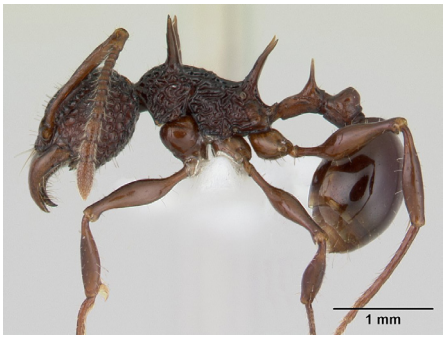
Identification

Body size	Body colour	Promesonotum armed?	Propodeum armed?
Not measured	Dark reddish brown	2 spines	2 spines

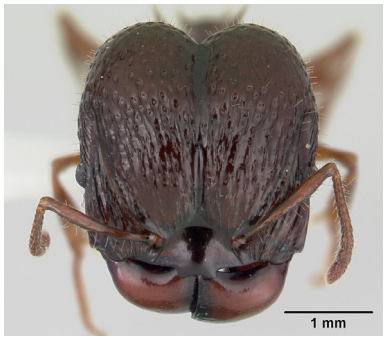
Additional characters (Moffett 1986):
- Petiole with lateral apical spines;
- Clypeus with medial clypeal lobe on either side of medial clypeal hair;
- Head with conspicuous alveolate structure.

Similar species	No congeneric species recorded in Sabangau, see further Moffett (1986).
Ecology	*Acanthomyrmex ferox* nests in leaf litter, rotten wood or soil in hill forest, lowland rainforest and disturbed primary rainforest (Moffett 1986).
Distribution	The species is found in peninsular Malaysia, Borneo (Sarawak, Sabah and Kalimantan) and Sumatra (Moffett 1986).

Minor worker



Major worker



Photographer:
April Nobile (from www.AntWeb.org)

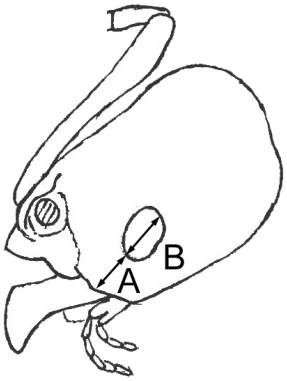
Subfamily	Myrmicinae
Genus	*Cardiocondyla*

Cardiocondyla

Emery, 1869

Number of species: SAB 4; BOR 6; WRD 69
Species identification and simplified key largely based on Seifert (2003).
Indices used in the species accounts (measures see Seifert 2003):

- Gena index (GI, index for distance between eye and mandible) = A/B, in which A is the distance between eye and mandible insertion, and B is the diameter of the eye;
- Postocular index (PoI) = postocular distance / head length;
- Scape index (SI) = scape length / head length;
- Petiole index (PeI) = max. petiole width / max. postpetiole width;
- Cephalic index (CI) = head width / head length.



Measurements for GI. Illustration by Stijn Schreven.

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	2-3 segments	5,3	2 spines	No

Additional characters (Bolton 1994):
- Lateral portions of clypeus dorsoventrally flattened and thin, strongly prominent over mandibles.

Related genera *Pheidologeton*, *Monomorium*. *Pheidologeton* can be distinguished by having 11 antennal segments (instead of 12). *Monomorium* differs from *Cardiocondyla* in lacking spines. Other small myrmicine genera can generally be excluded by the number of antennal segments or the features above.

Ecology *Cardiocondyla* ants are omnivores feeding on other arthropods, carrion, seeds and nectar. Colonies contain at most 500 workers, with one to several gynes. Nests are made in soil and have only one narrow entrance. Many tropical species are found in primary rainforest, but a large number of other species readily colonise disturbed environments as tramp species worldwide (Seifert 2003). Functional group: Opportunists (Brown 2000).

Distribution Warm Old World except Australia; adventive worldwide (Brown 2000).

Presence in peat-swamp forest habitat subtypes

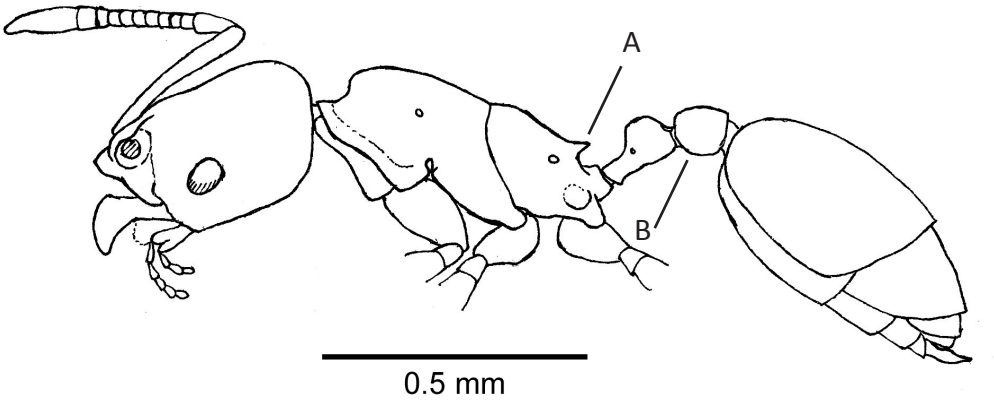
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	-	-	x	x	x

Key to the morphospecies of the genus *Cardiocondyla*

No.	Diagnosis	Go to:
1.	Postpetiole anteroventrally with a lateral lobe on either side. Body entirely yellow.	**2**
-	Postpetiole anteroventrally without lateral lobes. At least gaster dark brown.	**3**
2.	Propodeal spines 3.5 times as long as wide (at base); metanotal groove absent; petiole width 0.72 x postpetiole width	***Cardiocondyla wroughtonii*-group *sp. 1***
-	Propodeal spines 2 times as long as wide (at base); metanotal groove shallow but present; petiole width 0.66 x postpetiole width	***Cardiocondyla wroughtonii*-group *sp. 2***
3.	Propodeal spines reduced to blunt corners, width larger than height and not pointed	***Cardiocondyla sp. 2***
-	Propodeal spines pointed and triangular, height about as large as width at base	***Cardiocondyla sp. 1***

Subfamily	Myrmicinae	Code vial	FAB, FCU
Genus	*Cardiocondyla*	Code report	Cd1

Cardiocondyla sp. 1



Identification

Body size	Body colour	Propodeal spine shape	Postpetiole
1.5 - 2.4 mm (mean 2.1 mm)	Amber to dark brown	Width = length [A]	No lateral lobes [B]

- Head and alitrunk amber (though alitrunk can be a bit lighter), gaster dark brown;
- Propodeal spines triangular, width at base approximately equals length [A];
- Eye separated from mandible insertion by less than its diameter: GI = 0.59;
- Vertex (dorsum of head) clearly foveolate (honeycomb sculpture); alitrunk largely foveolate;
- PoI = 0.41 - 0.47; SI = 0.69 - 0.73; PeI = 0.68 - 0.73; CI = 0.61 - 0.86.

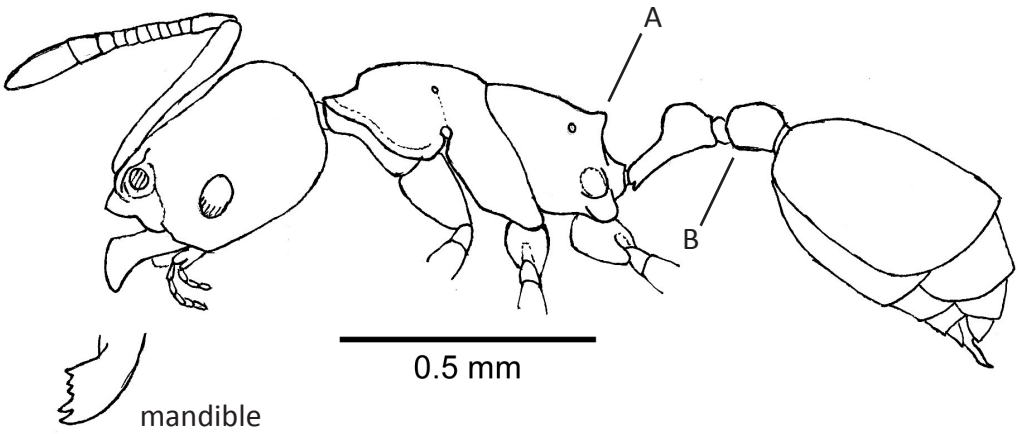
Similar species *Cardiocondyla sp. 2* has shorter, blunt propodeal spines. Both species have subtle differences in biometrics and body colour (of which the reliability remains to be determined).
Previously *Cardiocondyla sp. 1* and *sp. 2* have been recorded as one species, so the distribution data at present are compromised and include both species.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	-	-	x	x

Subfamily	Myrmicinae	Code vial	FCS
Genus	*Cardiocondyla*	Code report	Cd2

Cardiocondyla sp. 2



Identification

Body size	Body colour	Propodeal spine shape	Postpetiole
2.5 mm	Dark amber and dark brown	Width > length [A]	No lateral lobes [B]

- Head and alitrunk (dark) amber, gaster dark brown;
- Propodeal spines reduced to blunt corners, width at base is larger than length [A];
- Eye separated from mandible insertion by less than its diameter: GI = 0.75;
- Vertex clearly foveolate, alitrunk largely foveolate/ punctate;
- PoI = 0.45; SI = 0.87; PeI = 0.61; CI = 0.88.

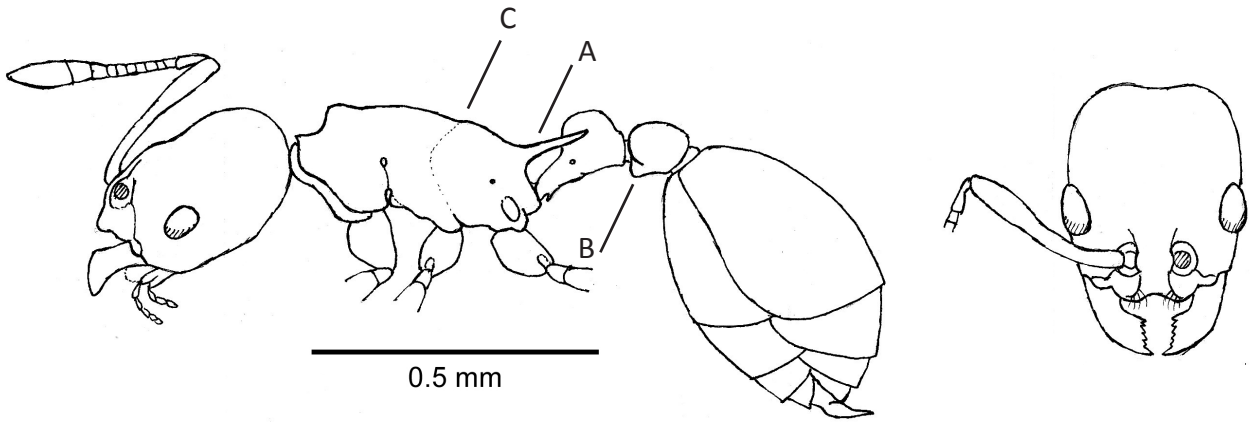
Similar species See *Cardiocondyla sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
Compromised distribution data under *Cardiocondyla sp. 1*							

Subfamily	Myrmicinae	Code vial	FAK
Genus	*Cardiocondyla*	Code report	Cd3

Cardiocondyla wroughtonii-group *sp. 1*



Identification

Body size	Body colour	Propodeal spine shape	Postpetiole
1.5 - 2.3 mm (mean 1.7 mm)	Yellow	3.5 x width = length [A]	With lateral lobes [B]

- Body entirely yellow;
- Propodeal spines long, 3.5x as long as wide at base [A];
- Eye separated from mandible insertion by slightly more than its diameter: GI = 1.07;
- Vertex clearly foveolate, alitrunk largely foveolate;
- Metanotal groove absent [C];
- PoI = 0.44; SI = 0.76; PeI = 0.72; CI = 0.87.

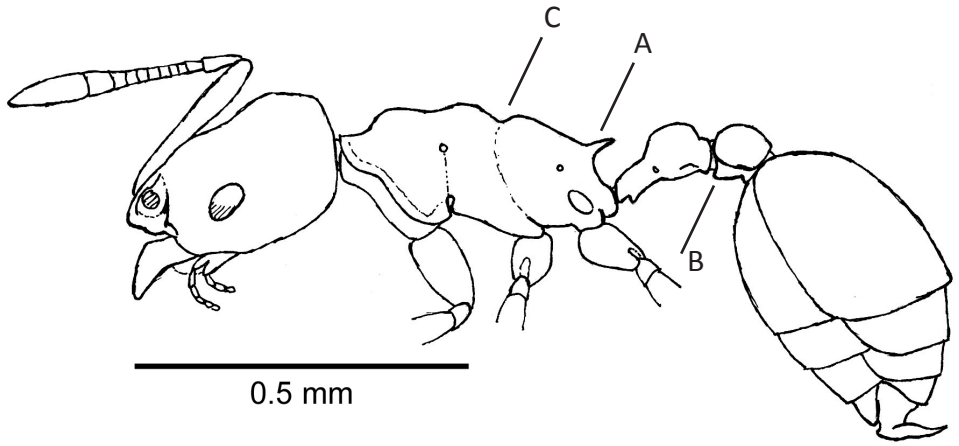
Similar species *Cardiocondyla wroughtonii*-group *sp. 2*, which can be distinguished by the shorter spines and the presence of a shallow metanotal groove.
Previously *Cardiocondyla wroughtonii*-group *sp. 1* and *C. wroughtonii*-group *sp. 2* have been recorded as one species, so the distribution data at present are compromised and include both species.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	x	x	x

Subfamily	Myrmicinae	Code vial	FCT
Genus	*Cardiocondyla*	Code report	Cd4

Cardiocondyla wroughtonii-group *sp. 2*



Identification

Body size	Body colour	Propodeal spine shape	Postpetiole
1.0 - 1.5 mm	Yellow	2 x width = length [A]	With lateral lobes [B]

- Body entirely yellow, slightly darker than in *Cardiocondyla wroughtonii*-group *sp. 1*;
- Propodeal spines long, 2x as long as wide at base [A];
- Eye separated from mandible insertion by approximately its diameter: GI = 0.88;
- Vertex clearly foveolate; alitrunk largely foveolate;
- Metanotal groove shallow but present [C];
- PoI = 0.46; SI = 0.72; PeI = 0.66; CI = 0.86.

Similar species See *Cardiocondyla wroughtonii*-group *sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
Compromised distribution data under *Cardiocondyla wroughtonii*-group *sp. 1*							

Subfamily	Myrmicinae
Genus	*Carebara*

Carebara

Westwood, 1840

Number of species: SAB 1; BOR 0; WRD 166

Pfeiffer *et al.* (2011) mention that there are many Bornean species in genera like *Carebara*, but so far all remain undescribed.

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
10 segments	2 segments	?	No	No

Additional characters:
- Minute eyes;
- Postpetiole narrowly attached to the gaster (Bolton 1994);
- Anterior clypeal margin with median pair of setae (Bolton 1994).

Related genera	*Mayriella*, *Rhopalomastix*, *Solenopsis*. *Solenopsis* ants have 9 antennal segments and the other two genera can be distinguished by the features mentioned in the key (antennal scrobe and postpetiole attachment).
Ecology	Functional group: Cryptic Species (Brown 2000).
Distribution	Afrotropical, Indomalayan and Neotropical (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	-	-	x	-

Distribution data refer to *Carebara sp. 1*.

Carebara sp. 1

Code vial	FDS
Code report	Cb1

Identification

Body size	Body colour	Eyes		
2.0 mm	Dark brown	Minute but present		

Similar species	See genus account.

Example of *Carebara* habitus: *Carebara alpha* (Forel, 1905). Photographer: Zach Lieberman (from www.AntWeb.org)

Subfamily	Myrmicinae
Genus	*Crematogaster*

Crematogaster - acrobat ants

Lund, 1831

Number of species: SAB 10; BOR 33; WRD 486

Diagnostic features for species derived from Longino (2003) and species identification of the subgenus *Physocrema* based on Hosoishi and Ogata (2009).

N.B.: Hosoishi and Ogata (2009) use a different numbering for the gastral segments, i.e. counting from the propodeum as the original first abdominal segment, the petiole as the 2nd, the postpetiole as the 3rd and the first gastral segment as the 4th abdominal segment. This is important when using their identification key and species descriptions.

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
11 segments	3 segments	5,3	0-2 spines	No

Easily recognisable by:
- The dorsal attachment of the postpetiole to the first gastral segment;
- The heart-shaped gaster.

Related genera	Unmistakable.
Ecology	Nesting mainly arboreal, in or on dead or living parts of plants (trunks, bark, branches, twigs), with some species forming a mutualistic relation with the plants in which they nest (myrmecophytes) (Brown 2000, Blaimer 2012). In Sabangau some *Crematogaster* colonies inhabit the stems of *Macaranga* plants. Functional group: Generalized Myrmicinae (Brown 2000).
Distribution	In tropical and temperate regions worldwide (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	x	x

Key to the morphospecies of the genus *Crematogaster*

No.	Diagnosis	Go to:
1.	Propodeum inflated; propodeum without spines, only rounded lobes.	**2**
-	Propodeum not inflated; propodeum armed with spines (varying from small and short to long and stout).	**4**
2.	Propodeal spiracle situated away from metapleural gland orifice: distance between them greater than propodeal spiracle diameter. Propodeum distinctly raised relative to promesonotum, metanotal groove deep.	***Crematogaster sewardi***
-	Propodeal spiracle situated close to metapleural gland orifice: distance between them about the same as propodeal spiracle diameter	**3**
3.	Clypeus smooth and shining without longitudinal rugulae. Body colour black, with orange propodeum.	***Crematogaster inflata***
-	Clypeus striated with rugulae. Body entirely brown. Dorsal face of head without longitudinal rugulae and posterior part of pronotum without transverse rugulae in dorsal view.	***Crematogaster cf. onusta***
4.	Body entirely yellow; small species (1.5-2 mm), short propodeal spines	***Crematogaster sp. 7***
-	Body not entirely yellow; generally larger species (at least 2 mm)	**5**
5.	Propodeum with short, triangular spines (length = width at base)	**6**
-	Propodeum with longer spines (length > width at base)	**7**

Subfamily	Myrmicinae
Genus	*Crematogaster*

No.	Diagnosis	Go to:
6.	Postpetiole wider than petiole; body entirely (dark) brown.	***Crematogaster sp. 6***
-	Postpetiole narrower than petiole; postpetiole and gaster dark brown to black, contrasting with rest of body which is yellow-orange.	***Crematogaster sp. 2***
7.	Petiole and postpetiole almost equally wide, petiole unflanged; body dark brown	**8**
-	Petiole wider than postpetiole, petiole laterally flanged; body light brown	**9**
8.	Spines long (8.5-10.5 units in graticulated eyepiece at 40x magnification); petiole laterally rounded, and its length in profile/dorsal view almost 2x the length of postpetiole (11 vs. 6 units respectively)	***Crematogaster sp. 1***
-	Spines shorter (6-6.5 units); petiole laterally more angular, and its length less than 1.5x the length of postpetiole (8 vs. 6 units respectively)	***Crematogaster sp. 5***
9.	Spines short and curved slightly backwards (5.5 units); antennal scape shorter	***Crematogaster sp. 3***
-	Spines longer and straight (10 units); antennal scape longer	***Crematogaster sp. 4***

Workers of a *Crematogaster* species (subgenus *Physocrema*) forage on a sugar-salt solution that was sprayed on vegetation. Andrew Walmsley Photography/ OuTrop.

Subfamily	Myrmicinae	Code vial	-
Genus	*Crematogaster*	Code report	Cri

Crematogaster (Physocrema) inflata

Smith, 1857

Photographer: Shannon Hartman (from www.AntWeb.org).

Identification

Body size	Body colour	Propodeum	Spines propodeum	Metanotal groove
Not measured.	Black and orange	Inflated	No, obtuse lobes	Slightly convex

Additional characters after Hosoishi and Ogata (2009):
- The colour pattern is distinctive and unique to this species: body black (or red-brown), propodeum orange - yellow;
- Polymorphic in size;
- Propodeal spiracle near metapleural gland orifice, distance between them is about the same as spiracle diameter;
- Clypeus smooth and shining, only finely punctate, without longitudinal rugulae.

Similar species *Crematogaster cf. onusta* and *C. sewardi*, but *C. inflata* is unmistakable by colour pattern.

Distribution From Southern Thailand and West Malaysia to Borneo and Philippines (Hosoishi & Ogata 2009).

Presence in peat-swamp forest habitat subtypes

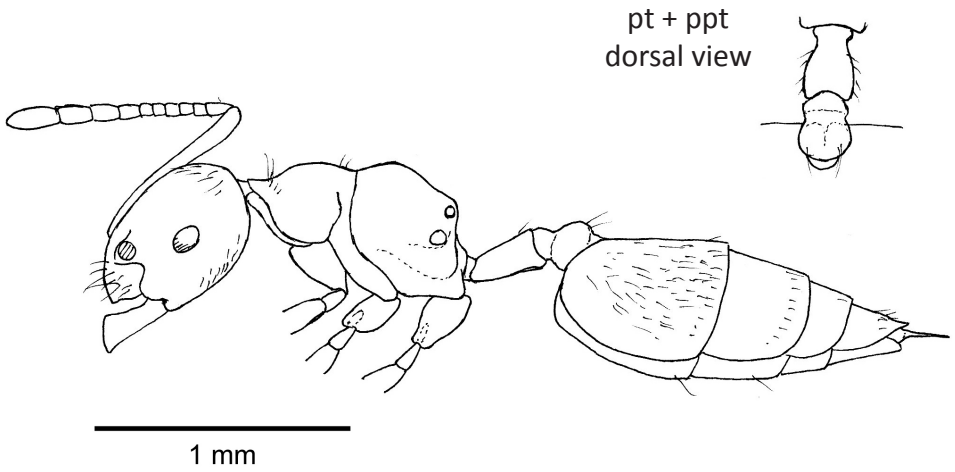
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-
Known only from field observations so far; at least present in intact mixed-swamp forest.							

Crematogaster inflata workers carrying a dead spider. Photographer: Erik Frank/ OuTrop.

Subfamily	Myrmicinae	Code vial	FΣ (sigma)
Genus	*Crematogaster*	Code report	Cro

Crematogaster (Physocrema) cf. onusta

Stitz, 1925



Identification

Body size	Body colour	Propodeum	Spines propodeum	Metanotal groove
2.7 - 3.4 mm (mean 3.2 mm)	Dark brown	Inflated	No, obtuse lobes	Almost straight

Additional characters after Hosoishi and Ogata (2009):
- Monomorphic in size;
- Propodeal spiracle near metapleural gland orifice, distance between them is about the same as spiracle diameter;
- Clypeus smooth and shining, only finely punctate, with some indistinct longitudinal rugulae.

Other characters:
- Several longitudinal rugulae between mesonotum and propodeum;
- Pro- and mesonotum in one convexity, propodeum slightly raised relative to promesonotum;
- Pronotum without rugulae.

Similar species *Crematogaster sewardi* and *C. inflata*. Different from the first by the distance between propodeal spiracle and gland orifice, and the depth of the metanotal groove. Different from *C. inflata* by the clypeus sculpture and metanotal groove, but more easily by the body colour (black and orange in *C. inflata*).
Previously *Crematogaster cf. onusta*, *C. sewardi* and *C. sp. 6* have been recorded as one species, so the distribution data at present are compromised and include all 3 species.

Distribution Tioman Island and Borneo (Hosoishi & Ogata 2009).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Crematogaster onusta. Photographer: Bonnie Blaimer (from www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FCR
Genus	*Crematogaster*	Code report	Crs

Crematogaster (Physocrema) sewardi

Forel, 1901

Photographer: Hans Peter Katzmann (from www.Antbase.net).

Identification

Body size	Body colour	Propodeum	Spines propodeum	Metanotal groove
4.0 mm	Dark brown	Inflated	No, obtuse lobes	Deep

Additional characters after Hosoishi and Ogata (2009):
- Pronounced size polymorphism;
- Propodeal spiracle situated away from the metapleural gland orifice, distance between them greater than spiracle diameter;
- Setae on 1st gastral tergite (= 4th abdominal tergite) directed posteriorly;
- Dorsal profile of promesonotum convex, propodeum distinctly raised relative to promesonotum.

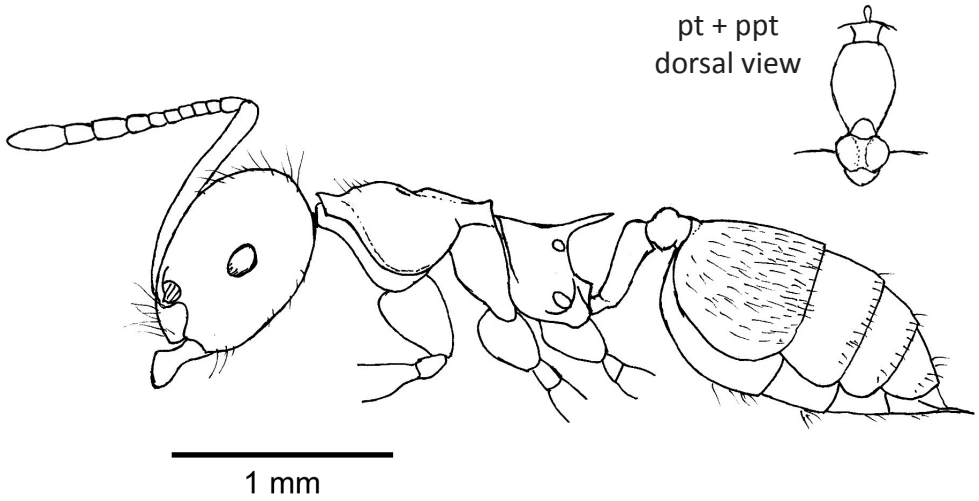
Similar species	See *Crematogaster cf. onusta*.
Distribution	Wide range: Thailand, West Malaysia, Sumatra, Borneo, Java, Bali, Lombok and Krakatau Island (Hosoishi & Ogata 2009).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	x	-	-	-
Previous compromised distribution data under *Crematogaster cf. onusta*							

Subfamily	Myrmicinae	Code vial	FO
Genus	*Crematogaster*	Code report	Cr1

Crematogaster sp. 1



Identification

Body size	Body colour	Propodeum	Spines propodeum	Index width ppt/pt
2.0 - 4.7 mm (mean 3.3 mm)	Dark brown	Not inflated	Long, straight	0.93

- Petiole unflanged, only slightly broader than postpetiole;
- Propodeal spines long, 8.5-10.5 units in graticulated eyepiece at 40x magnification;
- Sides of petiole rounded;
- Petiole almost 2x as long as postpetiole in dorsal view and in profile.

Similar species

Crematogaster sp. 3, *sp. 4* and *sp. 5*. *Crematogaster sp. 3* and *sp. 4* differ from *sp. 1* by having a flanged petiole which is clearly wider than the postpetiole, and a lighter brown body. *Crematogaster sp. 5* has shorter spines, more angular sides of the petiole, and a shorter petiole relative to the postpetiole.

Previously *Crematogaster sp. 1*, *sp. 3*, *sp. 4* and *sp. 5* have been recorded as one species, so part of the distribution data of *C. sp. 1* at present are compromised and include all four species.

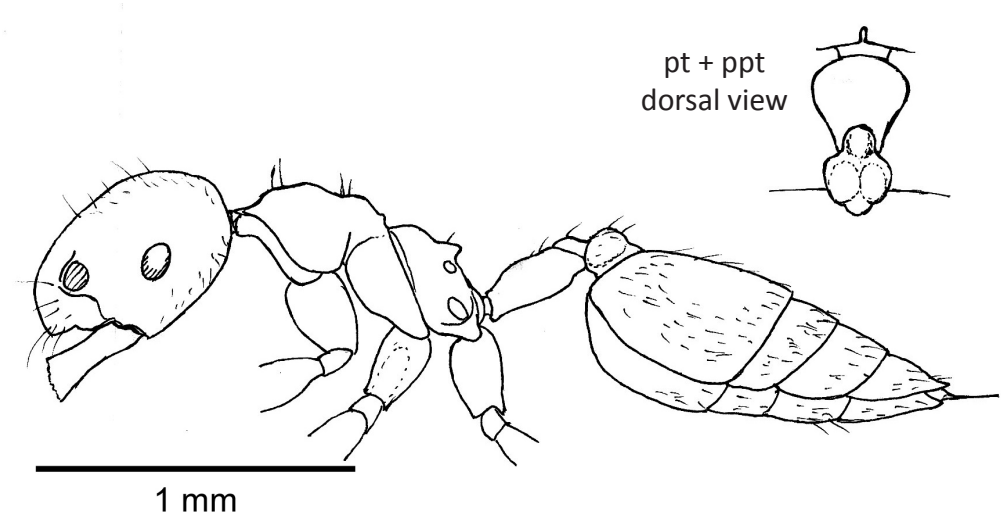
Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	x	x
-	-	x	x	-	-	-	-

The upper row represents compromised distribution data;
the lower row represents revised data from Feb-Apr 2012, including only *Crematogaster sp. 1*

Subfamily	Myrmicinae	Code vial	FV
Genus	*Crematogaster*	Code report	Cr2

Crematogaster sp. 2



Identification

Body size	Body colour	Propodeum	Spines propodeum	Index width ppt/pt
2.8 - 3.5 mm (mean 3.1 mm)	Light and dark brown	Not inflated	Very short, blunt	0.76

[antennae missing in the single collection specimen]
- Gaster dark brown to black, contrasting with the yellow-orange head, alitrunk, petiole and legs;
- Petiole clearly wider than postpetiole;
- Spines very short, triangular and blunt: width at base approximately equals length (length is 2 units in graticulated eyepiece at 40x magnification).

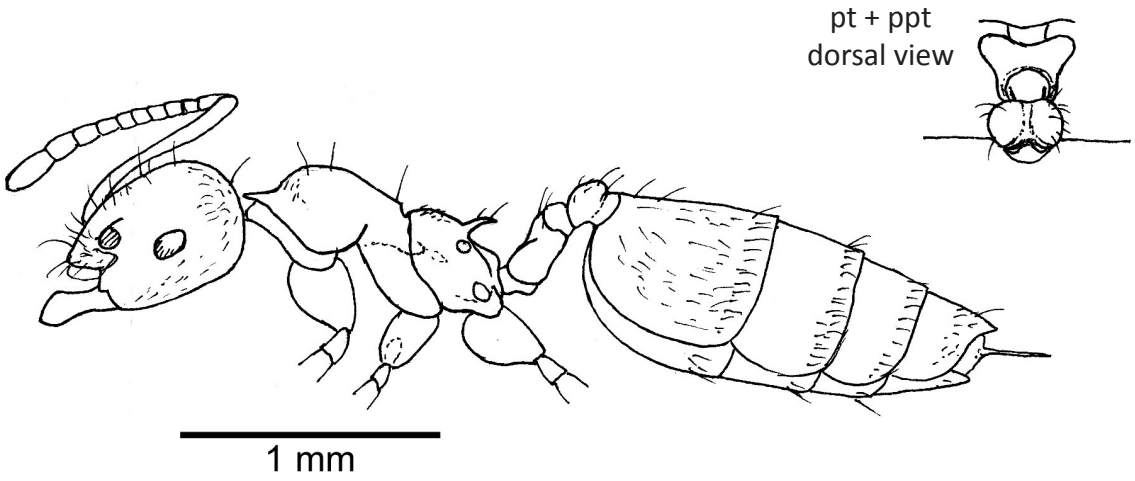
Similar species *Crematogaster sp. 6* has a unicoloured body and its petiole is narrower than the post-petiole (instead of the opposite as in *C. sp. 2*).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Subfamily	Myrmicinae	Code vial	FCN, FDG
Genus	*Crematogaster*	Code report	Cr3

Crematogaster sp. 3



Identification

Body size	Body colour	Propodeum	Spines propodeum	Index width ppt/pt
2.5 - 4.0 mm (mean 3.3 mm)	Light brown	Not inflated	Short, curved	0.79

- Petiole flanged: petiole broad with lateral parts extended;
- Petiole clearly wider than postpetiole;
- Propodeal spines short and curved, 5.5 units in graticulated eyepiece at 40x magnification.

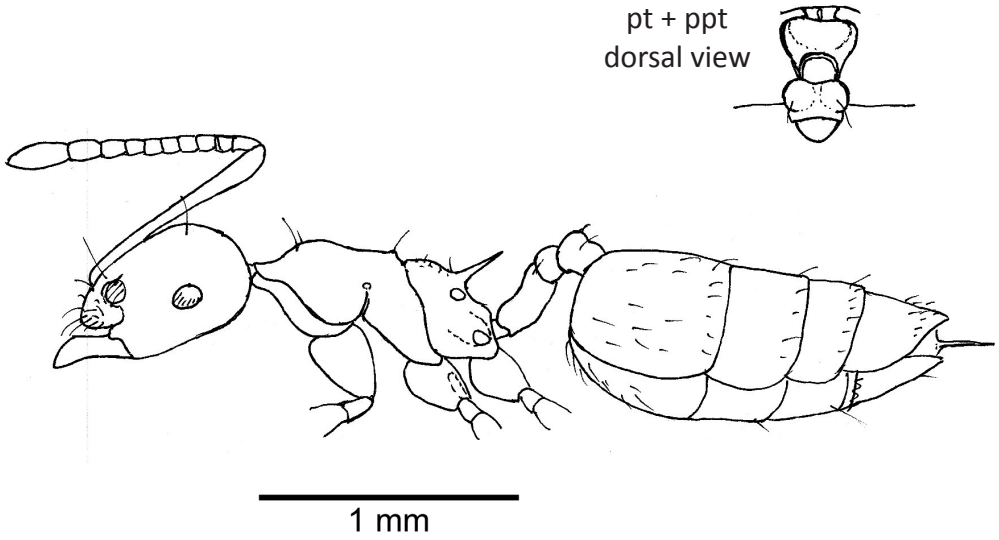
Similar species *Crematogaster sp. 4*; distinction by propodeal spine shape, spine length and antennal scape length. Distinction with *Crematogaster sp. 1* and *sp. 5*, see *Crematogaster sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	x	x	-	x	-
Previous compromised distribution data under *Crematogaster sp. 1*							

Subfamily	Myrmicinae	Code vial	FCO
Genus	*Crematogaster*	Code report	Cr4

Crematogaster sp. 4



Identification

Body size	Body colour	Propodeum	Spines propodeum	Index width ppt/pt
4.0 mm	Light brown	Not inflated	Long, straight	0.89

- Petiole flanged: petiole broad, but lateral parts less flattened/extended than *Crematogaster sp. 3*;
- Petiole clearly wider than postpetiole;
- Propodeal spines long and straight, 10 units in graticulated eyepiece at 40x magnification;
- Antennal scape relatively longer than in *Crematogaster sp. 3*.

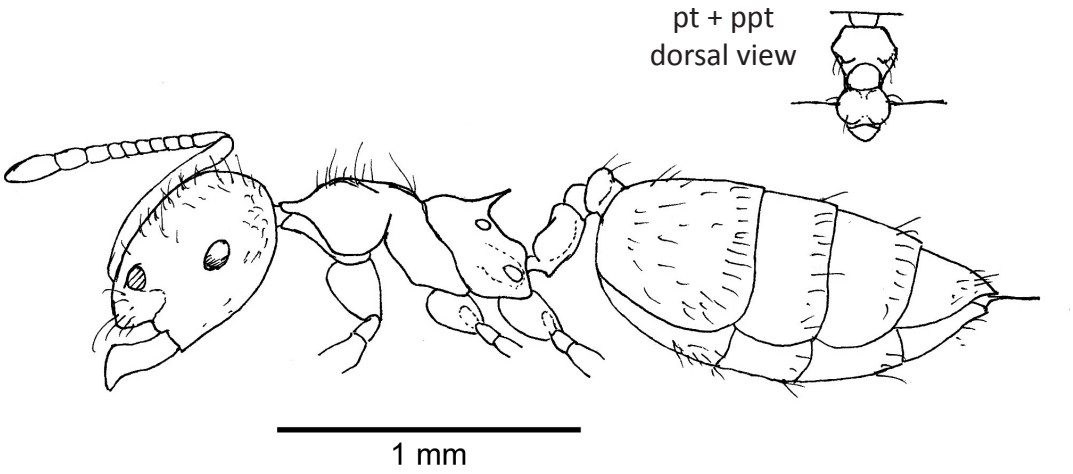
Similar species See *Crematogaster sp. 3*. Distinction with *Crematogaster sp. 1* and *sp. 5*, see *Crematogaster sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
Compromised distribution data under *Crematogaster sp. 1*							

Subfamily	Myrmicinae	Code vial	FCP
Genus	*Crematogaster*	Code report	Cr5

Crematogaster sp. 5



Identification

Body size	Body colour	Propodeum	Spines propodeum	Index width ppt/pt
2.0 - 3.5 mm (mean 2.7 mm)	Dark brown	Not inflated	Short, straight	0.90

- Petiole unflanged, only slightly broader than postpetiole;
- Propodeal spines shorter than in *Crematogaster sp. 1*, 6-6.5 units in graticulated eyepiece at 40x magnification;
- Sides of petiole more angular;
- Petiole less than 1.5x as long as postpetiole in dorsal view and in profile.

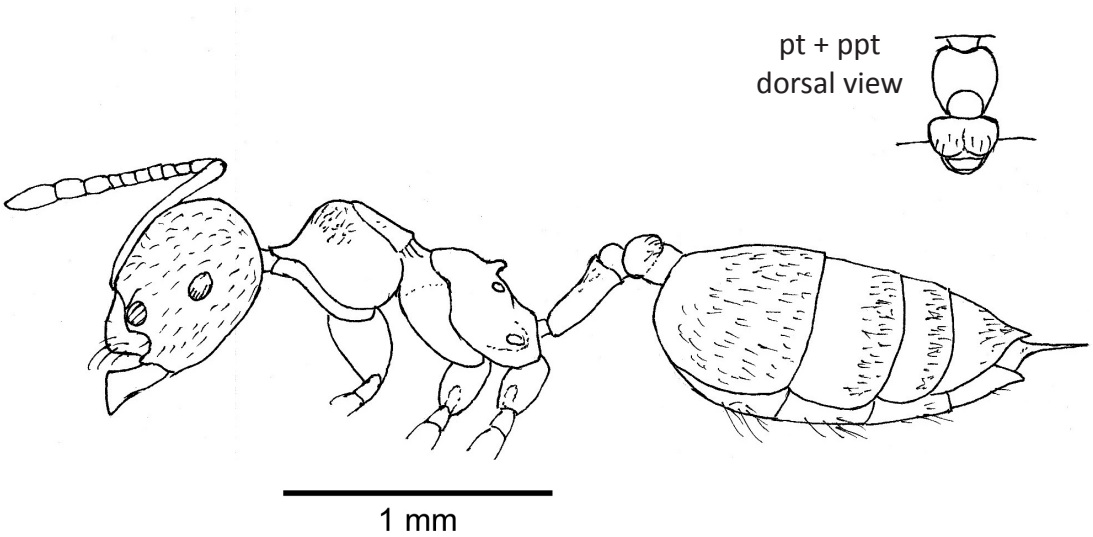
Similar species See *Crematogaster sp. 1*. Propodeal spines shorter than in *Crematogaster sp. 1* and *sp. 4*, longer than in *sp. 3*. Body colour slightly lighter brown than *Crematogaster sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	x	x	-	-
Previous compromised distribution data under *Crematogaster sp. 1*							

Subfamily	Myrmicinae	Code vial	FCQ
Genus	*Crematogaster*	Code report	Cr6

Crematogaster sp. 6



Identification

Body size	Body colour	Propodeum	Spines propodeum	Index width ppt/pt
2.0 - 3.5 mm (mean 2.7 mm)	Dark brown to black	Not inflated	Very short	1.20

- Body uniformly coloured dark brown to black;
- Petiole slightly narrower than postpetiole;
- Propodeal spines very short, width at base approximately equals length.

Similar species

See *Crematogaster sp. 2*.
Although previously mixed up with *Crematogaster cf. onusta* and *C. sewardi*, the difference with those two is quite clear: the propodeum of both is strongly inflated and instead of spines bears two obtuse lobes. In *Crematogaster sp. 6* the propodeum is not inflated as much as to belong to the subgenus *Physocrema*, and it bears two clear short spines.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
Compromised distribution data under *Crematogaster (Physocrema) cf. onusta*							

Subfamily	Myrmicinae	Code vial	FDF
Genus	*Crematogaster*	Code report	Cr7

Crematogaster sp. 7

Identification

Body size	Body colour	Propodeum	Spines propodeum	Index width ppt/pt
1.5 - 2.0 mm (mean 1.8 mm)	Yellow	Not inflated	Short	Not measured.

- Body entirely yellow;
- Propodeal spines short.

Similar species Unmistakable due to its small size and body coloured entirely yellow.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	x	-	-	-	-

Subfamily	Myrmicinae
Genus	*Mayriella*

Mayriella

Forel, 1902

Number of species: SAB 1; BOR 1; WRD 9

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
10 segments	2 segments	4,3	2 spines	No

Additional characters (Bolton 1994):
- Clypeus with a bidentate process projecting over mandibles;
- Mandible with 4-5 teeth;
- Petiole with ventral process.

Related genera *Rhopalomastix*, *Carebara*. Distinct from most small myrmicine genera by the antenna with 10 segments of which 2 make up the antennal club. *Rhopalomastix* and *Carebara* differ by the absence of antennal scrobes above the eyes (which are present in *Mayriella*) (Bolton 1994).

Ecology Functional group: Cryptic Species (uncertain) (Brown 2000).

Distribution Oriental and Australian regions (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Distribution data refer to *Mayriella sp. 1*.

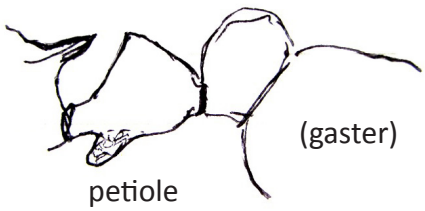
Mayriella sp. 1

Code vial	FDI
Code report	Ma1

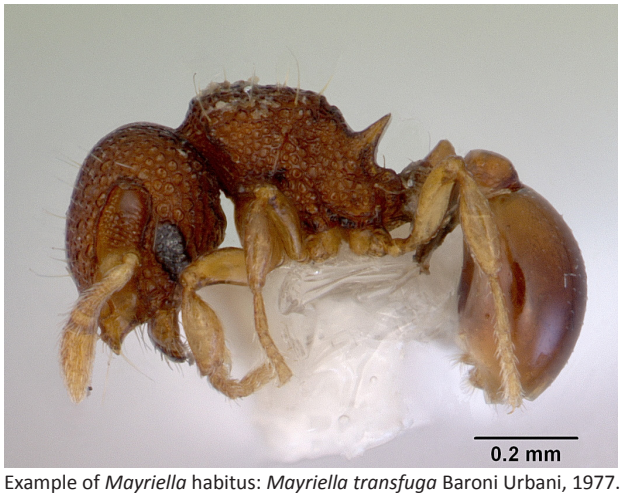
Identification

Body size	Body colour
1.0 mm	Amber
- Petiole with a ventral process (see sketch for shape).	

Similar species See genus account.



Sketch of petiole in side view, *Mayriella sp. 1*. Illustration by Stijn Schreven.



Example of *Mayriella* habitus: *Mayriella transfuga* Baroni Urbani, 1977. Photographer: April Nobile (from www.AntWeb.org).

Subfamily	Myrmicinae
Genus	*Meranoplus*

Meranoplus - shield ants

Smith, 1853

Number of species: SAB 1; BOR 6; WRD 87
The morphospecies recorded from Sabangau was identified using Schödl (1998) as *Meranoplus malaysianus* Schödl, 1998.

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
9 segments	3 segments	5,3	2 spines	No

Additional characters (Bolton 1994):
- Alitrunk marginate (shield);
- Head with conspicuous antennal scrobes.

Related genera	Unmistakable because of marginate alitrunk and conspicuous deep antennal scrobes (shield); also distinctive of other genera by combination of 9 antennal segments and 3-segmented antennal club (Bolton 1994).
Ecology	Nesting in ground; seed harvesters and general foragers. Functional group: Hot Climate Specialists (Brown 2000).
Distribution	Afrotropical, Madagascar, Oriental to Melanesia and Australia (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Distribution data refer to *Meranoplus malaysianus*.

Meranoplus malaysianus

Schödl, 1998

Code vial	FBG
Code report	Mem

Identification

Body size	Body colour	Premesonotal shield	Petiole
3.0 mm	Reddish brown	Unarmed	Unarmed

Additional characters (Schödl 1998):
- Posterior mesonotal margin distinctly overhanging the propodeum;
- Dorsum of head and promesonotum reticulate-rugulose.

Similar species	None recorded in Sabangau, but Schödl (1998) mentions *M. borneensis* as a similar species. *Meranoplus malaysianus* differs from the other by its pubescence, propodeal spines and the width of the petiole (see Schödl 1998).
Distribution	West Malaysia, Java and Borneo (Schödl 1998).

Meranoplus malaysianus. Photographer: Noel Tawatao (www.AntWeb.org).

Subfamily	Myrmicinae
Genus	*Monomorium*

Monomorium

Mayr, 1855

Number of species: SAB 2; BOR 7; WRD 396
Species identification and key based on comparison with pictures from AntWeb (2012), for the valid species recorded in Borneo thus far (Pfeiffer et al. 2011).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
11-12 segments	3 segments	1,2	No	No

Additional characters (Bolton 1994):
- Anterior clypeal margin with an unpaired median seta;
- Mandible with 4 teeth.

Related genera	*Vollenhovia*, *Cardiocondyla*. *Vollenhovia* also has 11 antennal segments, but unlike *Monomorium* has a large ventral process on the petiole. If 12 antennal segments, *Cardiocondyla* looks similar but can be distinguished by the 5-segmented maxillary palps and the spines on the propodeum (Bolton 1994).
Ecology	Generalized foragers, harvesters. Species in several functional groups (Generalized Myrmicinae and Hot, Cold and Tropical Climate Specialists) (Brown 2000).
Distribution	Worldwide in tropical and warm temperate zones (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	x	-	x	x	x

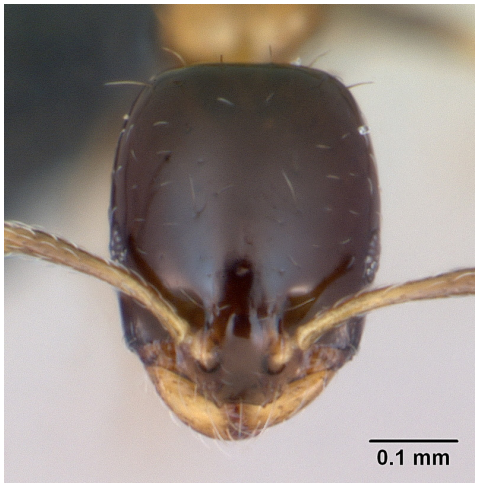
Key to the morphospecies of the genus *Monomorium*

No.	Diagnosis	Go to:
1.	12 antennal segments; body colour brown and amber, legs yellow-brown. Metanotal groove shallow; promesonotum and propodeum only weakly convex.	***Monomorium cf. floricola***
-	11 antennal segments; gaster brown, rest of body yellow. Metanotal groove shallow; promesonotum and propodeum only weakly convex.	***Monomorium sp. 1***

Subfamily	Myrmicinae	Code vial	Fλ (lambda)
Genus	*Monomorium*	Code report	Mmf

Monomorium cf. floricola

Jerdon, 1851



Monomorium floricola. Photographer: April Nobile (from www.AntWeb.org).

Identification

Body size	Body colour	Cephalic index	Scape index	Index width ppt/pt
1.0 - 3.5 mm (mean 1.7 mm)	Amber, (dark) brown	0.82	0.87	1.1

- Antenna with 12 segments;
- Body entirely smooth, unsculptured;
- Body colour amber and brown, legs and antennae yellow-brown;
- Eye with more than 10 ommatidia;
- Propodeum evenly rounded, without an angle;
- Promesonotum and propodeum only weakly convex;
- Metanotal groove clear but shallow.

Similar species *Monomorium sp. 1*, see key. Easiest difference is the number of antennal segments, then the body coloration. There seem to be additional subtle differences in biometrics, but the reliability of these remains unclear.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	x	-	x	x	x

Subfamily	Myrmicinae	Code vial	FAE
Genus	*Monomorium*	Code report	Mm1

Monomorium sp. 1

Identification

Body size	Body colour	Cephalic index	Scape index	Index width ppt/pt
1.0 - 2.4 mm (mean 1.5 mm)	Yellow, brown	0.82	0.67	1.0

- Antenna with 11 segments;
- Body entirely smooth, unsculptured;
- Body colour: gaster brown after basis of 1st segment, rest of body yellow;
- Propodeum evenly rounded, without an angle;
- Promesonotum and propodeum only weakly convex;
- Metanotal groove clear but shallow.

Similar species *Monomorium cf. floricola*, see key. There seem to be additional differences in biometrics, but the reliability of these remains unclear.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	x	-	x	x	-

Subfamily	Myrmicinae
Genus	*Pheidole*

Pheidole

Westwood, 1839

Number of species: SAB 9; BOR 56; WRD 1004
Species identification and simplified key based on Eguchi (2001).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	3 segments	2,2 or 3,2	2-4 spines	No

Additional characters (Eguchi 2001):
- Dimorphic workers (minors and majors);
- Promesonotum forms a dome that is higher than the dorsal surface of propodeum;
- Petiole in profile wedge-shaped (cuneiform), usually with a distinct node.

Related genera	*Acanthomyrmex*. Besides the differences in the key, *Acanthomyrmex* has spines or points on the petiole, which are absent in *Pheidole*.
Ecology	*Pheidole* ants are ground-dwelling seed harvesters, scavengers, omnivores and predators of small invertebrates, and nest on the ground in the soil (some in rotten wood) (Brown 2000, Eguchi 2001). Functional group: Generalized Myrmicinae (Brown 2000).
Distribution	Worldwide in tropical and warm temperate regions (Brown 2000, Eguchi 2001).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	x	x

Key to the morphospecies of the genus *Pheidole*

No.	Diagnosis	Go to:
1.	Alitrunk articulated posteroventrally to head; head large	**2 (majors)**
-	Alitrunk articulated posteriorly/posterodorsally to head; head normal	**3 (minors)**
2.	Dorsolateral portions of promesonotum produced outward	***Pheidole aristotelis***
-	Dorsolateral portions of promesonotum not produced outward, dorsal part of promesonotum narrower than ventral part	***Pheidole cf. aglae***
3.	Two spines on promesonotum	**4**
-	Promesonotum unarmed	**6**
4.	Head smooth and shining	***Pheidole quadricuspis***
-	Head clearly sculptured (reticulate)	**5**
5.	Spines on promesonotum blunt/truncate	***Pheidole aristotelis***
-	Spines on promesonotum long and pointed	***Pheidole quadrensis***
6.	Dorsum of head clearly sculptured, punctured	***Pheidole rugifera***
-	Dorsum of head smooth and shining	**7**
7.	Promesonotum without a prominence on posterior declivity; occipital carina almost evanescent or absent	***Pheidole hortensis/ clypeocornis***
-	Promesonotum with a prominence on posterior declivity; occipital carina complete	**8**
8.	Occipital carina well-developed into a flange, narrowed at its base	***Pheidole aglae***
-	Occipital carina well-developed, but not narrowed at its base	**9**
9.	Clypeus weakly rugose, weakly shining	***Pheidole plagiaria***
-	Clypeus smooth and shining	***Pheidole jacobsoni***

Subfamily	Myrmicinae	Code vial	FCL
Genus	*Pheidole*	Code report	Pea

Pheidole aglae

Forel, 1913

Identification

Body size	Body colour	Promesonotum	Promeson. declivity	Propodeum
2.2 - 3.0 mm (mean 2.8 mm)	Amber brown	Unarmed	With prominence [A]	2 spines

Additional characters of minor worker (Eguchi 2001):
- Occipital carina forming a flange that is narrowed at its base [B];
- Alitrunk punctured;
- Prominence on posterior declivity of promesonotum and dorsal surface of propodeum both with at least 2 pairs of hairs.

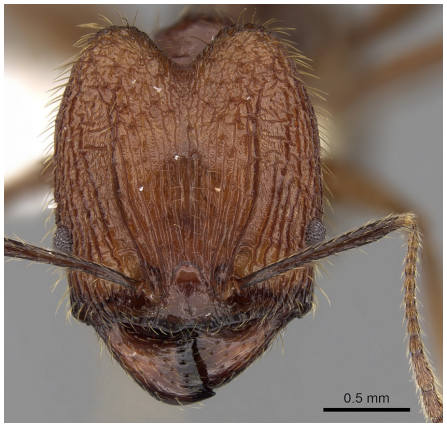
Similar species	*P. plagiaria* and *P. jacobsoni*, see key for differences.
Ecology	*Pheidole aglae* occurs in well-developed primary and secondary tropical forest, from lowland to hills, where it nests in rotting wood and logs on the ground (Eguchi 2001).
Distribution	Malay Peninsula, Singapore, Sumatra, Java, Borneo, New Guinea (Eguchi 2001).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	x	x	-	-
Previous compromised distribution data under *Pheidole jacobsoni*							

Minor worker

Major worker

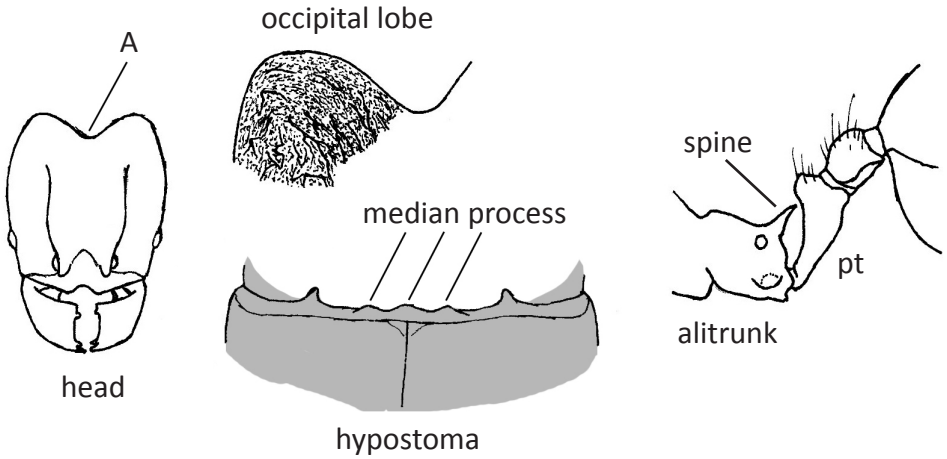


Photographer: Estella Ortega (from www.AntWeb.org)

Subfamily	Myrmicinae	Code vial	FCH
Genus	*Pheidole*	Code report	Peg

Pheidole cf. aglae

Forel, 1913



Identification

Body size	Body colour	Promesonotum	Promeson. declivity	Propodeum
5.0 mm	Amber brown	Unarmed	With prominence	2 spines

[1 major specimen in collection]
Additional characters (after Eguchi 2001):
- Hypostoma with 3 median processes (small but present);
- Antennal scrobe not margined below anteriorly;
- Propodeal spines not surpassing the petiole node (spine length is 2-2.5x the diameter of the propodeal spiracle);
- Head strongly concave at posterior margin in frontal view [A];
- Dorsum of occipital lobe with distinct (fine) sculpture.

Uncertainty:
- Frontal carina distinct;
- Lateral face of occipital lobe is finely rugose or punctate (not transversely rugose), but difficult to assess.

Similar species

There are no similar species in the recorded majors, but Eguchi (2001) shows that the majors of *Pheidole aglae* and *P. jacobsoni* (formerly *P. orophila*) are very similar. The key distinction is the frontal carina (weak versus distinct) and the sculpture of the lateral face of the occipital lobe (smooth to weakly rugoso-punctured versus distinctly rugoso-reticulate), both of which seem to be subtle differences. In addition, *P. aglae* is identified by a strongly concave hind margin of the head, which is weaker in *P. jacobsoni*. This latter feature seems to be true, as well as the distinct frontal carina, supporting *P. aglae* as the likely identity of this major worker specimen. In particular the sculpture of the occipital lobe needs to be judged by an expert taxonomist or be compared with reference specimens from museums.

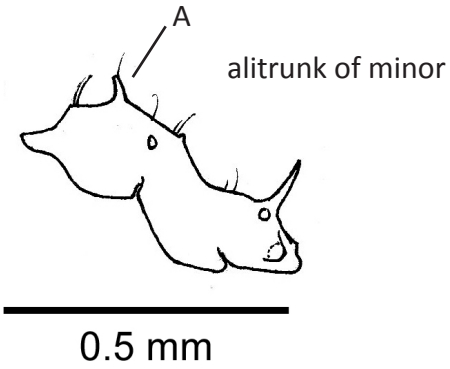
Presence in peat-swamp forest habitat subtypes

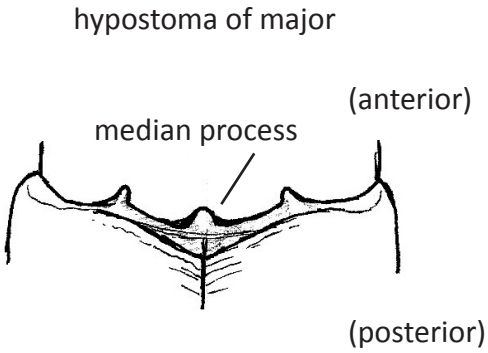
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
Exact locality unknown.							

Subfamily	Myrmicinae	Code vial	FY, FCE, FCF
Genus	*Pheidole*	Code report	Pex

Pheidole aristotelis

Forel, 1911





Identification

Body size	Body colour	Promesonotum	Promeson. declivity	Propodeum
1.3 - 3.8 mm (mean 2.0 mm)	Yellow - light amber	Minor: 2 truncate spines [A] Major: unarmed	Minor: without prominence	2 long spines

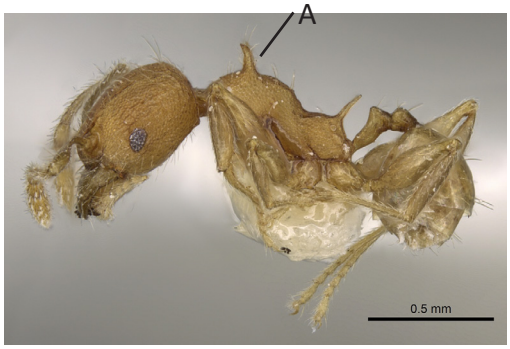
Additional characters of minor (Eguchi 2001): - Head (both dorsum and ventrolateral surface) distinctly sculptured, reticulate (bubbly); - Propodeal spine 5x diameter of propodeal spiracle.	**Additional characters of major (Eguchi 2001):** - Promesonotum laterally produced outward [B]; - Dorsum of head irregularly reticulate; - Hypostoma with a stout median process.

Similar species	Minor unmistakable: truncate spines on promesonotum and bubbly body texture. Major: no majors of similar species recorded so far, see further Eguchi (2001).
Ecology	*Pheidole aristotelis* inhabits well-developed tropical forests from lowland to hills. The nests are made in rotting twigs or wood, in which they store small seeds (Eguchi 2001).
Distribution	West Malaysia, Sumatra, Borneo, Java, Lombok (Eguchi 2001).

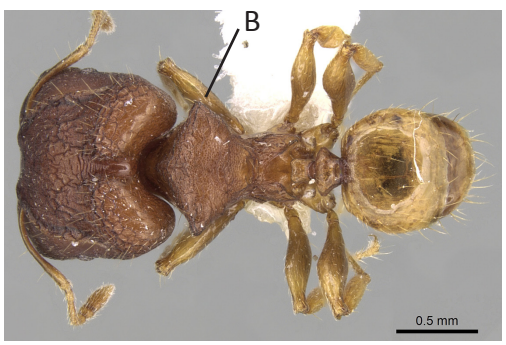
Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	-	-

Minor worker



Major worker



Photographer: Shannon Hartman (www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FCD
Genus	*Pheidole*	Code report	Peh

Pheidole hortensis / clypeocornis

Forel, 1913 (*hortensis*) / Eguchi, 2001 (*clypeocornis*)

Identification

Body size	Body colour	Promesonotum	Promeson. declivity	Propodeum
2.0 mm	Amber	Unarmed	Without prominence	2 short spines

[only minor workers collected so far]
Additional characters of minor worker (Eguchi 2001):
- Propodeal spine length 1.5x the diameter of propodeal spiracle;
- Head smooth, only sparsely punctured;
- Alitrunk with standing hairs;
- Occipital carina almost evanescent or absent [A];
- Promesonotum evenly convex.

Similar species Due to the reduced or absent occipital carina a lot of species are ruled out; *Pheidole hortensis* and *P. clypeocornis* can only be distinguished by their major workers (Eguchi 2001), and since only minors have been collected so far, further identification is not possible at present.

Ecology Of *P. hortensis* it is known that the colonies are found in both well-developed forest and drier shrub vegetation, with their nests in rotting twigs and wood, where small seeds are stored (Eguchi 2001). *Pheidole clypeocornis* nests in rotting wood and stores seeds but the habitat is not mentioned by Eguchi (2001).

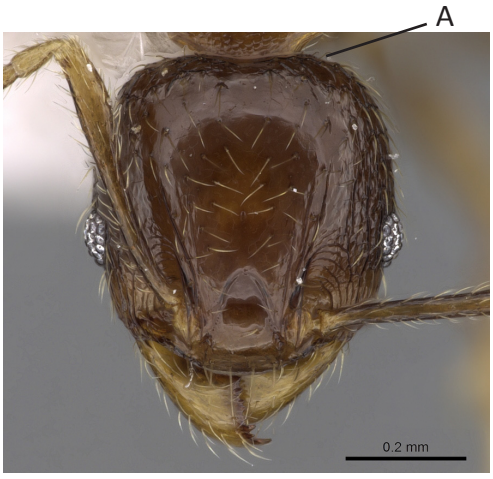
Distribution Both are found in West Malaysia, Sumatra, Borneo and Java, *P. clypeocornis* is also found in Lombok (Eguchi 2001).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	(?)	-	-	x	-	-	-

1 minor worker was previously stored together with *Pheidole rugifera*, and may belong to a sample from low-pole forest (17-9-2011 trap 34)

Minor worker



Pheidole hortensis. Photographer: Estella Ortega (www.AntWeb.org).

No pictures of major have been displayed because majors of *P. hortensis* and *P. clypeocornis* look different.

Subfamily	Myrmicinae	Code vial	FΨ (psi)
Genus	*Pheidole*	Code report	Peo

Pheidole jacobsoni

Forel, 1911

In the species key of Eguchi (2001) this is *P. orophila* Eguchi, 2001, but this latter name has become a junior synonym of *P. jacobsoni* Forel, 1911 (Eguchi 2004).

Identification

Body size	Body colour	Promesonotum	Promeson. declivity	Propodeum
1.9 - 3.6 mm (mean 2.9 mm)	Amber brown	Unarmed	With low prominence	2 short spines

[only minor workers collected so far]
Additional characters of minor worker (Eguchi 2001, under *P. orophila*):
- Occipital carina well-developed but not narrowed at its base [A];
- Clypeus smooth and shining;
- Dorsum of head smooth;
- Lower part of mesopleuron punctured;
- Both the prominence on posterior declivity of promesonotum and the dorsum of propodeum have more than 1 pair of hairs.

Similar species Minors: *Pheidole plagiaria* has a clypeus with weak sculpture (rugose), *P. aglae* has a flange at the occipital carina which is narrowed at its base.
Previously, *Pheidole jacobsoni*, *P. plagiaria* and *P. aglae* have been recorded as one species, so part of the distribution data of *P. jacobsoni* at present are compromised and include all three species.

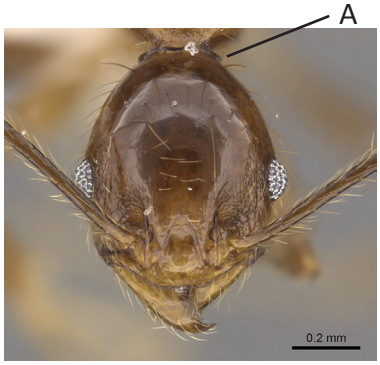
Distribution West Malaysia, Sumatra, Borneo, Java (Eguchi 2001).

Presence in peat-swamp forest habitat subtypes

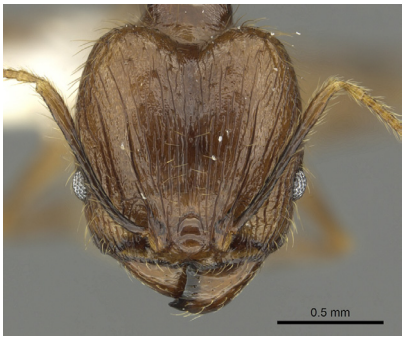
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	x	x
-	-	-	x	x	-	-	-

The upper row represents compromised distribution data;
the lower row represents revised data from Feb-Apr 2012, including only *P. jacobsoni*.

Minor worker



Major worker

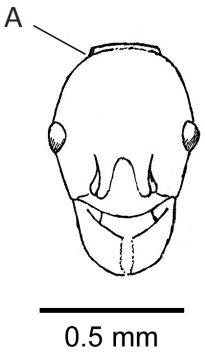


Photographer: Ryan Perry (www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FCM
Genus	*Pheidole*	Code report	Pep

Pheidole plagiaria

Smith, 1860



occipital carina of *P. plagiaria* minor (same in *P. jacobsoni*)

Identification

Body size	Body colour	Promesonotum	Promeson. declivity	Propodeum
3.5 mm	Amber brown	Unarmed	With prominence	2 spines

[only minor workers collected so far]
Additional characters of minor worker (Eguchi 2001):
- Occipital carina well-developed but not narrowed at its base [A];
- Clypeus weakly rugose and weakly shining;
- More than 1 pair of hairs on prominence on posterior declivity of promesonotum and dorsum of propodeum each.

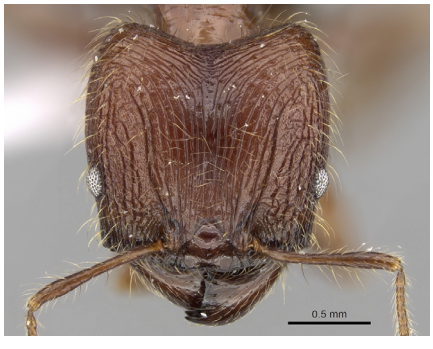
Similar species	See *Pheidole aglae* and *P. jacobsoni*.
Ecology	Pheidole plagiaria occurs in well-developed tropical forests of lowland and hills, but is known to move to forest edges and open land at the margins of its distribution range (in Vietnam) (Eguchi 2001).
Distribution	Wide range in Southeast-Asia, from Indochina to Sulawesi (Eguchi 2001).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
Compromised distribution data under *Pheidole jacobsoni*							

Minor worker

Major worker

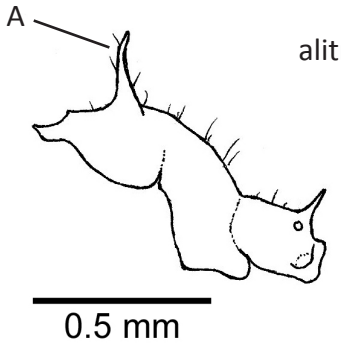


Photographer: Estella Ortega (www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FCK
Genus	*Pheidole*	Code report	Peq

Pheidole quadrensis

Forel, 1900



Identification

Body size	Body colour	Promesonotum	Promeson. declivity	Propodeum
3.0 mm	Dark amber	2 long spines	Prominence indistinct	2 spines

[only minor workers collected so far]
Additional characters of minor worker (Eguchi 2001):
- Spines on promesonotum long and pointed, with angle at tip (tip subtly tilted upward) [A];
- Head strongly reticulate.

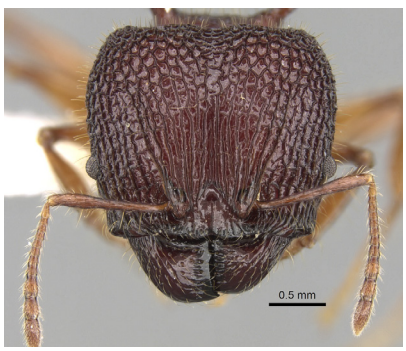
Similar species	*Pheidole quadricuspis* is similar but has a smooth (unsculptured) head; *P. aristotelis* has a different body colour and the spines on the promesonotum are blunt (Eguchi 2001).
Ecology	*Pheidole quadrensis* can be found in well-developed lowland forests, where it nests in rotting twigs and wood and stores small seeds (Eguchi 2001).
Distribution	Borneo, Sumatra (Eguchi 2001).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-
Previous compromised distribution data under *Pheidole quadricuspis*							

Minor worker

Major worker



Photographer: minor: Adam Lazarus, major: Shannon Hartman (www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FQ, F*
Genus	*Pheidole*	Code report	Pes

Pheidole quadricuspis

Emery, 1900

Identification

Body size	Body colour	Promesonotum	Promeson. declivity	Propodeum
2.5 - 3.9 mm (mean 3.1 mm)	Dark amber	2 long spines	Without prominence	2 spines

[only minor workers collected so far]
Additional characters of minor worker (Eguchi 2001):
- Head smooth and shining;
- Spines on promesonotum long and pointed spines, straight.

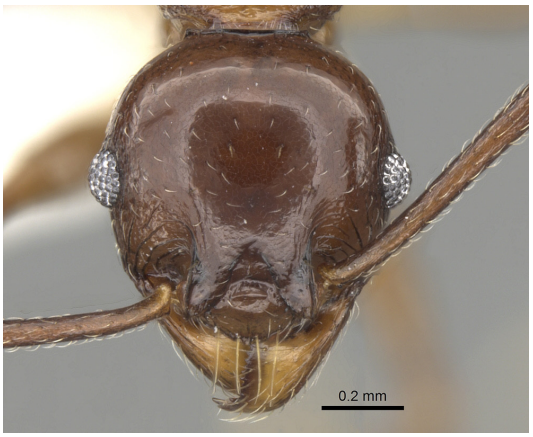
Similar species	See *P. quadrensis* (one subtle difference is that the promesonotal spines in *P. quadrensis* are slightly tilted at the tip, whereas they are straight in *P. quadricuspis*).
Ecology	Occurs in well-developed lowland forests, nesting in rotting twigs and wood and storing small seeds. In some areas sympatric with *P. quadrensis* (Eguchi 2001).
Distribution	West Malaysia, Sumatra, Borneo (Eguchi 2001).

Presence in peat-swamp forest habitat subtypes

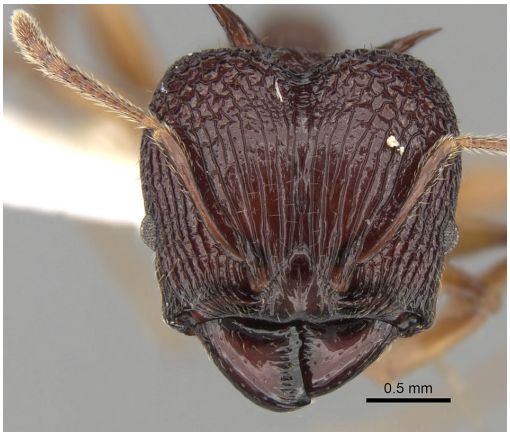
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	-	x
-	-	x	-	x	-	-	-

The upper row represents compromised distribution data;
the lower row represents revised data from Feb-Apr 2012, including only *P. quadricuspis*.

Minor worker



Major worker

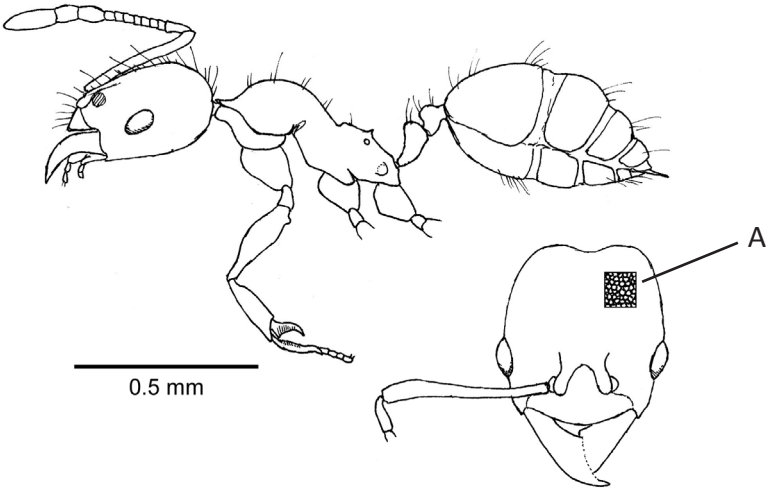


Photographer: minor: Shannon Hartman (www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FD
Genus	*Pheidole*	Code report	Per

Pheidole rugifera

Eguchi, 2001



Identification

Body size	Body colour	Promesonotum	Promeson. declivity	Propodeum
1.0-2.5 mm (mean 1.6 mm)	Brown	Unarmed	Without prominence	2 short spines

[only minor workers collected so far]
Additional characters of minor worker:
- Smallest of recorded *Pheidole* species;
- Minor: dorsum of head (and rest of body except gaster) clearly punctured (honeycomb-like) [A].

Similar species	*Pheidole rugifera* is unmistakable because of its small size, and the features described above (small spines and punctured head dorsum).
Ecology	Occurs in well-developed lowland forests, nesting in rotting wood (Eguchi, 2001).
Distribution	West Malaysia, Borneo and Sumatra (Eguchi, 2001).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	x	-

Minor worker

Major worker

Photographer: Ryan Perry (from www.AntWeb.org)

Subfamily	Myrmicinae
Genus	*Pheidologeton*

Pheidologeton - marauder ants

Mayr, 1862

Number of species: SAB 2; BOR 4; WRD 32
Species identification and key based on comparison with pictures from AntWeb (2012) of the valid species recorded in Borneo thus far (Pfeiffer *et al.* 2011).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
11 segments	2 segments	2,2	0-2 spines	No

Additional characters:
- Polymorphic species with minor, intermediate and major workers;
- Eyes small or reduced;
- A median pair of setae on anterior clypeal margin (or none at all);
- Clypeus broadly inserted between frontal lobes (Bolton 1994).

Related genera	*Cardiocondyla*. The easiest difference is in the number of antennal segments: 12 in *Cardiocondyla*, 11 in *Pheidologeton* (Bolton 1994).
Ecology	Generalized and mass foragers. Functional group: Cryptic species (Brown 2000).
Distribution	Afrotropical, India to Melanesia (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Key to the morphospecies of the genus *Pheidologeton*

No.	Diagnosis	Go to:
1.	Propodeum with two spines, which are slightly curved; petiole higher; body with long hairs on dorsum of head, alitrunk and abdomen; body colour more yellow-orange	***Pheidologeton cf. affinis***
-	Propodeum without spines, at most slightly raised angles; petiole lower; body with long hairs only at anterior part of head (not on dorsum), sternites and 3rd and 4th tergite of gaster, other body parts only bearing short hairs; body colour more amber	***Pheidologeton cf. pygmaeus***

Subfamily	Myrmicinae	Code vial	FAU
Genus	*Pheidologeton*	Code report	Poa

Pheidologeton cf. affinis

Jerdon, 1851

Identification

Body size	Body colour	Eye size	Propodeum
2.0 mm	Light amber	Small	2 spines

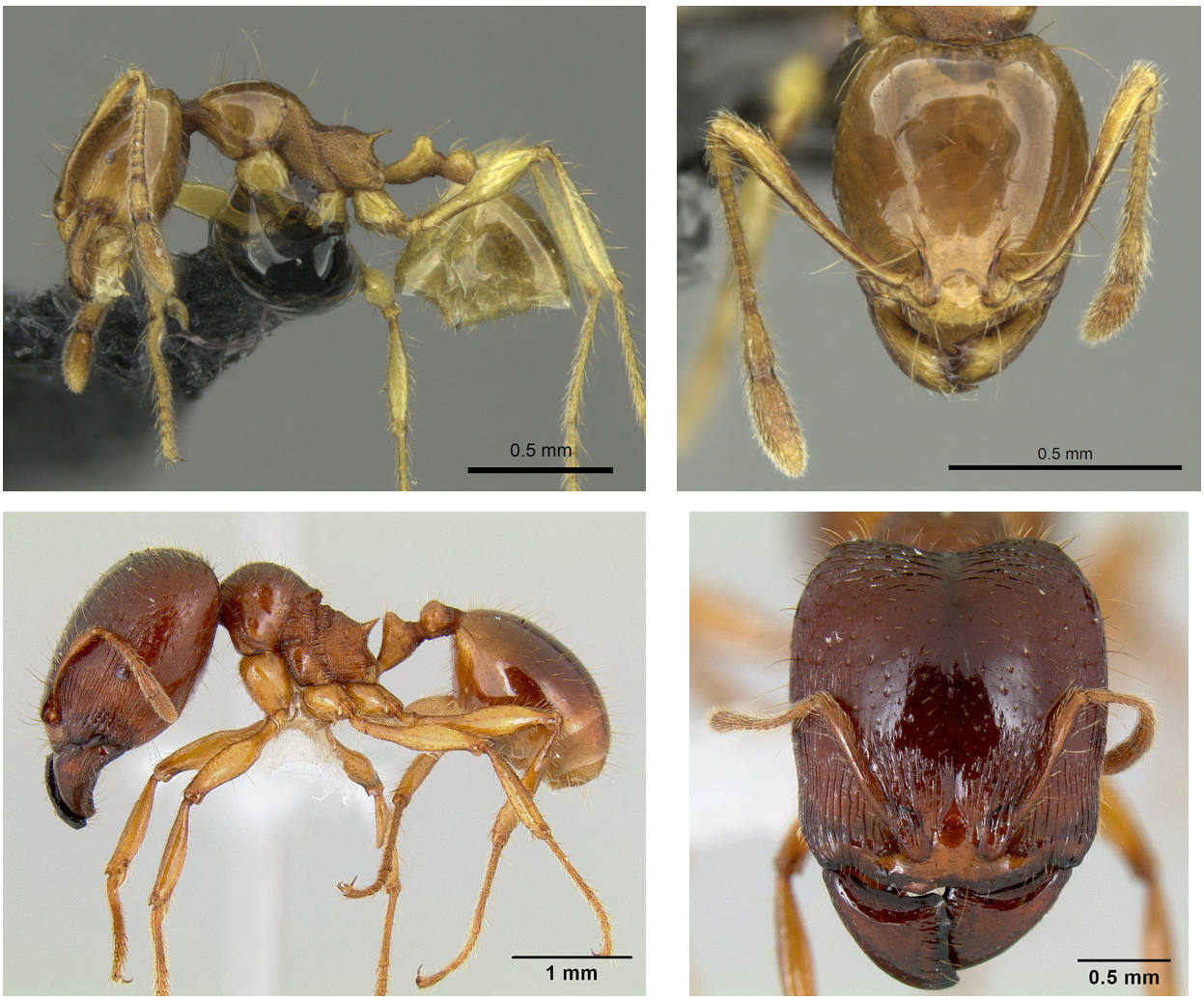
[only minor workers collected so far]
Additional characters:
- Long hairs scattered over body (including head, alitrunk, waist, gaster, antennae and legs).

Similar species *Pheidologeton cf. pygmaeus* has smaller eyes (minute), no spines on propodeum and the long hairs are restricted to the sternum (underside of gaster) and the later tergites (not 1st and 2nd). The body of *P. affinis* is coloured more yellow-orange.

Distribution Southeast-Asia from China to Northern Australia (Antwiki 2014).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-



Pheidologeton affinis. Photographer: minor: Noel Tawatao, major: Michael Branstetter (from www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FK, FAX
Genus	*Pheidologeton*	Code report	Pop

Pheidologeton cf. pygmaeus

Emery, 1887

Identification

Body size	Body colour	Eye size	Propodeum
1.6 - 2.0 mm (mean 1.8 mm)	Amber	Very small (minute)	Unarmed, only 2 angles

[only minor workers collected so far]
Additional characters:
- Long hairs on body restricted to sternum (underside of gaster) and 3rd and 4th tergite (or less), rest of body sparsely covered with short hairs.

Similar species	See *P. cf. affinis*.
Distribution	Borneo (Antwiki, 2014).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Pheidologeton pygmaeus. Photographer: Estella Ortega (from www.AntWeb.org).

Subfamily	Myrmicinae
Genus	*Rhopalomastix*

Rhopalomastix

Forel, 1900

Number of species: SAB 1; BOR 0; WRD 6

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
10 segments	2 segments	2,1	No	No

Additional characters (Bolton 1994):
- Frontal lobes reduced (not covering antennae) and touching each other;
- Postpetiole broadly attached to gaster;
- Clypeus with a pair of median setae on anterior margin.

Related genera	*Carebara*. Distinction can be based on the attachment of the postpetiole to the gaster, which is broad in *Rhopalomastix* and narrow in *Carebara* (Bolton 1994). *Vollenhovia* also looks alike, but has 11 antennal segments and a 3-segmented club (Bolton 1994).
Ecology	Nesting and foraging in and under bark; functional group unknown (Brown 2000).
Distribution	Oriental (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	x	-	-	-	-

Distribution data refer to *Rhopalomastix sp. 1*.

Rhopalomastix sp. 1

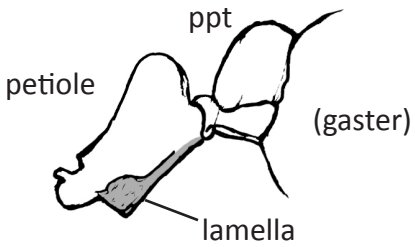
Code vial	FDJ
Code report	Rh1

Identification

Body size	Body colour
2.5 mm	Moderate brown

- Longitudinally striate head and alitrunk;
- Petiole with ventral lamella (see sketch).

Similar species	See genus account.



Petiole in side view, *Rhopalomastix sp. 1*. Illustration by Stijn Schreven.

Example of *Rhopalomastix* habitus: *Rhopalomastix janeti* Donisthorpe, 1936. Photographer: April Nobile (from www.AntWeb.org).

Subfamily	Myrmicinae
Genus	*Solenopsis*

Solenopsis

Westwood, 1840

Number of species: SAB 2; BOR 1; WRD 192

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
9 segments	2 segments	Not measured	2 spines	No

Additional characters:
- Small eyes.

Related genera Other small myrmicine genera. In the key distinguishable from *Rhopalomastix*, *Carebara* and *Mayriella* by antenna (9 segments). In habitus looking similar to *Pheidole* and *Monomorium*, but *Solenopsis* again differs in the number of antennal segments, small eyes and a lamellate lower side of the spines on propodeum.

Ecology Nesting in ground and litter; generalized foragers and thief ants. Functional groups: Tropical Climate Specialists and Cryptic Species (Brown 2000).

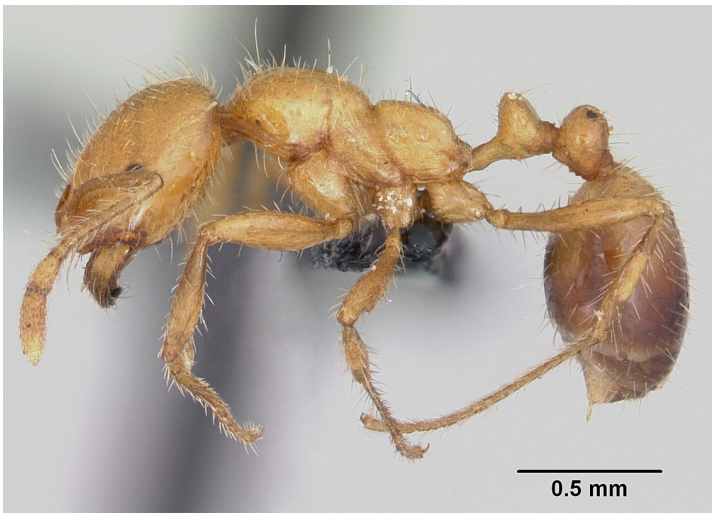
Distribution Worldwide in tropics and warm temperate (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	x	x	-	-	-

Key to the morphospecies of the genus *Solenopsis*

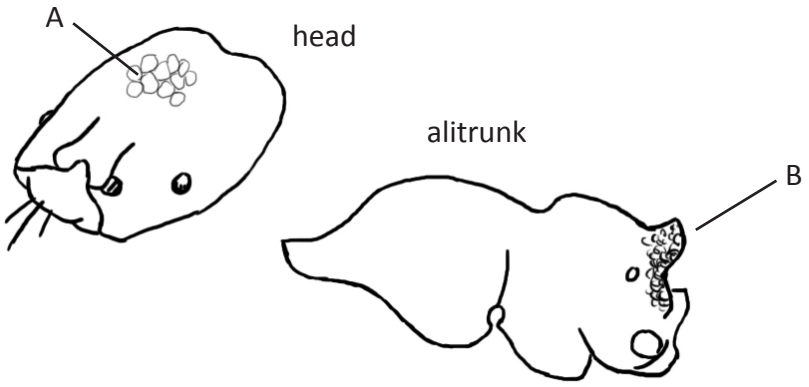
No.	Diagnosis	Go to:
1.	Head sculptured, reticulate	***Solenopsis sp. 1***
-	Head smooth	***Solenopsis sp. 2***



Example of *Solenopsis* habitus: *Solenopsis geminata* (Fabricius, 1804). Photographer: April Nobile (from www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FDE
Genus	*Solenopsis*	Code report	So1

Solenopsis sp. 1



Identification

Body size	Body colour	Head sculpture	Propodeum
1.0 mm	Moderate brown	Reticulate	2 broad spines

- Small eyes;
- Head, a large part of alitrunk, and petiole regularly reticulate [A];
- Propodeal spines broad, extending in a vertical lamella of spongiform texture below [B].

Similar species *Solenopsis sp. 2* has a smooth (unsculptured) head.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	x	-	-	-	-

Solenopsis sp. 2

Code vial	FDM
Code report	So2

Identification

Body size	Body colour	Head sculpture	Propodeum
Not measured.	Light brown	Smooth	Unknown

[single collected specimen incomplete: only head present]

Similar species See *Solenopsis sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	x	-	-	-

Subfamily	Myrmicinae
Genus	*Strumigenys*

Strumigenys - shrew ants

Smith, 1860

Number of species: SAB 2; BOR 92*; WRD 834

*Pfeiffer *et al.* (2011) retain *Pyramica* and *Strumigenys* as two separate valid genera; in this guide the classification of Baroni Urbani and De Andrada (2007) is followed, which reinstated *Pyramica* as a junior synonym of *Strumigenys*. Thus, the number of species shown here represents the sum of species of *Pyramica* and *Strumigenys* in Pfeiffer *et al.* (2011).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
6 segments	2 segments	1,1	No spines but lamellae	No

Additional characters:
- In habitus reminds of a shrew, with a distinctive triangular head, small mouth and tiny eyes;
- Minute to small ants;
- Often with spongiform processes on propodeum, petiole and postpetiole.

Related genera	Unmistakable because of head shape, antenna and spongiform processes.
Ecology	*Strumigenys* ants nest in leaf litter and prey mainly on springtails (Collembola). Functional group: Cryptic Species (Brown 2000).
Distribution	Worldwide in tropics and warm temperate regions, except Western Palearctic (Brown 2000).

Presence in peat-swamp forest habitat subtypes

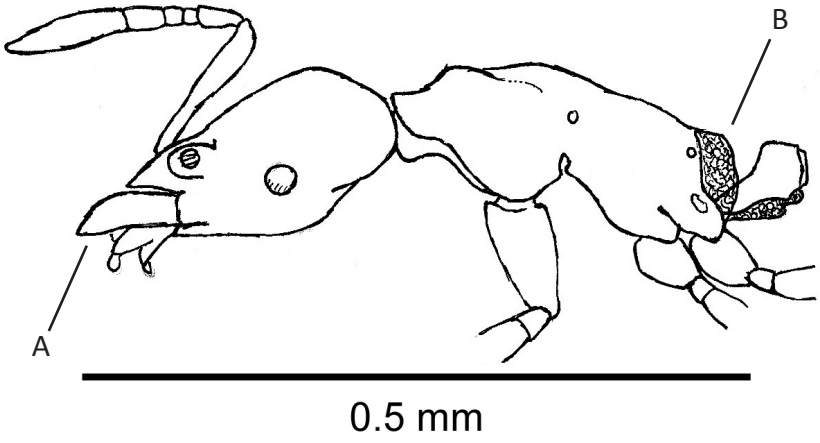
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Key to the morphospecies of the genus *Strumigenys*

No.	Diagnosis	Go to:
1.	Mandible long and linear, with 3 apical teeth and a longitudinal preapical lamella; propodeum with dorsally pointed spongiform lamellae, petiole and postpetiole with spongiform tissue; body colour amber	***Strumigenys sp. 2***
-	Mandible curved and shorter, with >10 teeth; propodeum with rounded longitudinal lamellae, petiole with spongiform lamellate ventral process; body colour yellow	***Strumigenys sp. 1***

Subfamily	Myrmicinae	Code vial	FBE, FCV
Genus	*Strumigenys*	Code report	Sg1

Strumigenys sp. 1



[ppt + gaster missing]

Identification

Body size	Body colour	Mandibles	Propodeal lamellae
1.3 - 1.5 mm (mean 1.4 mm)	Yellow	Broad and curved [A]	Rounded posterodorsally [B]

Additional characters:
- Propodeum with vertical spongiform translucent lamellae, rounded [B];
- Petiole pedunculate with spongiform ventral process;
- Metanotal groove absent;
- Mandible with approximately 16 teeth;
- Scape and head sculptured reticulate or punctate.

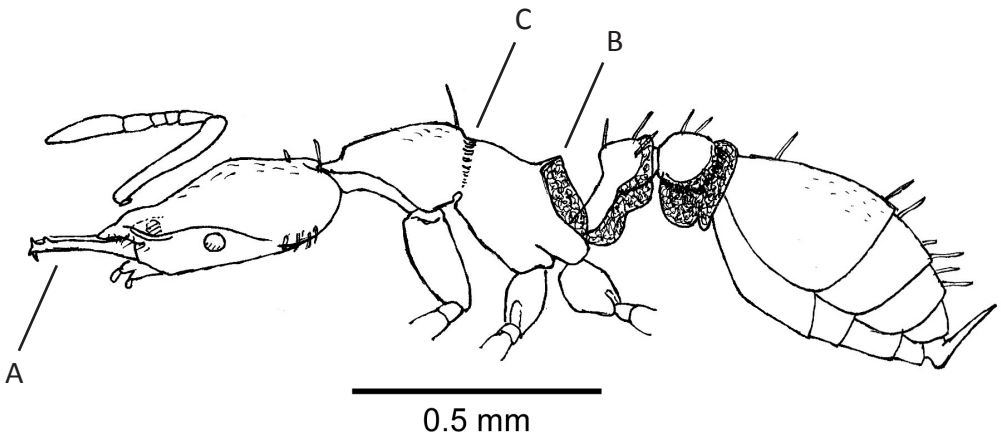
Similar species *Strumigenys sp. 2* differs by the mandibles (shape and number of teeth), metanotal groove, propodeal lamellae, presence of setae and body size and colour.

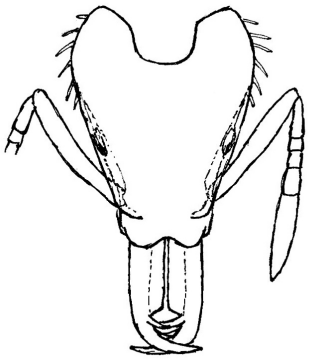
Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Subfamily	Myrmicinae	Code vial	FCA
Genus	*Strumigenys*	Code report	Sg2

Strumigenys sp. 2





head front view

Identification

Body size	Body colour	Mandibles	Propodeal lamellae
2.5 mm	Dark amber	Long and linear [A]	Pointed posterodorsally [B]

Additional characters:
- Propodeum with vertical spongiform translucent lamellae, pointed posterodorsally [B];
- Petoile pedunculate with spongiform ventral process;
- Metanotal groove shallow (impression after promesonotum) [C];
- Mandible with 2 apical teeth and a subapical longitudinal lamella;
- Postpetiole with spongiform tissue;
- Several strong, long setae on body.

Similar species See *Strumigenys sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Subfamily	Myrmicinae
Genus	*Tetramorium*

Tetramorium

Mayr, 1855

Number of species: SAB 6*; BOR 26; WRD 519

* Morphospecies FBF excluded from species list and key because of insufficient material.

Species identification and simplified key based on Bolton (1977).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	3 segments	4,3	2-4 spines	No

Additional characters:
- Alitrunk armed with two propodeal spines and two pointed metapleural lobes;
- Sting with lamellate appendage (Bolton 1994).

Related genera	Unlike any of the recorded genera, *Tetramorium* has a transparant appendage on the tip of the sting (Bolton 1994). For other diagnostic features see above and in generic key.
Ecology	Generalized foragers. Functional group: Opportunists (Brown 2000).
Distribution	Worldwide in tropics and temperate but adventive only in South America (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	x	x

Key to the morphospecies of the genus *Tetramorium*

No.	Diagnosis	Go to:
1.	Body largely covered with trifid hairs. Sting appendage pennant-shaped, petiole node and postpetiole spherical and sculptured, mandible striate.	***Tetramorium* cf. "Triglyphothrix" sp. 1**
-	Body only covered with simple hairs	**2**
2.	Lamelliform sting appendage spatulate	**3**
-	Lamelliform sting appendage triangular (pennant-shaped)	**4**
3.	11 antennal segments	***Tetramorium tortuosum*-group sp. 1**
-	12 antennal segments	***Tetramorium* sp. 1**
4.	Mandibles striate. Body colour amber, legs yellow; propodeal spines about 1.5-2x as long as pointed metapleural lobes; hind tibia and antennal scape with (sub)erect hairs; dorsum of head space between ruguloreticulate sculpture filled with dense reticulation.	***Tetramorium tonganum*-group sp. 1 (near *laparum*)**
-	Mandibles smooth, unsculptured	**5**
5.	Body colour yellow. Propodeal spines as long as peduncle, about 1.5-2x as long as pointed metapleural lobes.	***Tetramorium scabrosum*-group sp. 1**
-	Body colour dark (reddish) brown. Propodeal spines about 2-3x as long as pointed metapleural lobes; anterior margin of clypeus slightly convex with medial notch.	***Tetramorium pacificum***

Sting appendage: left = triangular (pennant-shaped), right = spatulate. Illustration by Stijn Schreven.

Subfamily	Myrmicinae	Code vial	FCW
Genus	*Tetramorium*	Code report	Tmp

Tetramorium pacificum

Mayr, 1870

Identification

Body size	Body colour	Antenna	Peduncle of petiole	Sting appendage
3.5 - 4.0 mm (mean 3.8 mm)	Dark reddish brown	12 segments	Shorter than node	Pennant-shaped

Additional characters (after Bolton 1977):
- Frontal carina beyond eye;
- Propodeal spines long, 2-3x as long as metapleural lobes;
- Petiolar node broader than high with posterior angle circa 90°;
- Hairs on body simple;
- Hind tibia and scape with suberect to appressed and decumbent hairs;
- Dorsum of head and alitrunk rugosoreticulate;
- Mandibles smooth;
- Anterior clypeal margin convex with slightly notched median part;
- Clypeus tricarinate;
- 1st gastral tergite without anterior horns.

Similar species	*Tetramorium sp. 1* and *T. cf. "Triglyphothrix" sp. 1* have a similar habitus but the former has a spatulate sting appendage and the latter is unmistakable by its trifid hairs; *Tetramorium scabrosum*-group *sp. 1* is most similar in the key but different in body colour and spine length.
Distribution	Common across Oriental and Indo-Australian regions (Bolton 1977).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	x	-	-	-
Previous compromised distribution data under *Tetramorium sp. 1*							

Photographer: April Nobile (from www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FR, FAM
Genus	*Tetramorium*	Code report	TmS

Tetramorium scabrosum-group *sp. 1*

Identification

Body size	Body colour	Antenna	Peduncle of petiole	Sting appendage
2.3 - 4.1 mm (mean 3.3 mm)	Yellow - brown	12 segments	Unknown	Pennant-shaped

Additional characters (after Bolton 1977):
- Frontal carina beyond eye;
- Propodeal spines as long as peduncle of petiole, 1.5-2x as long as metapleural lobes;
- Dorsum of head and alitrunk rugosoreticulate; head dorsum between rugulose sculpture with superficial puncturation (not as clear as in *Tetramorium tonganum*-group *sp. 1 (near laparum)*, but very clear on scape).
- Hairs on body simple;
- Hind tibia and scape with suberect hairs;
- Mandible smooth;
- Clypeus tricarinate;
- 1st gastral segment smooth, without anterior horns;
- Scape length less than 93% of head width;
- Petiole in dorsal view slightly longer than borad;
- Anterior edge of scape dorsum with row of erect hairs;
- Postpetiole reticulate, less strongly sculptured than petiole, but sculpture of postpetiole same as dorsum of alitrunk;
- With alitrunk in dorsal view, pronotal corners angular.

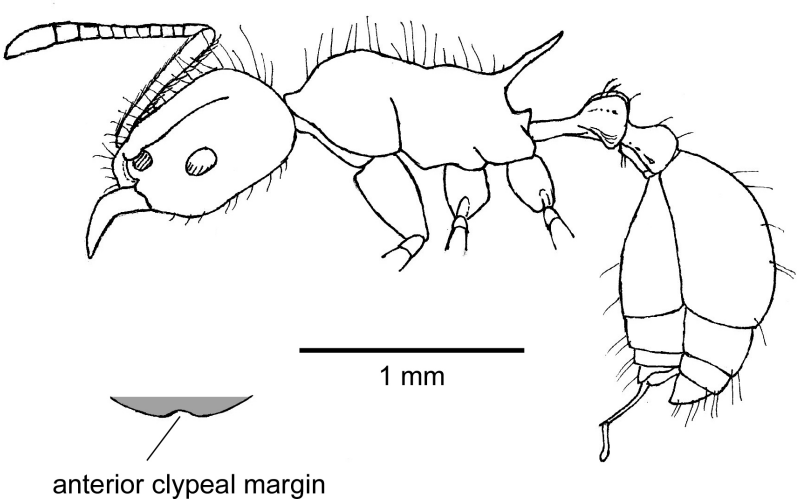
Similar species See *Tetramorium pacificum*. *Tetramorium tonganum*-group *sp. 1 (*near *laparum)* has striate mandibles and a colour contrast between body (amber) and legs (yellow) whereas *T. scabrosum*-group *sp. 1* has smooth mandibles and an entirely yellow body.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	x	x	-	x	x	x	x

Subfamily	Myrmicinae	Code vial	FB
Genus	*Tetramorium*	Code report	Tm1

Tetramorium sp. 1



Identification

Body size	Body colour	Antenna	Peduncle of petiole	Sting appendage
2.6 - 5.5 mm (mean 4.1 mm)	Dark reddish brown	12 segments	As long as node	Spatulate

Additional characters (after Bolton 1977):
- Frontal carina beyond eye;
- Propodeum with 2 long spines, about 4-5x as long as metapleural lobes;
- Metapleural lobes pointed, broad triangular;
- Petiolar node higher than broad, with posterior angle obtuse (>90°) and anterior angle very obtuse; sides of petiole parallel;
- Entire head and dorsum of alitrunk rugosoreticulate;
- Dorsum of 1st gastral segment and postpetiole smooth;
- Hairs on body simple;
- Mandibles smooth;
- Hairs on dorsum of hind tibia and scape suberect to decumbent;
- Clypeus sharply indented medially, and longitudinally tricarinate.

Similar species

See *Tetramorium pacificum*; also resembles *T. cf. "Triglyphotrhix" sp. 1*, but that species distinguishes itself from all others by the cover of trifid hairs over most of its body. Previously, *Tetramorium sp. 1* and *T. pacificum* have been recorded as one species, so part of the distribution data of *Tetramorium sp. 1* at present are compromised and include both species.

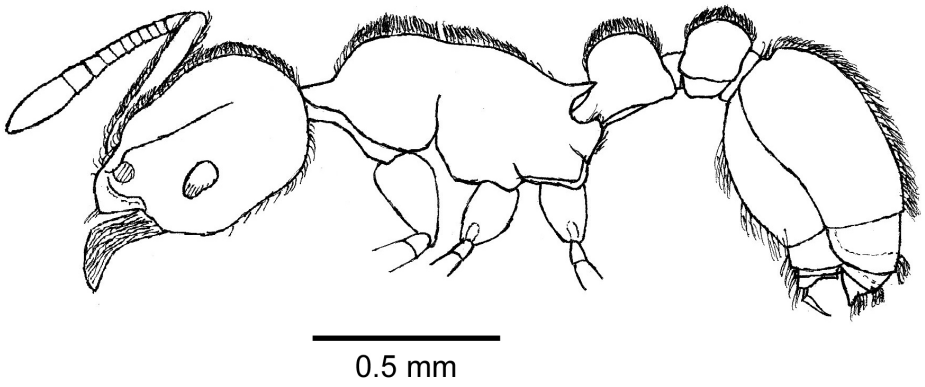
Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	x	x	x	x	x	x	-
-	-	x	-	-	-	-	-

The upper row represents compromised distribution data;
the lower row represents revised data from Feb-Apr 2012, including only *Tetramorium sp. 1*

Subfamily	Myrmicinae	Code vial	FS
Genus	*Tetramorium*	Code report	TmT

Tetramorium cf. "Triglyphothrix" sp. 1



Identification

Body size	Body colour	Antenna	Peduncle of petiole	Sting appendage
2.0 - 4.0 mm (mean 2.9 mm)	Dark reddish brown	12 segments	Unknown	Pennant-shaped

Additional characters (after Bolton 1977):
- Frontal carina beyond eye;
- Hairs trifid on head, alitrunk, gaster, legs, petiole, postpetiole;
- 1st gastral segment sculptured rugose/puncturate;
- Scape and hind tibia without long (sub)erect hairs (only short pubescence);
- Petiolar node globular, as long as broad.

Similar species

Several species look similar in habitus, but *Tetramorium cf. "Triglyphothrix" sp. 1* is unmistakable due to its trifid hairs on most body parts and the globular petiole shape. *Triglyphothrix* used to be the name of a genus, of which the species differed from *Tetramorium* only by the presence of branched hairs (bifid, trifid or quadrifid), but it is now synonymized with *Tetramorium* (Bolton 1985).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	x	x	-	-	-

Example of trifid hairs on head, alitrunk, waist and gaster: *Tetramorium adpressum* (Bolton, 1976). Photographer: Will Ericson (from www.AntWeb.org).

Subfamily	Myrmicinae	Code vial	FH, FDB, FDC
Genus	*Tetramorium*	Code report	TmL

Tetramorium tonganum-group *sp. 1* (near *laparum*)

Identification

Body size	Body colour	Antenna	Peduncle of petiole	Sting appendage
2.0 - 3.0 mm (mean 2.5 mm)	Amber	12 segments	Shorter than node	Pennant-shaped

Additional characters (after Bolton 1977):
- Frontal carina beyond eye;
- Petiole longer than broad in dorsal view, in lateral view as high as broad; anterior angle obtuse (>90°);
- Propodeal spines 2x as long as metapleural lobes; spines slightly upcurved;
- Hairs on body simple;
- Hind tibia and antennal scape with erect/suberect hairs;
- Body orange/amber, legs yellow;
- 1st gastral tergite without anterior horns;
- Dorsum of head and alitrunk (and postpetiole) rugosoreticulate; 1st gasteral tergite smooth;
- Mandibles striate;
- Clypeus tricarinate, not with clear concavity;
- Space between rugulose sculpture on head filled by dense reticulation/puncturation.

Similar species See *Tetramorium pacificum* and *T. scabrosum*-group *sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	x	x	-	-

Subfamily	Myrmicinae	Code vial	FBA
Genus	*Tetramorium*	Code report	TmU

Tetramorium tortuosum-group *sp. 1*

Identification

Body size	Body colour	Antenna	Peduncle of petiole	Sting appendage
3.1 - 4.0 mm (mean 3.8 mm)	Dark reddish brown	11 segments	As long as, or longer than node	Spatulate

Additional characters (after Bolton 1977):
- Frontal carina beyond eye;
- Propodeal spines 2-3x as long as metapleural lobes;
- Dorsum of head and alitrunk rugosoreticulate;
- Hairs on body simple;
- Hind tibia and scape with suberect to appressed/decumbent hairs;
- Clypeus tricarinate;
- Postpetiole and 1st gastral tergite smooth;
- Clypeus anteriorly with medial notch;
- Petiole higher than long, slight posterior angle.

Similar species *Tetramorium sp. 1*. Difference is in the number of antennal segments: 11 in *Tetramorium tortuosum*-group *sp. 1* versus 12 segments in *Tetramorium sp. 1*.

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Subfamily	Myrmicinae
Genus	*Vollenhovia*

Vollenhovia

Mayr, 1865

Number of species: SAB 1; BOR 8; WRD 58

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
11 segments	3 segments	3,2	No	No

Additional characters (Bolton 1994):
- Petiole subsessile, with ventral process;
- Clypeus bicarinate;
- Mandible with 6 teeth.

Related genera	*Monomorium*. Differences in petiole, see key.
Ecology	Many nesting under bark or in cavities in logs. Functional group: Tropical Climate Specialists (Brown 2000).
Distribution	China to Northern Australia, Madagascar (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	-	-	-	-	-

Distribution data refer to *Vollenhovia sp. 1*.

Vollenhovia sp. 1

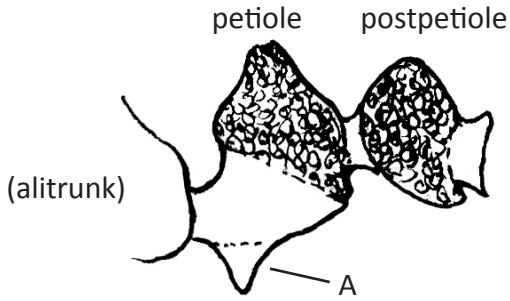
Code vial	FT
Code report	Vh1

Identification

Body size	Body colour
1.7 - 2.0 mm (mean 1.9 mm)	Dark amber/ brown

- Petiole with ventral tooth-shaped process [A];
- Petiole node on top with two bumps;
- Alitrunk, petiole and postpetiole with reticulate structure.

Similar species	See genus account.



Petiole of *Vollenhovia sp. 1*, in side view. Illustration by Stijn Schreven.

Example of *Vollenhovia* habitus: *Vollenhovia my01*. Photographer: Noel Tawatao (www.AntWeb.org).

Subfamily	Myrmicinae
Genus	*indet.*

Unidentified

Myrmicinae sp. 1

Code vial	FDR
Code report	M1

Identification

Body size	Body colour
> 2.0 mm (incomplete specimen, gaster missing)	Light brown, head moderate brown
One specimen collected in survey so far. The morphospecies looks like *Cardiocondyla* in habitus, but has no propodeal spines at all. Perhaps *Monomorium*?	

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	x	-	-	-

Subfamily Ponerinae

Characters	1 waist segment (petiole), sting present.
Diversity	5 genera, 5 species
Unidentified	None

Identification of the genera, based on Bolton (1994):

No.	Diagnosis	Go to:
1.	Mandibles long and linear, inserted in the middle of the anterior margin of the head in full-face view	***Odontomachus***
-	Mandibles linear to triangular, inserted at the anterolateral corners	**2**
2.	Frontal lobes widely separated throughout their length. Petiole with ventral process; hind coxa with posteriorly directed tooth.	***Gnamptogenys***
-	Frontal lobes closely approximated or even partly or entirely confluent	**3**
3.	Ventral apex of hind tibia with a single large pectinate spur	***Hypoponera***
-	Ventral apex of hind tibia with two spurs, one large pectinate and a second smaller, simple spur	**4**
4.	Pretarsal claws of hind leg pectinate on inner curvature. Ocelli absent.	***Leptogenys***
-	Pretarsal claws of hind leg unarmed on inner curvature. Petiole and pronotum unarmed, antennal sockets well behind anterior clypeal margin.	***Pachycondyla***

Subfamily	Ponerinae
Genus	*Gnamptogenys*

Gnamptogenys

Roger, 1863

Number of species: SAB 1; BOR 22; WRD 141
The morphospecies recorded from Sabangau was identified using Lattke (2004) as *Gnamptogenys gabata* Lattke, 2004.

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	3,2	2 denticles	No

Additional characters (Bolton 1994):
- Petiole with ventral process;
- Hind coxa with posteriorly directed tooth.

Related genera	Fairly easily recognisable by tooth on hind coxa, ventral process of petiole and palp formula (Bolton 1994). All other ponerine genera recorded from Sabangau have a palp formula of 4,4 or higher.
Ecology	*Gnamptogenys* ants are predators and scavengers in forests and savannah. They nest in the ground and rotten logs. Functional group: Tropical Climate Specialists (Brown 2000).
Distribution	Neotropical, South Nearctic, Oriental, India to Fiji (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	x	-	-	-	-

Gnamptogenys gabata in Sabangau. Photographer: Erik Frank/ OuTrop.

Subfamily	Ponerinae	Code vial	FJ
Genus	*Gnamptogenys*	Code report	Gng

Gnamptogenys gabata

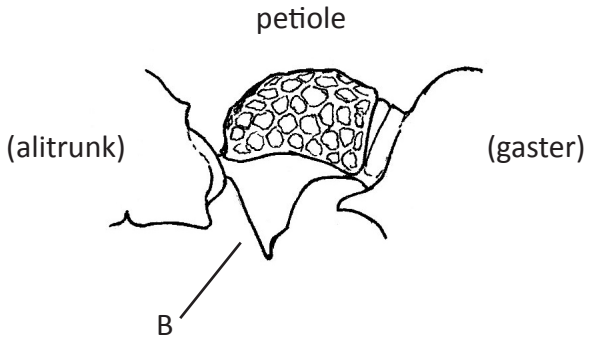
Lattke, 2004

Identification

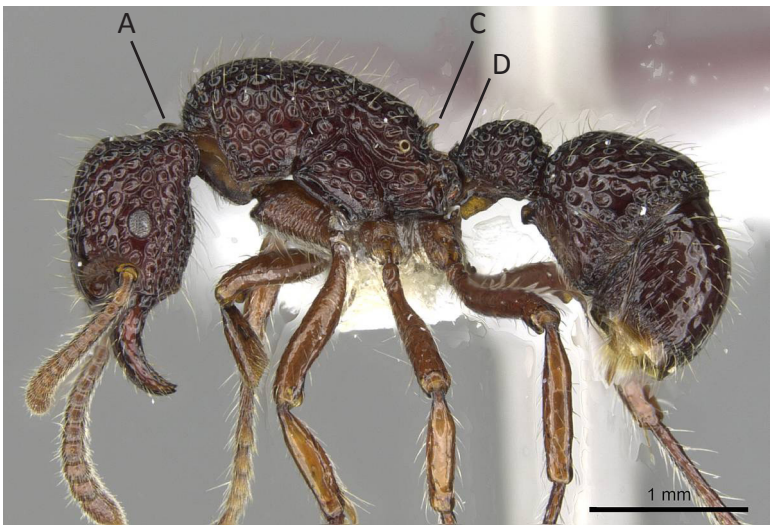
Body size	Body colour	Occipital lobe	Petiole process	Propodeum
6.0 - 12.7 mm (mean 7.8 mm)	Dark reddish brown	Ventrally protuberant [A]	With anteroventral lobe [B]	2 denticles [C]

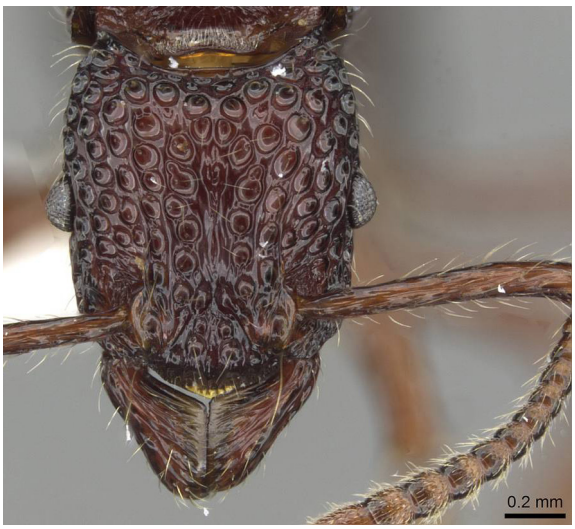
Additional characters (Lattke 2004):
- Metacoxal dorsum with denticle;
- Antenna completely ferruginous;
- Petiole relatively low, evenly convex;
- Eyes rounded;
- 4th abdominal tergite (= 2nd gastral tergite) punctate;
- 4th abdominal sternite (=2nd gastral sternite) with transverse rugae/rugulae;
- Scapes smooth, hairs without swollen base;
- Occipital lobes broad [A];
- Metapleural lobes greatly expanded [D].

Similar species	No similar species recorded in Sabangau so far. Lattke (2004) mentions *Gnamptogenys binghamii* and *G. fontana* as the closely related species.
Distribution	West Malaysia, Borneo (Lattke 2004).



Petiole and subpetiolar process of *Gnamptogenys gabata*.
Illustration by Stijn Schreven.





Photographer: Zach Lieberman (from www.AntWeb.org).

Subfamily	Ponerinae
Genus	*Hypoponera*

Hypoponera

Santschi, 1938

Number of species: SAB 1; BOR 3; WRD 148

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	?	No	No

Additional characters (Bolton 1994):
- One pectinate spur on ventral tip of hind tibia;
- Eyes very reduced, minute;
- Petiole with subpetiolar process, which is a simple lobe without posteroventral angle and anterior fenestra.

Related genera	Fairly distinctive from other recorded ponerine genera by having only 1 pectinate spur on the hind tibia.
Ecology	*Hypoponera* ants are generalized foragers that nest in litter in forests and savannah. Functional group: Cryptic Species (Brown 2000).
Distribution	Worldwide tropics and warm temperate regions (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	-	-	x	-	-	-

Distribution data refer to *Hypoponera sp. 1*.

Hypoponera sp. 1

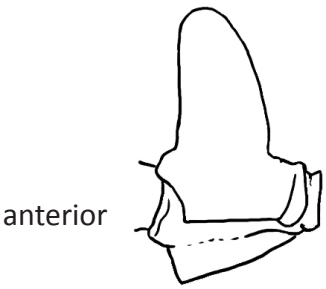
Code vial	FDN
Code report	Hy1

Identification

Body size	Body colour
2.0 mm	Dark brown

- Mandible with 10 short teeth (including corner basal-apical);
- Subpetiolar process with anteroventral angle (see sketch);
- Petiolar scale inclined anteriorly.

Similar species	See genus account.



Petiole of *Hypoponera sp. 1*. Illustration by Stijn Schreven.

Example of *Hypoponera* habitus: *Hypoponera confinis javana* Forel, 1905. Photographer: Zach Lieberman (from www.AntWeb.org).

Subfamily	Ponerinae
Genus	*Leptogenys*

Leptogenys

Roger, 1861

Number of species: SAB 1; BOR 12; WRD 265
For morphospecies classification diagnostic characters were derived from Bolton (1975b) and Lattke (2011).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	4,4	No	No

Additional characters:
- Two spurs on ventral tip of hind tibia (Bolton 1994);
- Claws of hind leg pectinate (Bolton 1994);
- Ocelli absent (Bolton 1994);
- Petiole with ventral process;
- Abundant erect hairs on head, alitrunk and gaster.

Related genera	*Pachycondyla*. Distinction as in key (pretarsal claws of hind leg).
Ecology	Predators of isopods and mass-foraging predators, especially of termites. Functional group: Specialist Predators (Brown 2000).
Distribution	Worldwide in tropics and some subtropics (Brown 2000).

Presence in peat-swamp forest habitat subtypes

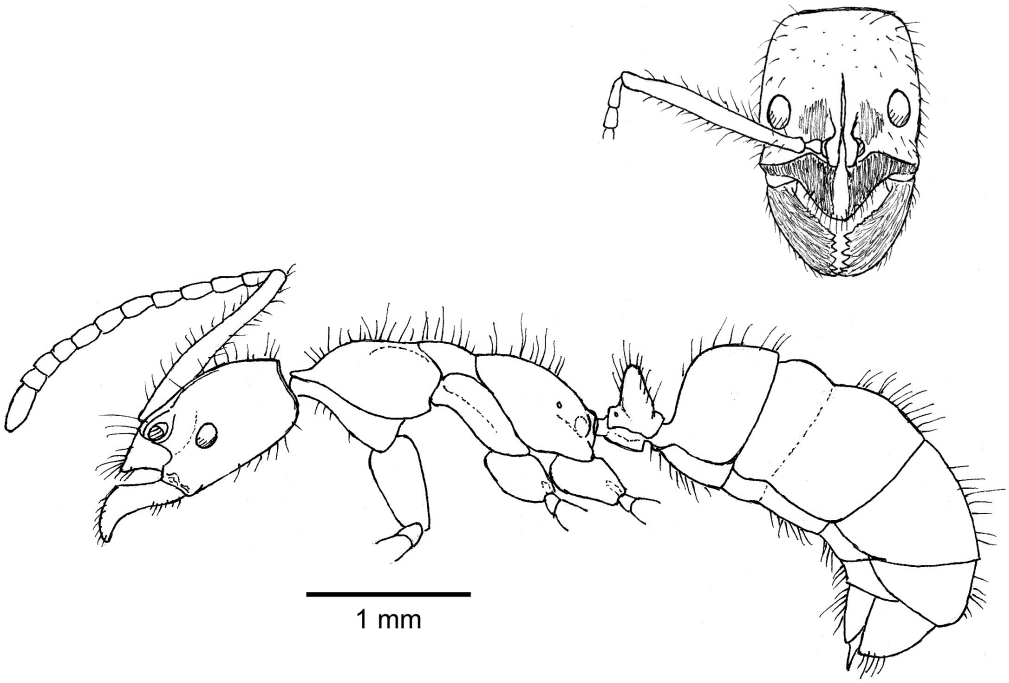
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
x	-	x	x	x	x	-	-

Distribution data refer to *Leptogenys sp. 1*.

Subfamily	Ponerinae	Code vial	FAO, Fire ant, FBH
Genus	*Leptogenys*	Code report	Lg1

Leptogenys sp. 1 - Sabangau fire ant

In Sabangau this species is often called a fire ant because of its painful bite, although strictly speaking this name is not correct, and it is actually a type of army ant.



Identification

Body size	Body colour	Mandible	Pronotal dorsum	Petiole
7.8 - 10.2 mm (mean 8.4 mm)	Dark reddish brown	With longitudinal striations	Smooth, shiny	With ventral process

Additional characters:
- Dorsum and sides of head smooth, shiny, only longitudinal striations above antennal sockets;
- Eyes relatively small, 1.25-1.5x max. scape width;
- Eyes situated anteriorly on head, circa 1x its diameter away from mandible insertion;
- Dorsum of head, alitrunk and gaster with abundant erect hairs (light red);
- Mandible with 5-6 teeth and a row of basal denticles;
- Clypeal margin strongly convex, median clypeal lobe with setae;
- 1st and 2nd gastral tergite without appressed pubescence;
- Metatibial spur well-developed, with more than 50 teeth in comb;
- Petiole side unsculptured, without dorsal process but with ventral process: a lamella ending posteriorly in a tooth;
- Occipital margin slightly concave in full-face view;
- Scape length = 1.5 mm, head width = 1.5 mm, head length = 1.75 - 2.0 mm;
- Very painful bite!

Similar species

Habitus somewhat resembles *Pachycondyla cf. tridentata*, but the latter is clearly distinct due to its petiole shape (3 dorsal teeth) and body sculpture (not smooth), and the differences mentioned in the generic key.

Ecology

This morphospecies is frequently encountered in the field in mass raids foraging for arthropods on the forest floor at daytime. Such army ant behaviour has been observed in *Leptogenys* species at other locations in Southeast-Asia, such as "*Leptogenys sp. 1*" with nocturnal mass raids in Ulu Gombak (Malay Peninsula) (Maschwitz et al. 1989) and the "Danum fire ant" from Danum valley, Sabah (Chung 1995).
Maschwitz et al. (1989) found that their *Leptogenys* species formed colonies of one queen and over 50,000 workers. A colony moved its brood at irregular intervals to new bivouac sites in leaf litter, ground cavities or rotten wood.

Subfamily	Ponerinae	Code vial	FAO, Fire ant, FBH
Genus	*Leptogenys*	Code report	Lg1

An unfortunate tarantula (*Lampropelma sp.*?) finds itself in a mass raid of *Leptogenys sp. 1* along the railway transect in Sabangau NLPSF, 24th August 2012. The ants attack both the spider (clutching its legs) and its egg sac (right picture). Photographer: Stijn Schreven/ OuTrop.

Workers of *Leptogenys sp. 1* in Sabangau. Photographer: Erik Frank/ OuTrop.

Subfamily	Ponerinae
Genus	*Odontomachus*

Odontomachus

Latreille, 1804

Number of species: SAB 1; BOR 5; WRD 69
The morphospecies recorded from Sabangau was identified using Brown (1976) as *Odontomachus rixosus* Smith, 1857.

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	4,4	No	No

Additional characters:
- Large ants;
- Linear and extended mandibles, inserted medially (Bolton 1994);
- Nuchal carina at midline V-shaped (Bolton 1994).

Related genera	Unmistakably different from recorded genera, because of trap-jaw and characteristic shape of head and petiole.
Ecology	Ants of *Odontomachus* are ground-dwelling predators. Functional group: Opportunists and Specialist Predators (?) (Brown 2000).
Distribution	Worldwide in tropical and warm temperate, not West Palearctic (Brown 2000).

Presence in peat-swamp forest habitat subtypes

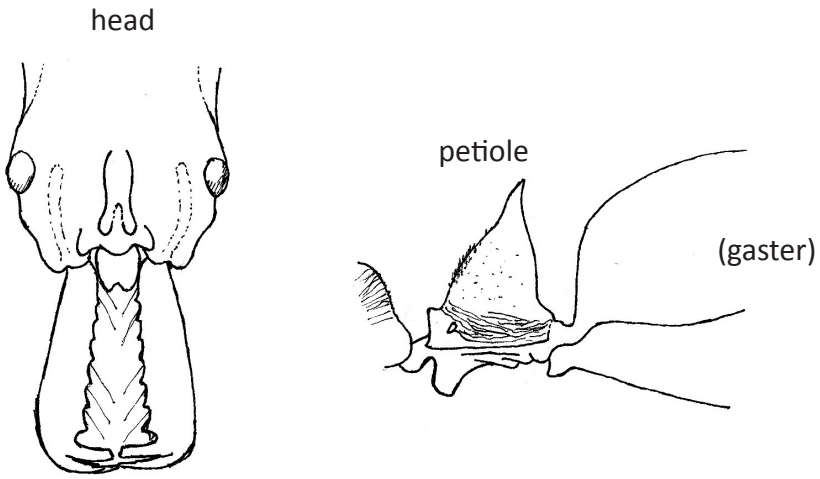
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	x	-	-	-	-	-	x

Distribution data refer to *Odontomachus rixosus*.

Subfamily	Ponerinae	Code vial	FAD
Genus	*Odontomachus*	Code report	Odr

Odontomachus rixosus

Smith, 1857



Identification

Body size	Body colour	Petiole node	1st gastral tergite
11.0 - 11.5 mm (mean 11.3 mm)	Dark brown	Conical	Smooth and shining

Additional characters (Brown 1976):
- Subapical tooth of mandible at least 2.5x as long as wide, truncate;
- Vertex mostly smooth, pronotum striate.

Similar species	Unmistakeably different from all other recorded ant species in Sabangau.
Distribution	Common in tropical forests of Southeast-Asia, Sumatra, Java and Borneo (Brown 1976).

Photographer: Ryan Perry (from www.AntWeb.org).

Subfamily	Ponerinae
Genus	*Pachycondyla*

Pachycondyla

Smith, 1858

Number of species: SAB 1; BOR 15; WRD 262

The morphospecies recorded from Sabangau resembles *Pachycondyla tridentata* Smith, 1858, based on comparison with pictures from AntWeb (2012). In Sabangau, *Pachycondyla* is known from one incidental record of a worker specimen, collected on the forest floor in intact mixed swamp forest.

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	?	No	Yes

Additional characters (Bolton 1994):
- Mandibles triangular;
- Frontal lobes closely approximated;
- Hind tibia with 1 large pectinate spur and 1 small simple spur;
- Pretarsal claws of hind leg unarmed;
- Antennal sockets very close to anterior clypeal margin;
- Pronotum unarmed;
- Mandible with 11 (?) teeth (at least more than 7).

Related genera	*Leptogenys*, see generic key for differences.
Ecology	Predators; functional group: Specialist Predators (Brown 2000).
Distribution	Worldwide in tropics and some warm temperate (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Distribution data refer to *Pachycondyla cf. tridentata*.

Subfamily	Ponerinae	Code vial	-
Genus	*Pachycondyla*	Code report	Pat

Pachycondyla cf. tridentata

Smith, 1858

Identification

Body size	Body colour
12 mm	Black to dark reddish brown

- Petiole with 3 posterodorsal teeth;
- Head, alitrunk and petiole punctate, gaster longitudinally striate.

Similar species	See genus account.
Distribution	Borneo, Philippines (AntWiki 2014).

3 teeth on petiole (dorsal view)

Pachycondyla tridentata. Photographer: Will Ericson (from www.AntWeb.org).

Subfamily Pseudomyrmecinae

Characters	2 waist segments (petiole and postpetiole), sting present, premesonotal suture present.
Diversity	1 genus, 3 species
Unidentified	None

The only genus in Southeast-Asia is *Tetraponera* (Bolton 1994).

Subfamily	Pseudomyrmecinae
Genus	*Tetraponera*

Tetraponera

Smith, 1852

Number of species: SAB 3; BOR 16; WRD 94

Species identification and simplified key based on Ward (2001). Explanations of indices (Ward 2001):

- Cephalic index (CI) = head width (HW) / head length (HL);
- Relative eye length (REL) = eye length (EL) / head length (HL);
- Petiole length index (PLI) = petiole height (PH) / petiole length (PL);
- Petiole width index (PWI) = dorsal petiole width (DPW) / petiole length (PL).

Identification

Antenna	Antennal club	Palp formula	Alitrunk armed?	Petiole armed?
12 segments	No	6,4	No	No

Additional characters (Bolton 1994):
- Large eyes, situated above midline of head length;
- Basal margin of mandible unarmed;
- Basitarsus of hind leg with longitudinal sulcus.

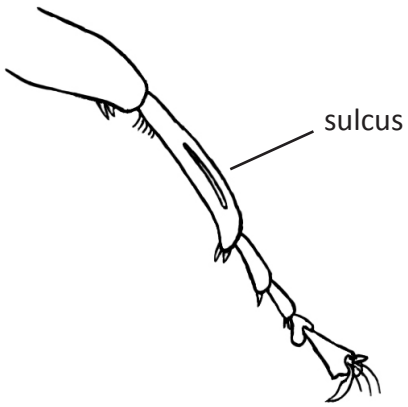
Related genera	Unmistakable. Habitus resembles Myrmicinae but is distinct because of the conspicuously large eyes and presence of the premesonotal suture (which is reduced in Myrmicinae).
Ecology	Ants of *Tetraponera* are arboreal and live mainly in forests, where they nest in plant cavities. Functional group: Tropical Climate Specialists (Brown 2000).
Distribution	Old World tropics and warm temperate, except Europe (Brown 2000).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	x	x

Key to the morphospecies of the genus *Tetraponera*

No.	Diagnosis	Go to:
1.	Large species, 8 mm	***Tetraponera attenuata***
-	Smaller species, circa 4 mm	**2**
2.	Mandible with 3 teeth (and 2 denticles basally), basal margin longer than apical margin; petiole without a pair of acute, posteroventral teeth; clypeus with median lobe with 3 teeth	***Tetraponera extenuata/ modesta***
-	Mandible with 4 teeth (and 1 denticle basally), basal margin equal or shorter than apical margin; petiole with a pair of acute, posteroventral teeth; clypeus without teeth on median lobe	***Tetraponera nitida***



Hind leg of *Tetraponera*, indicating longitudinal sulcus on basitarsus. Illustration by Stijn Schreven.

Subfamily	Pseudomyrmecinae	Code vial	FCJ
Genus	*Tetraponera*	Code report	Tpa

Tetraponera attenuata

Smith, 1877

mandible

clypeal lobe

Identification

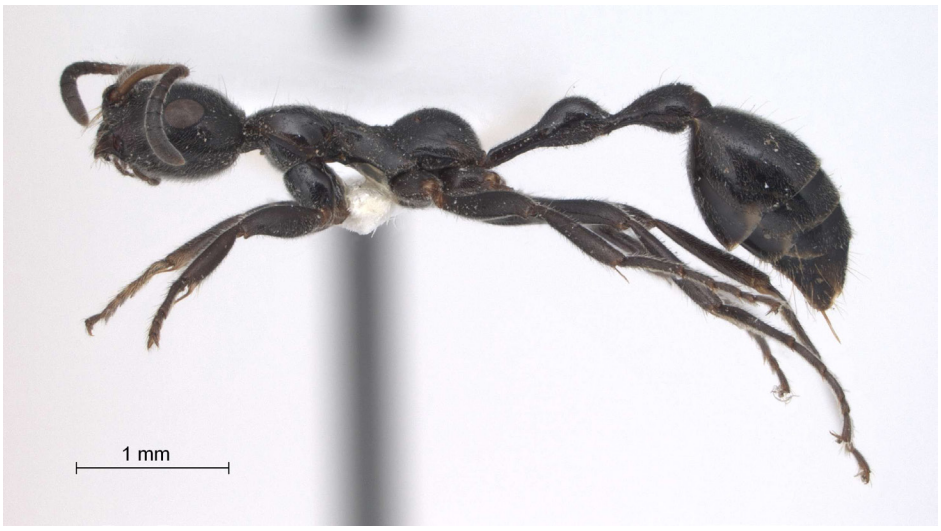
Body size	Body colour	Mandible	Median clypeal lobe	PLI
8.1 mm	Dark brown to black	4 teeth 1 basal denticle	Prominent, unarmed	0.37

Additional characters (Ward 2001):
- Ocelli absent;
- Large species, standing pilosity common;
- Petiole slender;
- CI = 0.83, broad head.

Similar species	Easily distinguishable from the other two *Tetraponera* species by the size (2x as large) and by the clypeal lobe which is prominent but unarmed (Ward 2001).
Ecology	The species is known from various types of tropical forests, from mangrove to lowland and hill forest, and nests in dead twigs and branches (Ward 2001).
Distribution	North-east India to China, south to Sumatra, Java, Borneo and Palawan (Ward 2001).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-



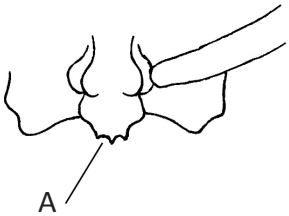
Photographer: Katrin Deufel (from www.Antbase.net).

Subfamily	Pseudomyrmecinae	Code vial	F (omega)
Genus	*Tetraponera*	Code report	Tpe

Tetraponera extuenata / modesta

Ward, 2001 (*extenuata*) / (Smith, 1860) (*modesta*)

mandible



clypeal lobe

Identification

Body size	Body colour	Mandible	Median clypeal lobe	PLI
4.6 mm	Dark reddish brown	3 teeth 2 basal denticles	Armed with 3 teeth [A]	0.51

Additional characters (Ward 2001):
- Metanotal plate absent;
- Smaller species, some parts of body lighter brown;
- Tibiae lighter yellow, contrasting with brown-black alitrunk;
- REL = 0.33; PWI = 0.395.

Similar species *Tetraponera extenuata* and *T. modesta* are distinguished from one another by colour and size differences that are subject to variation (Ward 2001), making it difficult to assign the specimens from Sabangau to one of both. This morphospecies is different from the other two recorded *Tetraponera* species by size, mandible and clypeal lobe (Ward 2001).

Ecology *Tetraponera modesta* has been found in a wide range of habitats. Both this species and *T. extenuata* have been recorded from lowland rainforest and dipterocarp forest. Nests of *T. extenuata* have been collected from dead twigs and workers have been recorded foraging on low vegetation (Ward 2001).

Distribution *Tetraponera modesta* and *T. extenuata* are both widely distributed throughout South-east-Asia, with *T. extenuata* having a smaller range than *T. modesta* (Ward 2001).

Presence in peat-swamp forest habitat subtypes

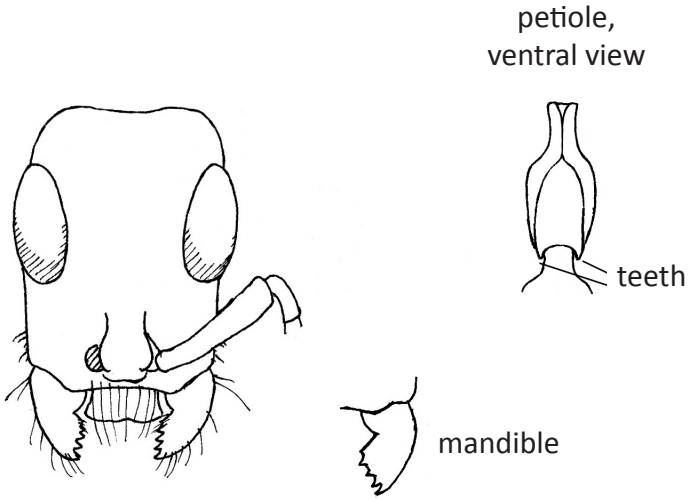
Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	-	-

Tetraponera extenuata. Photographer: Will Ericson (from www.AntWeb.org).

Subfamily	Pseudomyrmecinae	Code vial	FAL, FAV
Genus	*Tetraponera*	Code report	Tpn

Tetraponera nitida

(Smith, 1860)



Identification

Body size	Body colour	Mandible	Median clypeal lobe	PLI
2.2 - 4.1 mm (mean 3.4 mm)	Dark brown to black	4 teeth 1 basal denticle	Absent, clypeal margin slightly concave	0.63

Additional characters (Ward 2001):
- Smaller species;
- Petiole short, with a pair of acute, posteroventral teeth;
- Standing pilosity sparse on the sides of head, or absent from head;
- CI = 0.85; REL = 0.50.

Similar species	*Tetraponera extenuata / modesta* differs by its mandible and clypeal lobe (Ward 2001).
Ecology	*Tetraponera nitida* uses a wide range of habitats from mangrove to rainforest but also drier forests of eucalypt trees. It is a generalist inhabitant of dead twigs and plant stems (Ward 2001).
Distribution	Widely distributed throughout Southeast-Asia and south to northern Australia (Ward 2001).

Presence in peat-swamp forest habitat subtypes

Tall-pole forest	Low-pole forest	Mixed-swamp forest				Burned deforested	Sedge swamp
		Intact	Edge	Degraded	Clearings		
-	-	x	-	-	-	x	x

Photographer: Will Ericson (from www.AntWeb.org).

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