

# Revision of the *Crematogaster ranavalonae*-group in Asia, with description of two new species (Hymenoptera, Formicidae)

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## Abstract

The Asian members of the *Crematogaster ranavalonae*-group are revised and twelve species, including two new species, *C. hashimi* **sp. n.** and *C. imperfecta* **sp. n.** are recognized. The members are distinguished from the other Asian *Crematogaster* in having smooth, shiny bodies with short appressed setae on the surface. *Crematogaster sikkimensis* Forel, 1904 is raised to the species level, and the following new synonyms are established: *C. aberrans* Forel, 1892 = *C. aberrans assmuthi* Forel, 1913, **syn. n.** = *C. aberrans inglebyi* Forel, 1902, **syn. n.** = *C. soror* Forel, 1902, **syn. n.**; *C. ebenina* Forel, 1902 = *C. ebenina corax* Forel, 1902, **syn. n.** A key to the species based on the worker caste is provided.

## Keywords

Asia, *Crematogaster ranavalonae*-group, Formicidae, new species, *Oxygyne*, taxonomy, ventrolateral katepisternal ridge

## Introduction

The hyperdiverse ant genus *Crematogaster* had been subdivided into sixteen subgenera (Emery 1922; Wheeler 1922). Recently a molecular phylogenetic analysis has suggested that most of these subgenera are non-monophyletic, and that the subgenus *Oxygyne* is monophyletic (Blaimer 2012c). Subsequently Blaimer (2012b) established

the *Crematogaster ranavalonae*-group to accommodate the former subgenus *Oxygyne* in her subgeneric revision of this genus.

Members of the *Crematogaster ranavalonae*-group have been differentiated based on characters found in the worker and queen castes (Blaimer 2012a, 2012b). Although workers of the Asian members also possess the taxonomic characters identified by her, the propodeal spines in some of the Asian species are not well developed, appearing instead as small tubercles. However, I have identified a unique character among the members of the Asian *C. ranavalonae*-group; that is, while the ridge separating the lateral and ventral portions of the mesopleuron is distinct in most *Crematogaster* species, it is not distinct in the Asian members of the *C. ranavalonae*-group. Furthermore, the queen caste of some members of the species group has falcate mandibles, suggesting the occurrence of temporal social parasitism in those species (Forel 1910; Santschi 1934; Hölldobler and Wilson 1990; Blaimer 2012a). However, among the Asian fauna, falcate mandibles are found only in the queen of *C. augusti* and are unknown in other species due to the rarity with which they are encountered in the field. In this study, I do not treat the queen caste because it is not represented in my collections.

The *Crematogaster ranavalonae*-group consists of twenty-two species, including eleven species from Africa and Madagascar, ten from Asia, and one from New Guinea (Blaimer 2012b). Among the Asian fauna (ten species and four subspecies), four species and three subspecies have been described from India. It is considered that India is the center of diversity in this species-group, but this may be an overestimate attributable to the rarity of this species group in the field. This paper provides a revision of the Asian members of *C. ranavalonae*-group, based on the morphological characters of the worker caste.

## Materials and methods

### Sources of material

Specimens were examined and/or deposited in the collections listed below. Codes for public institutions mainly follow those in Brandão (2000). Nest series samples, most of which were recently collected, are represented as colony codes, e.g., “SH12-Tha-01.”

<b>BMNH</b>	The Natural History Museum, London, U. K.
<b>CASC</b>	California Academy of Sciences, San Francisco, CA, USA
<b>FRIM</b>	Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur, Malaysia.
<b>IEGG</b>	Istituto di Entomologia “Guido Grandi”, Bologna, Italy.
<b>KUM</b>	Kyushu University, Fukuoka, Japan.
<b>MCSN</b>	Museo Civico di Storia Naturale “Giacomo Doria”, Genoa, Italy.
<b>MCZC</b>	Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA.
<b>MHNG</b>	Musée d’Histoire Naturelle, Geneva, Switzerland.

<b>MBBJ</b>	Museum Zoologicum Bogoriense, Cibinong, Java, Indonesia.
<b>NHMB</b>	Naturhistorisches Museum, Basel, Switzerland.
<b>NHMW</b>	Naturhistorisches Museum Wien, Wien, Austria.
<b>SKYC</b>	Sk. Yamane Collection, Kagoshima University, Japan.
<b>THNHM</b>	Thailand Natural History Museum, Technopolis, Khlong Luang, Pathum Thani, Thailand.

## Methods

Most observations were made on an Olympus SZX12 stereomicroscope. The scanning electron micrographs (SEM) were prepared with a JSM-5600LV scanning electron microscope. Color images were taken using a Canon EOS 50D with a Canon MP-E 65 mm 1–5× macro lens, then processed using Combine ZM.

The relative position of propodeal spiracles was observed in lateral view, with the mesosoma carefully tilted to the position with the true maximum of Weber's length.

## Measurements and indices

Measurements were made under an Olympus SZX12 stereomicroscope using micrometers. All measurements are expressed in millimeters, recorded to the second decimal place. The measurements for petiole and postpetiole follow Longino (2003).

Head Width (HW): Maximum width of head in full-face view, excluding the eyes (Fig. 1).

Head Length (HL): Perpendicular distance from vertex margin to line tangent to anteriormost projections of clypeus in full-face view (Fig. 1).

Cephalic Index (CI):  $HW/HL \times 100$ .

Scape Length (SL): Length of the first antennal segment, excluding the neck and basal condyle (Fig. 2).

Scape Index (SI):  $SL/HW \times 100$ .

Eye Length (EL): Maximum length of the compound eye (Fig. 1).

Pronotal Width (PW): Maximum width of the pronotum in dorsal view (Fig. 3).

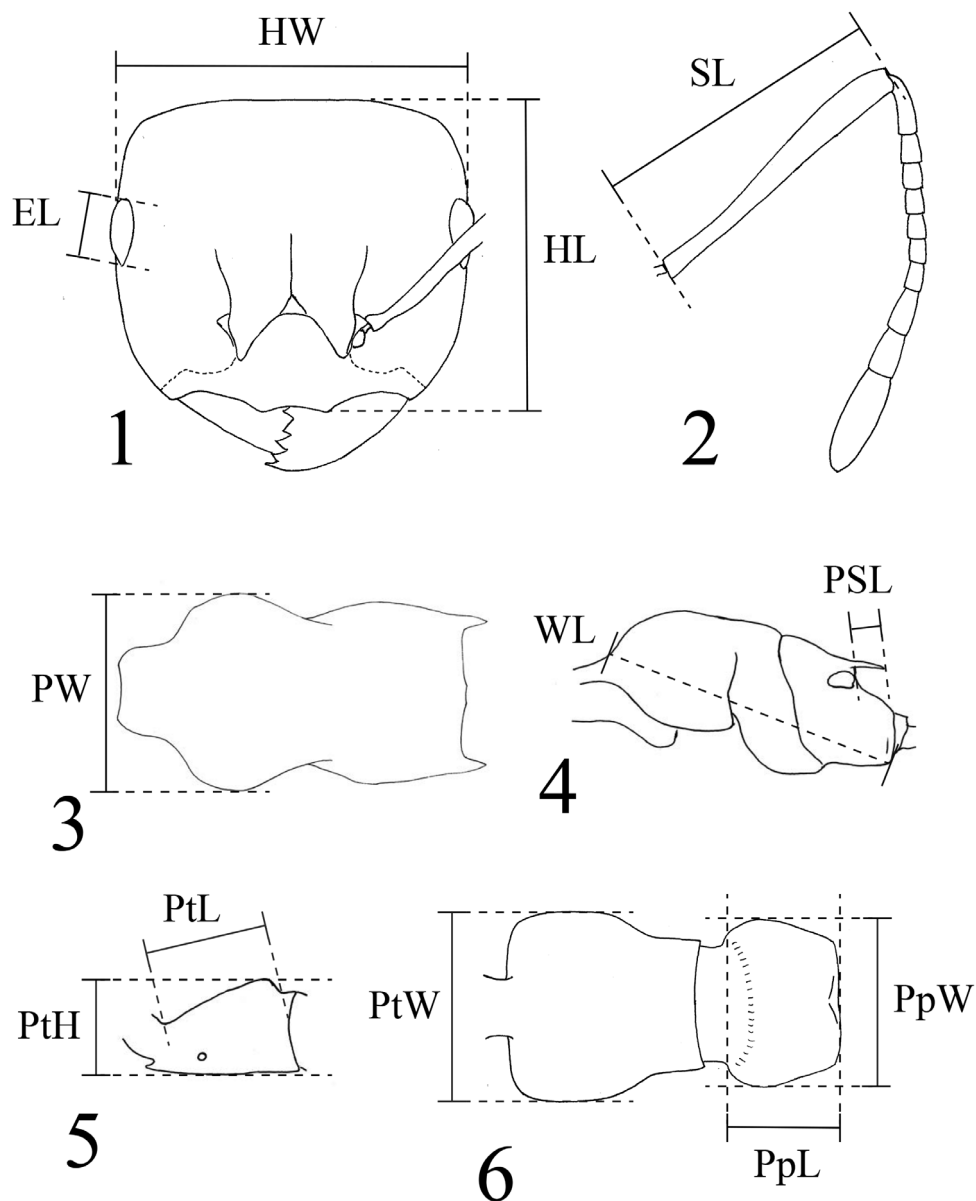
Weber's Length of the mesosoma (WL): Diagonal length, measured in lateral view from the anterior margin of the pronotum (excluding the collar) to the posterior extremity of the propodeal lobe (Fig. 4).

Propodeal Spine Length (PSL): measured from tip of propodeal spine to closest point on outer rim of propodeal spiracle (Fig. 4).

Petiole Length (PtL): Length of the petiole in lateral view (Fig. 5) (see Longino 2003, fig. 2).

Petiole Width (PtW): Maximum width of petiole in dorsal view (Fig. 6).

Petiole Height (PtH): Height of the petiole in lateral view (Fig. 5) (see Longino 2003, fig. 2).

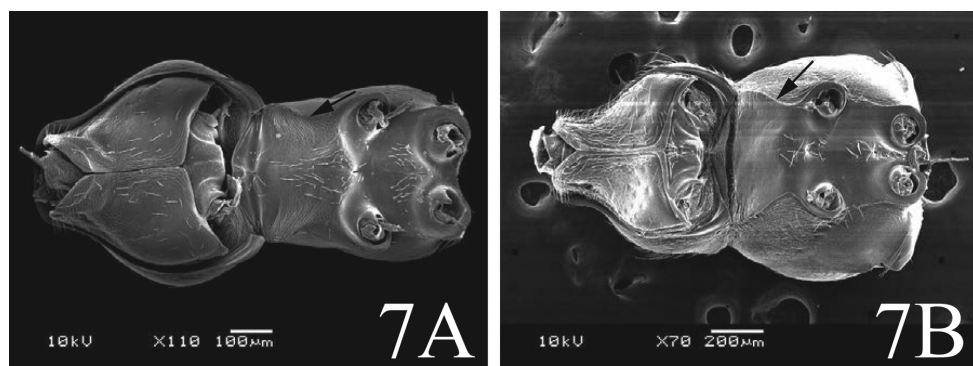


**Figures 1–6.** Measurements of workers. **1** Head width, head length and eye length **2** Scape length **3** Pronotal width **4** Weber's length and propodeal spine length **5** Petiole length and petiole height **6** Petiole width, postpetiole length and postpetiole width.

Postpetiole Length (PpL): Length of the postpetiole in dorsal view (Fig. 6) (see Longino 2003, fig. 2).

Postpetiole Width (PpW): Maximum width of postpetiole in dorsal view, excluding the helcium (Fig. 6).





**Figure 7.** Ventrolateral katepisternal ridge from ventral portion in mesosoma (legs removed). Arrow indicates the ridge. **A** *Crematogaster hashimi* **B** *Crematogaster physiothorax*.

Petiole Height Index (PtHI):  $PtH/PtL \times 100$ .

Petiole Width Index (PtWI):  $PtW/PtL \times 100$ .

Postpetiole Width Index (PpWI):  $PpW/PpL \times 100$ .

Waist Index (WI):  $PpW/PtW \times 100$ .

An important character in the Asian *Crematogaster ranavalonae*-group is explained below.

**Ventrolateral katepisternal ridge** (Fig. 7). The ridge separates the mesopleuron lateral surface from ventral surface. Most Asian *Crematogaster* species have a well-defined ridge separating the two surfaces (Fig. 7B), but in some species the ridge is absent or vestigial (Fig. 7A). The ridge is visible in pinned specimens from lateral or ventrolateral view.

### Asian *Crematogaster ranavalonae*-group

The Asian members of the *Crematogaster ranavalonae*-group not only have the morphological features diagnosed by Blaimer (2012a, 2012b), but also show the additional features below.

- (i) Pronotum steeply raised in lateral view.
- (ii) Ventrolateral katepisternal ridge indistinct, but weakly developed anteriorly in some species.
- (iii) Integument essentially smooth and shiny.
- (iv) Erect pilosity almost absent. Some erect setae are developed on the clypeus or dorsal surface of petiole and postpetiole, but absent on the dorsum of head, mesosoma and fourth to seventh abdominal tergites.
- (v) Dorsum of head, mesosoma and fourth abdominal tergite with short and appressed setae.

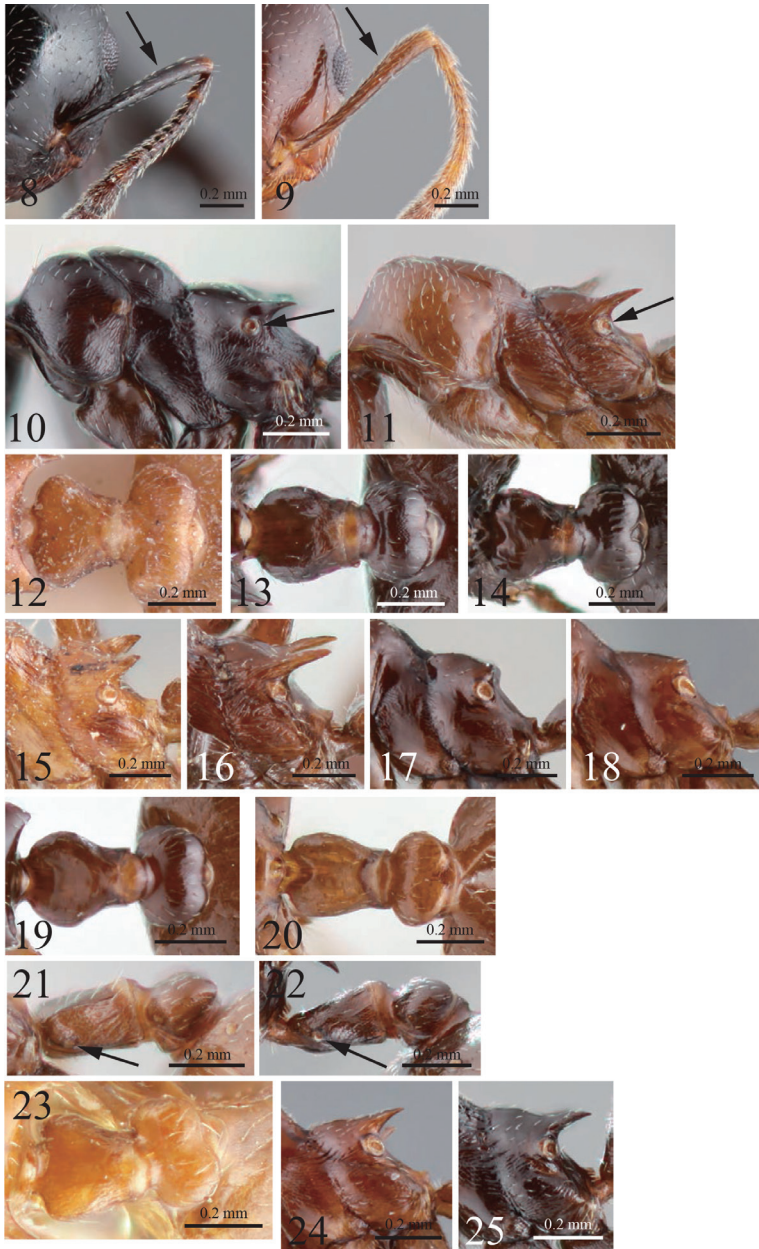
This species group is easily defined from other Asian *Crematogaster* in having a steeply raised pronotum, smooth and shiny body surface, and short and appressed body setae.

### Synonymic list of the Asian *Crematogaster ranavalonae*-group

- aberrans* Forel, 1892.  
 = *aberrans assmuthi* Forel, 1913, **syn. n.**  
 = *aberrans inglebyi* Forel, 1902, **syn. n.**  
 = *soror* Forel, 1902, **syn. n.**  
*augusti* Emery, 1895.  
*butteli* Forel, 1913.  
*daisyi* Forel, 1901.  
*dalyi* Forel, 1902.  
*ebenina* Forel, 1902.  
 = *ebenina corax* Forel, 1902, **syn. n.**  
*hashimi* **sp. n.**  
*imperfecta* **sp. n.**  
*pia* Forel, 1911.  
*sikkimensis* Forel, 1904. **stat. n.**  
*tumidula* Emery, 1900.  
*vandermeermohri* Menozzi, 1930

**Key to species based on the worker caste** (not included are *C. augusti*, known only from the queen caste, and *C. vandermeermohri* whose type specimens were not examined)

- 1 Scape with sparse setae (Fig. 8). Propodeal spiracles as small as mesothoracic spiracles (Fig. 10).....***aberrans***
- Scape with abundant setae (Fig. 9). Propodeal spiracles large; diameter ca. 2 × as large as mesothoracic spiracles (Fig. 11) .....**2**
- 2 Postpetiole markedly bilobed laterally, more than 2 × as broad as long (PpWI 212–236) (Fig. 12) .....**3**
- Postpetiole moderately bilobed laterally, generally ca. 1.2 to 2 × as broad as long (PpWI 125–200) (Figs 13, 14) .....**4**
- 3 Propodeal spines short; their length equal to or shorter than diameter of propodeal spiracles (Fig. 15).....***dalyi***
- Propodeal spines long; distinctly longer than diameter of propodeal spiracles (Fig. 16).....***sikkimensis***
- 4 Propodeal spines not developed, reduced to small tubercles (Figs 17, 18) ...**5**
- Propodeal spines developed (Fig. 11) .....**6**
- 5 Propodeal spiracles circular (Fig. 17). Petiole about as broad as or broader than long (PtWI 96–109) (Fig. 19) .....***hashimi***
- Propodeal spiracles elliptical (Fig. 18). Petiole longer than broad (PtWI 88–92) (Fig. 20) .....***imperfecta***
- 6 Anterolateral portion of petiole developed laterally and spiracles on petiole located on lower position and directed ventrally (Fig. 21)..... ***daisyi***



**Figures 8–25.** Worker characters of Asian *Crematogaster ranavalonae*-group. **8** left scape (*C. aberrans*) **9** left scape (*C. daisyi*) **10** propodeal spiracle (*C. aberrans*) **11** propodeal spiracle (*C. daisyi*) **12** petiole and postpetiole (*C. dalyi*) **13** petiole and postpetiole (*C. ebenina*) **14** petiole and postpetiole (*C. pia*) **15** propodeal spine (*C. dalyi*) **16** propodeal spine (*C. sikkimensis*) **17** propodeal spiracle and reduced propodeal spine (*C. hashimi*) **18** propodeal spiracle and reduced propodeal spine (*C. imperfecta*) **19** petiole and postpetiole (*C. hashimi*) **20** petiole and postpetiole (*C. imperfecta*) **21** spiracle on petiole (*C. daisyi*) **22** spiracle on petiole (*C. ebenina*) **23** petiole and postpetiole (*C. buttelii*) **24** propodeal spine (*C. tumidula*) **25** propodeal spine (*C. ebenina*).

- Anterolateral portion of petiole developed laterally, but spiracles on petiole located on middle portion and directed laterally (Fig. 22).....7
- 7 Anterolateral corners of petiole angulate, anterior face developed (Fig. 23) . *butteli*
- Anterolateral corners of petiole rounded, anterior face sinuate (Fig. 13).....8
- 8 Propodeal spines short and stout; as long as diameter of propodeal spiracles (Fig. 24).....*tumidula*
- Propodeal spines long; distinctly longer than diameter of propodeal spiracles (Fig. 25).....9
- 9 Anterolateral corners of petiole undeveloped, tapering anteriorly (Fig. 13). Postpetiole generally as wide as petiole in dorsal view (WI 96–100) ... *ebenina*
- Anterolateral corners of petiole developed (Fig. 14). Postpetiole wider than petiole in dorsal view (WI 103–115) .....*pia*

## Species accounts

### *Crematogaster aberrans* Forel

Fig. 26

*Crematogaster aberrans* Forel, 1892: 532–534. Type locality: India, Thana. Combination in *C. (Oxygyne)* by Forel, 1901: 375; in *C. (Crematogaster)* by Blaimer, 2012b: 55.

*Crematogaster (Oxygyne) aberrans* var. *assmuthi* Forel, 1913: 662. Type locality: India, Bombay. **syn. n.**

*Crematogaster (Oxygyne) aberrans* var. *inglebyi* Forel, 1902: 201. Type locality: India, Travancore. **syn. n.**

*Crematogaster (Oxygyne) soror* Forel, 1902: 200. Type locality: India, Poona and Bombay. Combination in *C. (Crematogaster)* by Blaimer, 2012b: 55. **syn. n.**

**Type material examined.** *Crematogaster aberrans*: lectotype worker (top specimen of three on one pin) by present designation and five paralectotype workers from India, Thana (MHNG, examined); one syntype worker from India, Thana (NHMB, examined). *Crematogaster (Oxygyne) aberrans* var. *assmuthi*: one syntype worker from India, Bombay (*M. Assmuth*) (MHNG, examined). *Crematogaster (Oxygyne) aberrans* var. *inglebyi*: three syntype worker from India, Travancore (*Ferguson* and *Ingleby*) (MHNG, examined). *Crematogaster (Oxygyne) soror*: five syntype workers from India, Poona (*Wroughton*) and Bombay (*Rothney*) (MHNG, examined); one syntype worker from India, Bombay (*Rothney*) (NHMB, examined).

**Non-type material examined. THAILAND:** 8 workers, Doi Chiang Dao (500–600m alt.), nr Chiang Mai, N. Thailand. 2.iv.2005 (TH05-SKY-22) (*Sk. Yamane*); 5 workers, Ngao, Lampang, 17.ii.1991 (*No collector's name*); 4 workers, Maegar, Phayao, 30.iii.1991 (*No collector's name*).

**Measurements and indices** (workers, n = 10). HW 0.82–0.96; HL 0.78–0.93; CI 102–109; SL 0.64–0.74; SI 75–82; EL 0.18–0.21; PW 0.50–0.58; WL 0.90–1.05; PSL



**Figure 26.** *Crematogaster aberrans* [Doi Chiang Dao, nr. Chiang Mai, N. Thailand]. **A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

0.09-0.12; PtL 0.25-0.30; PtW 0.25-0.32; PtH 0.17-0.20; PpL 0.15-0.19; PpW 0.25-0.33; PtHI 61-76; PtWI 97-116; PpWI 167-213; WI 100-114.

**General description of worker.** Head appearing rounded in front view. Mandible indistinctly striate, with four teeth, apical and subapical teeth large, basal two teeth smaller. Scape exceeding posterior corner of head, with sparse appressed setae, each of which is about as long as scape diameter. Compound eye slightly projecting beyond lateral margin of head in full face view.

Mesonotum highly convex in lateral view. Ventrolateral katepisternal ridge indistinct. Propodeal spine short and stout; the length variable, but generally as long as propodeal spiracle, dorsum not higher than anterior propodeum in lateral view. Pro-



podeal spiracle as large as mesothoracic spiracle pit, situated apart from the propodeal declivity in lateral view, directed laterally.

In dorsal view, shape of petiole scoop with convex side, as long as broad. Petiole with anterolateral corner angulate. Petiolar spiracle big, as wide as half of propodeal spiracle in diameter, directed laterally. Postpetiole bilobed, with slight longitudinal median sulcus. Postpetiole slightly wider than petiole in dorsal view.

Integument essentially smooth and shiny. Clypeus generally smooth and shiny, but weakly striated with faint rugulae. Malar region with feeble longitudinal rugulae. Dorsal surface of promesonotum weakly punctuated. Lateral surface of pronotum shiny, but weakly punctuated. Mesopleuron weakly punctuated. Dorsal surface of propodeum smooth and shiny. Lateral propodeum smooth and shiny.

Erect pilosity almost absent. Dorsum of head, clypeus and mesosoma with short and appressed, sparse setae. Clypeus without pair of longer setae on anteriormost portion. Anterior clypeal margin with one single longer seta and one pair of longer setae on median portion, mixed with some shorter setae on side. One to three pairs of short, erect setae on pronotal shoulder. Posterolateral tubercle with two pairs of erect setae. Ventral surface of petiole with longer appressed setae. Postpetiole with two pairs of longer setae posteriorly. Fourth abdominal tergite with appressed setae.

Body color reddish brown.

**Distribution.** This species is distributed in India and Thailand.

**Comments.** This species is unique among Asian *Crematogaster ranavalonae*-group in having the scape with sparse setae and smaller propodeal spiracles, situated apart from the propodeal declivity.

The syntype workers of *C. aberrans assmuthi* match well with syntype workers of *C. aberrans*. I treated *C. aberrans assmuthi* as a junior synonym of *C. aberrans*. The syntype workers of *C. aberrans inglebyi* match well with syntype workers of *C. aberrans*, but with only the following small difference: the former has right brown colored body (cf. Forel 1902). I concluded that *C. aberrans inglebyi* is a junior synonym of *C. aberrans*. The syntype workers of *C. soror* match well with syntype workers of *C. aberrans*. In Forel's original description (Forel 1902), he mentioned that the head is subquadratic. However, the posterior margin of head is not angulate, appearing rounded in front view. Thus I here synonymize *C. soror* with *C. aberrans*.

### ***Crematogaster augusti* Emery**

*Crematogaster augusti* Emery, 1895: 31, pl. 2, figs. 19, 20. Type locality: Indonesia, Marang, Sumatra. Combination in *C. (Oxygyne)* by Emery, 1922: 157; in *C. (Crematogaster)* by Blaimer, 2012b: 55.

**Type material examined.** *Crematogaster augusti*: one syntype queen from Indonesia, Marang, Sumatra (MCSN, examined).

**Comments.** Emery's original description was based on a single queen. Our collections are limited to worker specimens, but two unique features are found in the type. First, the propodeal spines are not developed, as they are in the queen of *C. agnetis* Forel from Madagascar (Blaimer 2012a). Second, the body surface appearing smooth and shiny. The taxonomic status will remain uncertain until nest series become available.

### *Crematogaster butteli* Forel

Fig. 27

*Crematogaster (Oxygyne) butteli* Forel, 1913: 78. Type locality: Indonesia, Soengei Bamban, Sumatra. Combination in *C. (Crematogaster)* by Blaimer, 2012b: 55.

**Type material examined.** *Crematogaster (Oxygyne) butteli*: lectotype worker (top specimen of two on one pin) by present designation and four paralectotype workers from Indonesia, Soengei Bamban, Sumatra (MHNG, examined); one syntype worker from Indonesia, Soengei Bamban, Sumatra (NHMB, examined).

**Measurements and indices** (type workers,  $n = 5$ ). HW 0.80-0.85; HL 0.76-0.80; CI 103-107; SL 0.64-0.67; SI 79-84; EL 0.16-0.17; PW 0.48-0.52; WL 0.91-0.96; PSL 0.12-0.14; PtL 0.21-0.22; PtW 0.22-0.24; PtH 0.15-0.16; PpL 0.14-0.15; PpW 0.24-0.25; PtHI 68-76; PtWI 95-114; PpWI 167-179; WI 100-119.

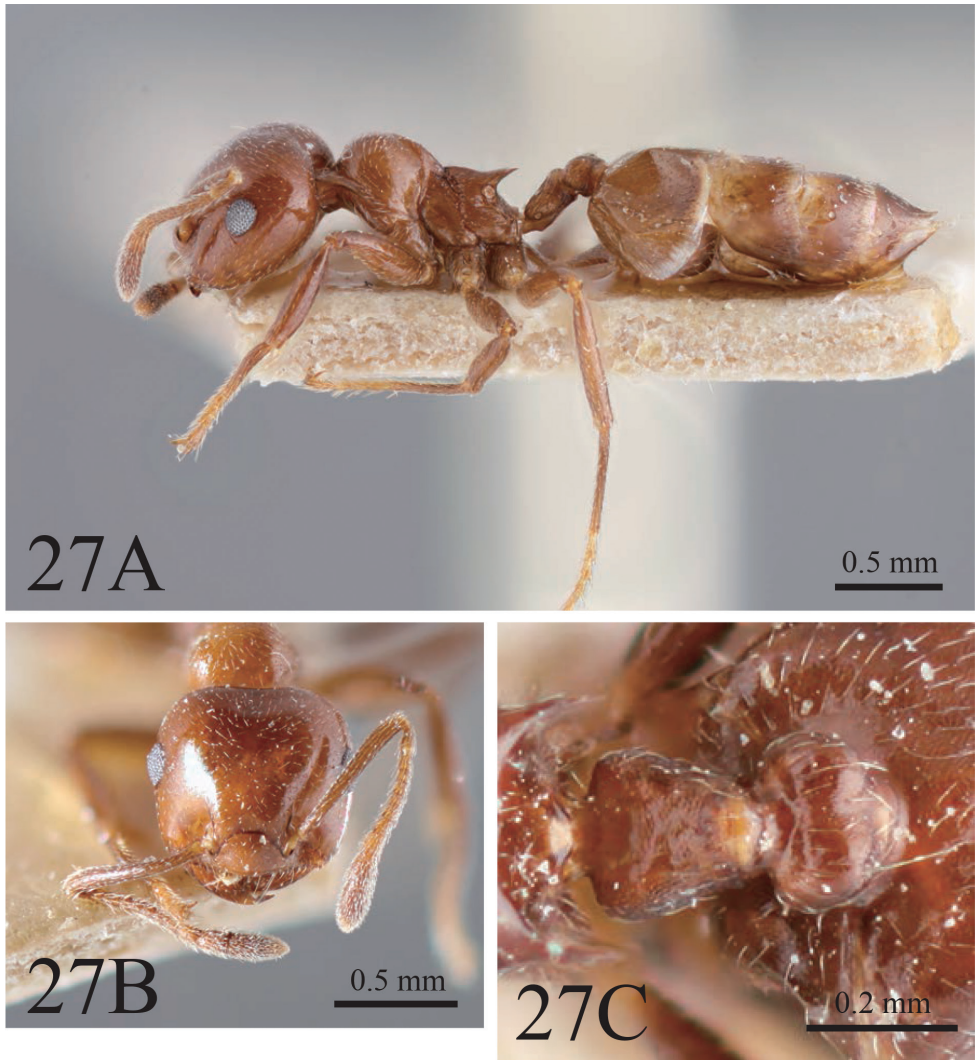
**General description of worker.** Head appearing subquadratic in front view. Mandible weakly striate, with four teeth, apical and subapical teeth large, basal two teeth smaller. Scape exceeding posterior corner of head, with appressed setae, each of which is as long as width of scape. Compound eye large and slightly projecting beyond lateral margin of head in full face view.

Ventrolateral katapisternal ridge indistinct posteriorly. Propodeal spine long and stout, longer than spiracle diameter, directed upward, dorsum higher than anterior propodeum in lateral view. Propodeal spiracle large, situated on lateral surface of propodeum and close to propodeal declivity in lateral view.

In dorsal view, shape of petiole scoop with tapering side posteriorly, longer than broad. Petiole with anterolateral corner angulate. Petiolar spiracle big, as wide as half of propodeal spiracle in size. Postpetiole bilobed but without longitudinal median sulcus. Postpetiole as wide as petiole in dorsal view.

Integument essentially smooth and shiny. Clypeus smooth and shiny without rugulae. Malar region generally smooth, with feeble rugulae. Dorsal surface of pronotum smooth and shiny. Lateral surface of pronotum smooth and shiny. Mesopleuron shiny, but with longitudinal rugulae. Dorsal surface of propodeum smooth and shiny. Lateral propodeum shiny, but with longitudinal rugulae.

Erect pilosity almost absent. Dorsum of head, clypeus and mesosoma with sparse, short and appressed setae. Clypeus with one pair of longer setae on anteriormost portion, directed medially. Anterior clypeal margin with two pairs of longer setae on



**Figure 27.** *Crematogaster butteli* [Soengei, Bamban, Sumatra, Indonesia]. **A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

median portion, mixed with some shorter setae on sides. No erect setae on pronotal shoulder. Posterolateral tubercle with some appressed setae. Ventral surface of petiole with appressed setae. Postpetiole with one pair of longer erect setae posteriorly. Fourth abdominal tergite with appressed setae.

Body color reddish brown.

**Distribution.** This species is known only from the type locality in Sumatra.

**Comments.** This species is similar to *C. tumidula* but can be distinguished in having angulate anterolateral corners of the petiole .





**Figure 28.** *Crematogaster daisyi* [Tasek Merimbun, Brunei]. **A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

***Crematogaster daisyi* Forel**

Fig. 28

*Crematogaster* (*Oxygyne*) *daisyi* Forel, 1901: 376. Type locality: Malaysia, Sarawak, Borneo. Combination in *C.* (*Crematogaster*) by Blaimer, 2012b: 55.

**Type material examined.** *Crematogaster* (*Oxygyne*) *daisyi*: lectotype worker (bottom specimen of three on one pin) by present designation and five paralectotype workers from Malaysia, Sarawak, Borneo (*Haviland*) (MHNG, examined); three syntype workers from Malaysia, Sarawak (NHMW, examined); three syntype workers from Malaysia, Sarawak (*Haviland*) (NHMB, examined).

**Non-type material examined. MALAYSIA:** 1 worker, Lambir National Park, Miri, Sarawak, Borneo, 2.i.1998, (*Sk. Yamane*); **BRUNEI:** 1 worker, Tasek Merimbun, 11.ii.1999 (Eg99-BOR-011) (*K. Eguchi*); 1 worker, Tasek Merimbun, 17.ii.1999 (Eg99-BOR-155) (*K. Eguchi*).

**Measurements and indices.** (workers,  $n = 6$ ). HW 0.79-0.88; HL 0.74-0.83; CI 101-107; SL 0.68-0.76; SI 86-90; EL 0.17-0.18; PW 0.49-0.54; WL 0.91-0.97; PSL 0.11-0.15; PtL 0.22-0.24; PtW 0.22-0.26; PtH 0.13-0.15; PpL 0.15-0.17; PpW 0.27-0.33; PtHI 59-68; PtWI 100-130; PpWI 169-200; WI 107-136.

**General description of worker.** Head appearing subquadratic in front view. Mandible weakly striate, with four teeth, apical and subapical teeth large, basal two teeth smaller. Scape exceeding posterior corner of head, with appressed setae, each of which is as long as width of scape. Compound eye large and slightly projecting beyond lateral margin of head in full face view.

Ventrolateral katapisternal ridge indistinct posteriorly. Propodeal spine long and stout; length greater than spiracle, directed upward, dorsum higher than anterior propodeum in lateral view. Propodeal spiracle large, touching to propodeal declivity in lateral view, directed laterally.

In dorsal view, shape of petiole scoop with convex side, longer than broad. Petiole with subparallel side on anterior half in dorsal view. Petiolar spiracle large, as large as half of propodeal spiracle, directed downward. Postpetiole bilobed with longitudinal median sulcus. Postpetiole wider than petiole in dorsal view.

Integument essentially smooth and shiny. Clypeus smooth and shiny without rugulae. Malar regions generally smooth. Dorsal surface of promesonotum smooth and shiny. Lateral surface of pronotum smooth and shiny. Mesopleuron and lateral propodeum generally shiny, but with feable rugulae. Dorsal surface of propodeum smooth and shiny.

Erect pilosity almost absent. Dorsum of head, clypeus and mesosoma with short and appressed setae sparsely. Clypeus with one pair of longer setae on anteriormost portion, directed medially. Anterior clypeal margin with two pairs of longer setae, mixed with some shorter setae on sides. No erect setae on pronotal shoulder. Postrolateral tubercle with some decumbent to appressed shorter setae. Ventral surface of petiole with appressed setae. Postpetiole with some shorter setae posteriorly. Fourth abdominal tergite with appressed setae.

Body color reddish brown.

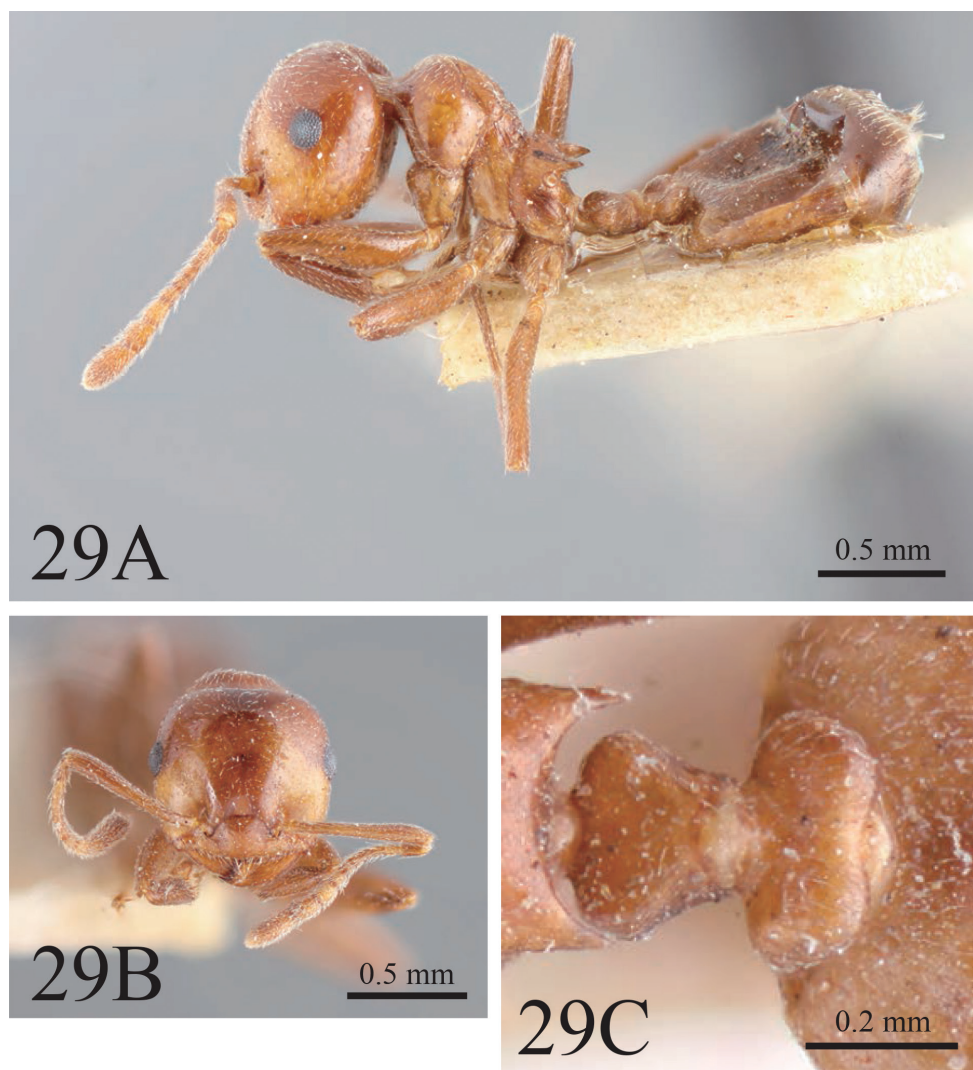
**Distribution.** This species is only known from Malaysia (Borneo).

**Comments.** This species is similar to *C. sikkimensis*, but differs in having the spiracles on the petiole located on the lower position in lateral view.

### *Crematogaster dalyi* Forel

Fig. 29

*Crematogaster (Oxygyne) dalyi* Forel, 1902: 201. Type locality: India, Coonoor. Combination in *C. (Crematogaster)* by Blaimer, 2012b: 55.



**Figure 29.** *Crematogaster dalyi* [Coonoor, India]. **A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

**Type material examined.** *Crematogaster* (*Oxygyne*) *dalyi*: lectotype worker (middle specimen of three on one pin) by present designation and two paralectotype workers from India, Coonoor (*Daly*) (MHNG, examined).

**Measurements and indices.** (type workers,  $n = 3$ ) HW 0.86-0.92; HL 0.85-0.87; CI 99-108; SL 0.74-0.75; SI 80-87; EL 0.16-0.18; PW 0.55-0.58; WL 1.02-1.03; PSL 0.1-0.12; PtL 0.25-0.26; PtW 0.30-0.33; PtH 0.16-0.17; PpL 0.17-0.18; PpW 0.37-0.39; PtHI 64-65; PtWI 115-132; PpWI 217-229; WI 118-126.

**General description of worker.** Head appearing subquadratic in front view. Mandible weakly striate, with four teeth, apical and subapical teeth large, basal two

teeth smaller. Scape exceeding posterior corner of head, with dense appressed setae, each of which is less than width of scape. Compound eye slightly projecting beyond lateral margin of head in full face view.

Ventrolateral katepisternal ridge indistinct posteriorly. Propodeal spine short and stout; length longer than spiracle, directed upward; dorsum as high as anterior propodeum in lateral view. Propodeal spiracle situated close to propodeal declivity in lateral view, directed laterally.

In dorsal view, shape of petiole scoop, longer than broad. Petiolar spiracle big, as wide as half of propodeal spiracle in size. Postpetiolar spiracle big and distinct, located anteriorly on lateral surface. In dorsal view, postpetiole broader than long, strongly bilobed but without longitudinal median sulcus. Postpetiole distinctly wider than petiole in dorsal view.

Integument essentially smooth and shiny. Clypeus generally smooth and shiny, but with feable rugulae. Malar region smooth and shiny. Dorsal surface of promesonotum smooth and shiny. Lateral surface of pronotum generally smooth and shiny, but with longitudinal rugulae on anterior portion. Mesopleuron and lateral propodeum generally smooth and shiny, but with weak longitudinal rugulae. Dorsal surface of propodeum smooth and shiny.

Erect pilosity absent. Dorsum of head, clypeus and mesosoma with short and appressed setae. Clypeus with one pair of longer setae on anteriormost portion, directed medially. Anterior clypeal margin with one single longer setae and two pairs of longer setae on the median portion, mixed with some shorter setae on sides. No erect setae on pronotal shoulders. Posterolateral tubercle without appressed setae. Ventral surface of petiole with appressed setae. Postpetiole without setae posteriorly. Fourth abdominal tergite with short and appressed setae.

Body color brown.

**Distribution.** This species is only known from the type locality in India.

**Comments.** This species is similar to *C. sikkimensis*, but differs in having short propodeal spines.

### *Crematogaster ebenina* Forel

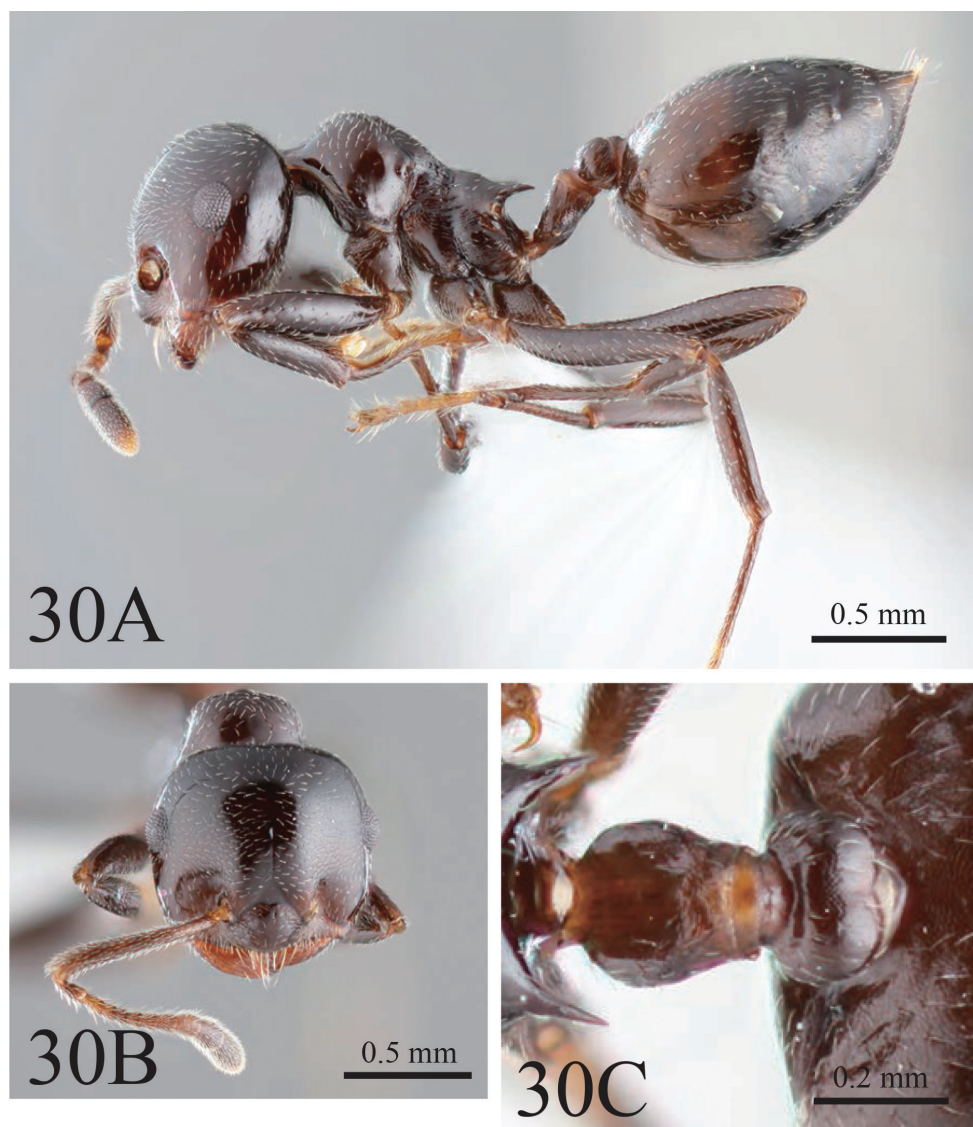
Fig. 30

*Crematogaster* (*Oxygyne*) *ebenina* Forel, 1902: 199. Type locality: India, Thana, Kanara, Poona, Belgaum. Combination in *C. (Crematogaster)* by Blaimer, 2012b: 55.

*Crematogaster ebenina* var. *corax* Forel, 1902: 200. Type locality: Myanmar, Moulmain. **syn. n.**

**Type material examined.** *Crematogaster* (*Oxygyne*) *ebenina*: lectotype worker (bottom specimen of three on one pin) by present designation and five paralectotype workers from India, Kanara (*Wroughton*) (MHNG, examined); one syntype worker from India, Poona (*Wroughton*) (NHMW, examined). *Crematogaster ebenina* var. *corax*: six syntype workers from Myanmar, Moulmain (*Hodgson*) (MHNG, examined).





**Figure 30.** *Crematogaster ebenina* [Gandhi National Park, India]. **A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

**Non-type material examined. INDIA:** 4 workers, Mumbai, 16.x.2007 (*S. Hosoiishi*).

**Measurements and indices.** (workers,  $n = 4$ ) HW 0.85-0.94; HL 0.81-0.86; CI 105-109; SL 0.69-0.76; SI 78-82; EL 0.18-0.19; PW 0.51-0.56; WL 0.98-1.05; PSL 0.11-0.13; PtL 0.24-0.26; PtW 0.24-0.27; PtH 0.16-0.17; PpL 0.14-0.16; PpW 0.24-0.26; PtHI 64-67; PtWI 100-113; PpWI 162-173; WI 96-100.

**General description of worker.** Head appearing subquadratic in front view. Mandible weakly striate, with four teeth, apical and subapical teeth large, basal two

teeth smaller. Scape exceeding posterior corner of head, with appressed setae, each of which is less than or as long as width of scape in length. Compound eye large and slightly projecting beyond lateral margin of head in full face view.

Ventrolateral katepisternal ridge indistinct. Propodeal spine long and stout; length equal to slightly greater than diameter of propodeal spiracle, directed upward, dorsum as high as anterior propodeum. Propodeal spiracle large and situated close to propodeal declivity in lateral view, directed posterolaterally.

In dorsal view, shape of petiole scoop with convex side, longer than broad. Anterolateral corner of petiole undeveloped, tapering anteriorly. Petiolar spiracle big, as large as half of propodeal spiracle in diameter. Postpetiole weakly bilobed but without longitudinal median sulcus. Petiole slightly wider than, or as wide as postpetiole in dorsal view.

Integument essentially smooth and shiny. Clypeus generally smooth and shiny, but with feable rugulae. Malar region smooth and shiny without rugulae. Dorsal surface of promesonotum smooth and shiny. Lateral surface of pronotum smooth and shiny. Mesopleuron and lateral propodeum generally shiny, but with feable rugulae. Dorsal surface of propodeum smooth and shiny.

Erect pilosity almost absent. Dorsum of head, clypeus and mesosoma with short and appressed sparse setae. Clypeus without longer setae on anteriormost portion. Anterior clypeal margin with one single longer setae and two pairs of longer setae, mixed with some shorter setae on the side. No erect setae on pronotal shoulder. Posterolateral tubercle with some decumbent to appressed shorter setae. Ventral surface of petiole with appressed setae. Postpetiole with some shorter setae posteriorly. Fourth abdominal tergite with appressed setae.

Body color reddish brown.

**Distribution.** This species is distributed in India and Myanmar.

**Comments.** This species is unique in Asian *C. ranavalonae*-group in having a slender petiole. This species is similar to *C. tumidula*, but distinguished in having the petiole without anterolateral corners.

The syntype workers of *C. ebenina corax* agree well with syntype workers of *C. ebenina*. Thus I treated *C. ebenina corax* as a junior synonym of *C. ebenina*.

### *Crematogaster hashimi* sp. n.

<http://zoobank.org/520D115A-F486-43F2-8520-E9114103C9EF>

Fig. 31

**Type material examined. Holotype. MALAYSIA:** Worker from Ulu Gombak, Selangor [N3°19', E101°45'] 15.iii.2010, leg. S. Hosoishi, SH10-Mal-67 (FRIM: KUMANT012). **Paratypes.** Seven workers, same data as holotype (CASC: KUMAN013; KUM: KUMANT014; BMNH: KUMANT015, MCZC: KUMANT016; MHNG: KUMANT017; MBBJ: KUMANT018; THNHM: KUMANT019).

**Non-type material examined. THAILAND:** MaeKlong, 29.xi.2003, leg. Watana Sakchoowong, TUS 15min, WS3 (KUM).



**Figure 31.** *Crematogaster hashimi* [Ulu Gombak, Selangor, W. Malaysia]. **A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

**Measurements and indices.** (type and non-type workers,  $n = 12$ ). HW 0.80-0.88; HL 0.77-0.82; CI 100-109; SL 0.67-0.75; SI 82-89; EL 0.16-0.18; PW 0.48-0.56; WL 0.87-0.98; PSL 0.03-0.06; PtL 0.23-0.26; PtW 0.22-0.26; PtH 0.13-0.15; PpL 0.15-0.17; PpW 0.24-0.28; PtHI 54-61; PtWI 96-109; PpWI 153-167; WI 96-108.

**General description of worker.** Head appearing subquadratic in front view. Mandible weakly striate, with four teeth, apical and subapical teeth large, basal two teeth smaller. Scape exceeding posterior corner of head, with appressed setae, each of which is less than width of scape in length. Compound eye large and slightly projecting beyond lateral margin of head in full face view.

Ventrolateral katepisternal ridge indistinct posteriorly. Propodeal spine undeveloped, but as small tubercule in some workers; length distinctly shorter than propodeal spiracle. Propodeal spiracle large and circular, situated close to propodeal declivity in lateral view, directed laterally.

In dorsal view, shape of petiole scoop with convex side, longer than broad. Anterolateral corner of petiole rounded. Petiolar spiracle small, less than half of propodeal spiracle in size. In dorsal view, postpetiole slightly broader than long. Postpetiole weakly bilobed, but without longitudinal median sulcus. Postpetiole as wide as petiole in dorsal view.

Integument essentially smooth and shiny. Clypeus smooth and shiny without rugulae. Malar region smooth and shiny. Dorsal surface of promesonotum smooth and shiny. Lateral surface of pronotum smooth and shiny. Mesopleuron smooth and shiny. Dorsal surface of propodeum smooth and shiny. Lateral propodeum smooth and shiny.

Erect pilosity almost absent. Dorsum of head, clypeus, mesosoma and fourth abdominal tergite with short and appressed sparse setae. Clypeus without longer setae on anteriormost portion. Anterior clypeal margin with two or three pairs of longer setae on median portion, with some shorter setae on side. No erect setae on pronotal shoulder. Posterolateral tubercle with some appressed setae. Ventral surface of petiole without setae. Postpetiole without longer erect setae posteriorly. Fourth abdominal tergite with appressed setae.

Body color reddish brown.

**Etymology.** The species is dedicated to Dr. Rosli Hashim, University of Malaya, who helped with field surveys in Malaysia.

**Distribution.** This species is distributed in Thailand and Malaysia (Peninsula).

**Comments.** This species is similar to *C. imperfecta*, but differs in having circular propodeal spiracles and broader petiole.

This species inhabits well-developed forests, and forage on trees.

***Crematogaster imperfecta* sp. n.**

<http://zoobank.org/B9AB38B4-BF0A-44FF-BA07-7E8CFE33FEBB>

Fig. 32

**Type material examined. Holotype. MALAYSIA:** Worker from Sg. Kalang, 800–1000 m alt., Sabah, Borneo, 23.ii.1997, leg. Sk. Yamane (ITBC: KUMANT020).

**Paratypes.** Three workers, same data as holotype (CASC: KUMANT021; KUM: KUMANT022; SKYC: KUMANT023). Two workers from MALAYSIA: Tower Region, Lambir NP, Miri, Sarawak, 26.i.1983, leg. Sk. Yamane, Canopy Ecol. (BMNH: KUMANT024; THNHM: KUMANT025).

**Measurements and indices.** (type workers, n = 6). HW 0.77–0.87; HL 0.72–0.81; CI 103–108; SL 0.63–0.71; SI 78–83; EL 0.16–0.18; PW 0.48–0.54; WL 0.86–0.95; PSL 0.02–0.04; PtL 0.24–0.26; PtW 0.21–0.23; PtH 0.13–0.15; PpL 0.14–0.16; PpW 0.22–0.26; PtHI 54–60; PtWI 88–92; PpWI 156–167; WI 104–114





**Figure 32.** *Crematogaster imperfecta* [Sg. Kalang, Tenom, Sabah, Borneo, E. Malaysia]. **A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

**General description of worker.** Head appearing subquadratic in front view. Mandible weakly striate, with four teeth, apical and subapical teeth large, basal two teeth smaller. Scape exceeding posterior corner of head, with appressed setae, each of which is less than width of scape in length. Compound eye large and slightly projecting beyond lateral margin of head in full face view.

Ventrolateral katepisternal ridge indistinct posteriorly. Propodeal spine undeveloped, but as small tubercle in some workers; length distinctly shorter than propodeal spiracle. Propodeal spiracle large, situated close to the propodeal declivity in lateral view, directed laterally.

In dorsal view, shape of petiole scoop with convex side, longer than broad. Anterolateral corner of petiole developed. Petiolar spiracle small, less than half of propo-

deal spiracle in size. In dorsal view, postpetiole slightly broader than long. Postpetiole weakly bilobed, but without longitudinal median sulcus. Postpetiole as wide as petiole in dorsal view.

Integument essentially smooth and shiny. Clypeus smooth and shiny without rugulae. Malar region smooth and shiny. Dorsal surface of promesonotum smooth and shiny. Lateral surface of pronotum smooth and shiny. Mesopleuron smooth and shiny. Dorsal surface of propodeum smooth and shiny. Lateral propodeum smooth and shiny.

Erect pilosity almost absent. Dorsum of head, clypeus, mesosoma and fourth abdominal tergite with short and appressed sparse setae. Clypeus with longer setae on anteriormost portion, directed medially. Anterior clypeal margin with two pairs of longer setae on median portion, with some shorter setae on side. No erect setae on pronotal shoulder. Posterolateral tubercle with some appressed setae. Ventral surface of petiole without setae. Postpetiole without longer erect setae posteriorly. Fourth abdominal tergite with appressed setae.

Body color reddish brown.

**Etymology.** The specific name refers to the undeveloped propodeal spines.

**Distribution.** This species is known from Malaysia (Borneo).

**Comments.** This species is very similar to *C. hashimi*, but differs in having elliptical propodeal spiracles and a slender petiole.

### *Crematogaster pia* Forel

Fig. 33

*Crematogaster tumidula* subsp. *pia* Forel, 1911: 384. Type locality: Malaysia, Berhentian Tingi, Nigri Sembilan, Malacca. Combination in *C. (Acrocoelia)*, and raised to species by Emery, 1922: 151; in *C. (Crematogaster)* by Blaimer, 2012b: 55.

**Type material examined.** *Crematogaster tumidula* subsp. *pia*: lectotype worker (top specimen of three on one pin) by present designation and five paralectotype workers from Malaysia, Berhentian Tingi, Nigri Sembilan, Malacca (*R. Matrin*) (MHNG, examined); five syntype workers from Malaysia, Berhentian Tingi, Nigri Sembilan, Malacca (*R. Matrin*) (NHMB, examined).

**Non-type material examined.** **THAILAND:** 4 workers, Maegar, Phayao, 21.iii.1990 (*No collector's name*); 6 workers, Thachai Sukhothai, 1.iii.1991 (*No collector's name*); 21 workers, Ban Krang Camp, Kaeng Krachan National Park, Phet Buri [N12°47', E99°27'] 23.xii.2012 (SH12-Tha-01) (*S. Hosoishi*); 14 workers, Evergreen For., Khlong Naka WS, Ranong Prov., S. Thailand, 12.viii.2009, (WJT09-TH2045) (*W. Jaitrong*).

**Measurements and indices.** (workers, n = 11). HW 0.90-0.96; HL 0.88-0.92; CI 102-108; SL 0.79-0.87; SI 83-94; EL 0.18-0.21; PW 0.54-0.59; WL 1.05-1.13; PSL 0.14-0.17; PtL 0.25-0.27; PtW 0.25-0.30; PtH 0.16-0.18; PpL 0.15-0.19; PpW 0.28-0.31; PtHI 59-69; PtWI 96-115; PpWI 158-187; WI 103-115.



**Figure 33.** *Crematogaster pia* [Ban Krang Camp, Kaeng Krachang National Park, Phet Buri, Thailand].  
**A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

**General description of worker.** Head appearing subquadratic in front view. Mandible weakly striate, with four teeth, apical and subapical teeth large, basal two teeth smaller. Scape exceeding posterior corner of head, with appressed setae, each of which is as long as width of scape in length. Compound eye large and slightly projecting beyond lateral margin of head in full face view.

Ventrolateral katepisternal ridge indistinct posteriorly. Propodeal spine long and stout; length longer than spiracle, dorsum as high as anterior propodeum in lateral

view; basal width larger than spiracle in diameter. Propodeal spiracle large, situated close to propodeal declivity in lateral view, directed laterally.

In dorsal view, shape of petiole scoop with convex side, as broad as long. Anterolateral corner of petiole angulate. Petiolar spiracle big, as wide as half of propodeal spiracle in diameter, directed laterally. In dorsal view, postpetiole broader than long, bilobed but without longitudinal median sulcus. Postpetiole slightly wider than petiole in dorsal view.

Integument essentially smooth and shiny. Clypeus smooth and shiny without rugulae. Malar region smooth and shiny. Dorsal surface of promesonotum smooth and shiny. Lateral surface of pronotum smooth and shiny. Mesopleuron and lateral propodeum generally shiny, but with feable rugulae. Dorsal surface of propodeum smooth and shiny; anterior dorsum with feable rugulae.

Erect pilosity almost absent. Dorsum of head, clypeus and mesosoma with short and appressed sparse setae. Clypeus with one pair of longer setae on anteriormost portion, directed medially. Anterior clypeal margin with two or three pairs of longer setae on median portion, mixed with some shorter setae on side. No erect setae on pronotal shoulder. Posterolateral tubercle with some decumbent to appressed shorter setae. Ventral surface of petiole with appressed setae. Postpetiole with some shorter setae posteriorly. Fourth abdominal tergite with appressed setae.

Body color reddish brown to brownish.

**Distribution.** This species is distributed in Thailand and Malaysia (Peninsula).

**Comments.** This species is similar to *C. butteli* and *C. tumidula*, but differs from *C. butteli* in having an anterolaterally developed petiole, and from *C. tumidula* in having long propodeal spines.

This species inhabits well-developed forests, make a carton nest and forage on trees.

### ***Crematogaster sikkimensis* Forel, stat. n.**

Fig. 34

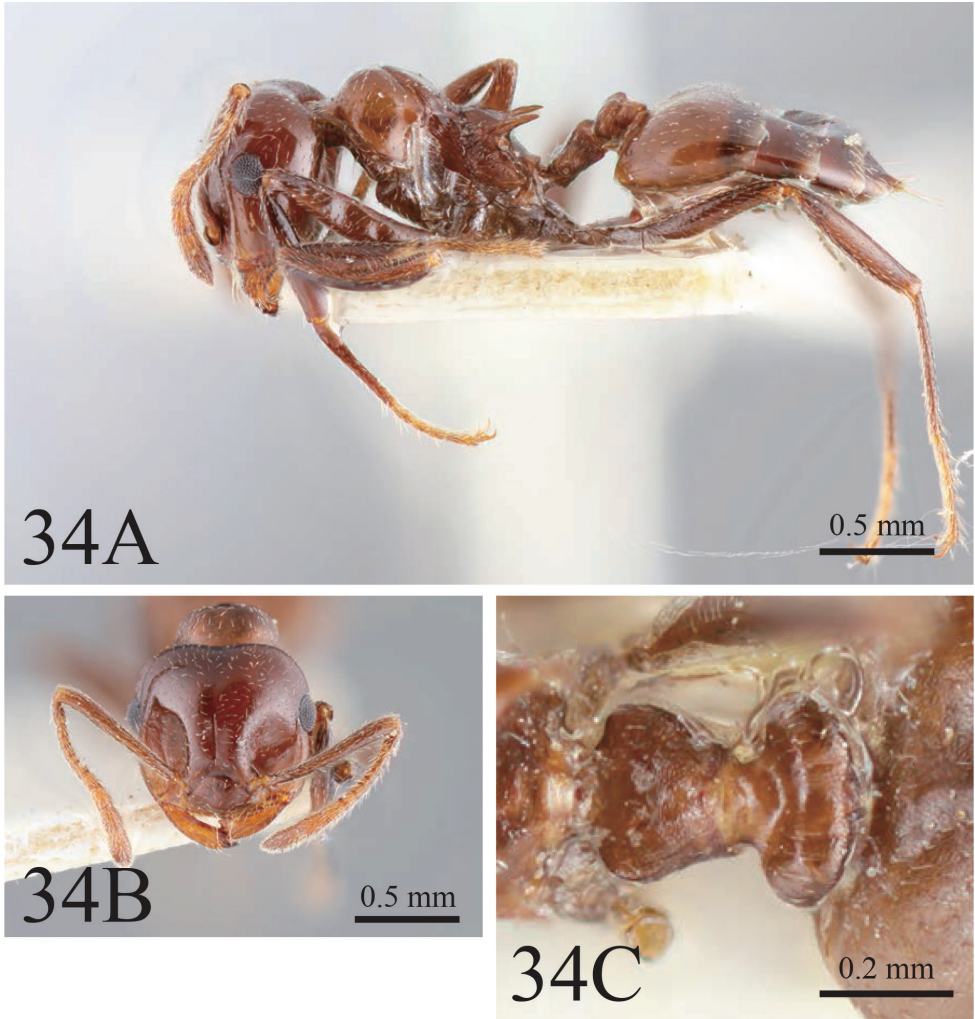
*Crematogaster (Oxygyne) dalyi* var. *sikkimensis* Forel, 1904: 24. Type locality: India, Sikkim.

**Type material examined.** *Crematogaster (Oxygyne) dalyi* var. *sikkimensis*: lectotype worker (top specimen of three on one pin) by present designation and three paralectotype workers from India, Sikkim (Möller) (MHNG, examined).

**Measurement and indices.** (type workers, n = 4). HW 0.82-0.91; HL 0.80-0.88; CI 102-103; SL 0.72-0.78; SI 83-89; EL 0.17-0.19; PW 0.50-0.56; WL 0.92-1.07; PSL 0.14-0.17; PtL 0.25-0.26; PtW 0.27-0.30; PtH 0.14-0.17; PpL 0.14-0.17; PpW 0.33-0.36; PtHI 60-65; PtWI 108-116; PpWI 212-236; WI 120-130.

**General description of worker.** Head appearing subquadratic in front view. Mandible weakly striate, with four teeth, apical and subapical teeth large, basal two teeth smaller. Scape exceeding posterior corner of head, with appressed setae, each of





**Figure 34.** *Crematogaster sikkimensis* [Sikkim, India]. **A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

which is as long as width of scape in length. Compound eye large and slightly projecting beyond lateral margin of head in full face view.

Ventrolateral katepisternal ridge appearing indistinct posteriorly. Propodeal spine long and slender; length longer than spiracle, directed upward; dorsum higher than anterior propodeum. Propodeal spiracle large, situated close to propodeal declivity in lateral view, directed laterally.

In dorsal view, shape of petiole scoop with convex side, as long as broad. Petiolar spiracle big, as wide as half of propodeal spiracle in diameter. In dorsal view, postpetiole broader than long, strongly bilobed laterally, but without longitudinal median sulcus. Postpetiole wider than petiole in dorsal view.

Integument essentially smooth and shiny. Clypeus smooth and shiny without rugulae. Malar region with feable rugulae. Dorsal surface of promesonotum smooth and shiny. Lateral surface of pronotum smooth and shiny. Mesopleuron and lateral propodeum generally shiny, but with longitudinal rugulae. Dorsal surface of propodeum smooth and shiny.

Erect pilosity almost absent. Dorsum of head, clypeus and mesosoma with short and appressed sparse setae. Clypeus with one pair of longer setae on anteriormost portion, directed medially. Anterior clypeal margin with two pairs of longer setae, mixed with some shorter setae on side. No erect setae on pronotal shoulder. Posterolateral tubercle with some decumbent to appressed shorter setae. Ventral surface of petiole with appressed setae. Postpetiole with some shorter setae posteriorly. Fourth abdominal tergite with appressed setae.

Body color brown.

**Distribution.** This species is only known from the type locality in India.

**Comments.** This species is similar to *C. daisyi* and *C. dalyi*, but differs from *C. daisyi* in having the spiracles on the petiole located on the middle position in lateral view, and from *C. dalyi* in having long propodeal spines.

Top specimen of three on one pin was designated as lectotype worker here, but it is noted that the body of the middle specimen was lost from the card point.

### *Crematogaster tumidula* Emery

Fig. 35

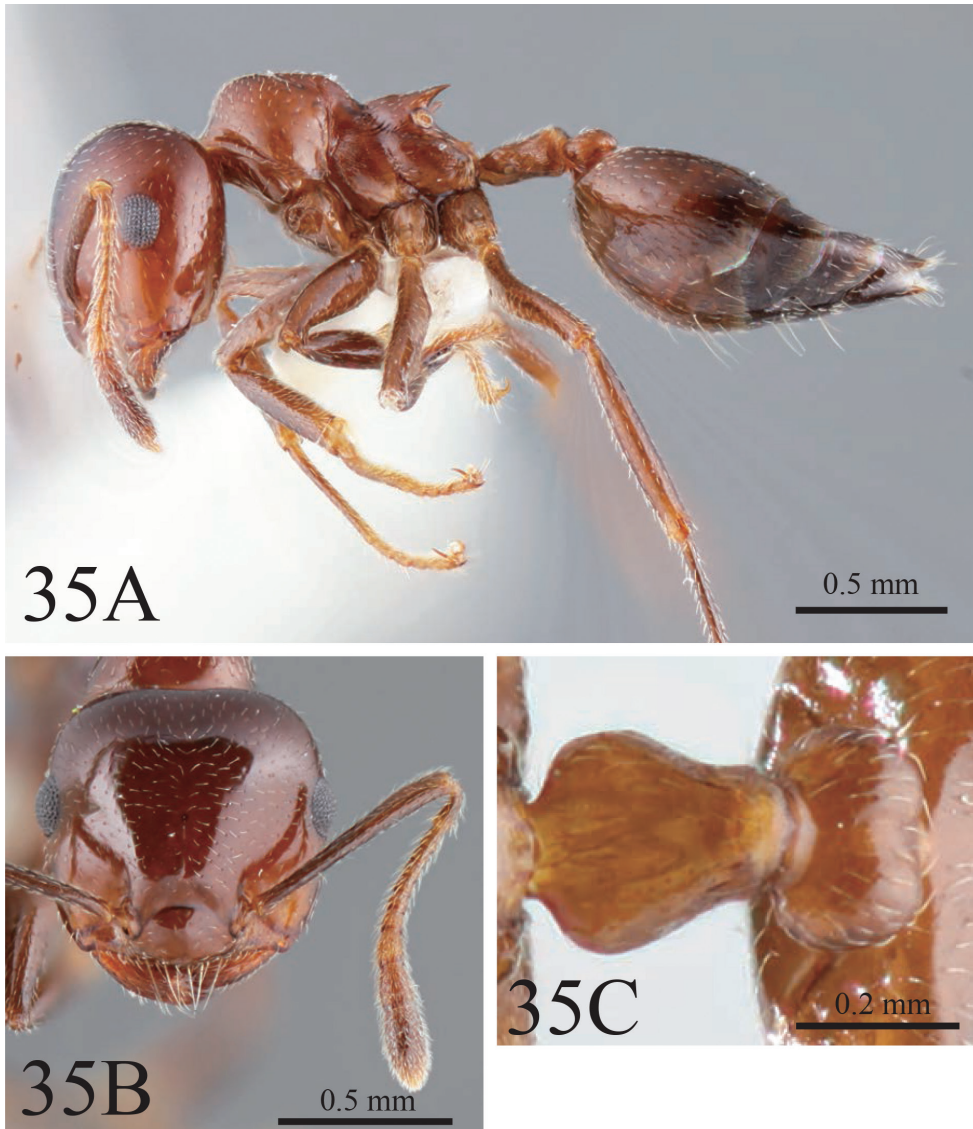
*Crematogaster tumidula* Emery, 1900: 689, fig. 8. Type locality: Indonesia, Pangherang-Pisang, Sumatra. Combination in *C. (Physocrema)* by Emery, 1922: 140; Donisthorpe 1941: 226; in *C. (Oxygyne)* by Hosoishi & Ogata, 2009: 33; in *C. (Crematogaster)* by Blaimer, 2012b: 55.

**Type material examined.** *Crematogaster tumidula*: lectotype worker by present designation and one paralectotype worker from Indonesia, Pangherang-Pisang, Sumatra (*E. Modigliani*) (MCSN) [examined].

**Non-type material examined.** **MALAYSIA:** 2 workers, Old Tower R., Lambir N. P., Miri, Sarawak, 30.xii.1997, (SR97-SKY-106) (*Sk. Yamane*); 3 workers, Bt. Pantu, Lambir N. P., Miri, Sarawak, 13.viii.1995, (*Sk. Yamane*); 1 worker, Tower Region, Lambir N. P., Miri, Sarawak, 21.i.1993, (*Sk. Yamane*); **INDONESIA:** 1 worker, Sangkimah, Kutai N. P., Kalimantan, 17.ix.1993, (*Sk. Yamane*).

**Measurements and indices.** (workers, n = 10). HW 0.73-0.88; HL 0.72-0.86; CI 101-107; SL 0.60-0.77; SI 80-88; EL 0.15-0.19; PW 0.43-0.53; WL 0.80-0.97; PSL 0.08-0.12; PtL 0.20-0.26; PtW 0.23-0.27; PtH 0.14-0.18; PpL 0.14-0.22; PpW 0.20-0.28; PtHI 54-68; PtWI 89-113; PpWI 125-178; WI 88-118.

**General description of worker.** Head appearing subquadratic in front view. Mandible weakly striate, with four teeth, apical and subapical teeth large, basal two



**Figure 35.** *Crematogaster tumidula* [Lambir National Park, Sarawak, Borneo, E. Malaysia]. **A** Lateral view of body **B** Full face view **C** Dorsal view of petiole and postpetiole.

teeth smaller. Scape exceeding posterior corner of head, with appressed setae, each of which is less than width of scape in length. Compound eye large and slightly projecting beyond lateral margin of head in full face view.

Ventrolateral katepisternal ridge indistinct posteriorly. Propodeal spine short and stout; length as long as spiracle, directed posteriorly, dorsum as high as anterior propodeum; basal width smaller than spiracles in diameter. Propodeal spiracle large, situated close to propodeal declivity in lateral view, directed laterally or posterolaterally.

In dorsal view, shape of petiole scoop with convex side, longer than broad. Anterolateral corner of petiole developed. Petiolar spiracle as large as half of propodeal spiracle in diameter, directed laterally. Postpetiole bilobed but without longitudinal median sulcus. Postpetiole as wide as petiole in dorsal view.

Integument essentially smooth and shiny. Clypeus smooth and shiny without rugulae. Malar region smooth and shiny. Dorsal surface of promesonotum smooth and shiny. Lateral surface of pronotum smooth and shiny. Mesopleuron and lateral propodeum generally smooth, but with feable rugulae. Dorsal surface of propodeum smooth and shiny; anterior dorsum smooth without rugulae.

Erect pilosity almost absent. Dorsum of head, clypeus and mesosoma with short and appressed sparse setae. Clypeus with one pair of longer setae on anteriormost portion, directed medially. Anterior clypeal margin with two pairs of longer setae on median portion, mixed with some shorter setae on side. No erect setae on pronotal shoulder. Posterolateral tubercle with some appressed shorter setae. Ventral surface of petiole with appressed setae. Postpetiole with some appressed setae. Fourth abdominal tergite with appressed setae.

Body color reddish brown.

**Distribution.** This species is known from Malaysia (Borneo) and Indonesia (Kalimantan, Sumatra).

**Comments.** This species is similar to *C. ebenina*, but differs in having developed anterolateral corners of the petiole. It is also similar to *C. pia*, but differs in having short and stout propodeal spines and the basal portion with smooth surface.

### ***Crematogaster vandermeermohri* Menozzi**

*Crematogaster* (*Paracrema*) *vandermeermohri* Menozzi, 1930: 1, fig. 1. Type locality: Indonesia, Toetoeapan, Sumatra. Combination in *C. (Crematogaster)* by Blaimer, 2012b: 55.

**Type material.** *Crematogaster* (*Paracrema*) *vandermeermohri*: syntype worker from Indonesia, Toetoeapan, Sumatra (probably in IEGG, not seen).

**Comments.** I have not been able to examine type-material of *C. vandermeermohri*. Judging from the original description and figure, this species is close to *C. hashimi* and *C. imperfecta*. Menozzi (1930) described the following features: (1) propodeal spines small and blunt, inflated near the base; (2) postpetiole slightly narrower than petiole in dorsal view. The two features are not found in the related species. The postpetiole is as wide as or wider than petiole in *C. hashimi* and *C. imperfecta*.

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