ZOOTAXA

1902

A revision of Northern Vietnamese species of the ant genus *Pheidole* (Insecta: Hymenoptera: Formicidae: Myrmicinae)

KATSUYUKI EGUCHI

Magnolia Press
Auckland, New Zealand

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A revision of Northern Vietnamese species of the ant genus *Pheidole* (Insecta: Hymenoptera: Formicidae: Myrmicinae)
(*Zootaxa* 1902)

118 pp.; 30 cm.

15 Oct. 2008

ISBN 978-1-86977-291-8 (paperback)

ISBN 978-1-86977-292-5 (Online edition)

FIRST PUBLISHED IN 2008 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: zootaxa@mapress.com

http://www.mapress.com/zootaxa/

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

Zootaxa 1902: 1–118 (2008)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
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A revision of Northern Vietnamese species of the ant genus *Pheidole* (Insecta: Hymenoptera: Formicidae: Myrmicinae)

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Accepted by J. Longino: 4 Jun. 2008; published: 15 Oct. 2008

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Abstract

Northern Vietnamese species of the ant genus *Pheidole* (Myrmicinae: Pheidolini) were revised, and 31 species including six new species were recognized: *capellinii* Emery, *colpigaleata* Eguchi, *dugasi* Forel, *elongicephala* **sp.n.**, *fervens* F. Smith, *fervida* F. Smith, *fortis* Eguchi, *foveolata* Eguchi, *gatesi* (Wheeler), *hongkongensis* Wheeler, *indosinensis* Wheeler **stat.n.**, *laevicolor* Eguchi, *laevithorax* **sp.n.**, *magna* Eguchi, *megacephala* (Fabricius), *noda* F. Smith, *ochracea* **sp.n.**, *parva* Mayr, *pieli* Santschi, *plagiaria* F. Smith, *planifrons* Santschi, *rabo* Forel, *rugithorax* **sp.n.**, *smythiesii* Forel, *taipoana* Wheeler, *tjibodana* Forel, *tumida* **sp.n.**, *vieti* **sp.n.**, *vulgaris* Eguchi, *yeensis* Forel, *zoceana* Santschi. The following cases of synonymy were resolved: *Myrmica agilis* F. Smith as a junior synonym of *Pheidole megacephala*; *Pheidole rhombinoda* var. *stella* Forel, *P. rhombinoda* var. *formosensis* Forel, *P. rhombinoda* var. *taprobanae* Forel, and *P. nodus* var. *flebilis* Santschi as junior synonyms of *P. noda*; *Pheidole peguensis* r. *yomensis* as a junior synonym of *P. plagiaria*; and *Pheidole smythiesii* var. *bengalensis* Forel and *P. bhavanae* Bingham as junior synonyms of *P. smythiesii*. The lectotype was designated for the following species: *Pheidole dugasi*, *P. rhombinoda* var. *stella*, *P. peguensis* r. *yomensis* and *P. sulcaticeps* r. *yeensis*. A key to N. Vietnamese species of *Pheidole* based on the worker caste is given.

Key words: *Pheidole*, Indo-China, Vietnam, taxonomy, regional revision

Introduction

The ant genus *Pheidole*, belonging to the tribe Pheidolini in the subfamily Myrmicinae, contains 957 named species in the world (Bolton *et al.* 2006) and is hyperdiverse, especially in tropical/subtropical regions (Wilson 2003). The genus is one of the most abundant ant genera in natural forest ecosystems (Ward 2000), and it is considered a key-stone taxon because its members are predators, scavengers, seed dispersers, seed predators, prey for other animals, and soil-mixing agents. Some *Pheidole* species are common in rural and urban areas, agroecosystems and other man-made habitats. For example, *Pheidole megacephala* (Fabricius), an African native, is now one of the most famous invasive ants. Widespread in the world tropics and subtropics, *P. megacephala* not only strongly affects the native faunas (Wetterer 1998, Hoffmann *et al.* 1999, Vanderwoude *et al.* 2000) but also causes serious agricultural losses. The species attends and decreases the mortality of honeydew-producing homopteran pests which often cause diseases of crops (Petty & Tustin 1993, Reimer *et al.* 1993, Campbell 1994, González-Hernández *et al.* 1999). On the other hand, some *Pheidole* species (including *P. megacephala*) act as major predators of small herbivorous pests in some cropping systems (Godfrey *et al.* 1989, van den Berg *et al.* 1997, Goebel *et al.* 1999, Way & Khoo 1992, Mansfield *et al.* 2003, Stuart *et al.* 2003).

In comparison with the New World fauna of the genus (e.g., Gregg 1959; Wilson 2003), the Oriental fauna has so far been poorly studied. Since Ogata's revision of Japanese species (Ogata 1982), however, valuable taxonomic and faunistic studies of Chinese species have been provided by Xu *et al.* (1998), Zhou & Zheng (1999) and Zhou (2001), and those of other Oriental species by Eguchi (1999, 2000, 2001a, b, 2003, 2004a, 2006), Eguchi & Bui (2005) and Eguchi, Yamane & Zhou (2007). In the present study, I revise the taxonomy of *Pheidole* species of Northern Vietnam in order to contribute to our better understanding of the myrmecofauna of Indochina, a part of the great "Green Corridor" connecting tropical rain forests in Southeast Asia with temperate deciduous and northern conifer forests in East/Far East Asia.

Materials and methods

"Northern Vietnam" and "N. Vietnam" in the present paper refer to the northern part of the country above 18°N in latitude. Most of the area is classified into the bioclimatic type II*.1 (monsoon tropical climate with cold winter, summer rains) and the remainder into the type X (monsoon tropical climate associated with mountain) (Nguyen *et al*. 2000). Northern Vietnam is of particular biogeographic interest because it represents a broad transition zone from tropical to temperate habitats. Recent works on the N. Vietnamese ant fauna, e.g., Bui & Eguchi (2003), Yamane *et al.* (2003) and Eguchi, Bui *et al.* (2005), highlighted a dominance of *Pheidole*, and Eguchi *et al.* (2004) showed that *Pheidole* is one of the most active ground foragers in natural forests.

In the present study I examined colony-based specimens (nest series) collected from N. Vietnam and other parts of the Oriental region. Examination of isolated workers was limited because such specimens are less valuable in taxonomic studies of worker-dimorphic and polymorphic taxa. Codes are given to colonies collected by myself (e.g., Eg01-VN-001 or Eg01vi05-01); Dr. Seiki Yamane (Kagoshima Univ., JAPAN) (e.g., VN01-SKY-01); Dr. Tuan Viet Bui (IEBR) and me (e.g., B&E03-1); Dr. Hirofumi Okido (Kyushu Environ. Evaluation Assoc., Fukuoka, JAPAN) (e.g., VN99-HO-001); and Dr. Fuminori Ito (Kagawa University) (e.g., FI92MG-001 or FI99-001).

Abbreviations of public institutions and private collections follow those in Arnett *et al*. (1993), where available.

BMNH	Natural History Museum, London, UK
FSKU	Entomological Collection of Faculty of Science, Kagoshima University, Japan
IEBR	Entomological Collection of the Institute of Ecology and Biological Resources, Hanoi, Vietnam
MCSN	Museo Civico di Storia Naturale "Giacomo Doria", Genoa, Italy
MCZC	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA
MHNG	Muséum d'Histoire Naturelle, Geneva, Switzerland
NHMB	Naturhistorisches Museum, Basel, Switzerland
NHMW	Naturhistorisches Museum, Wien, Austria
OXUM	Hope Entomological Collection, University Museum, Oxford, UK
ZMHB	Zoologisches Museum an der Humboldt-Universität zu Berlin, Germany
ACEG	Ant Collection of Katsuyuki Eguchi (see his contact address given under the title of this article)

The following measurements and indices are used in the present article: HL, head length (maximal length of head capsule); HW, head width (maximal width of head capsule excluding eyes); SL, scape length (length of antennal scape excluding the basal condylar bulb); FL, length of hind femur; CI, cephalic index (=HW/HL×100); SI, scape index (=SL/HW×100); FI, hind femur index (=FL/HW×100).

The terms "occipital carina", "occipital lobe" and "alitrunk" employed in Eguchi's earlier publications (e.g., Eguchi, 1999, 2000, 2001a, b, 2004) are replaced with "preoccipital carina", "vertexal lobe" and "mesosoma" in the present paper.

Multi-focused montage images in Figs. 1–31 were produced using Helicon Focus 4.03/4.30 Pro (MP) or Syncroscopy Auto-Montage Essentials version 5.02 from a series of source images taken by a Nikon Coolpix 8400 attached to a Nikon Eclipse E600 or a Nikon AZ100. When fine hairs and other parts which were not recognized automatically were found, the focused parts from the source images were copied to the montage image using the brush function of Auto-Montage or the retouching function of Helicon Focus. Artifacts (ghost images) and unnecessary parts (unfocused appendages, insect pin, etc.) surrounding or covering terget objects were erased and cleaned up using the brush function of Auto-Montage or the retouching function of Helicon Focus. Non-montage images (Fig. 32) were taken using KEYENCE Digital HF Microscope VH-8000.

Finally, for both montage and non-montage images, the backgrounds were cleaned up, and the color balance, contrast and sharpness were adjusted using Adobe Photoshop CS2

Synopsis of Indo-Chinese species of the genus *Pheidole*

For a full listing of generic synonymy of *Pheidole* see Bolton (2003) and Bolton et al. (2006). Workers of the Oriental species of the genus can be distinguished from those of the other genera of the subfamily Myrmicinae by the combination of the following characteristics (see also Bolton 1994).

- Worker caste divided into two subcastes, "the major" and "the minor" (the major of a few species may rarely show a weak variability in size).

- Mandible massive with masticatory margin edentate excluding apical and preapical teeth and 1–2 denticles in front of basal angle (major); mandible triangular without edentate edge on masticatory margin (minor).

- Midpoint of anterior clypeal margin without an unpaired median seta (major & minor).

- Frontal lobes far apart so that the posteromedian portion of the clypeus, where it projects between the frontal lobes, is usually broader than one of the lobes (major & minor).

- Hypostoma always bearing a large or reduced "lateral" process just mesal to each mandibular base, and often bearing a "median" process and/or a pair of "submedian" processes, i.e., the middle of hypostoma bearing 0–3 processes (major).

- Eye always present but varying in size, rarely consisting of only a few ommatidia (major & minor).

- Antenna 12-segmented, with 3-, 4- or 5-segmented club, or without a conspicuous club (3-segmented club dominant in the genus) (major & minor).

- Promesonotum forming a dome which is raised well above the level of dorsum of propodeum; the posterior slope of the dome sometimes with a mound or prominence (major & minor).

- Propodeal spine usually present (rarely vestigial or almost absent), and variable in size and shape (major & minor).

- Petiole in lateral view consisting of slender anterior peduncle and raised posterior node, or gradually heightened from the base toward the top of the node (major & minor).

- Postpetiole in lateral view hemispherical to somewhat globular (major & minor).

- Sting reduced (major & minor).

Synonymic list of *Pheidole* in Northern Vietnam

capellinii Emery, 1887: 463
= *lighti* Wheeler, 1927b: 2
= *attila* Forel, 1913: 34
colpigaleata Eguchi, 2006: 116–118
dugasi Forel, 1911c: 222–223
elongicephala Eguchi **sp.n.**
fervens F. Smith, 1858: 176
= *cavannae* Emery, 1887: 464
= *javana* Mayr, 1867: 98
= *oceanica* var. *nigriscapa* Santschi, 1928a: 48
= *amia* Forel, 1912a: 60–61
= *javana* var. *desucta* Wheeler, 1929a: 2
= *javana* var. *dharmsalana* Forel, 1902: 184, 198

= *javana* var. *dolenda* Forel, 1912a: 60
= *javana* var. *soror* Santschi, 1937b: 369
= *nodus* st. *azumai* Santschi, 1941: 274
= *Solenopsis pungens* (F. Smith, 1861: 48–49)
fervida F. Smith, 1874: 406
fortis Eguchi, 2006: 118–120
foveolata Eguchi, 2006: 121–123
gatesi (Wheeler, 1927a: 44)
hongkongensis Wheeler, 1928: 11
indosinensis Wheeler, 1928: 10 **stat.n.**
laevicolor Eguchi, 2006: 123–125
laevithorax Eguchi **sp.n.**
magna Eguchi, 2006: 125–127
megacephala (Fabricius, 1793: 36)
= *Myrmica trinodis* Losana, 1834: 327
= *Formica edax* Forskål, 1775: 84
= *Oecophthora perniciosa* Gerstäcker, 1859: 263
= *Oecophthora pusilla* Heer, 1852: 15
= *Myrmica agilis* F. Smith, 1857: 71 **syn.n.**
= *Myrmica suspiciosa* F. Smith, 1859: 148
= *Atta testacea* F. Smith, 1858: 168
noda F. Smith, 1874: 7
= *rhombinoda* Mayr, 1879: 678
= *rhombinoda* var. *stella* Forel, 1911b: 380 **syn.n.**
= *rhombinoda* var. *formosensis* Forel, 1913b: 193 **syn.n.**
= *rhombinoda* var. *taprobanae* Forel, 1902: 178 **syn.n.**
= *nodus* var. *flebilis* Santschi, 1937b: 370 **syn.n.**
= *treubi* Forel, 1905: 19
ochracea Eguchi **sp.n.**
parva Mayr, 1865: 98
= *parva* var. *decanica* Forel, 1902: 175
= *bugi* Wheeler, 1919: 66
= *rinae* var. *mala* Forel, 1911a: 205
= *rinae* r. *tipuna* Forel, 1912a: 68
= *sauteri* Wheeler, 1909: 334
pieli Santschi, 1925: 83
= *rinae* subsp. *incensa* Wheeler, 1928: 13
plagiaria F. Smith, 1860: 112
= *divergens* Mayr, 1867: 97
= *peguensis* r. *yomensis* Forel, 1903: 253 **syn.n.**
planifrons Santschi, 1920: 166
rabo Forel, 1913c: 28–30
= *tsailuni* Wheeler, 1929a: 2
rugithorax Eguchi **sp.n.**
smythiesii Forel, 1902: 165, 185
= *smythiesii* var. *bengalensis* Forel, 1902: 186 **syn.n.**
= *bhavanae* Bingham, 1903: 228–229 **syn.n.**

taipoana Wheeler, 1928: 12
tjibodana Forel, 1905: 16
tumida Eguchi **sp.n.**
vieti Eguchi **sp.n.**
vulgaris Eguchi, 2006: 127–129
yeensis Forel, 1902: 179, 195
zoceana Santschi, 1925: 83

Key to species of N. Vietnamese *Pheidole*

The following key to species includes the above-mentioned species and also *Pheidole indica* Mayr which is widely distributed in East, Southeast and South Asia but has not yet been found in Northern Vietnam.

1a. Major & minor: apical 4 segments of antenna enlarged or just elongate. 2
1b. Major & minor: apical 3 segments of antenna enlarged or just elongate. 3
2a. Minor: petiole usually 0.85–1.0 times as long as postpetiole (excluding helcium) [Fig. 9g]; hairs on promesonotal dome rather dense [Fig. 9g]. ..... *gatesi* (Wheeler)
2b. Minor: petiole usually less than 0.85 times as long as postpetiole (excluding helcium) [Fig. 24g]; hairs on promesontal dome rather sparse [Fig. 24g]. ..... *smythiesii* Forel
3a. Major: hypostoma in the middle having an extremely developed median process, but nearly or completely lacking submedian processes; frontal carina well developed, partly overhanging antennal scrobe [Fig. 26a]. ..... *tjibodana* Forel
3b. Major: hypostoma in the middle lacking any process, or having 2 processes (submedian processes only) or 3 processes (both median and submedian processes), but never dominated by a single stout median process; condition of frontal carina variable. 4
4a. Minor: frons and vertex punctured strongly and densely, and often overlain by weak reticulation [Figs. 1e, 8e, 31e]. 5
4b. Minor: frons and vertex smooth or only weakly sculptured (rugose, rugoso-punctate or rugoso-reticulate), but neither punctured strongly nor densely [Figs. 5e, 6e, 6f, 10e, 15e]. 10
5a. Minor: promesonotal dome with a conspicuous prominence or mound on its posterior slope [Fig. 1g]. Major: dorsum of vertexal lobe bearing a few standing hairs among very short appressed background hairs [Fig. 1b]. ..... *capellinii* Emery
5b. Minor: promesonotal dome at most with an inconspicuous mound on its posterior slope [Figs. 8g, 22g]. Major: dorsum of vertexal lobe bearing many standing or subdecumbent hairs [Figs. 22b, 31b]. 6
6a. Major: frontal carina well developed, partly overhanging antennal scrobe [Fig. 2a]. .... *colpigaleata* Eguchi
6b. Major: frontal carina absent or inconspicuous (present just as rugulae) [Figs. 8a, 18a, 22a]. 7
7a. Minor: promesonotal spine reduced to a small dent [Fig. 8g]. ..... *foveolata* Eguchi
7b. Minor: promesonotal spine moderately or well developed [Figs. 18g, 31g]. 8
8a. Minor: lateral face of promesonotal dome largely smooth and shining [Fig. 31g]; mediodorsal part of the dome dimly punctured, smooth with several rugulae [Fig. 31f], or sometimes strongly rugoso-reticulate, but never punctured densely. ..... *zoceana* Santschi
8b. Minor: dorsal and lateral faces of promesonotal dome entirely and densely punctured (the punctation often overlain sparsely by weak rugulae) [Fig. 18f, 18g]. 9
9a. Minor: antennal scape exceeding posterior margin of head by less than the half length of antennal segment II [Fig. 18e], or not exceeding the posterior margin; maximal diameter of eye longer than antennal

segment X. ..... *parva* Mayr

9b. Minor: antennal scape exceeding posterior margin of head by the half length of antennal segment II or more [Fig. 22e]; maximal diameter of eye as long as or shorter than antennal segment X. .. *rabo* Forel

10a. Major: dorsum of vertexal lobe smooth and shining [Figs. 6a, 14a, 15a], or at most shagreened or very weakly rugoso-punctate [Fig. 28a]. 11

10b. Major: dorsum of vertexal lobe strongly sculptured: rugose, rugoso-reticulate or reticulate [Figs. 4a, 7a, 20a, 27a], often with enclosures/interspaces densely punctured [Fig. 22a]. 15

11a. Major: hypostoma in the middle at most with a pair of very small submedian processes (median process absent). ..... *P. megacephala* (Fabricius)

11b. Major: hypostoma in the middle with conspicuous submedian processes and usually (but not always) a median process. 12

12a. Major: body very large (HW>2.00 mm). ..... *magna* Eguchi

12b. Major: body small to medium (HW<2.00 mm). 13

13a. Major: petiole at most a little longer than postpetiole (excluding helcium) [Fig. 28d]; postpetiole relatively massive [Fig. 28c]. ..... *vieti* **sp.n.**

13b. Major: petiole distinctly longer than postpetiole (excluding helcium) [Fig. 6d]; postpetiole not massive [Fig. 6c]. 14

14a. Major: head relatively narrow (CI=91 or <91) [Fig. 29a]; promesonotal dome at most with an inconspicuous mound on its posterior slope [Fig. 29d]. ..... *vulgaris* Eguchi (part)

14b. Major: head relatively broad (CI>>91) [Fig. 6a]; promesonotal dome usually (but not always) with a low prominence or mound on its posterior slope [Fig. 6d]. ..... *fervida* F. Smith

15a. Major: body very large (HW > 2.7 mm; FL > 2.1 mm). ..... *dugasi* Forel

15b. Major: body small to large (HW < 2.3 mm; FL < 1.8 mm). 16

16a. Major: petiole with a large lobate subpetiolar process [Fig. 27d]. ..... *tumida* **sp.n.**

16b. Major: petiole without a large lobate subpetiolar process (but often with a longitudinal carina or ridge ventrally) [Figs. 5d, 11d, 16d, 30d]. 17

17a. Major: postpetiole massive [Figs. 13c, 16c]; petiole usually as long as or shorter than postpetiole (excluding helcium) [Figs. 13d, 16d]. 18

17b. Major: postpetiole not massive [Figs. 5c, 11c, 30c]; petiole longer than postpetiole (excluding helcium) [Figs. 5d, 11d, 30d]. 21

18a. Major: frontal carina absent [Fig. 7a]. ..... *fortis* Eguchi

18b. Major: frontal carina conspicuous [Fig. 13a]. 19

19a. Major: dorsum of head bearing sparse standing setae which are much longer and distinctly thicker than background hairs (many short deccumbent-suberect hairs) [Figs. 16b]. ..... *noda* F. Smith

19b. Major: dorsum of head bearing sparse long standing hairs which are mostly indistinguishable from shorter and thinner background hairs [Figs. 23b]. 20

20a. Minor: humeral area of promesonotal dome strongly rugose and often armed with a low humeral prominence [Figs. 23f, 23g]. ..... *rugithorax* **sp.n.**

20b. Minor: humeral area of promesonotal dome neither strongly rugose nor armed with a humeral prominence [Figs. 13f, 13g]..... *laevithorax* **sp.n.**

21a. Major: hypostoma with conspicuous submedian processes, and usually (but not always) with a conspicous median process. 22

21b. Major: hypostoma at most with an inconspicuous median and inconspicuous submedian processes. . 30

22a. Minor: preoccipital carina conspicuous as a collar [Figs. 4e, 11e, 11f, 17e]. Major: promesonotum in lateral view usually with a low to conspicuous prominence or mound on its posterior slope [Figs. 4d, 11d, 17d]. 23

22b. Minor: dorsal part of preoccipital carina at most weakly present or completely absent [Figs. 10e, 12e,

19e, 29e]. Major: promesonotum in lateral view at most with an inconspicuous prominence or mound on its posterior slope [Figs. 10d, 12d, 19d, 29d]. 25

23a. Major: submedian processes of hypostoma well developed, much higher than median process (median process inconspicuous); vertexal lobes in full-face view relatively widely separated from each other [Fig. 11a]. ..... *indosinensis* Wheeler **stat.n.**

23b. Major: submedian processes of hypostoma moderately developed, at most a little higher than median process; vertexal lobes in full-face view relatively close to each other [Fig. 4a]. 24

24a. Minor: the longest axis of eye having 8–9 ommatidia [Fig. 4f]; head behind eyes in full-face view rather strongly produced posteriad [Fig. 4e]. ..... *elongicephala* **sp.n.** (part)

24b. Minor: the longest axis of eye having 6–7 ommatidia [Fig. 17f]; head behind eyes in full-face view moderately produced posteriad [Fig. 17e]. ..... *ochracea* **sp.n.** (part)

25a. Major: head in lateral view rather strongly impressed on vertex [Fig. 25b]; frontal carina rather conspicuous [Fig. 25a]. 26

25b. Major: head in lateral view rather weakly or not impressed on vertex [Fig. 12b, 29b]; frontal carina inconspicuous or almost absent [Fig. 12a. 29a]. 28

26a. Minor: propodeal spine reduced to a small dent [Fig. 19g]. ..... *pieli* Santschi (part)

26b. Minor: propodeal spine distinctly larger than a small dent [Fig. 10g, 25g]. 27

27a. Minor: dorsum of head from frons to vertex sparsely sculptured with weak longitudinal rugulae; posteriormost part of vertex and dorsolateral face of head weakly sculptured by rugulae, rugoso-reticulation and/or rugoso-punctation [Fig. 10e]. Major: longitudinal rugulae on frons rather strong [Fig. 10a]. .... *hongkongensis* Wheeler

27b. Minor: head entirely smooth [Fig. 25e]. Major: longitudinal rugulae on frons rather weak [Fig. 25a]. .. .. *taipoana* Wheeler

28a. Minor: propodeal spine reduced to a small dent [Fig. 19g]; preoccipital carina in posterodorsal view absent or evanescent dorsally; the posterior slope of the promesonotal dome rather steep [Fig. 19g]. .... *pieli* Santschi (part)

28b. Minor: propodeal spine distinctly larger than a small dent [Fig. 12g]; preoccipital carina in posterodorsal view very weak but complete dorsally; the posterior slope of the promesonotal dome rather gentle [Fig. 12g]. 29

29a. Major: vertex and dorsum of vertexal lobe covered with a weak or interrupted rugose or rugoso-reticulate sculpture which runs obliquely towards posterolateral corner of the lobes [Fig. 29a]. .... *vulgaris* Eguchi (part)

29b. Major: vertex and dorsum of vertexal lobe sculptured with reticulation which never runs obliquely toward posterolateral corner of the lobe [Fig. 12a]. ..... *laevicolor* Eguchi

30a. Major: first gastral tergite longitudinally rugose or densely rugoso-punctured over the entire surface, or excluding median portion of the posterior 1/3. 31

30b. Major: first gastral tergite smooth entirely, or weakly sculptured only in its anterior half. 32

31a. Major: frons densely sculptured with longitudinal rugulae [Fig. 21a]; vertex in lateral view forming a gently sloping (and often weakly impressed) face toward vertexal lobe [Fig. 21b]. . *planifrons* Santschi

31b. Major: frons sparsely sculptured with longitudinally rugulae [Fig. 30a]; vertex in lateral view strongly impressed in front of vertexal lobe [Fig. 30b]. ..... *yeensis* Forel

32a. Major: vertexal lobes in full-face view narrowly separated from each other [Fig. 4a]. 33

32b. Major: vertexal lobes in full-face view widely separated from each other [Figs. 5a, 20a]. 34

33a. Minor: the longest axis of eye having 8–9 ommatidia [Fig. 4f]; head behind eyes in full-face view rather strongly produced posteriad [Fig. 4e]. ..... *elongicephala* **sp.n.** (part)

33b. Minor: the longest axis of eye having 6–7 ommatidia [Fig. 17f]; head behind eyes in full-face view moderately produced posteriad [Fig. 17e]. ..... *ochracea* **sp.n.** (part)

34a. Major: propodeal spine narrowly based and slightly curved apically [Fig. 5d]. 35
34b. Major: propodeal spine broadly based and not curved apically. 36
35a. Major: posterior margin of head in full-face view shallowly concave [Fig. 5a]. Minor: median part of clypeus smooth, without median longitudinal carina [Fig. 5e]. ..... *fervens* F. Smith
35b. Major: posterior margin of head in full-face view deeply concave [Fig. 20a]. Minor: median part of clypeus a zigzag or ramified (but rarely straight) median carina which is usually accompanied with weak rugulae [Fig. 20e]. ..... *plagiaria* F. Smith (part)
36a. Major: outer surface of foretibia bearing relatively long decumbent-suberect hairs. .... *plagiaria* F. Smith (part)
36b. Major: outer surface of foretibia bearing short decumbent-appressed hairs. ..... *indica* Mayr

Pheidole **species occurring in N. Vietnam**

Pheidole capellinii **Emery**

Figs. 1a–g

Pheidole capellinii Emery, 1887: 463. Eguchi 2001a: 7–8 (redescription of major & minor), Eguchi, Bui *et al.* 2005: 89 (checklist). Syntype: 1 major, "Giava" [Java, Indonesia], MCSN, examined.

Pheidole lighti Wheeler, 1927b: 2. Zhou & Zheng 1997: 222 (junior synonym of *capellinii*), Eguchi 2001: 7 (lectotype designation). Syntypes: 1 major & 4 minors, "Back Liang, China, S.F. Light", MCZC cotype-20661, examined.

Pheidole attila Forel, 1913: 34. Eguchi 2001a: 7 (lectotype designation, junior synonym of *capellini*). Syntypes: 3 majors & 3 minors, Bahsoemboe, Sumatra, MHNG, examined.

Other material examined: N. Vietnam: Ha Tay: Ba Vi N.P., 21°03'N, 105°23'E, 460 m alt. [TUS 15min. #55 N.C. Duong]. Thailand: Chiang Mai: Doi Suthep-Pui N.P., 900 m alt. [Eg01-TH-091]; Songkhla: Ton Nga Chang, nr. Hat Yai [Eg01-TH-618]. Indonesia: W. Sumatra: Padang [M. Kawamura's colony: 4/27b (1998)]; C. Java: Kaliadem, 800–1000 m alt., G. Merapi [JV02/03-SKY-35, -44].

Worker measurements & indices: Major (n=4). — HL 1.75–2.18 mm; HW 1.58–1.98 mm; CI 86–91; SL 0.78–0.86 mm; SI 44–52; FL 1.28–1.46 mm; FI 74–83.

Minor (n=4). — HL 0.67–0.74 mm; HW 0.61–0.66 mm; CI 84–91; SL 0.69–0.75 mm; SI 113–121; FL 0.75–0.85 mm; FI 123–135.

Worker description

Major. — Head bearing very short appressed background hairs over entire surface and a few thick standing hairs dorsally; head in lateral view highly raised at the border of frons and vertex, not or hardly impressed on vertex; frons flat or very weakly impressed medially; frons and anterior part of vertex punctured, overlain by longitudinal rugulae; posterior part of vertex and dorsal and lateral faces of vertexal lobe largely rugoso-punctate, shagreened or almost smooth; frontal carina well developed horizontally, partly overhanging antennal scrobe; median part of clypeus punctured, with a relatively weak median longitudinal carina; median and submedian processes of hypostoma inconspicuous or poorly developed; lateral processes conspicuous; outer surface of mandible (excluding area around the base) smooth or shagreened, bearing short appressed hairs; antenna with a 3-segmented club; maximal diameter of eye much longer than antennal segment X. Promesonotal dome at most with a few standing hairs, in lateral view with a conspicuous prominence on its posterior slope; humerus weakly produced laterad; the dome at the humeri usually narrower than at the bottom, but sometimes a little broader than at the bottom; propodeum without standing hairs. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite weakly punctured anteriorly and shagreened to smooth posteriorly.

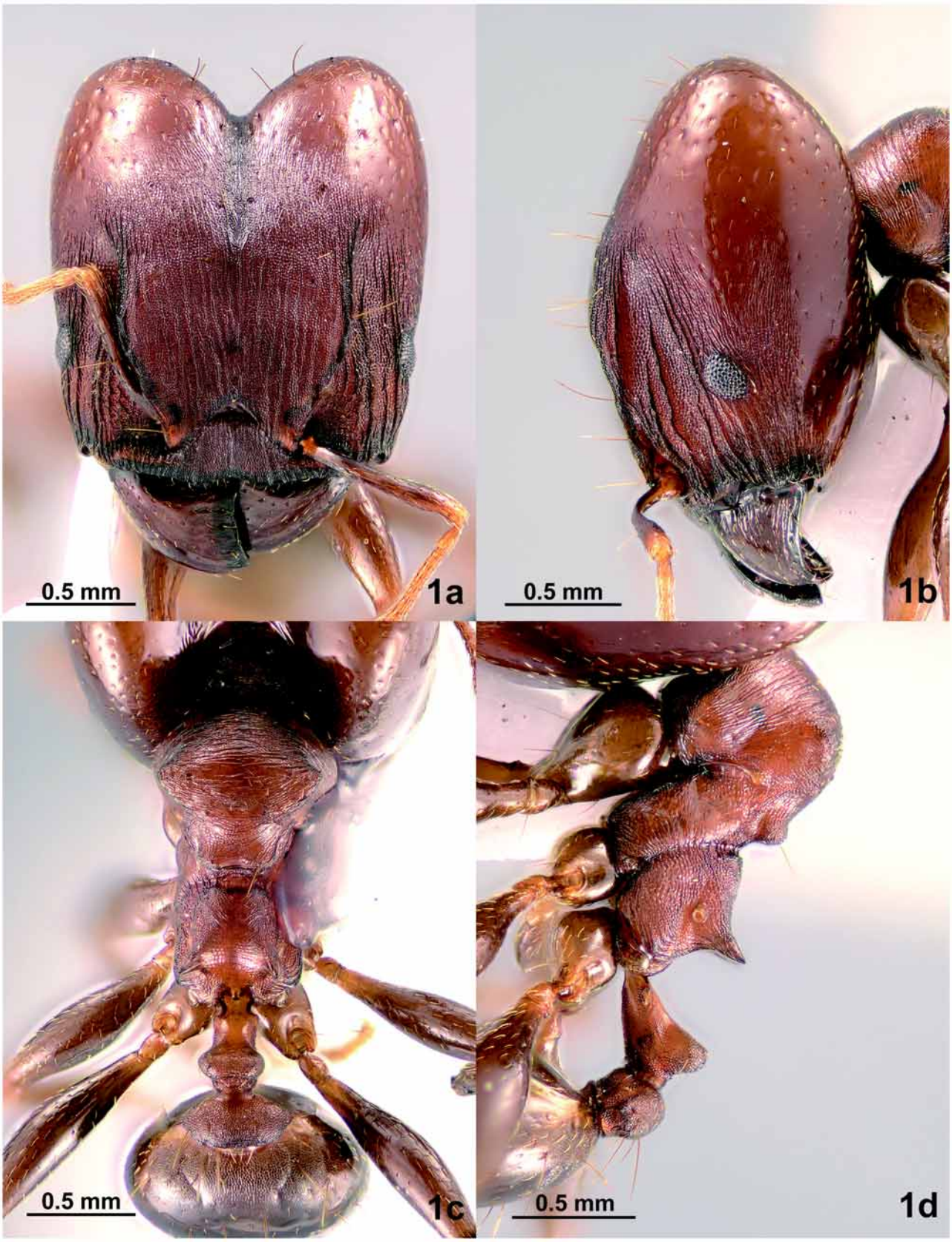

FIGURE 1a–d, *Pheidole capellinii*, nontype major [D.N. Cuong leg., 11/xi/2001, TUS 15min. #55] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

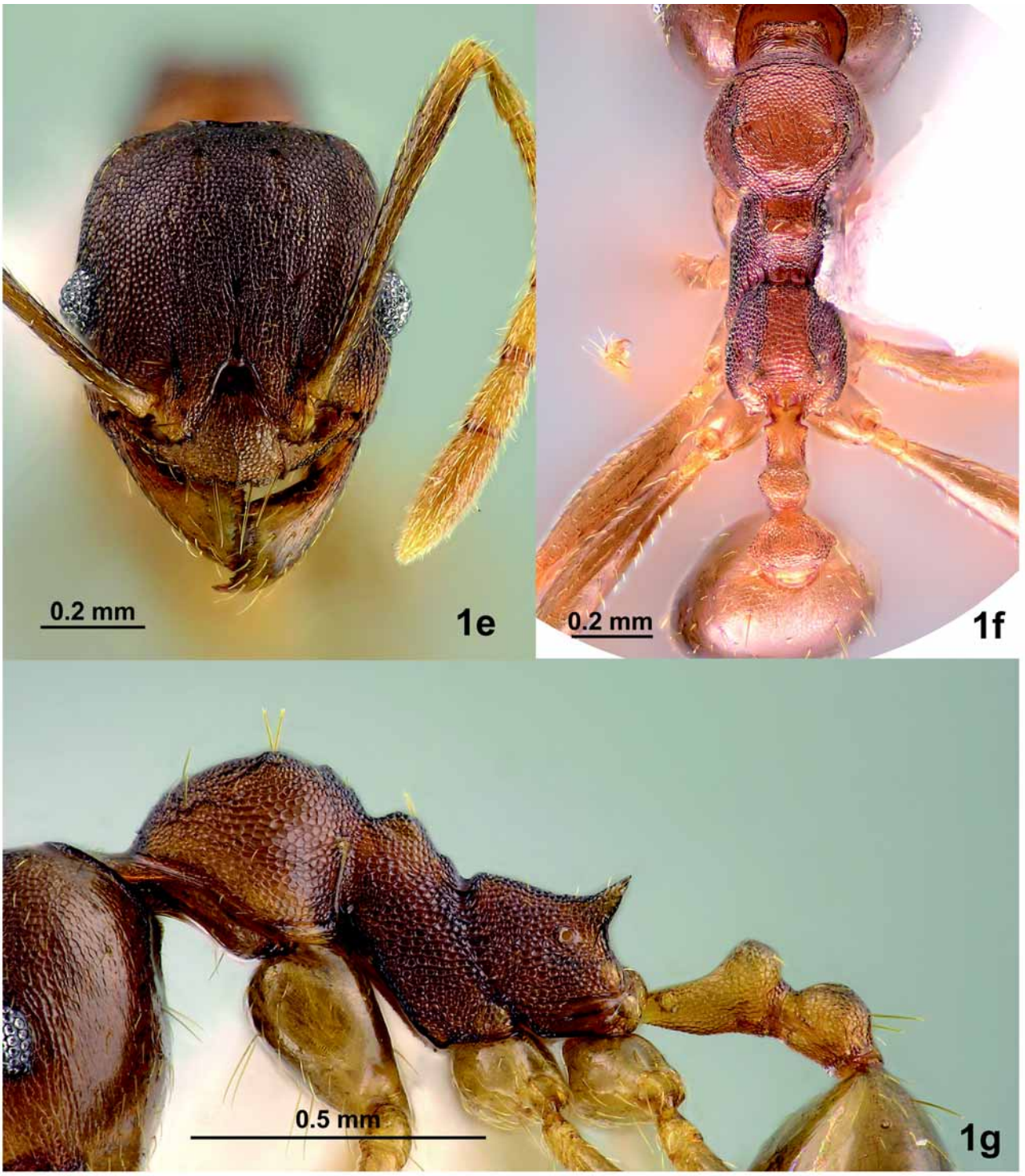

FIGURE 1e–g, *Pheidole capellinii*, nontype minor [D.N. Cuong leg., 11/xi/2001, TUS 15min. #55] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Minor. — Dorsum of head punctured, bearing sparse, very short appressed background hairs, and having only a few standing hairs; preoccipital carina conspicuous dorsally and laterally; median part of clypeus weakly punctured; median longitudinal carina of clypeus conspicuous to weak, or absent; antenna with a 3-segmented club; scape exceeding posterior margin of head by 1.5× length of antennal segment II or more; maximal diameter of eye almost as long as or a little shorter than antennal segment X. Dorsal and lateral faces of mesosoma punctured (punctuation weaker in posterolateral part of promesonotal dome); promesonotal dome bearing a few short and thick standing hairs dorsally, in lateral view with a conspicuous prominence or

mound on its posterior slope; humerus of the dome in dorso-oblique view not or very weakly produced laterad; propodeum without standing hairs. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: This species is well characterized among Indo-Chinese species by the combination of the following characteristics: in the major and minor dorsum of head with a few thick standing hairs among very short appressed background hairs; in the major head in lateral view strongly raised at the border of frons and vertex; in the major frontal carina well developed horizontally, partly overhanging antennal scrobe; in the minor dorsum of head and dorsal and lateral faces of mesosoma punctured; in the major and minor promesonotal dome in lateral view with a conspicuous prominence or mound on its posterior slope.

The major of *P. capellinii* is similar to that of *P. planifrons*, but is easily separated from the latter by the following characteristics of the latter: head in lateral view poorly raised at the border between frons and vertex; vertex and lateral faces of vertexal lobe reticulate; first gastral tergite longitudinally rugoso-punctate entirely or excluding somewhat polished posteromedian part.

Distribution & bionomics: Known from N. Vietnam, China (Wheeler 1927b), Thailand, Sumatra and Java. This species occurs in open habitats, such as annual cropping fields, and nests in the soil.

***Pheidole colpigaleata* Eguchi**
Figs. 2a–g

Pheidole colpigaleata Eguchi, 2006: 116–118. Holotype: major, Ba Vi N.P., Ha Tay, Vietnam, Eg01-VN-222, IEBR, examined; paratypes: 11 majors, 13 minors & 1 dealate queen, same data as holotype, IEBR, MHNG, MCZC, BMNH, FSKU & ACEG, examined.

Pheidole sp. eg-113. Bui & Eguchi 2003: 9 (checklist), Eguchi *et al.*, 2004 (ecological study), Eguchi, Bui *et al.* 2005: 91 (checklist).

Other material examined: N. Vietnam: Lao Cai: Y Linh Ho (a small fragment of forest), ca. 1100 m alt., Sa Pa [Eg02-VN-219]; Bac Giang: W. Yen Tu N.P. (=Tay Yen Tu N.P.), 21°11'N, 106°44'E, 195 m alt. [B&E03-04], W. Yen Tu, 21°10'N, 106°43'E, 435 m alt. [Eg04-VN-127], W. Yen Tu, 21°11'N, 106°43'E, 1070 m alt. [Eg03-VN-127, -128]; Ha Tay (mislabeled as Ha Tai): Ba Vi N.P., 21°03'N, 105°22'E, 1100–1200 m alt. [Eg99-VN-130; Eg01-VN-213; Eg02-VN-038, -039]. Eguchi's informal species code "*Pheidole* sp. eg-113" has been applied to these specimens.

Worker measurements & indices: Major (data from the original description). — HL 1.21–1.29 mm, HW 1.16–1.24 mm, CI 92–96, SL 0.60–0.63 mm, SI 48–53, FL 0.74–0.78 mm, FI 61–66.

Minor (data from the original description). — HL 0.53–0.58 mm, HW 0.50–0.54 mm, CI 91–95, SL 0.51–0.56 mm, SI 98–106, FL 0.53–0.58 mm, FI 106–110.

Worker description

Major. — Head in lateral view hardly or weakly impressed on vertex; anterior part of frons longitudinally rugose; posterior part of frons, vertex and dorsal and dorsolateral faces of vertexal lobe reticulate; frontal carina well developed, partly overhanging antennal scrobe; median longitudinal carina of clypeus absent, or present but inconspicuous; median, submedian and lateral processes of hypostoma conspicuous; outer surface of mandible (excluding basal area) smooth, bearing sparse, very short appressed hairs; antenna with a 3-segmented club; maximal diameter of eye longer than antennal segment X. Promesonotal dome in dorsal view rugoso-reticulate transversely or reticulate irregularly, in lateral view lacking a conspicuous prominence or mound on its posterior slope; humerus moderately produced laterad; the dome broader at the humeri than at the bottom. Petiole (much) longer than postpetiole (excluding helcium); postpetiole not massive, in lateral view with its anteroventral part acutely produced. First gastral tergite largely smooth, but usually with a weakly sculptured area around its articulation with postpetiole.

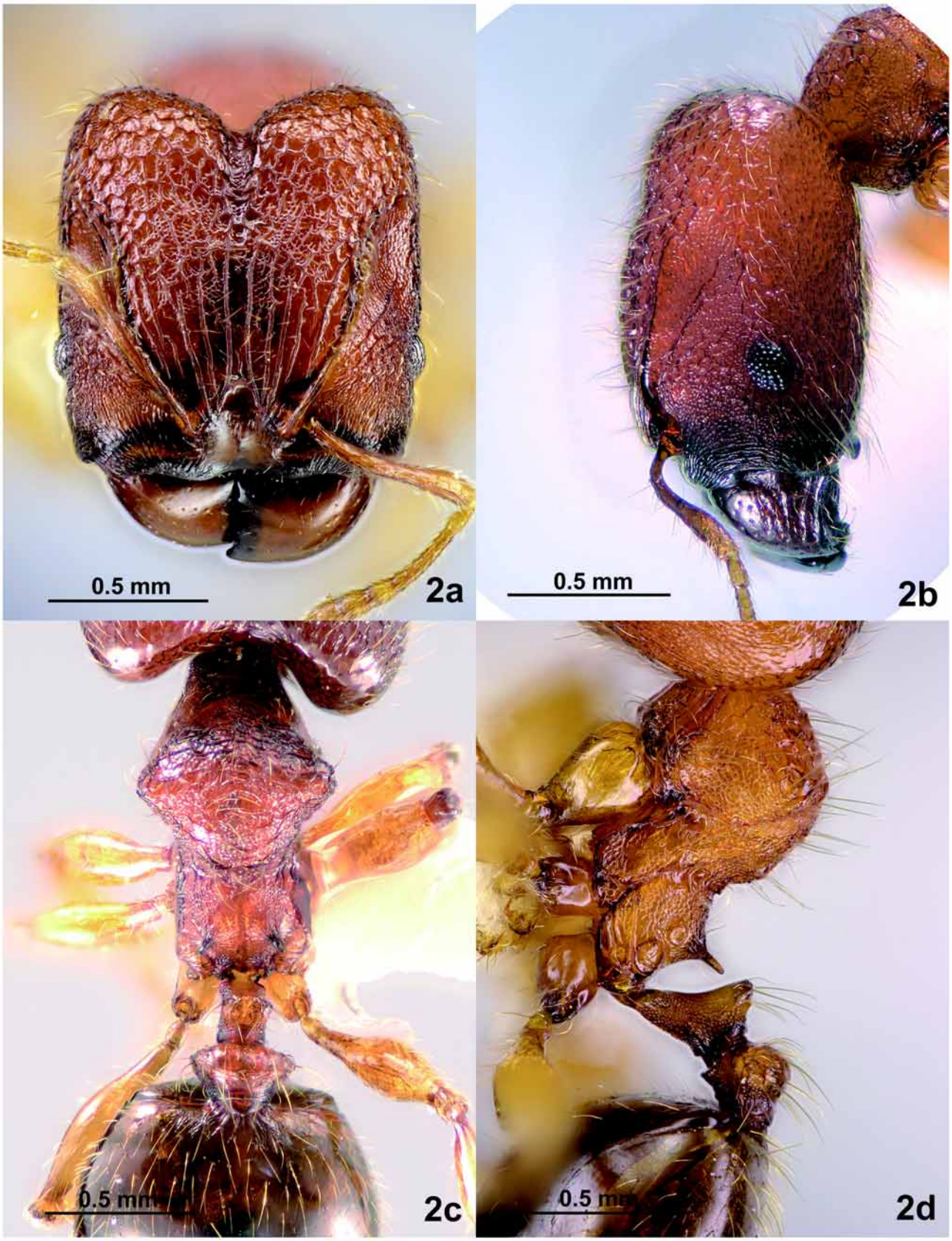

FIGURE 2a–d, *Pheidole colpigaleata*, paratype major [Eg01-VN-222] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

FIGURE 2e–g, *Pheidole colpigaleata*, paratype minor [Eg01-VN-222] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Minor. — Dorsal and lateral faces of head largely punctured, often overlain by weak rugoso-reticulation; anteromedian part of frons (just behind frontal triangle) dimly punctured; preoccipital carina inconspicuous or very weak dorsally; median part of clypeus smooth and shining; median longitudinal carina of clypeus absent, or present but inconspicuous; antenna with a 3-segmented club; scape usually exceeding posterior margin of head by the length of antennal segment II or more; maximal diameter of eye as long as or a little longer than antennal segment X. Dorsum of promesonotal dome well punctured and often overlain by weak rugoso-reticulation, or well reticulate with enclosure weakly punctured; lateral face of the dome, mesopleuron, metapleuron and lateral face of propodeum punctured well; the dome in lateral view lacking a prominence/mound on its posterior slope; humerus of the dome in dorsal-oblique view very weakly produced laterad; propodeal spine small, elongate-triangular. Petiole longer than postpetiole (excluding helcium); postpetiole not massive, in lateral view somewhat globular.

Recognition: This species is characterized among Indo-Chinese species by the following characteristics: in the minor dorsal and lateral faces of head and mesosoma punctured; in the major hypostoma in the middle with a conspicuous median and a pair of conspicuous submedian processes; in the major frontal carina well developed horizontally; in the major and minor promesonotal dome lacking a conspicuous prominence/mound on its posterior slope. The major of *P. colpigaleata* is very similar to that of *Pheidole nodgii* Forel and its relatives, e.g., *P. tjibodana* Forel, *P. magrettii* Emery and *P. retivertex* Eguchi, but is well distinguished from the latter three which have hypostoma in the middle with a well-developed median process only. The major of *P. colpigaleata* is also similar to those of *Pheidole rabo* Forel, *P. zoceana* Santschi and *P. parva* Mayr, but is well distinguished from the latter three which have frontal carinae almost absent or vestigial.

Distribution & bionomics: Known from N. Vietnam. This species inhabits forest from lowland to hilly areas (ca. 1200 m alt.), and nests in rotting twigs and small wood fragments. Majors serve as repletes (e.g., Eg02-VN-038, -039). Colony Eg01-VN-222 (the type series) stored many small seeds inside the nest.

***Pheidole dugasi* Forel**
Figs. 3a–g, 32a, b

Pheidole dugasi Forel, 1911c: 222–223. Yamane *et al*. 2003 (checklist), Eguchi, Bui *et al*. 2005: 89 (checklist). Syntypes: 3 minors, “Cochinchine (Dugas)” [S. Vietnam], MHNG, examined, one of them designated here as the **lectotype** [Fig. 32a, 32b].

Pheidole sp. eg-59 (?*ocellata* Zhou). Eguchi 2003: 337 (description of male genitalia).

Other material examined: S. China: Guangxi: Shiwandashan N.R., Quinzhou [J. Fellowes]; Hainan: Wuzhishan N.R., Qiongzhong, 700 m alt. [J. Fellowes], Wangxia N.R., nr. Bawangling, Changjiang [J. Fellowes], Jianling N.R., Wanling [J. Fellowes]. N. Vietnam: Ha Tay (mislabeled as Ha Tai): Ba Vi N.P., 21°03’N, 105°22’E, ca. 400 m alt. [K. Eguchi]; Ninh Binh: Cuc Phuong N.P., 20°14’N, 105°36’E [VN98-SKY-23; Eg01-VN-200, -201; Eg10vi05-01]. S. Vietnam: Dong Nai: S. Cat Tien N.P., < 160 m alt. [Eg04-VN-508, -539]. Thailand: Chiang Mai: Campus of Chiang Mai Univ. [Eg01-TH-162], Doi Chiang Dao [Eg01-TH-142], Doi Chiang Dao, 500–600 m alt. [Sk. Yamane]; Chanthaburi: Khao Soi Dao W.S. [TH01-SKY-03; Eg01-TH-002, -020, -034; H. Okido]; Chacheongsao: Khao Ang Reu Nai W.S., near the Headquarters [TH03-SKY-89].

Worker measurements & indices: Major (n=5). — HL 3.38–3.60 mm; HW 3.15–3.40 mm; CI 93–99; SL 1.48–1.67 mm; SI 47–49; FL 2.35–2.49 mm; FI 71–78.

Minor (n=5). — HL 0.97–1.19 mm; HW 0.84–1.04 mm; CI 85–88; SL1.15–1.36 mm; SI 124–137; FL 1.47–1.67 mm; FI 159–175.

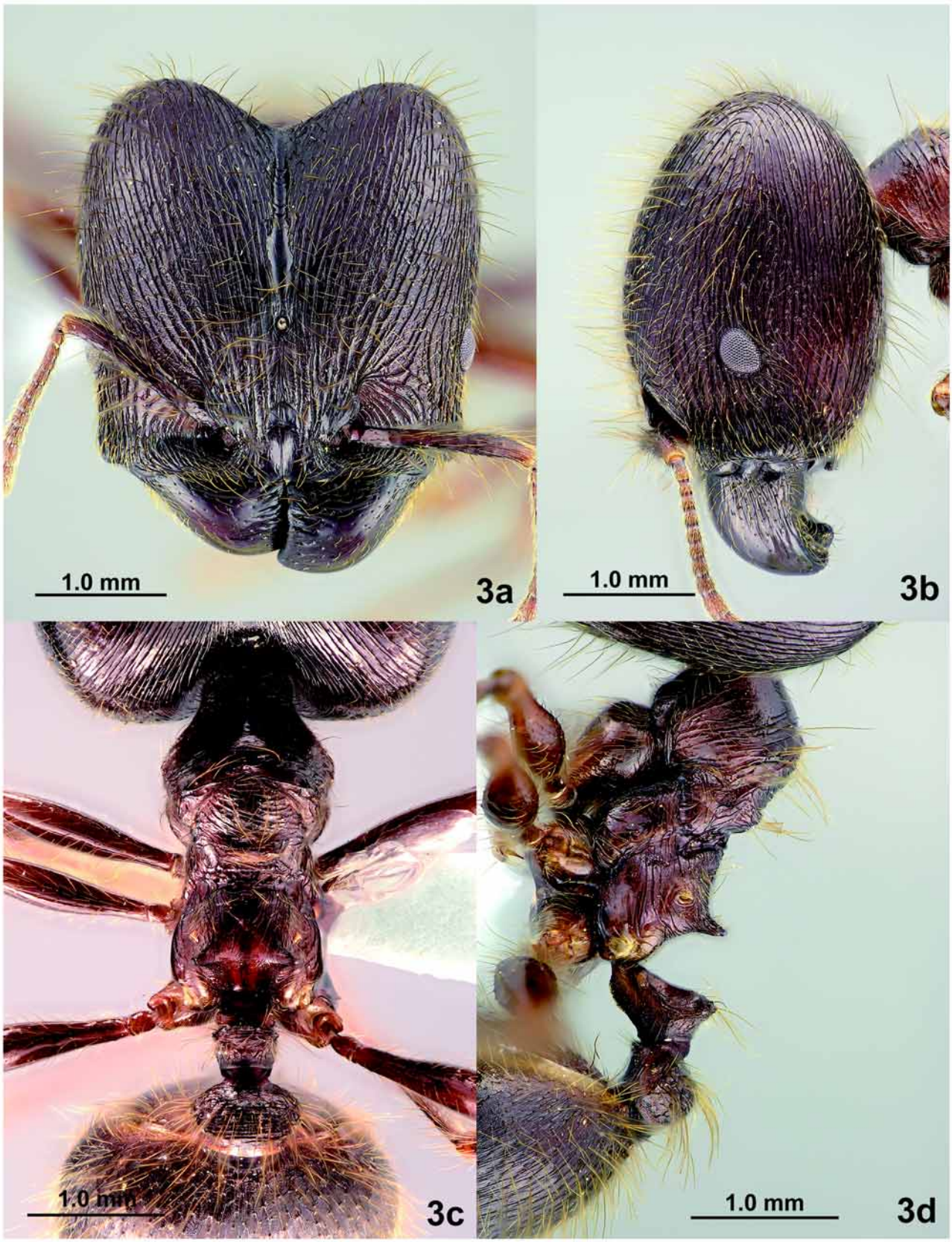

FIGURE 3a–d, *Pheidole dugasi*, nontype major [Eg01-VN-200] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

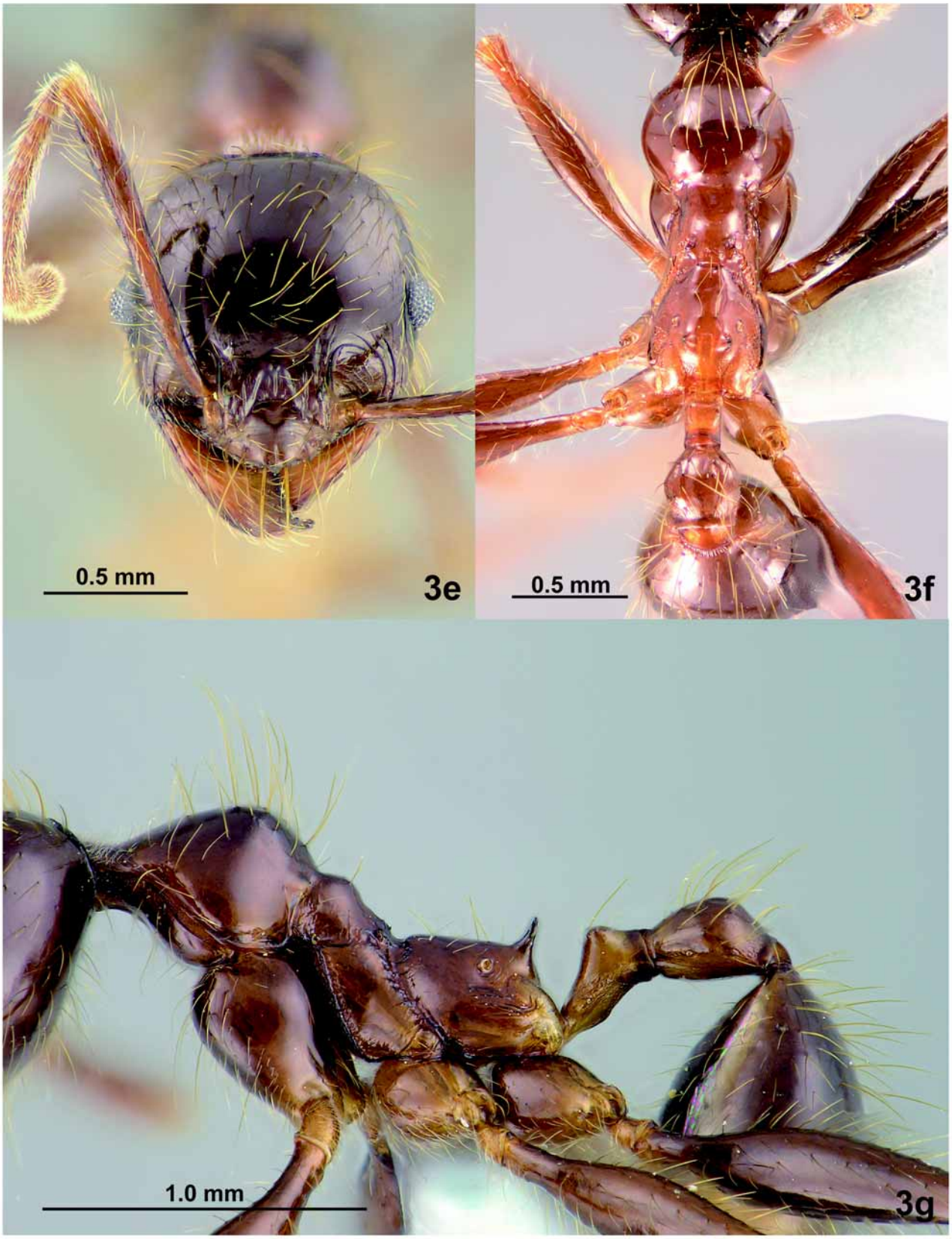

FIGURE 3e–g, *Pheidole dugasi*, nontype minor [Eg01-VN-200] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Worker description

Major. — Head in lateral view roundly convex dorsally, not impressed on vertex; frons with longitudinal-oblique rugulae which reach the end of vertexal lobes; frontal carina and antennal scrobe absent; clypeus with a conspicuous median longitudinal carina; hypostoma with an inconspicuous or low and broad median and low submedian processes in addition to small to conspicuous lateral processes; the median process somewhat emaginate or with a concavity in the center; antenna with a 3-segmented club; maximal diameter of eye (much) longer than antennal segment X; median ocellus often present. Promesonotal dome with a small to inconspicuous prominence or mound on its posterior slope; humerus not produced; the dome much narrower at the humeri than at the bottom. Petiole (a little) longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite rugoso-punctate weakly but densely.

Minor. — Dorsum of head largely smooth; area between antennal insertion and eye with rugulae; dorsolateral and posterodorsal faces of head sometimes shagreened; preoccipital carina conspicuous dorsally and laterally; median part of clypeus smooth; median longitudinal carina of clypeus absent, or sometimes present but inconspicuous or weak; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye almost as long as, or a little shorter or a little longer than antennal segment X. Promesonotal dome smooth and shining, usually bearing very long hairs dorsally, in lateral view with a low or inconspicuous mound on its posterior slope; humerus of the dome in dorsal-oblique view not raised/produced; mesopleuron, metapleuron and lateral face of propodeum smooth and shining, or at most very weakly punctured partly; propodeal spine in lateral view spiniform or elogate-triangular, directing upward. Petiole almost as long as postpetiole (excluding helcium); postpetiole relatively large.

Recognition: This species is characterized among Indo-Chinese species by the combination of the following characteristics: in the major and minor body extremely large; in the major frons with longitudinal-oblique rugulae which run till the end of vertexal lobes; in the major and minor antennal club 3-segmented. In N. Vietnam there are two other extremely large-sized species, *Pheidole gatesi* (Wheeler) and *P. smythiesii* Forel. But these two species are easily separated from *P. dugasi* by the 4-segmented antennal club in the major and minor. *Pheidole magna* Eguchi (see below) is relatively similar to *P. dugasi*, but easily separated from *P. dugasi* by the following characteristics of the major of *P. magna*: dorsal and lateral faces of vertexal lobe smooth and shining; first gastral tergite smooth and shining, often with a weakly punctured area just around its articulation with postpetiole (see also Eguchi 2006).

Distribution & bionomics: Known from Vietnam, S. China and Thailand. This species usually nests under the ground in woody gardens and forest edges. Majors serve as repletes (e.g., Eg01-TH-034, -142). In S. Cat Tien N.P. (S. Vietnam) I observed masses of workers retrieving seeds from mammal feces.

Pheidole elongicephala Eguchi **sp.n.**

Figs. 4a–h

Pheidole sp. B (aff. *aglae* Forel). Yamane *et. al.* 2003: 58 (checklist).

Pheidole aglae Forel. Misidentification made by Eguchi *et al.* 2004 (ecological study).

Type material examined: Holotype, major, Cuc Phuong N.P. ("Dong Nguoi Xua" Area), Ninh Binh, N. Vietnam [Eg09vi05-08 (K. Eguchi leg., 09/JUN/2005)] (IEBR); paratypes: 7 majors, 9 minors & 2 males, same data as holotype (IEBR, MHNG, MCZC, & ACKE).

Other material examined: S. China: Hong Kong: Taipo Kau N.P., New Territory [Eg00-HK-028]. Vietnam: Thai Nguyen: My Yen Commune Forest, 21°35'N, 105°36'E, Na Hau Village [Eg01-VN-158]; Bac Giang: W. Yen Tu N.P. (=Tay Yen Tu N.P.), 21°10–11'N, 106°43–44'E, 190–370 m alt. [Eg03-VN-030, -040, -135, -153, -160; B&E03-12]; Ha Tay (mislabeled as Ha Tai): Ba Vi N.P., 21°03'N, 105°22'E, 400–700 m alt. [Eg02-VN-009, -022]; Ninh Binh: Cuc Phuong N.P. [Eg11iv05-14; Eg15vi05-07]. Part of specimens to which

Eguchi's informal species code "*Pheidole* sp. eg-101" has been applied (Eguchi, Bui *et al.* 2005: 90) is *P. elongicephala*, and the remainder is *P. ochracea*.

Worker measurements & indices: Holotype (major). — HL 1.76 mm; HW 1.56 mm; CI 89; SL 1.18 mm; SI 76; FL 1.56 mm; FI 100.

Nontype major (n=4). — HL1.68–1.78 mm; HW 1.51–1.57 mm; CI 88–90; SL 1.13–1.16 mm; SI 74–75; FL 1.53–1.56 mm; FI 99–102.

Minor (n=5, including one paratype minor). — HL 0.78–0.85 mm; HW 0.58–0.64 mm; CI 75–76; SL 1.06–1.19 mm; SI 176–187; FL 1.11–1.25 mm; FI 187–197.

Worker description

Major. — Body deep yellowish-brown, brown or deep reddish-brown, with paler appendages. Head in lateral view not or weakly impressed on vertex; vertexal lobes in full-face view relatively close to each other; frons and anterior part of vertex longitudinally rugose; posterior part of vertex and dorsum of vertexal lobe rugoso-reticulate or reticulate; clypeus without a conspicuous median longitudinal carina; frontal carina conspicuous; antennal scrobe very shallow; hypostoma with a very low or inconspicuous median process and a pair of low or inconspicuous submedian processes in addition to a pair of conspicuous lateral processes; antenna with a 3-segmented club; maximal diameter of eye shorter than antennal segment X. Promesonotal dome sparsely rugose transversely, with interspaces smooth and shining; a conspicuous prominence present on its posterior slope; humerus not or hardly produced laterad; the dome at the humeri much narrower than at the bottom; mesopleuron and metapleuron weakly punctured, overlain by rugoso-reticulation; propodeal spine narrowly based. Petiole longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite smooth entirely, or shagreened only around its articulation with postpetiole.

Minor. — Body yellowish-brown or brown, with paler appendages. Head in full-face view elongate-elliptical, tapered posterad behind eyes; frons and vertex smooth or shagreened; median portion of clypeus smooth; median longitudinal carina very weak or absent; occipital carina forming a well-developed collar; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye much shorter than antennal segment X; 8–9 ommatidia present on the long axis of eye; promesonotal dome smooth and shining, in lateral view with a low mound on its gentle posterior slope; the mound bearing usually 4 standing hairs; humerus in dorso-oblique view not raised/produced; mesopleuron, metapleuron and lateral face of propodeum punctured, often overlain by weak rugulae; propodeal spine elongate-triangular, directing upward; petiole (a little) longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: *Pheidole elongicephala*, *P. binghamii* and *P. ochracea* sp.n. are morphologically very similar to each other (and probably very closely related to each other). Differences between *P. elongicephala* and *P. binghamii* are as follows: head behind eyes in full-face view more elongated and tapered posterad in the minor of the former than in that of the latter; mound on the posterior slope of promesonotal dome bearing usually 4 standing hairs in the minor of the former, but usually only a pair of standing hairs in the minor of the latter. The body size of both the subcastes is almost constantly larger in *P. elongicephala* than in *P. binghamii*. The two species are allopatric or parapatric (range of *P. binghamii*: Myanmar, Thailand, S. Vietnam). Differences between *P. elongicephala* and *P. ochracea* sp.n. are as follows: head behind eyes in full-face view more elongated and tapered posterad in the minor of the former than in that of the latter; occipital carina of the minor much more developed in the former than in the latter; the long axis of eye having 8–9 ommatidia in the minor of the former, but 6–7 ommatidia in that of the latter. They are sympatric in S. China and N. Vietnam.

Distribution & bionomics: Known from N. Vietnam and S. China. This species occurs in woody habitats, and nests in rotting wood material (logs, stubs) and in the soil.

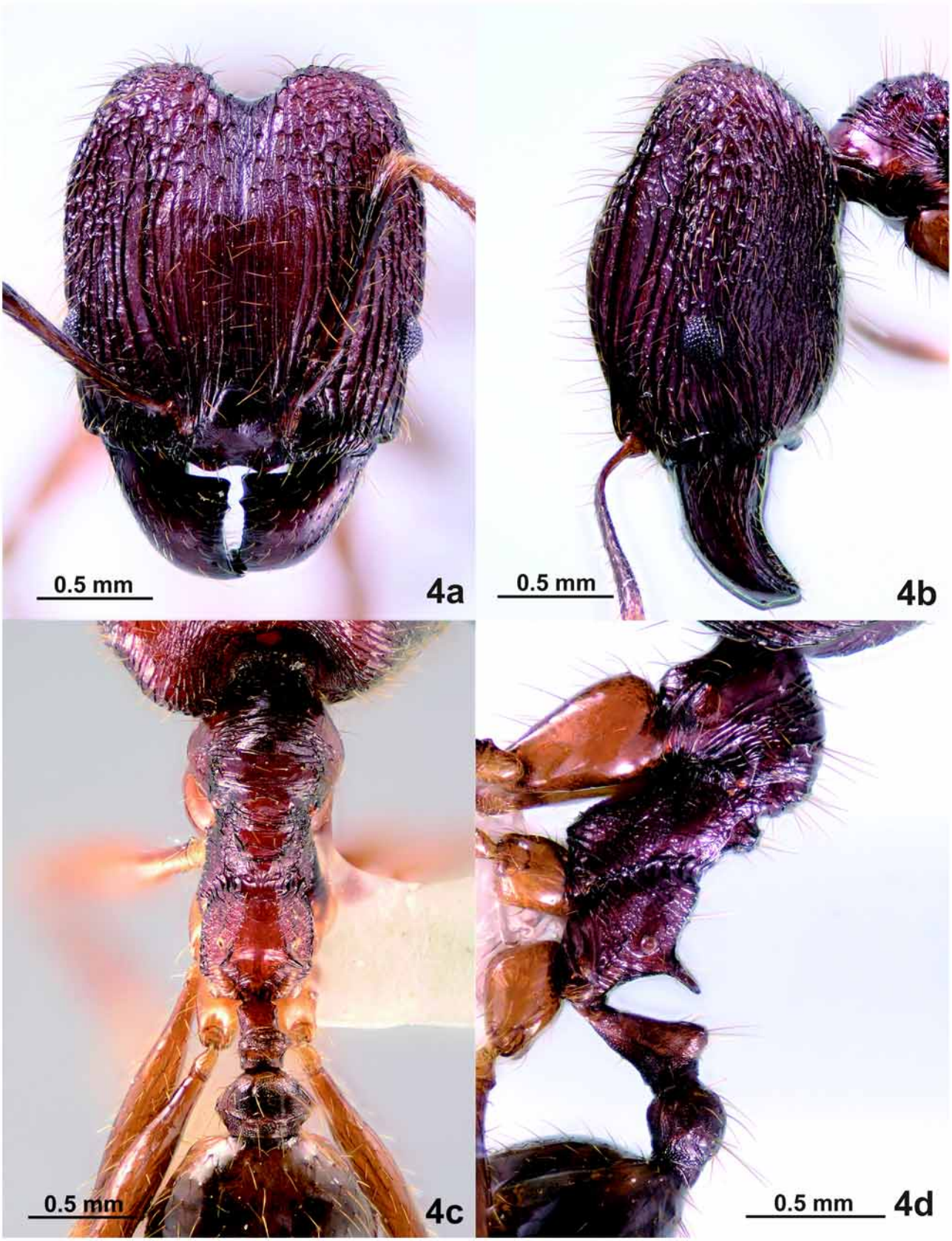

FIGURE 4a–d, *Pheidole elongicephala* sp.n., major [Eg09vi05-08] — a, holotype, head in full-face view; b, paratype, head in lateral view; c, paratype, mesosoma and waist in dorsal view; d, paratype, mesosoma and waist in lateral view.

FIGURE 4e–h, *Pheidole elongicephala* sp.n., paratype minor [Eg09vi05-08] — e, head in full-face view; f, head in lateral view; g, mesosoma and waist in dorsal view; h, mesosoma and waist in lateral view.

***Pheidole fervens* F. Smith**
Figs. 5a–g

Pheidole fervens F. Smith, 1858: 176. Ogata 1982: 197 (description of male), Eguchi 2001b: 53–55 (redescription of major & minor), Eguchi 2004: 197–198 (taxonomic remarks). Syntypes: 1 major & 2 minors, "SING 33" [Singapore], BMNH, examined.

Pheidole cavannae Emery, 1887: 464. Emery 1914 : 401 (as subspecies of *P. oceanica*), Wilson & Taylor 1967: 45 (junior synonym of *fervens*). Syntype(s): major, New Caledonia, not examined.

Pheidole javana Mayr, 1867: 98. Wilson & Taylor 1967: 45 (junior synonym of *fervens*), Eguchi 2004: 197 (lectotype designation). Lectotype: major: "Batavia" [Jakarta, Java], NHMW, examined; paralectotypes: 2 majors, same data as lectotype, NHMW, examined.

Pheidole (*Pheidole*) *oceanica* var. *nigriscapa* Santschi, 1928a: 48. Wilson & Taylor 1967: 45 (junior synonym of *fervens*). Syntype: 1 minor, "SAMOAN IS. Apia. 3.iii.24. P.A.Buxton. 627.", NHMB, examined; syntype(?): 1 major, "Apia, Samoa oct 1911. (leg. H. Swole)", NHMB, examined.

Pheidole oceanica subsp. *nigriscapa* var. *tahitiana* Santschi, 1928b: 516 (unavailable name). Wilson & Taylor 1967: 45 (material referable to *P. fervens*). Material referable to this form: minor, Tahiti, not examined.

Pheidole amia Forel, 1912a: 60–61. Bolton 1995: 316 (catalogue), Eguchi 2004: 197 (lectotype designation, junior synonym of *fervens*). Lectotype: major, "Takao Formosa Sauter XI 7-0" [= Kaohsiung, Taiwan], MHNG, examined; paralectotypes: 3 minors, "Takao Formosa (Sauter) 26", MHNG, examined.

Pheidole javana var. *desucta* Wheeler, 1929a: 2. Eguchi 2001b: 53 (lectotype designation, junior synonym of *fervens*). Lectotype: major, "Back Liang, China", MCZC co-type 20659, examined; paralectotypes: 1 major, 2 minors & 3 queens, same data as lectotype, MCZC co-type 20659, examined.

Pheidole javana var. *dharmsalana* Forel, 1902: 184, 198. Eguchi 2004: 198 (lectotype designation, junior synonym of *fervens*). Lectotype: major, "Dharmsala" [India], MHNG, examined; paralectotypes: 2 minors, same data as lectotype, MHNG, examined.

Pheidole javana var. *dolenda* Forel, 1912a: 60. Eguchi 2004: 198 (lectotype designation, junior synonym of *fervens*). Lectotype: major, "Akau, Formosa", MHNG, examined; paralectotypes: 1 major & 3 minors, same data as lectotype, MHNG, examined.

Pheidole javana var. *soror* Santschi, 1937b: 369. Eguchi 2004: 198 (lectotype designation, junior synonym of *fervens*). Lectotype: major, "Hokuto Formose K. Sato 731" [= Taiwan], NHMB, examined; paralectotypes: 4 minors, same data as lectotype, NHMB, examined.

Pheidole nodus st. *azumai* Santschi, 1941: 274. Eguchi 2004: 198 (lectotype designation, junior synonym of *fervens*). Lectotype: major, "Japon. Osaka Tennooji 26II39 M. Azuma." [= Tennooji, Osaka, Japan], NHMB, examined; paralectotypes: 2 minors, same data as holotype, NHMB, examined.

Solenopsis pungens F. Smith, 1861: 48–49. Donisthorpe 1932: 469 (combination in *Pheidologeton*), Bolton 1995: 328 (combination in *Pheidole*), Eguchi 2004: 198 (lectotype designation, junior synonym of *fervens*). Lectotype: major, "Menado" [= Menado Sulawesi, Indonesia], OXUM, examined; paralectotypes: 1 major, same data as lectotype, OXUM, examined; 1 minor, "Men. 18." [= Menado Sulawesi, Indonesia], OXUM, examined.

Type material of *P. javana* var. *pectinata* Stitz, 1912: 504 (type locality: Seram I., Indonesia) has not yet been examined by me, and its status is still unsettled in the present study.

Other material examined: Mainland Japan: Kagoshima: Toso, Kagoshima City [T. Akiyama's colony: 021105-1]. Ryukyus: Okinoerabu-jima I.: Azufu, [Litter shift-3 (A. Shimono)]; Iriomote-jima I. [K. Eguchi's colony 96-JPN-001, -003]. Taiwan: Nantou: Hori [S. Kubota's sample: 81-A-T16]; Kaohsiung: Meishankou [S. Kubota's sample: 80-E-K6]. S. China: Macau: Taipa I. [Eg99-MAC-01, -02], Hac-Sa, Coloane I. [K. Eguchi]; Hong Kong: Victoria Park, Hong Kong I. [K. Eguchi]. Vietnam: Thai Nguyen: My Yen Commune Forest (edge of secondary forest), 21°35'N, 105°36'E, Na Hau Village [Eg01-VN-143, -149, -150]; Ha Noi: urban

area [T.V. Bui's colony: BTV04-HN-01, -14, -15, -16]. Thailand: Bangkok: Campus of Kasetsart Univ. [Eg01-TH-583, -584], Bang Khean Distr. (residential area) [TH03-SKY-103]; Chanthaburi: Yay-am Dist. [Eg01-TH-66B]. E. Malaysia: Sabah: Tawau Hills Park [Eg96-BOR-009, -021]; Sarawak: Niah N.P. [Sk. Yamane]. Indonesia: W. Sumatra: Maninjau, [SNS col.], Sako, nr. Tapan [SNS col.], Sukarami, Padang [M. Kawamura's colony: 9/28a (1999)], Ulu Gadut, nr. Padang [SNS col.]; W. Java: Bogor [M. Kawamura's colony: 153 (1998)]; E. Java: Air Panas Cargar, 1600 m alt., Bumiaji, Batu [JV02/03-SKY-71, -72, -73, -75, -80], Sumberbrantas, 1600 m alt., Tulungrejo, Batu [F. Yamane]. Philippines: Palawan: Pupok, Napsan, in a cottage [H. Fukuda]. Tonga: Eua Is.: Eua Forest Res. [J. Wetterer]. Samoa: Apia [H. Swole, NHMB]. USA: California: Los Angeles [M.J. Martinez, MCZC].

Worker measurements & indices: Major (n=5). — HL 1.31–1.56 mm; HW 1.22–1.44 mm; CI 92–97; SL 0.84–0.95 mm; SI 66–70; FL 1.12–1.27 mm; FI 88–94.

Minor (n=5). — HL 0.65–0.73 mm; HW 0.54–0.60 mm; CI 81–84; SL 0.77–0.87 mm; SI 138–153; FL 0.81–0.93 mm; FI 149–163.

Worker description

Major. — Head in lateral view not or hardly impressed on vertex; posterior concavity of head in full-face view usually shallow; frons and anterior part of vertex rugose longitudinally; posterior part of vertex and dorsal face of vertexal lobe rugoso-reticulate, with interspaces weakly punctured; frontal carina conspicuous; antennal scrobe inconspicuous or shallowly impressed; clypeus without a median longitudinal carina; median and submedian processes of hypostoma absent or present but inconspicuous; lateral processes conspicuous; antenna with a 3-segmented club; maximal diameter of eye almost as long as or shorter than antennal segment X. Promesonotal dome in dorsal view largely smooth, or sparsely sculptured with weak transverse rugulae, in lateral view with a low to conspicuous mound on its posterior slope; humerus not produced; the dome much narrower at the humeri than at the bottom; mesopleuron, metapleuron and lateral face of propodeum well punctured, sometimes overlain with weak rugulae; propodeal spine narrowly based, usually slightly curved apically. Petiole longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite smooth and shining entirely, or sometimes shagreened around its articulation with postpetiole.

Minor. — Frons and vertex smooth and shining, or rarely shagreened or very weakly rugoso-punctate; area between antennal insertion and eye weakly rugoso-punctate; preoccipital carina conspicuous dorsally and laterally; median part of clypeus smooth, without a median longitudinal carina; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye much shorter than antennal segment X. Promesonotal dome largely smooth and shining, but sometimes weakly rugoso-punctate dorsolaterally, in lateral view with a low or inconspicuous mound on its gentle posterior slope; humerus of the dome in dorsal-oblique view not produced; mesopleuron, metapleuron and lateral face of propodeum well punctured; propodeal spine elongate-triangular, directing upward. Petiole (a little) longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: This medium-sized species with general habitus is similar to *Pheidole binghamii* Forel, *P. elongicephala* sp.n., *P. indica* Mayr, *P. ochracea* sp.n. and *P. plagiaria* F. Smith among Indo-Chinese species. *P. fervens* is well separated from *P. indica* which has the following characteristics: eye relatively large (maximal diameter of eye much longer than antennal segment X in the major, and as long as or a little longer than X in the minor); in the major propodeal spine is relatively broadly based (see Eguchi 2004).

Posterior margin of head in full-face view is more deeply and narrowly concave in the major of *P. binghamii*, *P. elongicephala* and *P. ochracea* than in that of *P. fervens*, and sculpture on dorsum of vertexal lobe is usually stronger in the major of the former three.

The major of *P. fervens* is separated from that of *P. plagiaria* which has the following characteristics: posterior margin of head in full-face view deeply concave; the rugulae running almost transversely along posterior margin of vertexal lobe.

FIGURE 5a–d. *Pheidole fervens*, nontype major [BTV04-HN-14] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

FIGURE 5e–g, *Pheidole fervens*, nontype minor [BTV04-HN-14] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Distribution & bionomics: Known from N. Vietnam, Manchurian subregion (southern part only), Oriental region, Austro-Malayan subregion, W. Pacific and West coast of N. America. In the Indo-Malayan subregion this species is one of the prevailing *Pheidole* species in semiurban and rural areas.

***Pheidole fervida* F. Smith**
Figs. 6a–h

Pheidole fervida F. Smith, 1874: 406. Ogata, 1982: 195 (male genitalia). Syntypes: major & queen, Hiogo [Hyogo, Japan], not examined.

Other material examined: Mainland Japan: Hokkaido: Misumai, 200 m alt., Sapporo [S. Takahashi]; Kyoto: Ashiu Experimental Forest (Miyama-cho) [D. Wiwatwitaya's colony: JP02-DW-01, -02, -03]; Ehime: Mts. Ishizuchi, 650–700 m alt. [JP03-SKY-04]; Kagoshima: Hoyoshi-jinja, 390 m alt., Hoyoshi-dake, Mts. Kimotsuki [H. Watanabe]. S. Korea: Gangwon-Do: Baekdamsa, 500–800 m alt., Seoraksan N.P. [KR03-SKY-18], Osaek-summit, 550–750 m alt., Seoraksan N.P. [Sk. Yamane], Jeohangryeong V., 270–300 m alt., Seoraksan N.P. [KR03-SKY-31], Jeohangryeong V., 560 m alt., Seoraksan N.P. [KR03-SKY-30]. S. China: Guizhou: Pudi Xiang, Dafang [L. Latella]. Taiwan: Chiayi: Funkiko [S. Kubota's sample 80-E-B11]. Vietnam: Lai Chau: W. Cong Troi (western slope of Mt. Phansipan), 2100–2200 m alt. [Eg02-VN-317, -319, -321, -324, -326, -329, -331, -335]; Lao Cai: Ban Khoang (Site-A: stream-side secondary forest), 1700–1800 m alt., Sa Pa [Eg02-VN-115, -118, -134], Ban Khoang (Site-A: shoulder of a road), 1700–1800 m alt., Sa Pa [Eg02-VN-135], Cat Cat (a trail to Phansipan), 1300–1400 m alt., Sa Pa [Eg02-VN-257], Cong Troi (Site-B: well-developed forest), 2000 m alt., Sa Pa [Eg02-VN-091, -092, -093, -096, -107], Cong Troi (Site-C: stream-side secondary forest), 2000–2200 m alt., Sa Pa [Eg02-VN-146, -150, -158, -161], Cong Troi (Site-D: well-developed forest), 2100–2200 m alt., Sa Pa [Eg02-VN-182, -185, -188, -192, -197, -199, -295, -297, -299, -304, -306, -309, -312], Cong Troi (Site-E: well-developed forest), 2100–2200 m alt., Sa Pa [Eg02-VN-232, -234, -236, -238, -240, -242, -244, -246, -250], Y Linh Ho (a small fragment of forest), 1100 m alt., Sa Pa [Eg02-VN-223], Sa Seng (small fragment of limestone forest) [Eg02-VN-275, -287].

Worker measurements & indices: Major (n=5). — HL 1.30–1.43 mm; HW 1.31–1.47 mm; CI 94–104; SL 0.68–0.78 mm; SI 50–53; FL 0.88–1.06 mm; FI 66–73.

Minor (n=5). — HL 0.62–0.66 mm; HW 0.58–0.63 mm; CI 88–95; SL 0.58–0.72 mm; SI 94–124; FL 0.60–0.77 mm; FI 102–133.

Worker description

Major. — Head in full-face view relatively shallowly concave posteriorly, in lateral view roundly convex dorsally, not impressed on vertex; frons and vertex rugose longitudinally, with interspaces smooth; vertexal lobe smooth and shining (but rarely dimly rugosed); frontal carina weak, or inconspicous just as rugula(e); antennal scrobe almost absent, or present but inconspicuous; median part of clypeus smooth, without a median longitudinal carina absent (rarely with a very weak carina); hypostoma with median and submedian processes in addition to conspicuous lateral processes; submedian processes always conspicuous, but median process often less conspicuous than submedian processes; antenna with a 3-segmented club; maximal diameter of eye longer than antennal segment X; outer surface of mandible smooth (excluding the basal area), with relatively long decumbent hairs. Promesonotal dome sparsely rugose transverselly, with interspaces smooth and shining, in lateral view with a low to inconspicuous mound on its posterior slope; humerus not or very weakly produced laterad; the dome at the humeri as broad as at the bottom, or narrower than at the bottom. Petiole longer than postpetiole (excluding helcium); postpetiole not massive, sometimes with its lateral corner forming a conspicuous horn. First gastral tergite smooth and shining entirely.

Minor. — Dorsum of head variable in sculpture, usually rugoso-reticulate or rugoso-punctate at least partly, but sometimes smooth and shining almost entirely; preoccipital carina present dorsally and laterally, but often very weak dorsally; median part of clypeus smooth and shining; median longitudinal carina absent, or present but inconspicuous; antenna with a 3-segmented club; scape usually exceeding posterior margin of head by the length of antennal segment II or more; maximal diameter of eye almost as long as or shorter than antennal segment X. Dorsum of promesonotal dome smooth and shining with several rugulae or rugoso-reticulate with enclosures almost smooth and shining, or rarely rugoso-punctuate largely; the dome in lateral view

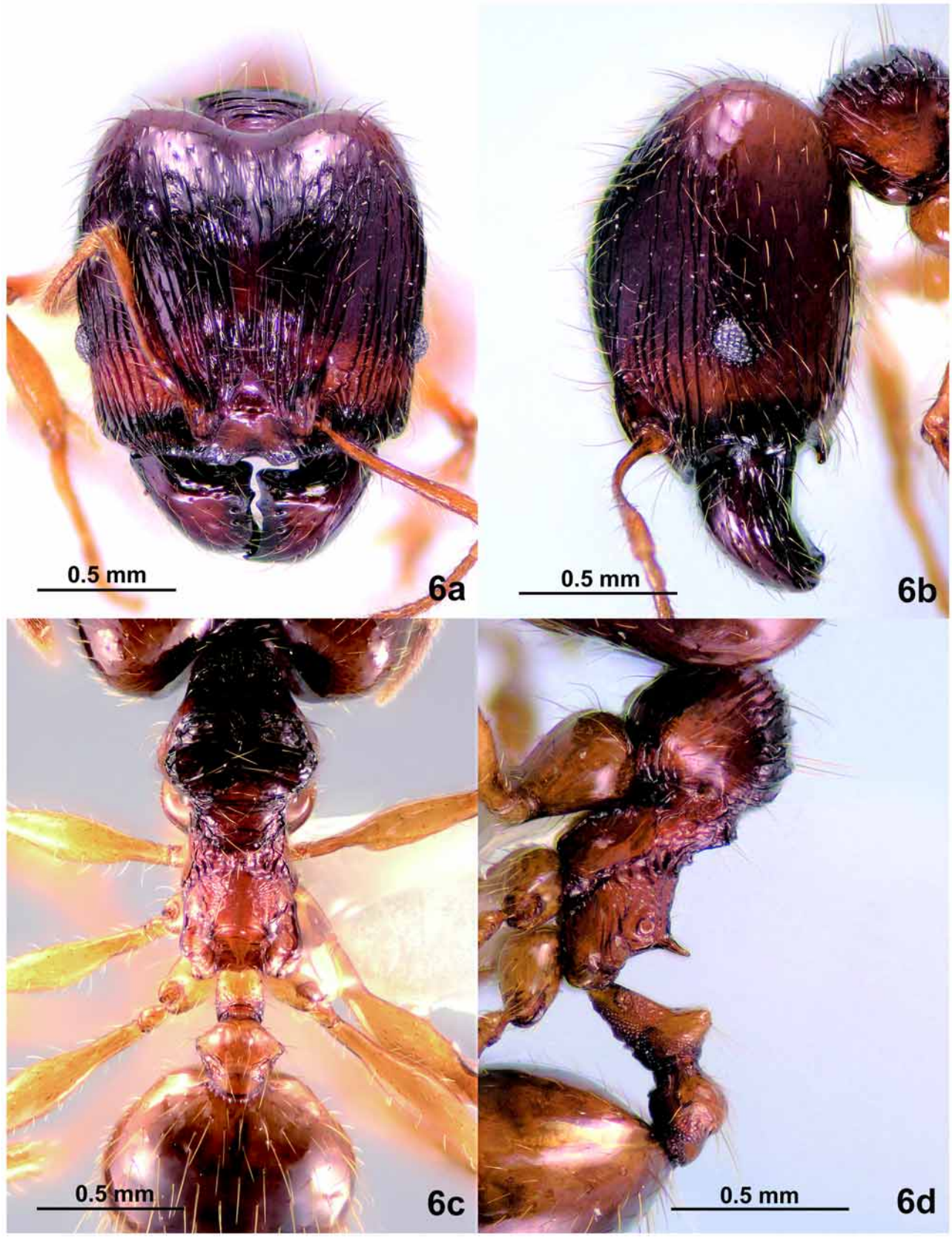

FIGURE 6a–d, *Pheidole fervida*, nontype major [Eg02-VN-091] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

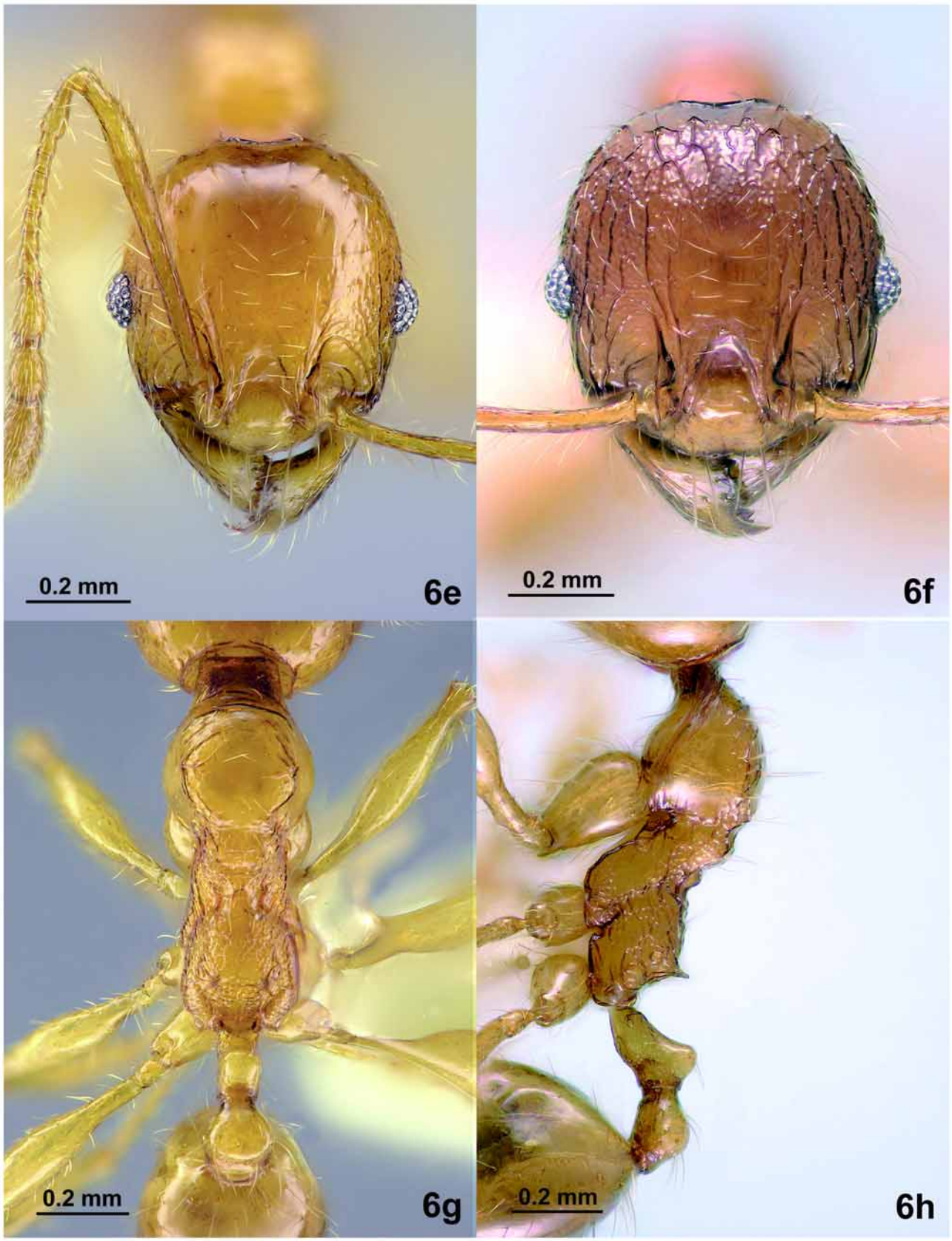

FIGURE 6e–h. *Pheidole fervida*, nontype minor [e, g, h, Eg02-VN-091; f, Eg02-VN-234] — e, f, head in full-face view; g, mesosoma and waist in dorsal view; h, mesosoma and waist in lateral view.

with a low to inconspicuous mound on its posterior slope; humerus of the dome in dorsal-oblique view hardly or very weakly produced laterad; mesopleuron, metapleuron and lateral face of propodeum usually punctured very weakly or weakly. Petiole longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: Posterior margin of head of the minor is generally more convex in N. Vietnamese populations than in Korean and Japanese populations. However, in population(s) of Lao Cai and Lai Chau, N. Vietnam, the minor is variable not only in the convexity of posterior margin of head but also in the sculpture on frons and vertex. It is also possible that *P. fervida* recognized here actually includes two or more sibling species.

A variant of *P. fervida* (the minor having sculptured frons and vertex) is similar to *P. ryukyuensis* Ogata. However, in the major of *P. ryukyuensis* posterior margin of head in full-face view is rather deeply concave; and in the major and minor of *P. ryukyuensis* mound on the posterior slope of promesonotal dome is almost absent (see also Ogata 1982). Another variant of *P. fervida* (the minor having smooth head) is similar to a variant of *P. vulgaris* (the major having almost smooth vertexal lobe). However, in the major of *P. vulgaris* the head rather long; and in the major and minor of *P. vulgaris* the mound on the posterior slope of promesonotal dome is almost absent.

Distribution & bionomics: Known from N. Vietnam, mainland Japan, N. Ryukyus and Korean Peninsula. This species seems to be restricted to cool-temperate to warm-temperate humid areas in East and Southeast Asia. It usually inhabits well-developed natural forests, man-made woody habitats (timber plantations, woody gardens, etc.) and forest edges, and nests mainly in rotting logs and other wood material, and sometimes in the litter/soil, and among root networks of vegetation on the rocks.

***Pheidole fortis* Eguchi**
Figs. 7a–7g

Pheidole fortis Eguchi, 2006: 118–120. Holotype: major, "Cat Cat (a trail to Mt. Phansipan), ca. 1300–1400 m alt., Sa Pa, Lao Cai, Vietnam, Eg02-VN-264", IEBR, examined; paratypes: 1 major & 19 minors, same data as holotype, IEBR, MHNG, MCZC, BMNH, FSKU & ACEG, examined.

Pheidole sp. eg-160. Bui & Eguchi 2003: 9 (checklist), Eguchi, Bui *et al.* 2005: 91 (checklist).

Other material examined: N. Vietnam: Vinh Phuc: Tam Dao N.P., 21°27'N, 105°38'E, 950 m alt. [Sk. Yamane]. Thailand: Chiang Mai: Doi Pui, ca. 1200 m alt., Doi Suthep-Pui N.P. [Eg01-TH-113]. Eguchi's informal species code "*Pheidole* sp. eg-160" has been applied to these specimens.

Worker measurements & indices: Major (data from the original description). — HL 2.12–2.23 mm, HW 1.79–2.05 mm, CI 84–92, SL 0.90–0.91 mm, SI 44–51, FL 1.33–1.39 mm, FI 67–78.

Minor (data from the original description). — HL 0.71–0.75 mm, HW 0.64–0.71 mm, CI 90–95, SL 0.79–0.87 mm, SI 118–124, FL 0.92–0.97 mm, FI 134–144.

Worker description

Major. — Head in lateral view not or hardly impressed on vertex; head densely covered with short decumbent to subdecumbent hairs entirely; frons with longitudinal rugulae which reach posterolateral corner of vertexal lobes; frontal carina and antennal scrobe absent; clypeus with a median longitudinal carina; hypostoma with an inconspicuous median process and low or relatively developed submedian processes in addition to small lateral processes; antenna with a 3-segmented club; maximal diameter of eye almost as long as or longer than antennal segment X. Promesonotal dome with a much reduced prominence on its posterior slope; humerus not or very weakly produced laterad; the dome at the humeri as broad as or narrower than at the bottom. Petiole as long as postpetiole (excluding helcium); postpetiole massive. First gastral tergite rugoso-punctured at least in its anterior 1/3.

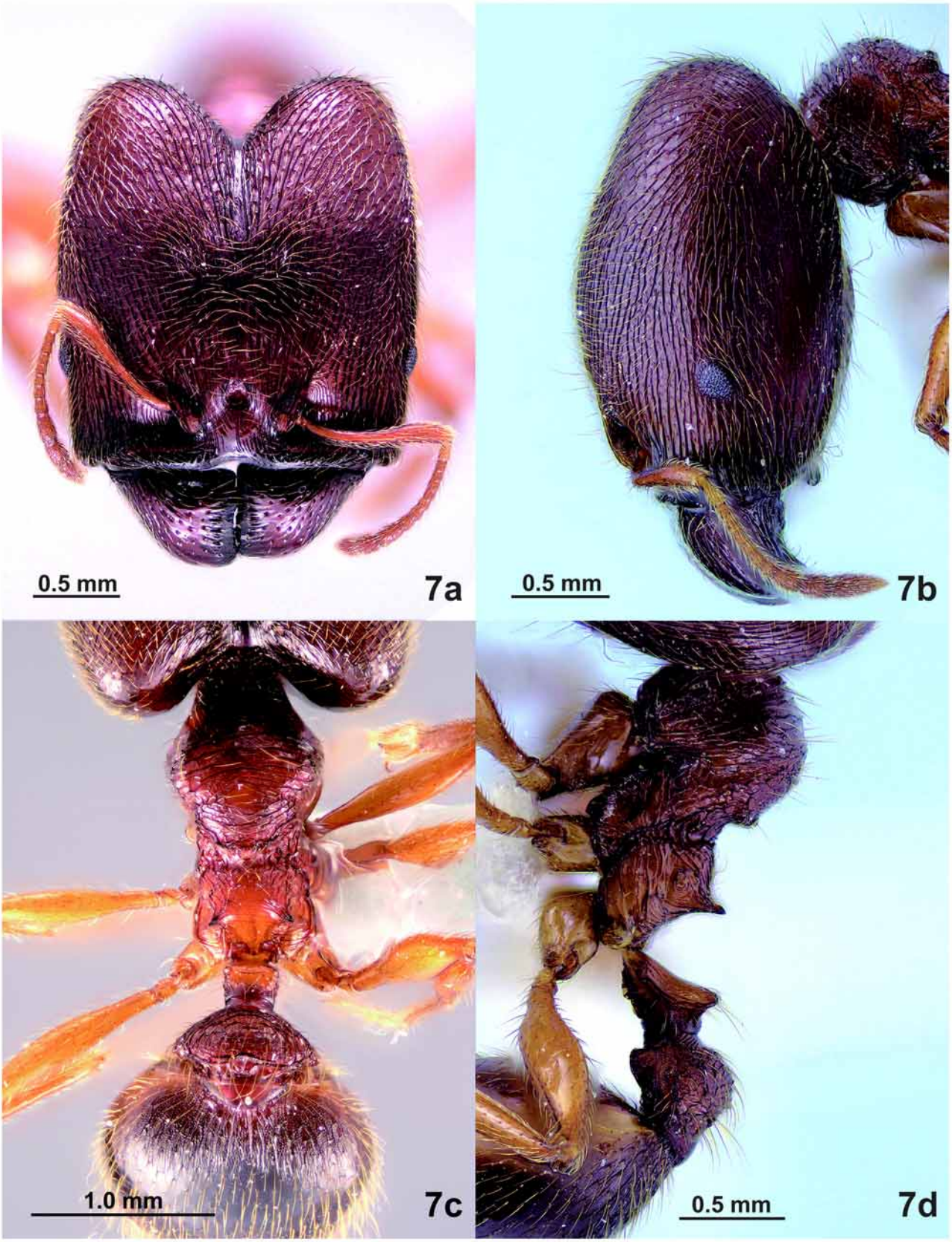

FIGURE 7a–d, *Pheidole fortis*, major [Eg02-VN-264] — a, holotype, head in full-face view; b, holotype, head in lateral view; c, paratype mesosoma and waist in dorsal view; d, holotype, mesosoma and waist in lateral view.

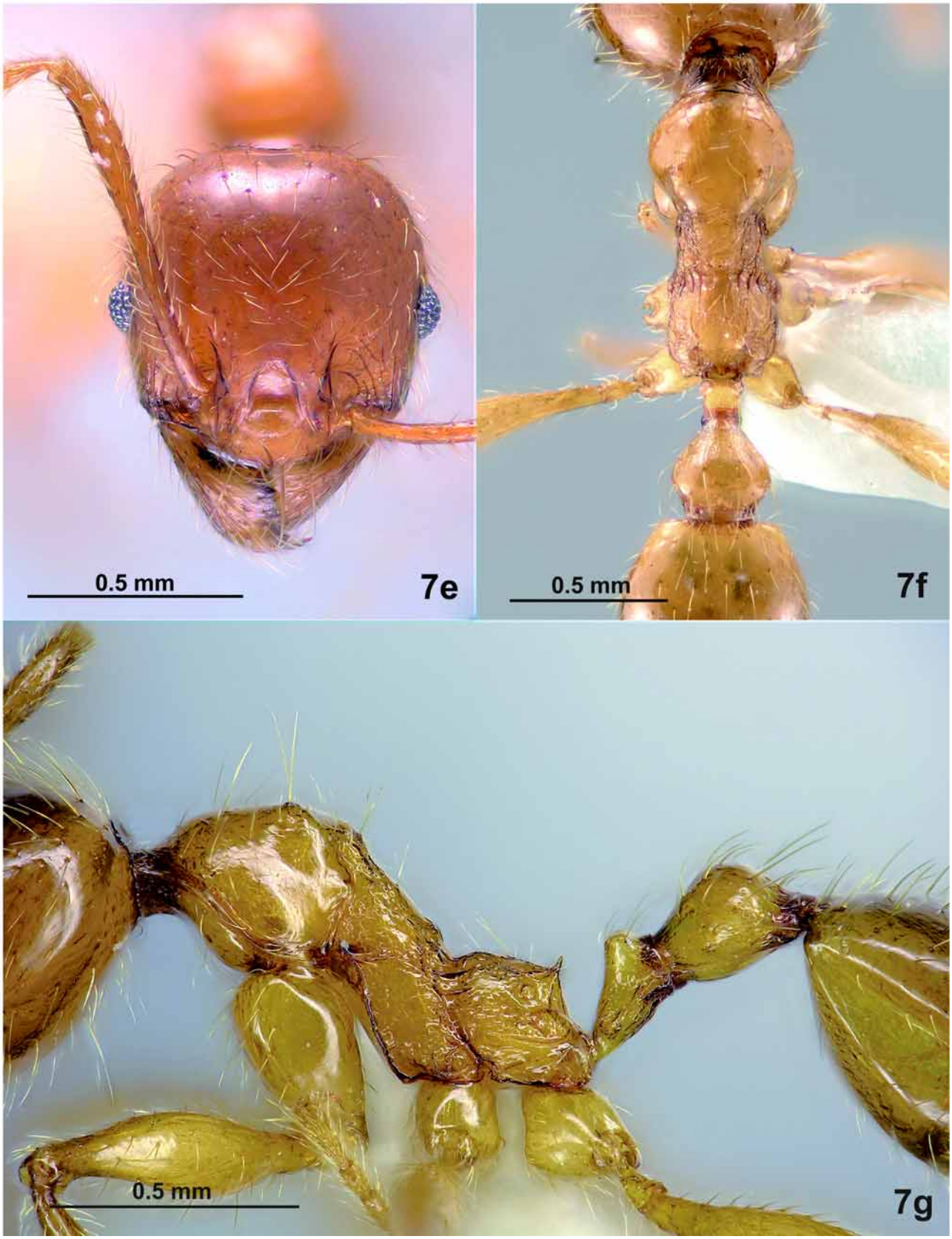

FIGURE 7e–g, *Pheidole fortis*, paratype minor [Eg02-VN-264] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Minor. — Dorsum of head largely smooth and shining; preoccipital carina complete but weak dorsally; median part of clypeus almost smooth, usually with a conspicuous to weak median longitudinal carina; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye shorter than antennal segment X. Promesonotal dome smooth, in lateral view lacking a conspicuous prominence/mound on its posterior slope; humerus of the dome in dorso-oblique view hardly to weakly produced laterad; propodeal spine small, elongate-triangular. Petiole shorter than postpetiole (excluding helcium); postpetiole massive.

Recognition: This species is characterized among Indo-Chinese species by the following characteristics: in the major head densely covered with short decumbent to subdecumbent hairs entirely; in the major frons with longitudinal-oblique rugulae which reach posterolateral corner of vertexal lobes; in the minor promesonotal dome lacking a conspicuous prominence on its posterior slope; in the major and minor postpetiole massive. *Pheidole fortis* is similar to *P. wroughtoni* Forel (the type material housed in MHNG was examined), but well distinguished from the latter in which vertex and dorsum of vertexal lobe in lateral view forms an obtuse angle in the major, maximal diameter of eye longer than antennal segment X in the minor, and the posterior slope of promesonotal dome has a conspicuous prominence/mound in the minor. The minor of this species is similar to that of *P. magna*, but the minor of *P. magna* has a conspicuous prominence/mound on the posterior slope of promesonotal dome (see also Eguchi 2006).

Distribution & bionomics: Known from N. Vietnam and Thailand. This species inhabits open forests and forest edges, and nests in the soil (Eguchi 2006).

***Pheidole foveolata* Eguchi**
Figs. 8a–g

Pheidole foveolata Eguchi, 2006: 121–123. Holotype: major, "Y Linh Ho (a small fragment of forest), ca. 1100 m alt., Sa Pa, Lao Cai, Vietnam, Eg02-VN-210", IEBR, examined; paratypes: 19 majors, 21 minors & 1 dealate queen, same data as holotype, IEBR, MHNG, MCZC, BMNH, FSKU & ACEG, examined.

Pheidole sp. eg-163. Bui & Eguchi 2003: 9 (checklist).

Other material examined: Vietnam: Lao Cai: Y Linh Ho (a small fragment of forest), 1100 m alt., Sa Pa [Eg02-VN-220, -227]. Eguchi's informal species code "*Pheidole* sp. eg-163" has been applied to these specimens.

Worker measurements & indices: Major (data from the original description). — HL 0.93–0.97 mm, HW 0.91–0.97 mm, CI 98–101, SL 0.46–0.49 mm, SI 48–54, FL 0.56–0.58 mm, FI 60–62.

Minor (data from the original description). — HL 0.47–0.51 mm; HW 0.42–0.46 mm, CI 89–94, SL 0.42–0.45 mm, SI 98–102, FL 0.42–0.47 mm, FI 100–102.

Worker description

Major. — Head in lateral view very weakly impressed on vertex; frons longitudinally rugose; vertex and dorsal and lateral faces of vertexal lobe weakly reticulate, with enclosures punctured; frontal carina absent, or present just as rugula(e); antennal scrobe absent; clypeus without a median longitudinal carina; median, submedian and lateral processes of hypostoma conspicuous; antenna with a 3-segmented club; maximal diameter of eye longer than antennal segment X. Promesonotal dome lacking a prominence/mound on its posterior slope; humerus weakly produced laterad; the dome at the humeri as broad as at the bottom, or a little broader at the bottom. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite largely smooth and shining except a weakly punctured area around its articulation with postpetiole.

Minor. — Head puncutured dorsally and laterally; preoccipital carina absent dorsally; median part of clypeus smooth and shining, usually with a weak or very weak median longitudinal carina; antenna with a

FIGURE 8a–d, *Pheidole foveolata*, major [Eg02-VN-210] — a, paratype, head in full-face view; b, holotype, head in lateral view; c, paratype, mesosoma and waist in dorsal view; d, paratype, mesosoma and waist in lateral view.

FIGURE 8e–g, *Pheidole foveolata*, paratype minor [Eg02-VN-210] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

3-segmented club; scape exceeding posterior margin of head by 0.5–1.5× length of antennal segment II; maximal diameter of eye a little longer than antennal segment X. Mesosoma punctured well dorsally and laterally; promesonotal dome in lateral view lacking a prominence/mound on its posterior slope; humerus in dorsal-oblique view not or hardly produced; propodeal spine much reduced to a tiny dent (at most as long as maximal

diameter of propodeal spiracle). Petiole much longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: This species is characterized among Indo-Chinese species by the following characteristics: in the minor dorsal and lateral faces of head and mesosoma punctured; in the minor median part of clypeus smooth and shining; in the major hypostoma in the middle with a conspicuous median process and a pair of conspicuous submedian processes; in the major and minor promesonotal dome lacking a conspicuous prominence/mound on its posterior slope; in the minor propodeal spine much reduced to a small dent.

It is similar to *Pheidole mus* Forel and *P. sagei* Forel (the type material of both species housed in MHNG was examined) and *P. parva* Mayr (the type material housed in NHMW was examined) but distinguished from the latter three by the following characteristics: propodeal spine is rather developed in the minor of the latter three; the minor of *P. mus* having median portion of clypeus which is punctured weakly or dimly and not shining.

Distribution & bionomics: Known from N. Vietnam. This species inhabits forest edges and nests in the soil (Eguchi 2005). Majors serve as repletes (e.g., the type series).

***Pheidole gatesi* (Wheeler)**
Figs. 9a–g

Aphaenogaster (*Attomyrma*) *gatesi* Wheeler, 1927a: 44. Syntypes: 2 minors, "Rangoon, Burma, G.E. Gates" [Myanmar], MCZC cotype-20600, examined.

Pheidole gatesi (Wheeler). Brown 1966: 283 (combination in *Pheidole*), Yamane *et al.* 2003: 57 (checklist), Eguchi 2003: 323 (description of male), Eguchi, Bui *et al*. 2005: 89 (checklist).

Other material examined: S. China: Hainan: Wuzhishan N.R., Qiongzhong [J. Fellowes]. Vietnam: Vinh Phuc: Tam Dao N.P., 21°27'N, 105°38'E, 900 m alt. [Eg01-VN-102], Tam Dao N.P., 900–1100 m alt. [Eg99-VN-046, -047, -050, -051], Tam Dao N.P., 900–1240 m alt. [VN98-SKY-07, -22; VN98-HO-008], Tam Dao N.P., 1000 m alt. [Eg01-VN-120], Tam Dao, 1000–1240 m alt. [Sk. Yamane]; Ha Tay (mislabeled as Ha Tai): Ba Vi N.P., 21°03'N, 105°22'E, 800 m alt. [Eg02-VN-046]; Ninh Binh: Cuc Phuong N.P., 20°14'N, 105°36'E [Eg10vi05-02; Eg14vi05-10], Cuc Phuong, 320 m alt. [Eg01-VN-184]. Thailand: Chiang Mai: Doi Suthep-Pui N.P. [Sk. Yamane; F. Yamane], Doi Suthep-Pui, 900 m alt. [Eg01-TH-081], Doi Suthep-Pui, 1200 m alt. [Eg01-TH-112, -114, -116], Doi Suthep-Pui, 1400 m alt. [TH98-SKY-01], Doi Suthep-Pui, 1470 m alt. [W.L. Brown & I. Burikam, MCZC]. Myanmar: Chin: between Kampetlet and Natmataung N.P., 1373 m alt. [MM02-SKY-37].

Worker measurements & indices: Major (n=5). — HL 2.93–3.40 mm; HW 2.73–3.08 mm; CI 90–100; SL 1.42–1.57 mm; SI 47–58; FL 2.14–2.30 mm; FI 70–84.

Minor (n=5). — HL 0.99–1.11 mm; HW 0.89–1.00 mm; CI 89–94; SL 1.09–1.40 mm; SI 121–144; FL 1.31–1.70 mm; FI 146–173.

Worker description

Major. — Head in lateral view not impressed on vertex; frons and vertex rugose longitudinally-obliquely; dorsum of vertexal lobe rugose or rugoso-recticulate; clypeus with a weak to conspicuous median longitudinal carina; frontal carina and antennal scrobe absent; median process of hypostoma low (but rarely almost absent), sometimes with a concavity in the center; submedian processes low or relatively well developed (but rarely almost absent); lateral processes always present but usually small; antenna with a 4-segmented club; maximal diameter of eye much longer than antennal segment X. Promesonotal dome in dorsal view sparsely and transversely rugose (but rarely with the posterior part rugose irregularly or longitudinally), in lateral view with a small to conspicuous prominence on its posterior slope (but rarely without a prominence/mound); humerus not produced laterad; the dome narrower at the humeri than at the bottom. Petiole almost as long as,

or a little longer than postpetiole (excluding helcium); postpetiole relatively large to massive. First gastral tergite weakly rugoso-punctate around its articulation with postpetiole and shagreened in the remainder part (but rarely longitudinally rugose entirely).

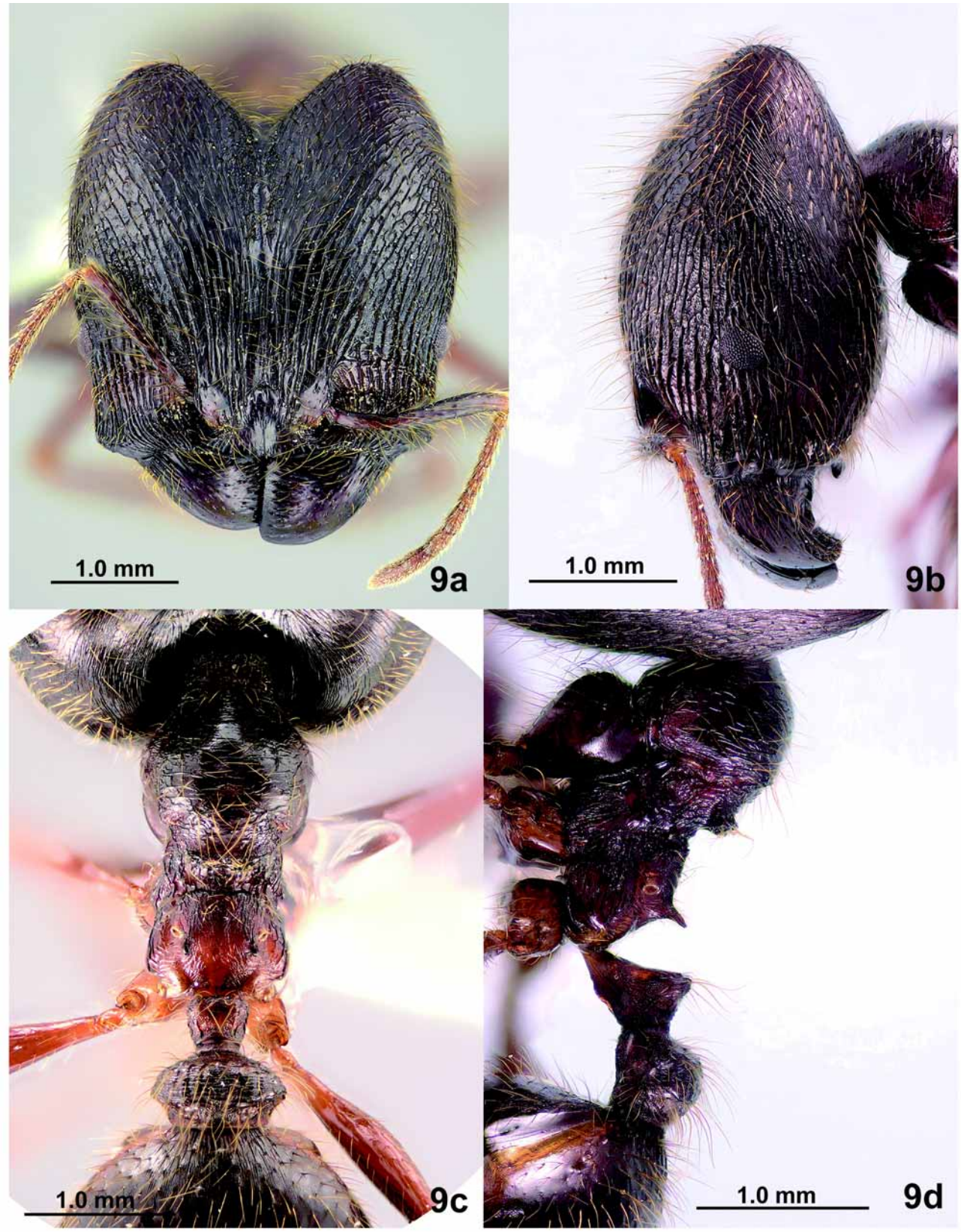

FIGURE 9a–d, *Pheidole gatesi*, major [Eg01-VN-120] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

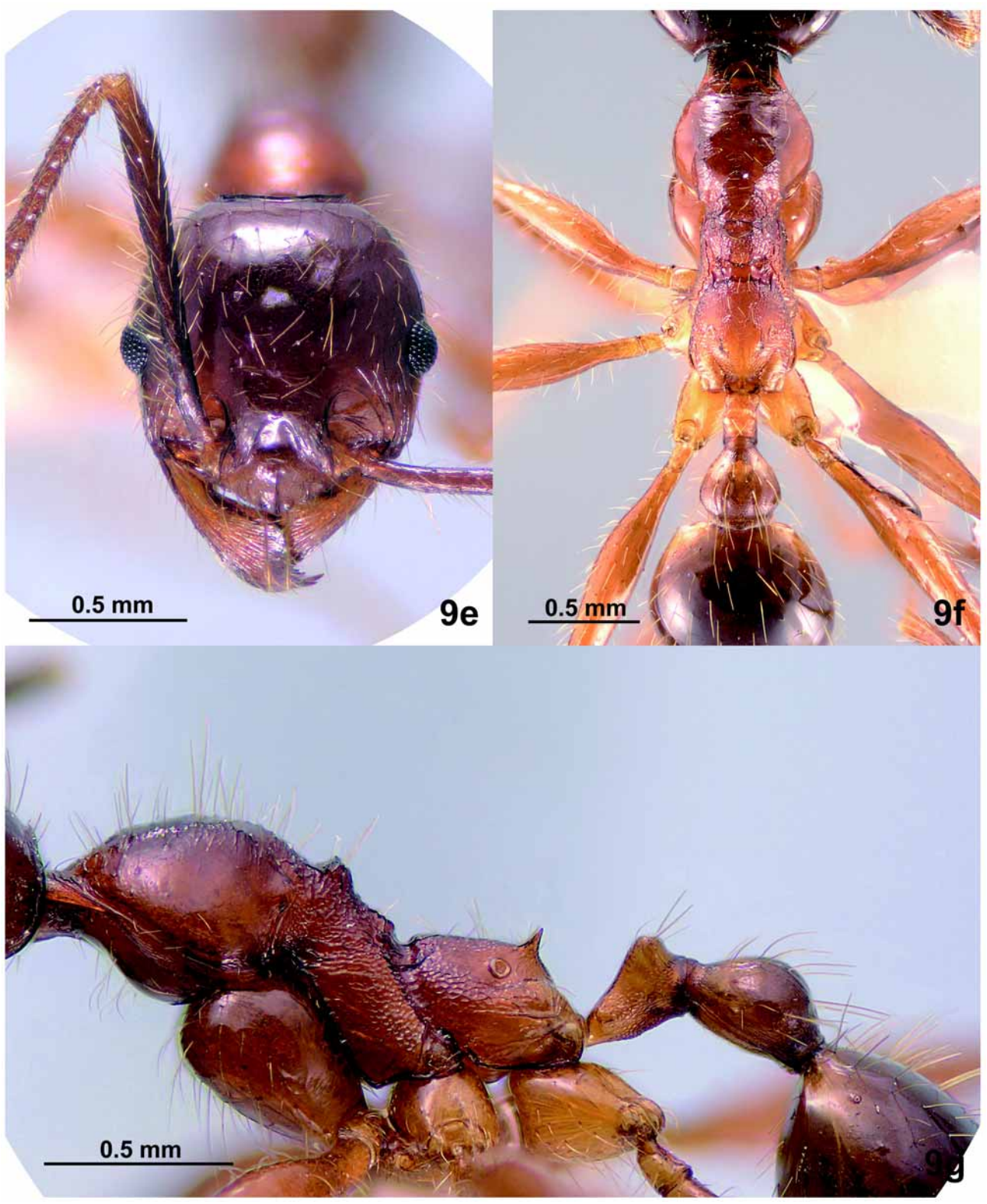

FIGURE 9e–g, *Pheidole gatesi*, major [Eg01-VN-120] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Minor. — Dorsum of head smooth, with several rugulae on the area between antennal insertion and eye (rarely rugoso-punctate on the dorsolateral face); preoccipital carina conspicuous dorsally and laterally; median part of clypeus almost smooth, with a weak or conspicuous median longitudinal carina; antenna with a

4-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye almost as long as or shorter than antennal segment X. Promesonotal dome largely smooth, sometimes with weak transverse rugulae dorsolaterally, in lateral view with a conspicuous prominence/mound on its posterior slope; the prominence often developed well as a transverse ridge; humerus of the dome in dorso-oblique view not produced laterad; mesopleuron, metapleuron and lateral face of propodeum punctured weakly, often overlain with weak rugoso-reticulation. Petiole almost as long as or a little shorter than postpetiole (excluding helcium); postpetiole relatively massive.

Recognition: *Pheidole gatesi* and *P. smythiesii* are morphologically very similar to each other. Differences between the two species are as follows: in the minor petiole usually 0.85–1.0 times as long as postpetiole in *P. gatesi*, but usually less than 0.85 times in *P. smythiesii*; in the minor dorsum of promesonotum bearing hairs more densely in *P. gatesi* than in *P. smythiesii*. Furthermore, in the minor of *P. gatesi*, the prominence on the posterior slope of promesonotal dome is rather conspicuous, often developed well as a transverse ridge. These differences between the two species are relatively conspicuous when sympatric populations of the two species are compared.

Distribution & bionomics: Known from N. Vietnam, S. China, Thailand and Myanmar. This species inhabits woody habitats, and nests in the soil. Majors serve as repletes (e.g., Eg01-TH-116, Eg01-VN-184, Eg02-VN-046).

***Pheidole hongkongensis* Wheeler**
Figs. 10a–g

Pheidole rinae subsp. *hongkongensis* Wheeler, 1928: 11. Eguchi 2001a: 23 (lectotype designation). Lectotype: major, "Hong Kong, Silvestri", MCZC cotype-20668, examined; paralectotypes: 2 majors, 2 minors & 2 queens, same data as lectotype, MCZC cotype-20668, examined.

Pheidole hongkongensis Wheeler. Zhou & Zheng, 1999: 87 (raised to species), Eguchi, Bui *et al*. 2005: 89 (checklist), Eguchi, Yamane & Zhou 2007: 259–261 (redescription of the major and minor are given, but two majors and three minors of *Pheidole* sp. eg-179 were erroneously combined).

Other material examined: China: Hong Kong: Victoria Park, Hong Kong I. [Eg99-HK-34], nr. Taipo Kau N.P., New Territory [Eg00-HK-31]; Macau: Taipa Grande Trail, Taipa I. [Eg99-MAC-09, -10], Taipa I. [Eg99-MAC-03], Hac-Sa, Coloane I. [Eg99-MAC-11]; Hainan: Qingpilin N.R., Wanling [J. Fellowes]. Vietnam: Bac Kan: Ba Be N.P., 22°24' N, 105°38'E, ca. 215 m alt. [10-min TUS sample: Eg-6-5, BTV-6-5]; Thai Nguyen: My Yen Commune Forest (edge of secondary forest), 21°35'N, 105°36'E, Na Hau Village [Eg01-VN-159]; Bac Giang: W. Yen Tu N.P., 21°10–11'N, 106°43–44'E, 170 m alt. [Eg03-VN-081]; Vinh Phuc: Tam Dao N.P., 900 m alt., [SKY], Tam Dao N.P., 21°27'N, 105°38'E [VN01-SKY-05]. Thailand: Nakonratchasima: Sakaerat lowland forest, dried dipterocorp forest [TH99-SKY-04]. Eguchi's informal species code "*Pheidole* sp. eg-103" has been applied to these specimens.

Worker measurements & indices: Major (n=7). — HL 0.96–1.11 mm; HW 0.82–0.93 mm; CI 84–87; SL 0.42–0.46 mm; SI 47–53; FL 0.57–0.65 mm; FI 68–71.

Minor (n=9 for HL, HW, SL, CI and SI, but n=8 for FL and FI). — HL 0.48–0.53 mm; HW 0.44–0.50 mm; CI 88–96; SL 0.41–0.45 mm; SI 89–96; FL 0.43–0.50 mm; FI 99–107.

Worker description

Major. — Head in full-face view deeply concave posteromedially, in lateral view strongly impressed on vertex; frons and anterior part of vertex longitudinally rugose; posterior part of vertex rugose to reticulate; dorsum of vertexal lobe reticulate, or obliquely or transversely rugoso-reticulate; frontal carina weak but conspicuous, extending beyond midlength of head; antennal scrobe inconspicuous; clypeus without a median longitudinal carina; hypostoma with a conspicuous (or sometimes reduced) median process and conspicuous

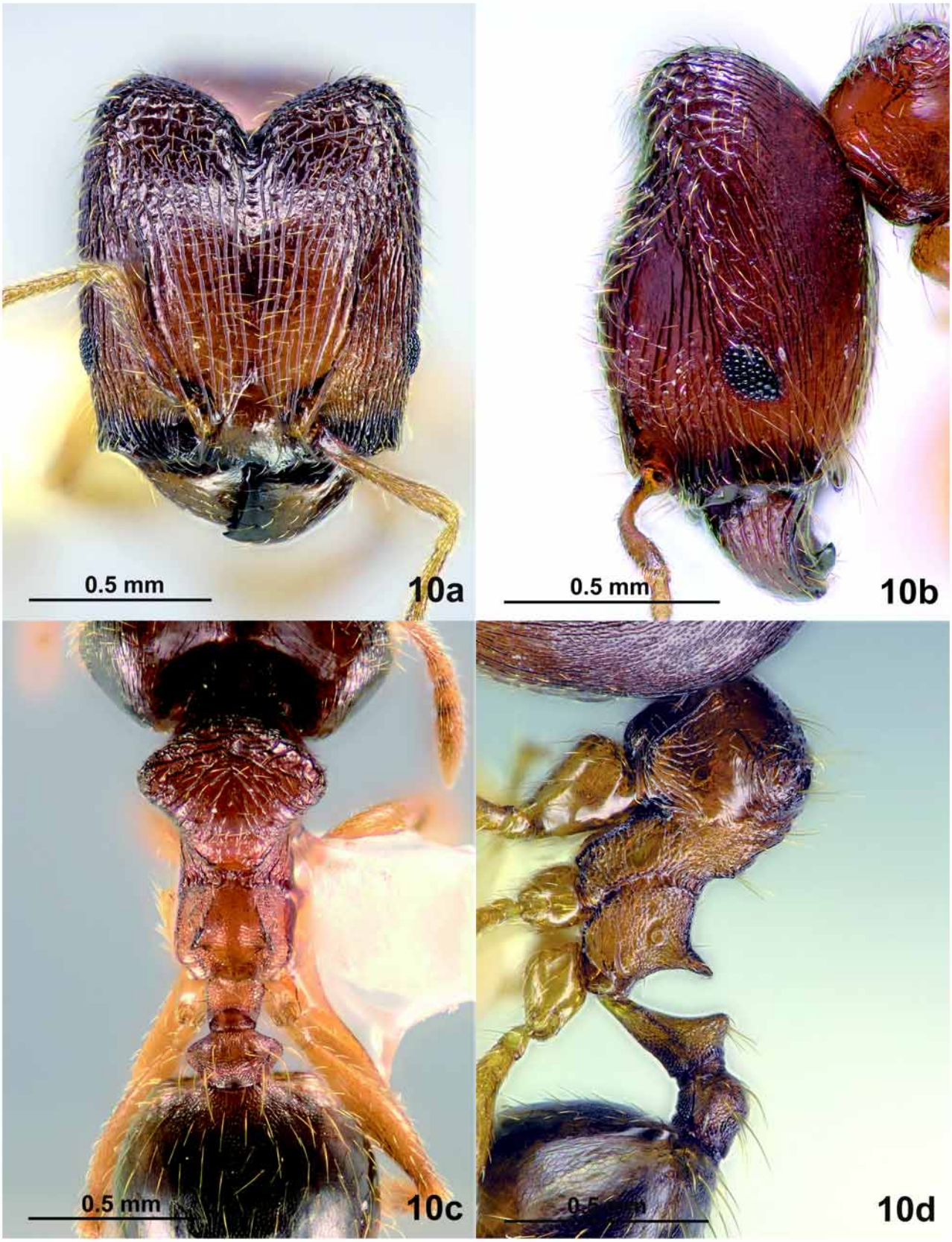

FIGURE 10a–d, *Pheidole hongkongensis*, major [Eg01-VN-159] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

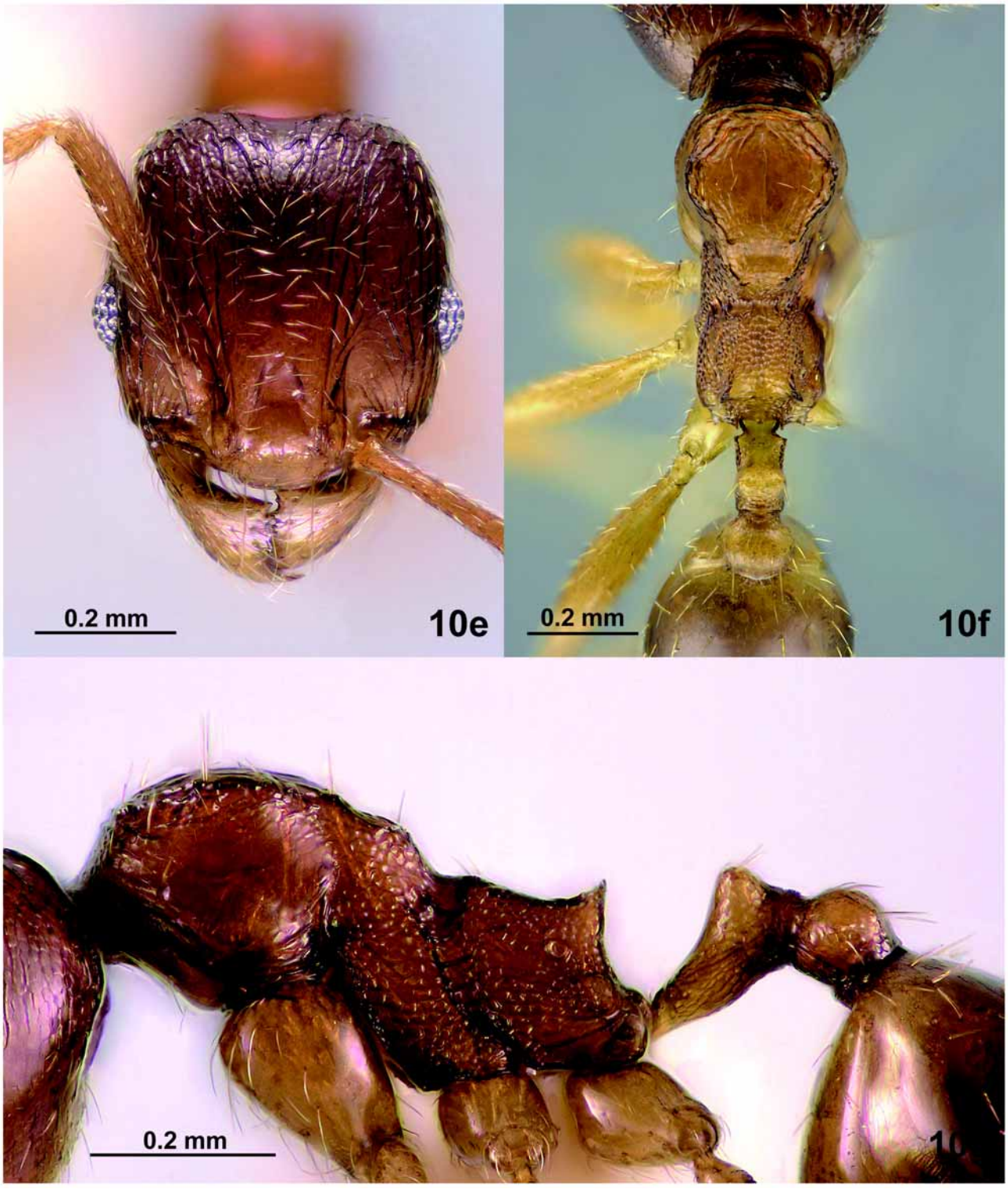

FIGURE 10e–g, *Pheidole hongkongensis*, minor [Eg01-VN-159] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

submedian processes in addition to conspicuous lateral processes; antenna with a 3-segmented club; maximal diameter of eye much longer than antennal segment X. Promesonotal dome in dorsal view rugose transversely or rugoso-reticulate, in lateral view at most having an inconspicuous mound on its posterior slope; humerus of the dome relatively well produced laterad; the dome at the humeri broader than at the bottom (but sometimes only a little broader than at the bottom). Petiole much longer than postpetiole (excluding helcium); postpetiole

not massive. First gastral tergite weakly punctured around its articulation with postpetiole, and smooth or shagreened in the remainder.

Minor. — Frons and vertex smooth to weakly punctured, overlain sparsely by weak londigudinal rugulae; median part of clypeus smooth and shining; the median longitudinal carina absent, or sometimes present but weak; preoccipital carina absent dorsally on head; antenna with a 3-segmented club; scape reaching or exceeding posterior margin of head at most by 1.5× length of antennal segment II; maximal diameter of eye as long as or longer than antennal segment X. Promesonotal dome with sparse standing hairs, in lateral view relatively poorly convex or almost flat dorsally, often with an inconspicuous mound on its posterior slope; the mediodorsal part of the dome almost smooth to shagreened, usually overlain by several weak rugulae, or coarsely rugoso-reticulate; humerus in dorso-oblique view very weakly to weakly produced laterad; mesopleuron, metapleuron and lateral face of propodeum punctured; propodeal spine elongate-triangular. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: This species is similar to *Pheidole taipoana* Wheeler, but well separated from the latter which has the following characteristics: head smooth entirely in the minor; longitudinal rugulae on frons weak in the major.

The minor of *P. hongkongensis* is similar to that of *P. planidorsum* Eguchi. But in the major both impression on vertex in lateral view and concavity of posterior margin of head in full-face view are shallower in *P. planidorsum* than in *P. hongkongensis*. There is a certain possibility that *P. planidorsum* is just a variant of *P. hongkongensis* (see also Eguchi, Yamane & Zhou 2007).

Distribution & bionomics: Known from N. Vietnam, S. China and Thailand. This species usually inhabit woody gardens, forest edges and sometimes open habitats, and nests in the soil (but rarely in rotting wood as in colony VN01-SKY-05).

***Pheidole indosinensis* Wheeler stat.n.**
Figs. 11a–h

Pheidole sulcaticeps subsp. *indosinensis* Wheeler, 1928: 10. Eguchi, Bui *et al.* 2005: 90 (checklist). Syntypes: 6 minors, “Yi Liang, Indochina, F. Silvestri leg.” [China], MCZC cotype-20665, examined.

Other material examined: S. China: Guangdong: Dawuling N.R., Maoming [J. Fellowes], Nankunshan N.R., Top Gate, Longmen [J. Fellowes]; Hainan: Diaoluoshan N.R., Lingshui [J. Fellowes], Jianfengling N.R., Ledong [J. Fellowes]. N. Vietnam: Vinh Phuc: Tam Dao N.P., 21°27’N, 105°38’E, ca. 900 m alt. [Eg01-VN-108, -110, -111], Tam Dao N.P., 900–1100 m alt. [Eg99-VN-054, -057]; Ha Tay (misspelled as “Ha Tai”): Ba Vi N.P., 21°03’N, 105°22’E, ca. 1100 m alt. [Eg02-VN-032, -034], Ba Vi N.P., 1100–1200 m alt. [Eg99-VN-128].

Worker measurements & indices: Major (n=5). — HL 1.65–1.80 mm; HW 1.58–1.78 mm; CI 94–99; SL 0.91–0.99 mm; SI 55–59; FL 1.27–1.36 mm; FI 76–84.

Minor (n=5). — HL 0.70–0.78 mm; HW 0.59–0.67 mm; CI 83–86; SL 0.87–0.96 mm; SI 143–149; FL 0.89–1.00 mm; FI 149–157.

Worker description

Major. — Body deep yellowish-brown with paler appendages. Head in lateral view not or hardly impressed on vertex; vertexal lobes in full-face view relatively widely separated from each other; frons and anterior part of vertex rugose longitudinally-obliquely; posterior part of vertex and dorsal and dorsolateral faces of vertexal lobe rugoso-reticulate or reticulate; median longitudinal carina of clypeus usually conspicuous but sometimes very weak or inconspicuous; frontal carina relatively well developed; antennal scrobe present as a shallow impression; median process of hypostoma poorly developed or almost absent; submedian processes developed well; lateral processes conspicuous; antenna with a 3-segmented club; maximal diameter

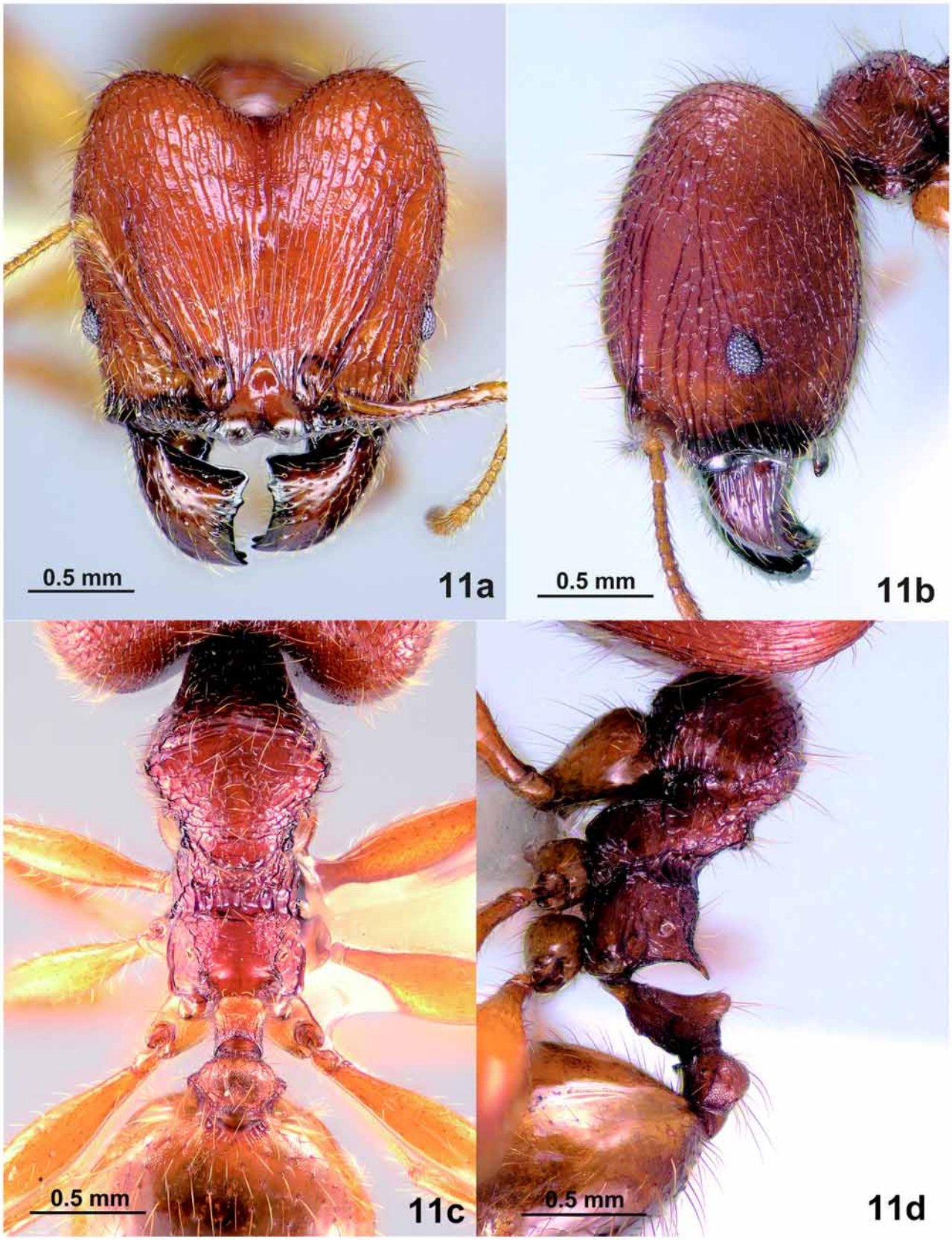

FIGURE 11a–d, *Pheidole indosinensis*, major [Eg01-VN-110] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

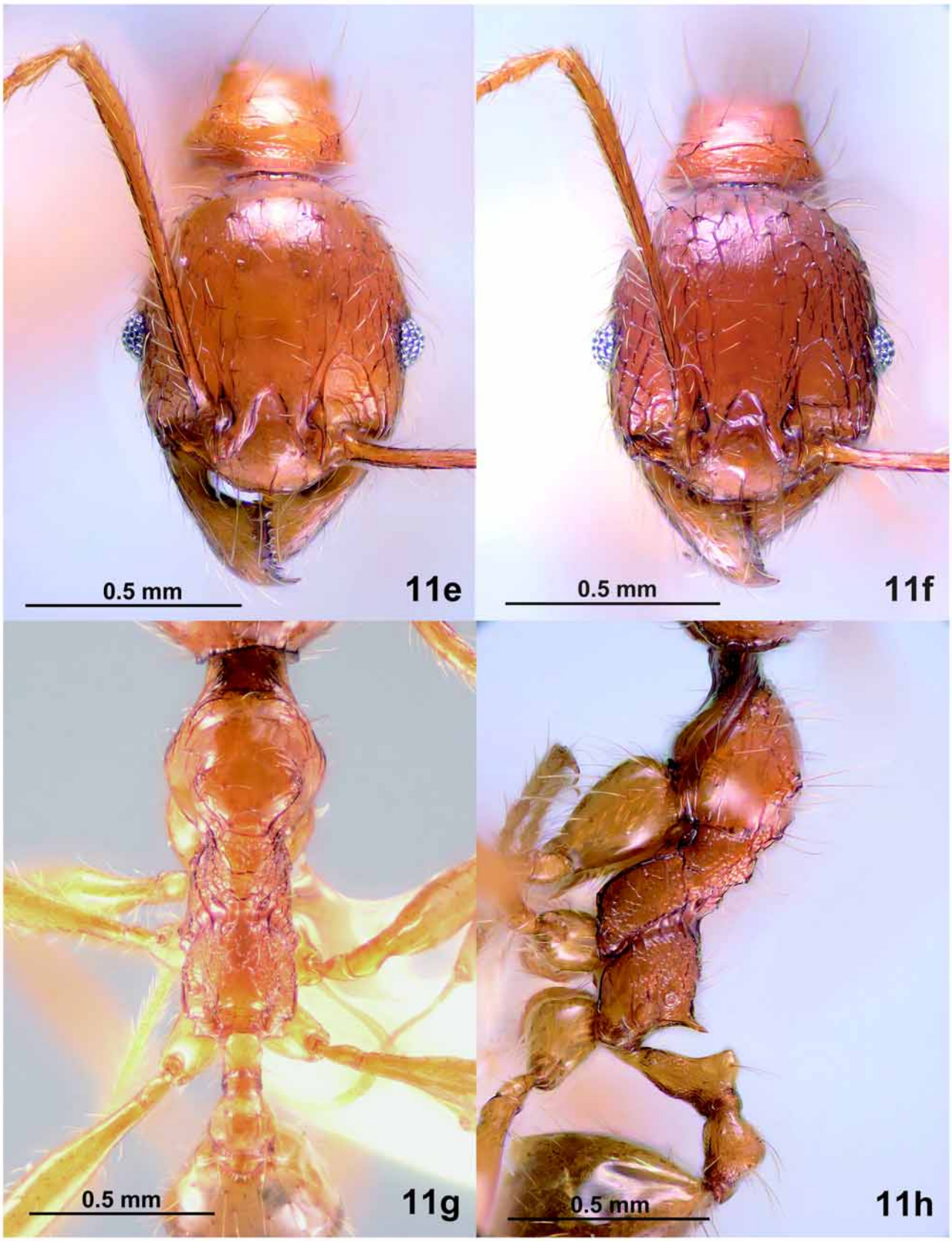

FIGURE 11e–h, *Pheidole indosinensis*, minor [e, g, h, Eg01-VN-110; f, Eg01-VN-108] — e, head in full-face view; f, head in full-face view; g, mesosoma and waist in dorsal view; h, mesosoma and waist in lateral view.

of eye shorter than or almost as long as antennal segment X (sometimes a little longer than antennal segment X). Promesonotal dome in dorsal view sparsely rugose or rugoso-reticulate transversely, with interspaces smooth, in lateral view with a low prominence/mound on its posterior slope; humerus hardly or very weakly produced laterad; the dome at the humeri as broad as or narrower than at the bottom. Petiole longer than postpetiole (excluding helcium); postpetiole not massive. First gasteral tergite smooth over the surface or very weakly punctured in its anterior 1/3.

Minor. — Body yellowish-brown. Frons and vertex smooth and shining or shagreened, or sometimes weakly rugoso-reticulate; dorsolateral and lateral face of head usually rugoso-reticulate dimly or weakly; median portion of clypeus smooth and shining, with a weak or conspicuous median longitudinal carina; preoccipital carina conspicuous dorsally and laterally; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye shorter than antennal segment X. Promesonotal dome largely smooth and shining, in lateral view usually with an inconspicuous mound on its gentle posterior slope; humerus in dorso-oblique view usually (but not always) produced very weakly; mesopleuron, metapleuron and lateral face of propodeum weakly punctured; propodeal spine elongate-triangular. Petiole longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: I was unable to find the type material of the nominotypical taxon of *Pheidole sulcaticeps* Roger in a possible depository (Zoologisches Museum an der Humboldt-Universität zu Berlin). According to its original description (Roger, 1863a: 193–194) head of the major is in lateral view strongly impressed at the posterior 1/3 of its dorsum, and dorsum of "mesonotum [= a mound (prominence) on the posterior slope of promesonotal dome]" of the minor is in lateral view horizontal at the begining. These characteristics are not seen in *P. sulcaticeps* subsp. *indosinensis* which I recognised based on my examination of the type material of the subspecies. Thus, I here conclude that the two forms are different from each other at the species level, and raise the subspecies *indosinensis* to the species rank.

This species is characterized among Indo-Chinese species by a combination of the following characteristics: in the major dorsal and lateral faces of vertexal lobe rugoso-reticulate or reticulate; in the major frontal carina relatively well developed; in the minor preoccipital carina conspicuous dorsally and laterally; in the major submedian processes of hypostoma well developed; in the major posterior slope of promesonotal dome with a low prominence/mound; in the major and minor petiole longer than postpetiole. This species is similar to *Pheidole elongicephala* sp.n. and *P. ochracea* sp.n. However, in the major of the latter two vertexal lobes in full-face view relatively close to each other; and submedian processes of hypostoma is usually (but not always) very small or inconspicuous.

Distribution & bionomics: Known from N. Vietnam and S. China. This species seemingly prefers woody habitats. Majors serve as repletes [Eg99-VN-128].

***Pheidole laevicolor* Eguchi**
Figs. 12a–g

Pheidole laevicolor Eguchi, 2006: 123–125. Holotype: major, "Tam Dao N.P., 21°27'N, 105°38'E, ca. 1000 m alt., Vinh Phuc, Vietnam, Eg01-VN-130", IEBR, examined; paratypes: 14 majors & 15 minors, same data as holotype, (IEBR, MHNG, MCZC, BMNH, FSKU & ACEG, examined.

Pheidole sp. eg-114. Eguchi *et al*. 2004 (ecological study), Eguchi, Bui *et al.* 2005: 91 (checklist).

Other material examined: Vietnam: Bac Kan: Ba Be N.P., 22°24–25'N, 105°37–38'E, < 260 m alt. [Eg04-VN-153, -155, -161, -173, -179, -202, -212, -214]; Thai Nguyen: My Yen Commune Forest (21°35'N, 105°36'E), Na Hau Village [Eg01-VN-160]; Bac Giang: W. Yen Tu N.P. (=Tay Yen Tu N.P.), 21°10–11'N, 106°43–44'E, 170 m alt. [B&E03-30], W. Yen Tu N.P., 190 m alt. [Eg03-VN-023], W. Yen Tu N.P., 195 m alt. [B&E03-01, -03], W. Yen Tu N.P., 330–400 m alt. [Eg04-VN-094], W. Yen Tu N.P., 415 m alt. [B&E03-35, -

36, -40; Eg03-VN-093], W. Yen Tu N.P., 435 m alt. [Eg04-VN-123, -124]; Quang Ninh: Chua Yen Tu, 21°09'N, 106°43'E, 520–725 m alt. [Eg04-VN-015, -016]; Ha Tay (mislabeled as "Ha Tai"): Ba Vi N.P., 21°03'N, 105°22'E, 1100–1200 m alt. [Eg99-VN-129; Eg02-VN-033]. Eguchi's informal species code "*Pheidole* sp. eg-114" has been applied to these specimens.

Worker measurements & indices: Major (data from the original description, but FL was erroneously given as "0.86–0.76" in the original description). — HL 1.06–1.20 mm; HW 0.98–1.08 mm; CI 90–92; SL 0.49–0.55 mm; SI 50–52; FL 0.68–0.76 mm; FI 67–72.

Minor (data from the original description). — HL 0.50–0.58 mm; HW 0.42–0.50 mm; CI 84–88; SL 0.47–0.58 mm; SI 108–116; FL 0.49–0.62 mm; FI 117–124.

Worker description

Major. — Head in lateral view weakly or hardly impressed on vertex; frons longitudinally rugose; vertex and dorsal and lateral facecs of vertexal lobe reticulate, with enclosures weakly punctured; frontal carina very weak or inconspicuous (present just as rugulae); antennal scrobe inconspicuous; clypeus at most with an inconspicuous median longitudinal carina; median, submedian and lateral processes of hypostoma conspicuous; antenna with a 3-segmented club; maximal diameter of eye a little longer than antennal segment X. Promesonotal dome at most with an inconspicuous mound on its posterior slope; humerus weakly produced laterad; the dome at the humeri usually as broad as or a little broader than at the bottom (but sometime a little narrower than at the bottom). Petiole much longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite weakly punctured around its articulation with postpetiole, and shagreened to smooth in the remainder.

Minor. — Dorsum of head smooth and shining; preoccipital carina complete, but usually very weak dorsally; median part of clypeus smooth and shining, without a median longitudinal carina; antenna with a 3-segmented club; scape exceeding posterior margin of head at least by the half length of antennal segment II; maximal diameter of eye almost as long as or a little longer than antennal segment X. Promesonotal dome largely smooth and shining, with one or several weak or inconspicuous transverse rugulae anterodorsally, in lateral view at most with an inconspicuous mound on its posterior slope; humerus in dorso-oblique view not or hardly produced laterad; mesopleuron, metapleuron and lateral face of propodeum weakly or dimly punctured; propodeal spine elongate-triangular. Petiole (much) longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: This species is characterized among Indo-Chinese species by the combination of the following characteristics: in the major dorsal and lateral faces of head and promesonotal dome smooth and shining; in the major vertex and dorsal and lateral faces of vertexal lobe reticulate, with enclosures weakly punctured; in the major hypostoma in the middle with a conspicuous median process and a pair of conspicuous submedian processes; in the major and minor promesonotal dome at most with an inconspicuous mound on its posterior slope.

It is very similar to *Pheidole taipoana* Wheeler, but distinguished from the latter which has the following characteristics in the major: impression on vertex in lateral view deep; area in front of a transverse impression on vertex sparsely sculptured with weak longitudinal rugulae, with interspaces smooth and shining (see also Eguchi 2006).

Distribution & bionomics: Known from N. Vietnam. This species occurs from forest edges to well-developed forests and nests in the soil (Eguchi *et al*. 2004, Eguchi 2006). Majors serve as repletes (e.g., the type series, B&E03-03, Eg02-VN-033, Eg04-VN-161).

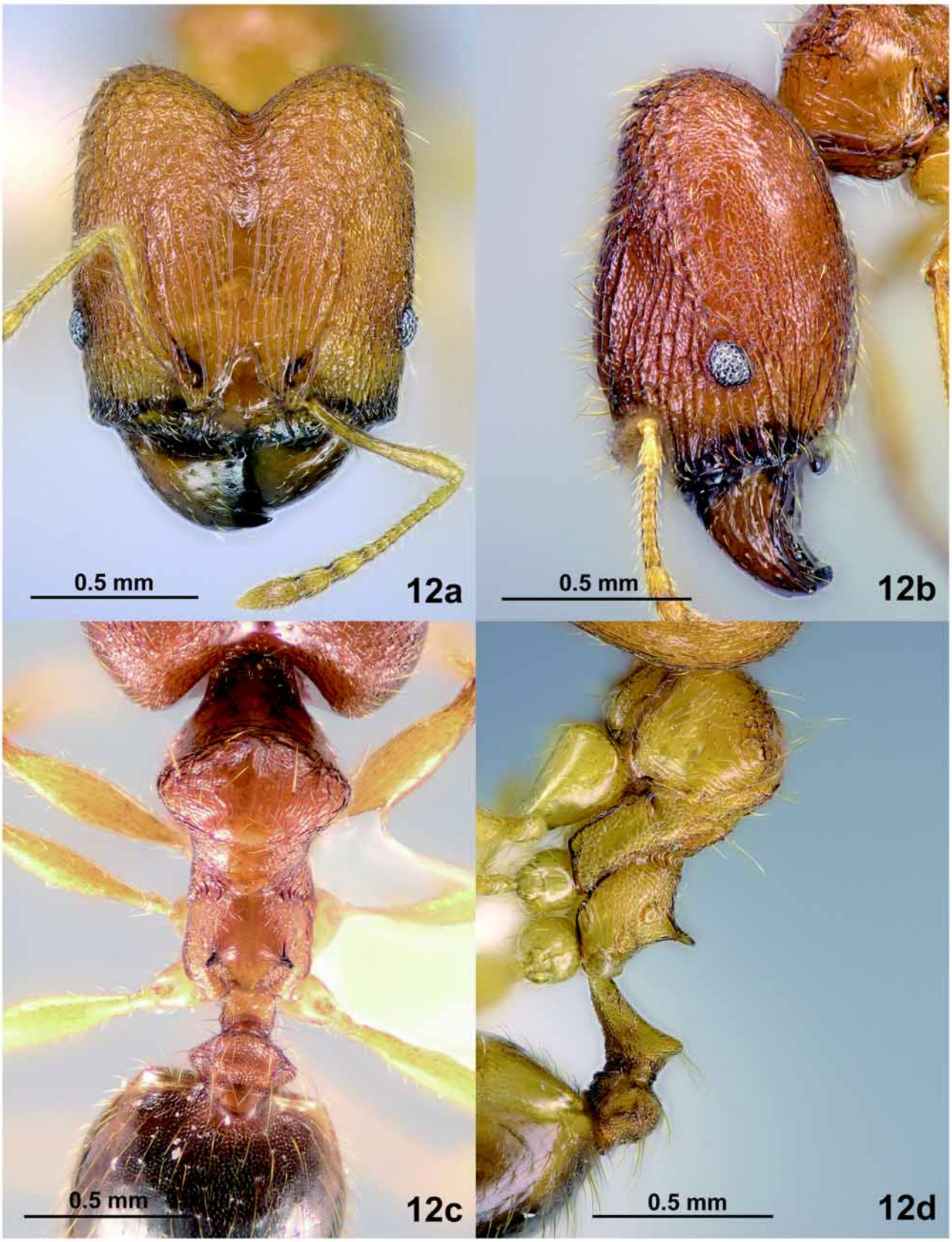

FIGURE 12a–d, *Pheidole laevicolor*, paratype major [Eg01-VN-130] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

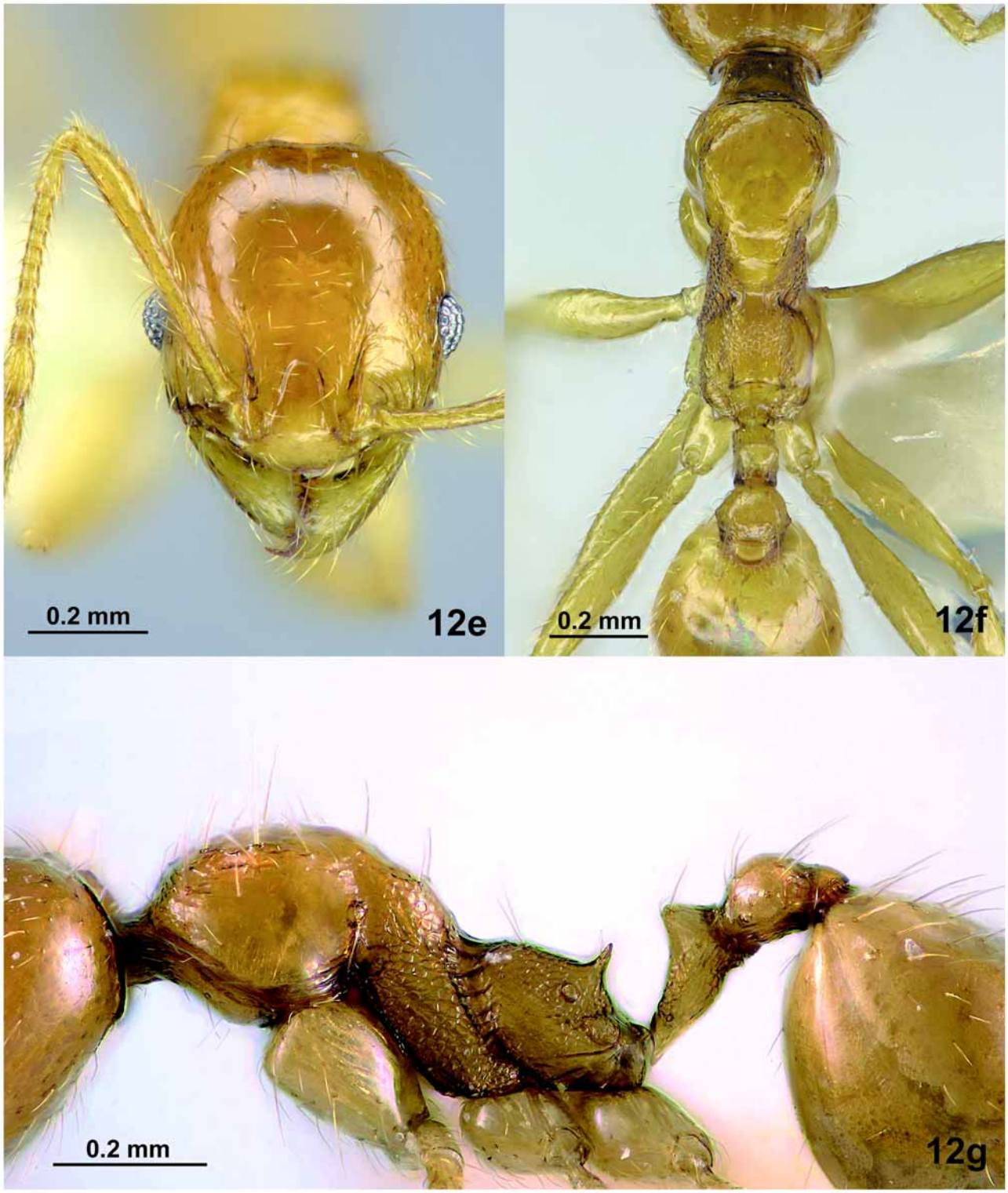

FIGURE 12e–g, *Pheidole laevicolor*, paratype minor [Eg01-VN-130] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

***Pheidole laevithorax* sp.n.**
Figs. 13a–g

Pheidole sp. eg-174 (cf. *protea* Forel). Eguchi, Bui *et al.* 2005: 91 (checklist).

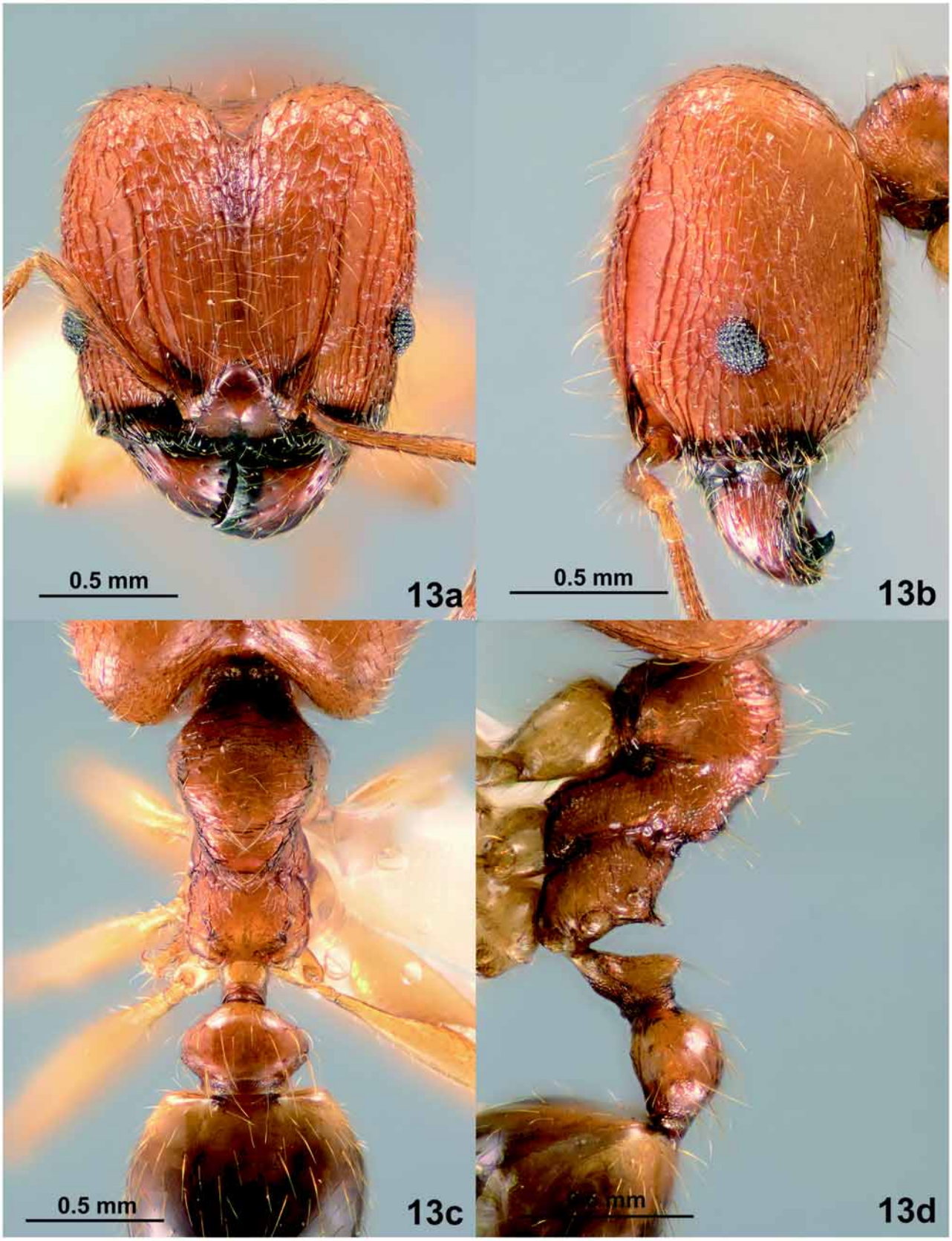

FIGURE 13a–d, *Pheidole laevithorax*, holotype (major) [Eg01-VN-230] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

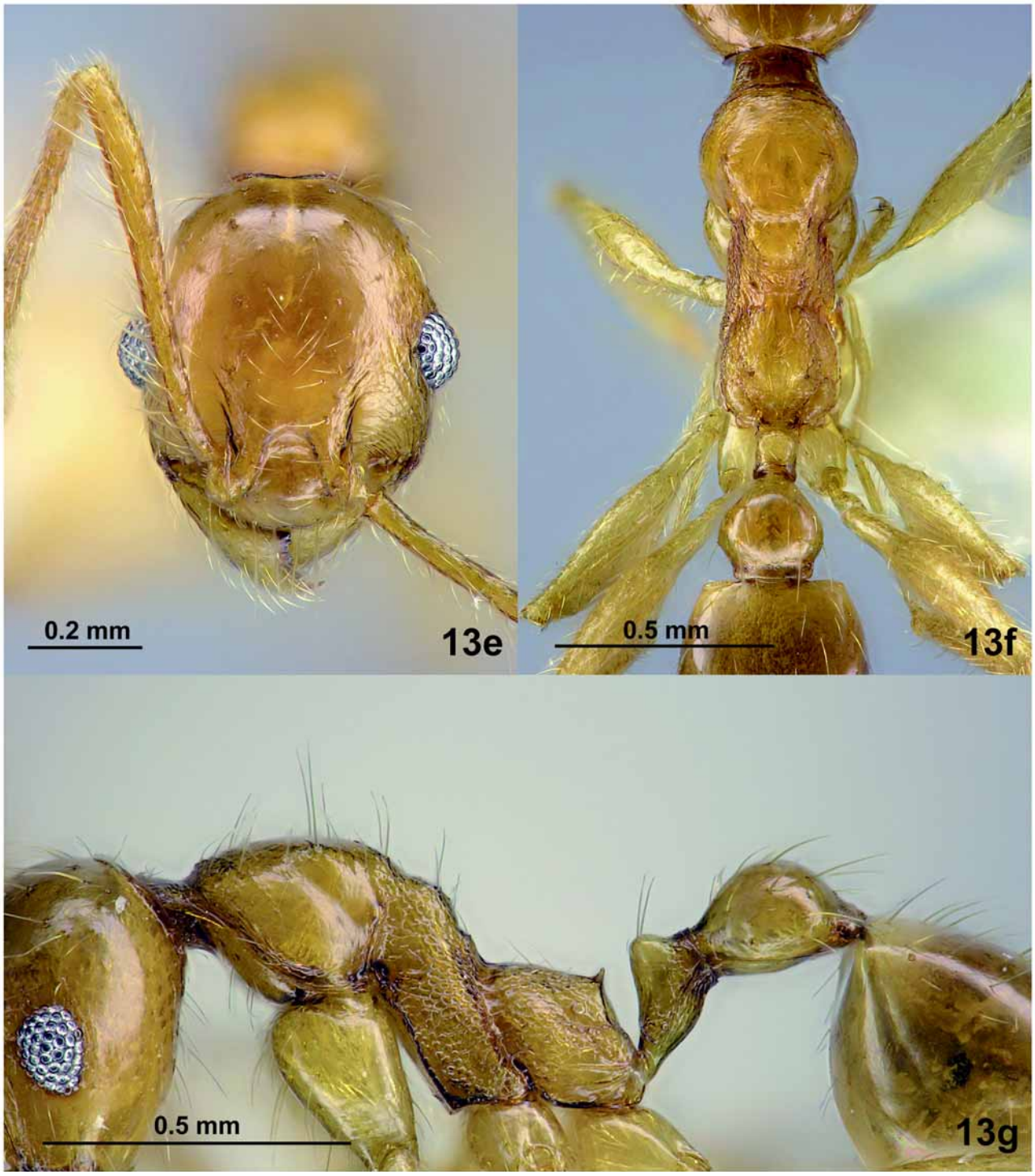

FIGURE 13e–g, *Pheidole laevithorax*, paratype minor [Eg01-VN-230] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Type material examined: Holotype: major, Ba Vi N.P., 21°03'N, 105°22'E, 670 m alt., Ha Tay (misspelled as Ha Tai on the label), N. Vietnam [K. Eguchi leg., colony: Eg01-VN-230] (IEBR); paratypes: 11 majors & 12 minors from the same colony as holotype (IEBR, MCZC, MHNG & ACEG).

Other material examined: N. Vietnam: Bac Giang: W. Yen Tu N.P. (=Tay Yen Tu N.P.), 21°10'N, 106°43'E, 1070 m alt. [Eg03-VN-122]; Quang Ninh: Chua Yen Tu, 21°09'N, 106°43'E, 720–845 m alt. [Eg04-VN-069]; Ha Tay (misspelled as Ha Tai): Ba Vi N.P., 21°03'N, 105°22'E, 800 m alt. [Eg02-VN-050, -053, -055, -067, -069, -076]. Eguchi's informal species code "*Pheidole* sp. eg-174" applies to this species.

Worker measurements & indices: Holotype (major). — HL 1.34 mm; HW 1.28 mm; CI 96; SL 0.76 mm; SI 59; FL 1.00 mm; FI 78.

Nontype major (n=4). — HL 1.25–1.33 mm; HW 1.21–1.23 mm; CI 92–98; SL 0.75–0.79 mm; SI 62–65; FL 0.97–1.02 mm; FI 79–83.

Minor (n=4, including one paratype minor). — HL 0.63–0.70 mm; HW 0.53–0.58 mm; CI 84; SL 0.76–0.84 mm; SI 141–145; FL 0.82–0.90 mm; FI 154–156.

Worker description

Major. — Head in lateral view not or hardly impressed on vertex; frons rugose longitudinally; vertex rugoso-reticulate longitudinally or reticulate; dorsal and dorsolateral faces of vertexal lobe reticulate; frontal carina conspicuous; antennal scrobe inconspicuous to weak; clypeus without a median longitudinal carina; median process of hypostoma low or inconspicuous; submedian processes low or moderately developed; lateral processes developed well, located rather ventrally; antenna with a 3-segmented club; maximal diameter of eye longer than antennal segment X. Promesonotal dome in dorsal view smooth to shagreened with several weak transverse rugulae, in lateral view with a low mound (as in the holotype) or a conspicuous prominence on its posterior slope; humerus of the dome not produced; the dome at the humeri narrower than at the bottom. Petiole as long as or a little shorter than postpetiole (excluding helcium); petiolar node in lateral view subangulate dorsally; postpetiole massive. First gastral tergite smooth and shining entirely.

Minor. — Frons and vertex smooth and shining; area between antennal insertion and eye with several weak rugulae or weakly rugoso-punctate; preoccipital carina conspicuous dorsally and laterally; median part of clypeus smooth and shining, without a median longitudinal carina; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye a little shorter than antennal segment X. Promesonotal dome smooth to shagreened dorsally, and largely smooth laterally; the dome in lateral view with a low or inconspicuous mound on its posterior slope; humeral area of the dome in dorso-oblique view neither strongly rugose nor armed with a prominence; mesopleuron, metapleuron and lateral face of propodeum dimly to weakly punctured at least partly. Petiole shorter than postpetiole (excluding helcium); postpetiole massive.

Recognition: This species is characterized by the combination of the following features (see also the recognition of *P. rugithorax* sp.n.): in the major head in lateral view not impressed on vertex; in the minor frons and vertex smooth and shining; in the major dorsal and lateral faces of vertexal lobe reticulate; in the major frontal carina conspicuous, and antennal scrobe inconspicous or very weak; in the major hypostoma with a low or inconspicuous median process and a pair of low or moderately developed submedian processes, and with conspicuous lateral processes which are located rather ventrally; in the minor promesonotal dome smooth to shagreened dorsally, and largely smooth laterally; in the minor dorsolateral part of the dome neither margined nor armed with a humeral prominence; posterior slope of the dome with a low mound or a conspicuous prominence in the major, and a low or inconspicuous mound in the minor; in the major and minor postpetiole massive.

P. laevithorax is closest to *P. rugithorax* sp.n. (see under *P. rugithorax*). *P. laevithorax* is also similar to *P. noda*, but the latter has the following characteristics in the major: head in full-face view rather broadly concave posteriorly; dorsum of head sparsely bearing standing setae which are much longer and distinctly thicker than background hairs (many short decumbent-suberect hairs).

***Pheidole magna* Eguchi**

Figs. 14a–g

Pheidole magna Eguchi, 2006: 125–127. Holotype: major, “Bang Khoang (Site-A: ca. 1700–1800 m alt.), Sa

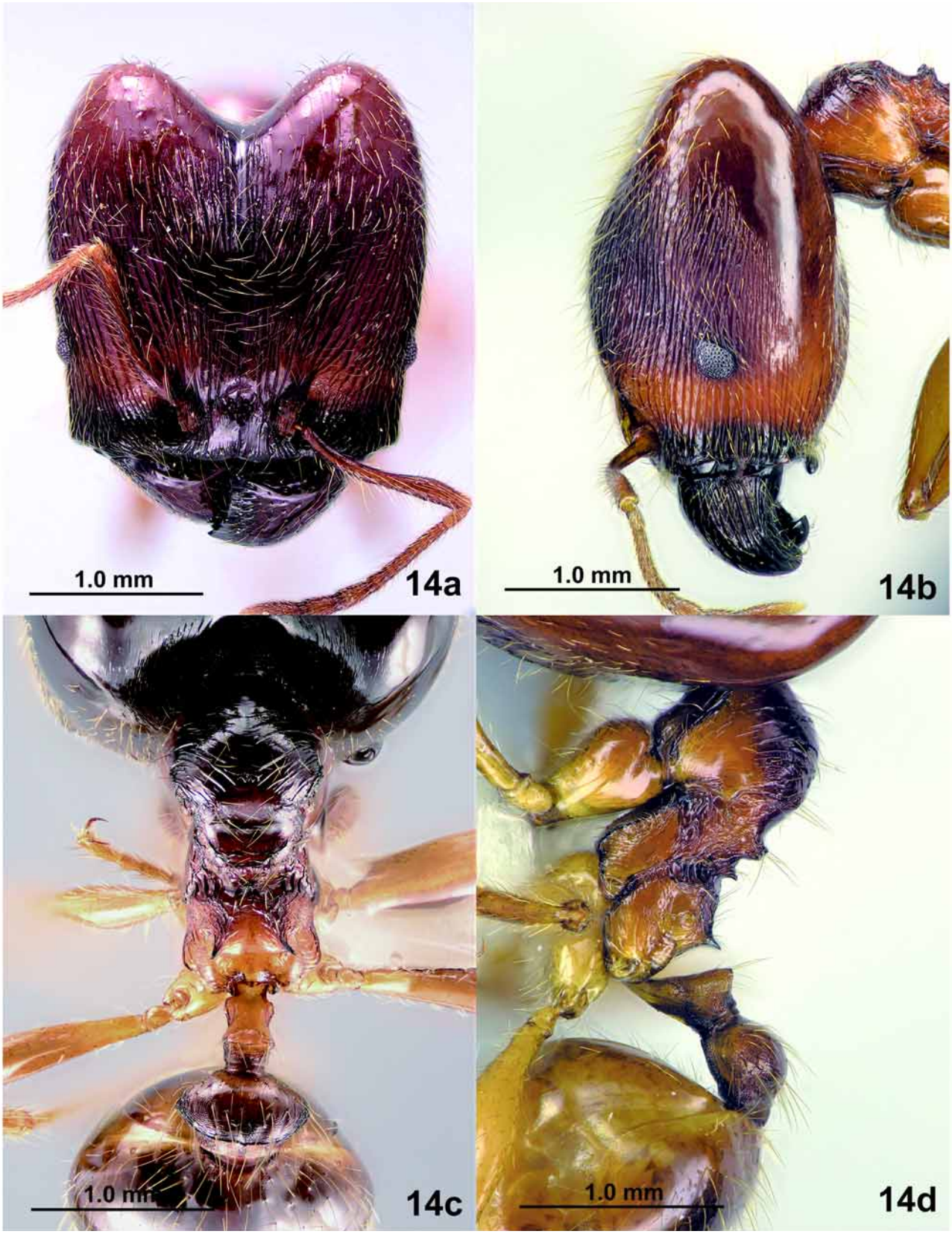

FIGURE 14a–d, *Pheidole magna*, major [Eg02-VN-137] — a, holotype, head in full-face view; b, paratype, head in lateral view; c, paratype, mesosoma and waist in dorsal view; d, paratype, mesosoma and waist in lateral view.

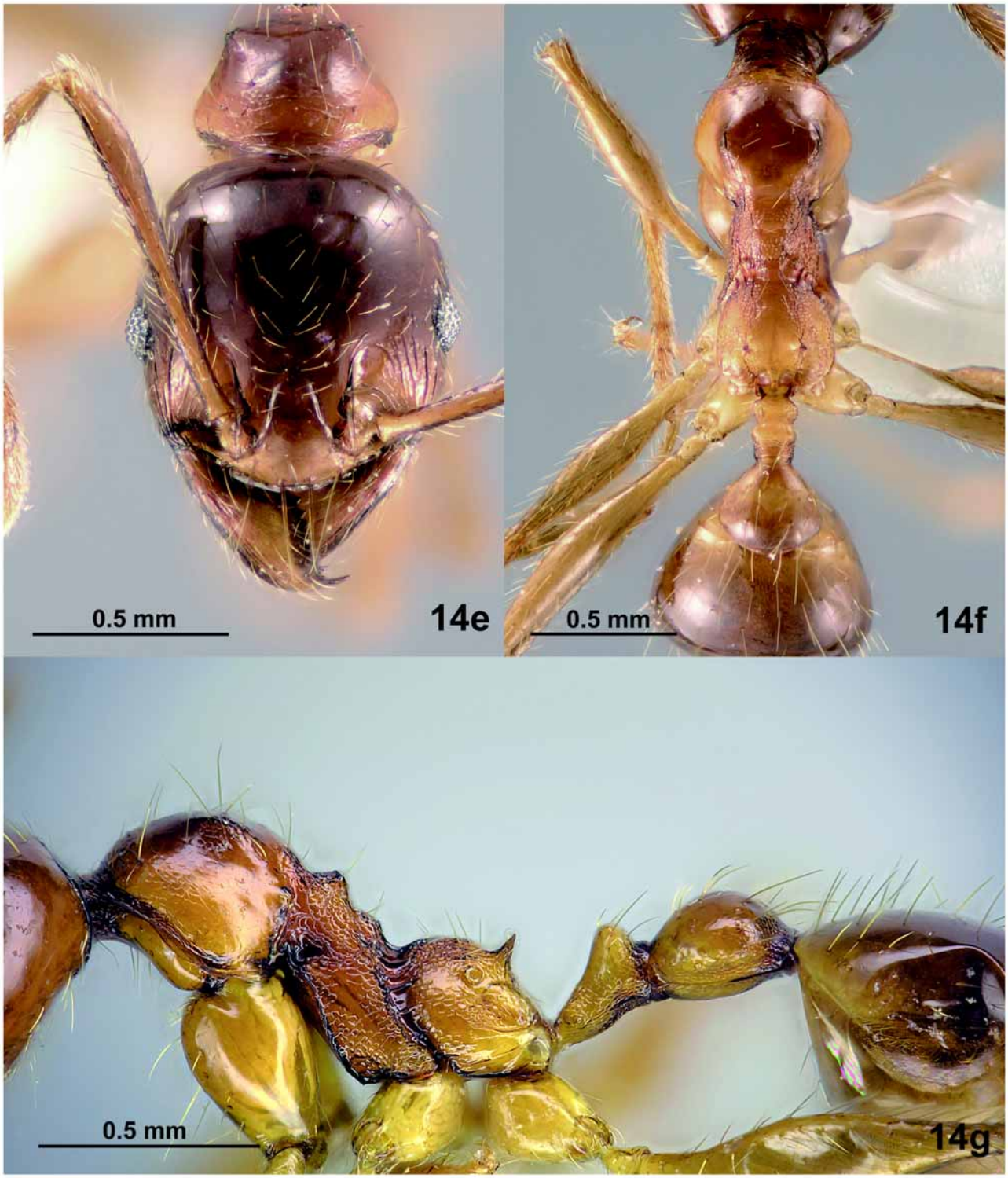

FIGURE 14e–g, *Pheidole magna*, paratype minor [Eg02-VN-137] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Pa, Lao Cai, Vietnam, Eg02-VN-137", IEBR, examined; paratypes: 34 majors & 35 minors, same data as holotype, BMNH, FSKU, IEBR, MHNG, MCZC & ACEG, examined.

Pheidole sp. eg-162. Bui & Eguchi 2003: 9 (checklist), Eguchi, Bui *et al*. 2005: 91 (checklist).

Other material examined: Vietnam: Lao Cai: Sa Pa town [Eg02-VN-087], Bang Khoang (Site-A: a stream-side secondary forest), 1700–1800 m alt., Sa Pa [Eg02-VN-116, -124, -129], Bang Khoang (Site-B: a

well-developed forest), ca. 1700 m alt. [Eg02-VN-165, -169, -175], Sa Seng (small fragment of limestone forest), Sa Pa [Eg02-VN-280]; Ha Tay: Ba Vi N.P. [T.V. Bui]. Eguchi's informal species code "*Pheidole* sp. eg-162" has been applied to these specimens.

Worker measurements & indices: Major (data from the original description). — HL 2.21–2.39 mm; HW 2.13–2.32 mm; CI 92–99; SL 1.04–1.14 mm; SI 45–51; FL 1.59–1.66 mm; FI 70–75.

Minor (data from the original description). — HL 0.87–0.94 mm; HW 0.79–0.90 mm; CI 91–96; SL 0.94–1.03 mm; SI 113–122; FL 1.12–1.22 mm; FI 134–143.

Worker description

Major. — Head in lateral view not or very weakly impressed on vertex; frons and vertex longitudinally-obliquely rugose; vertexal lobe largely smooth and shining; frontal carina and antennal scrobe absent; clypeus with a median longitudinal carina which is sometimes reduced into a weak rugula; hypostoma with a low or inconspicuous median and moderately to strongly developed submedian processes; lateral processes present but reduced, much smaller than submedian processes; antenna with a 3-segmented club; maximal diameter of eye a little longer than antennal segment X. Promesonotal dome with a conspicuous prominence on its posterior slope; humerus not or very weakly produced laterad; the dome at the humeri narrower than at the bottom; propodeal spine small. Petiole almost as long as postpetiole (excluding helcium); postpetiole relatively massive. First gastral tergite smooth and shining, often with a weakly punctured area just around its articulation with postpetiole.

Minor. — Head smooth and shining; preoccipital carina complete but weak dorsally; median part of clypeus smooth and shining, with a median longitudinal carina in its anterior half; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye shorter than antennal segment X. Promesonotal dome smooth and shining, in lateral view raised relatively highly in front of a conspicuous prominence/mound on its posterior slope; humerus in dorso-oblique view not produced, or very weakly produced; mesopleuron, metapleuron and lateral face of propodeum largely punctured weakly. Petiole almost as long as or a little shorter than postpetiole (excluding helcium); postpetiole massive.

Recognition: This species is characterized among Indo-Chinese species by the combination of the following features: in the major vertexal lobe largely smooth and shining; in the major and minor promesonotal dome having a conspicuous prominence on its posterior slope; in the major and minor postpetiole relatively massive. This large-bodied species is similar to *Pheidole dugasi* Forel, but well distinguished from the latter which has the following characteristics in the major: dorsum of vertexal lobes distinctly rugose; first gastral tergite entirely rugoso-punctured (see also Eguchi 2006).

Distribution & bionomics: Known from N. Vietnam. This species occurs from relatively open habitats to forests at relatively high altitude (1000 m alt. or higher), and nests in the soil and rotting logs (Eguchi 2006). Majors serve as repletes (e.g., the type series, Eg02-VN-280).

***Pheidole megacephala* (Fabricius)**

Figs. 15a–g

Formica megacephala Fabricius, 1793: 36. Roger 1863b: 30 (combination in *Pheidole*). Syntype(s): major, no locality given, not examined.

Myrmica trinodis Losana, 1834: 327. Roger 1863b: 30 (junior synonym of *megacephala*). Syntype(s): "worker", Italy, not examined.

Formica edax Forskål, 1775: 84. Emery 1892: 160 (junior synonym of *megacephala*), Dalla Torre 1892: 90 (same). Syntype(s): "worker", Egypt, not examined.

Oecophthora perniciosa Gerstäcker, 1859: 263. Roger 1863b: 31 (combination in *Pheidole*), Emery, 1915c: 235 (junior synonym of *megacephala*). Syntype(s): "worker", Mozambique, not examined.

Oecophthora pusilla Heer, 1852: 15. F. Smith 1858: 173 (combination in *Pheidole*), Roger 1859: 259 (senior synonym of *laevigata* Fr. Smith, 1855: 130), Mayr 1870: 981 (senior synonym of *laevigata* Mayr, 1862: 747), Mayr 1886: 360 (senior synonym of *janus*), Emery 1915: 235 (subspecies of *megacephala*), Wheeler 1922: 812 (junior synonym of *megacephala*). Syntypes: major, minor, queen & male, Madeira, not examined.

Myrmica agilis F. Smith, 1857: 71. Donisthorpe 1932: 449 (combination in *Pheidole*). **Syn.n.** Syntypes: 3 minors, "MALAC" [= Malacca, S. Malay Peninsula], OXUM TYPE HYM: 988 1-3/3, examined.

Myrmica suspiciosa F. Smith, 1859: 148. Donisthorpe 1932: 455 (junior synonym of *megacephala*). Syntype(s): "worker", Aru I. (Indonesia) , not examined.

Atta testacea F. Smith, 1858: 168. Mayr 1886: 360 (combination in *Pheidole*), Brown, 1981: 530 (junior synonym of *megacephala*). Syntypes: major & minor, Brazil, not examined.

Subspecies enumerated in Bolton, 1995: nominal plus *costauriensis* Santschi, 1914: 443, syntype(s): major, Ghana, not examined; *duplex* Santschi, 1937a: 220, syntypes: major, minor & queen, Angola, not examined; *ilgi* Forel, 1907: 82, syntypes: major & minor, Ethiopia, not examined.; *impressifrons* Wasmann, 1905: 110 (replacement name for *impressiceps* Wasmann, 1904: 72), syntypes: major, minor & queen, South Africa, not examined; *melancholica* Santschi, 1912: 164, syntypes: major & minor, Ivory Coast, not examined; *nkomoana* Forel, 1916: 415, syntypes: major, minor, queen & male, Zaire, not examined; *rotundata* Forel, 1894: 92, syntypes: major & minor, Mozambique, not examined; *scabrior* Forel, 1891: 178, syntypes: major & minor, Madagascar, not examined; *speculifrons* Stitz, 1911: 386, syntypes: major & minor, Tanzania, not examined; *talpa* Gerstäcker, 1871: 356, syntypes: "worker" & queen, Kenya, not examined. For these forms type material not examined.

Other material examined: S. China: Hong Kong: Victoria Park, Hong Kong I. [K. Eguchi]; Macau: Mong Ha [K. Eguchi]. N. Vietnam: Ha Noi: Hanoi Agric. Univ. (Gia Lam) [K. Ogata: 15-min TUS #2]; Quang Ninh: Hoanh Bo [K. Eguchi]. S. Vietnam: Vinh Long (misspelled as "Vinlong"): Vinh Long (10°15'N, 105°58'N) [S. Kawaguchi]. Thailand: Trang: Khao Chong Waterfall [Eg01-VN-761]. W. Malaysia: Penang: beside a building of Univ. Sains Malaysia [C.Y. Lee]. E. Malaysia: Sabah: Kota Kinabalu [Eg97-BOR-376], Tambunan Village [H. Okido], Danam Valley [Eg96-BOR-108]. Indonesia: Kalimantan Timur: Tandjung Isuy [Seyfert & Graindl]; Irian Jaya: Wamena, 1600 m alt. [Eg98-IRI-674, -675, -676, -703]. Australia: Queensland: S. Mission Beach near Tully [AU01-SKY-12]. Tonga: Tongatapu: Vaini [J.K. Wetterer].

Worker measurements & indices: Major (n=5). — HL 1.28–1.45 mm; HW 1.25–1.45 mm; CI 98–100; SL 0.71–0.76 mm; SI 52–57; FL 0.94–0.98 mm; FI 68–77.

Minor (n=5). — HL 0.62–0.72 mm; HW 0.55–0.65 mm; CI 88–91; SL 0.67–0.73 mm; SI 111–121; FL 0.68–0.77 mm; FI 118–123.

Worker description

Major. — Head in lateral view roundly convex dorsally, not impressed on vertex, in full-face view shallowly concave posteriorly; frons longitudinally rugose (or rarely almost smooth, only sparsely with short interrupted longitudinal rugulae); vertex and dorsum of vertexal lobe smooth and shining or shagreened; frontal carina absent or present just as weak rugula(e); antennal scrobe absent; median longitudinal carina of clypeus weak or absent; hypostoma at most with a pair of very small or inconspicuous submedian processes in addition to a pair of conspicuous lateral processes; antenna with a 3-segmented club; maximal diameter of eye almost as long as or longer than antennal segment X. Promesonotal dome in dorsal view smooth and shining or shagreened, sometimes with several weak transverse rugulae, in lateral view at most with an inconspicuous mound on its posterior slope; humerus not or weakly produced laterad; the dome at the humeri narrower than at the bottom; mesopleuron, metapleuron and lateral face of propodeum weakly or very weakly punctured. Petiole a little longer than postpetiole (excluding helcium); postpetiole not massive; its anteroventral part weakly swollen. First gastral tergite smooth and shining entirely, or very weakly punctured around its articulation with postpetiole and smooth or shagreened in the remainder.

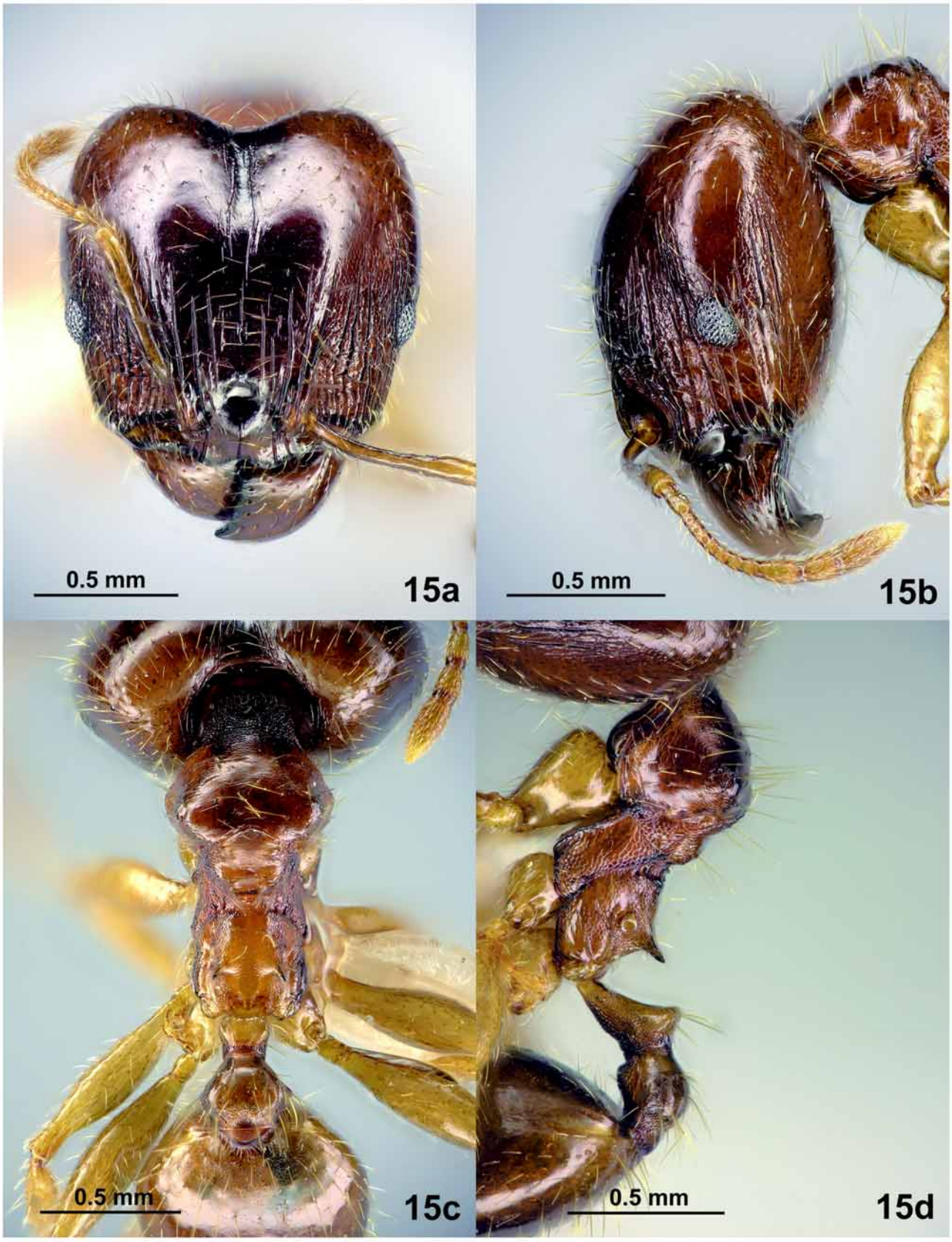

FIGURE 15a–d, *Pheidole megacephala*, major, Thailand [Eg01-TH-761] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

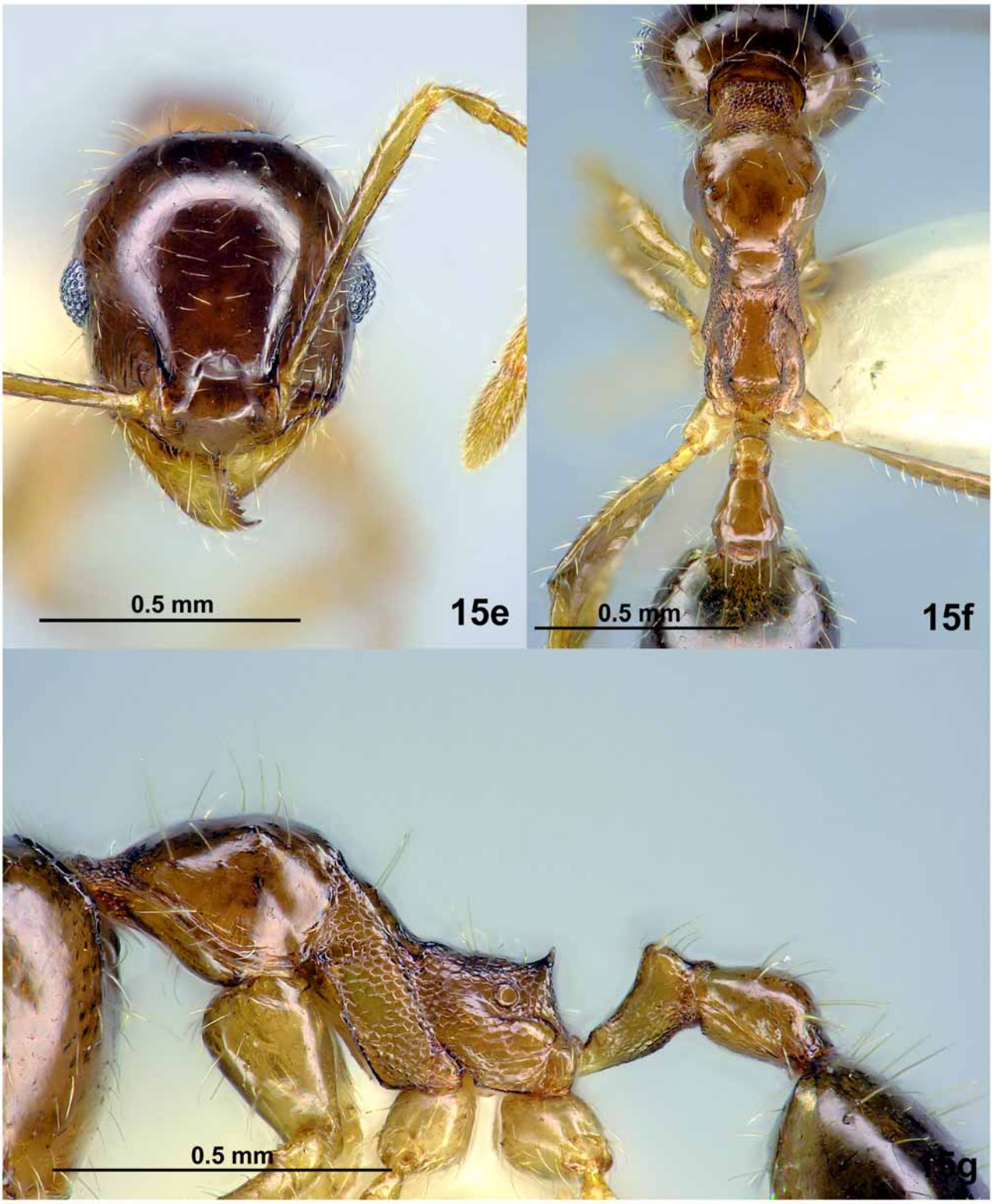

FIGURE 15e–g, *Pheidole megacephala*, minor, Thailand [Eg01-TH-761] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Minor. — Head smooth and shining; preoccipital carina weak but present dorsally and laterally; median part of clypeus smooth and shining, without a median longitudinal carina; antenna with a 3-segmented club; scape extending beyond posterolateral margin of head by the double length of antennal segment II or more; maximal diameter of eye almost as long as, or sometimes a little shorter than antennal segment X. Promesonotal dome smooth and shining, in lateral view lacking a mound on its posterior slope; humerus in dorso-oblique

view not or hardly produced; mesopleuron, metapleuron and lateral face of propodeum punctured weakly; metanotal groove inconspicuous. Petiole almost as long as or a little longer than postpetiole (excluding helcium); postpetiole relatively long but not massive; its anteroventral part weakly swollen.

Recognition: The syntype minors of "*Myrmica agilis*" agree well with minors of Bornean populations (e.g., Eg96-BOR-108) of *P. megacephala*. I conclude that *P. agilis* is a juninor synonym of *P. megacephala*.

P. megacephala is well distinguished from Indo-Chinese species by the combination of the following characteristics: in the major head in full-face view only shallowly concave posteriorly; in the major dorsum of vertexal lobe smooth and shining or shagreened; in the major hypostoma in the middle at most with a pair of very small or inconspicuous submedian processes; in the minor preoccipital carina weak but present dorsally and laterally; posterior slope of promesonotal dome at most with an inconspicuous mound in the major, and without any mound in the minor; in the major and minor anteroventral part of postpetiole weakly swollen.

Distribution & bionomics: Widely distributed in the world tropics and subtropics. For detailed information on biology and ecological and economic impacts of this species see Reimer *et al.* (1993), Campbell (1994), Hoffmann (1998), Wetterer (1998), Hoffmann *et al.* (1999), Vanderwoude *et al.* (2000), etc.

***Pheidole noda* F. Smith**
Figs. 16a–g, 32c, 32d

Pheidole nodus F. Smith, 1874: 7. Ogata 1982: 196 (description of male), Bui & Eguchi 2003: 9 (checklist), Eguchi 2004b (ecological study), Eguchi, Bui *et al*. 2005: 89 (checklist). Syntype(s): major, Hyogo, Japan, not examined.

Pheidole rhombinoda Mayr, 1879: 678. Wheeler 1929: 3 (subspecies of *noda*), Santschi, 1937b: 371 (subspecies of *noda*), Yasumatsu, 1962: 96 (junior synonym of *noda*). Syntype: 1 major, "Calcutta Sm. 73" [India], NHMW, examined.

Pheidole rhombinoda var. *stella* Forel, 1911b: 380. Wheeler 1929a: 3 (subspecies of *noda*). **Syn.n.** Syntypes: 2 majors, "Sikkim 4000 ft (Bingham)" [Sikkim, Himalaya, 1200 m alt., India], MHNG, examined, 1 (intact major) of the two syntype majors designated here as the **lectotype** [Fig. 32c, 32d].

Pheidole rhombinoda var. *formosensis* Forel, 1913b: 193. Santschi 1937b: 370 (stirps of *noda*). **Syn.n.** Syntypes: 3 majors, "Kankau Erde V.12 No 721" [Kankau, Taiwan], MHNG, examined; 3 minors, "Kankau No 83", MHNG, examined; 2 queens, "Taihorin No. 41" [Taihorin, Taiwan], MHNG, examined; 3 males, "Taihorin No 28", MHNG, examined.

Pheidole rhombinoda var. *taprobanae* Forel, 1902: 178. Forel 1913a: 662 (race/stirps of *rhombinoda*), Santschi 1937b: 371 (stirps of *noda*), Bolton 1995: 326, 331 (unsolved junior primary homonym of *taprobanae* F. Smith 1858: 175). **Syn.n.** Syntypes: 2 majors & 3 minors, "Ceylon (Yerbury) 10", MNHG, examined.

Pheidole nodus var. *flebilis* Santschi, 1937b: 370. **Syn.n.** Syntypes: 1 major & 3 minors, "Hori Form K Sato" [Hori, Taiwan], NHMB, examined.

Pheidole nodus st. *rhombinoda* var. *gratiosa* Santschi, 1937b: 371, unavailable name. Material referable to this form: 1 major & 1 minor, "Indes Kanara Ritken." [Kanara, India], NHMB, examined.

Pheidole treubi Forel, 1905: 19. Eguchi 2001a: 18 (lectotype designation, junior synonym of *noda*). Lectotype: major, Buitenzorg [Bogor, Java], MHNG, examined; paralectotype(s): queen(s) from the same locality (according to the original description), not examined.

Other material examined: Mainland Japan: Kagoshima: Toso, Kagoshima-shi [T. Akiyama's colony: 021102-1], Shiroyama, Kagoshima-shi [Eg02-JPN-01, -02, -03, -04], Eboshi-dake Nature Trail, 100 m alt., Hirakawa, Kagoshima-shi [Eg02-JPN-22], Hirakawa, Kagoshima-shi [Eg02-JPN-24]. S. China: Guangxi: new campus of Guangxi Normal Univ., Guilin [Eg00-GNGX-02, -03], Nonggang & Longhu, Longhu [J. Fellowes], Dayaoshan N.R., Jinxiu [J. Fellowes], Gao Zhai, 300 m alt., Xing An [Eg00-GNGX-013, -017, -018, -019]; Guangdong: Dawuling N.R., Maoming [J. Fellowes], Nankunshan N.R., Summit Trail, Longmen [J.

Fellowes], Yangchun Baiyong N.R., Yangchun [J. Fellowes]; Hong Kong: Victoria Park, Hong Kong I. [Eg99-HK-018, -20, -21, -23, -25, -29, -30], Tai Lung Farm, Sheung Shui, New Territory [Eg99-HK-39, -40]. Taiwan: Nantou: Lienhuachi, 600 m alt. [Sk. Yamane]. Vietnam: Lao Cai: Sa Pa [K. Eguchi], Y Linh Ho (small fragment of forest), 1100 m alt., Sa Pa [Eg02-VN-207, -228], Cat Cat (along trail to Fansipan), 1300–1400 m alt., Sa Pa [Eg02-VN-255], Sa Seng (small fragment of limestone forest), Sa Pa [Eg02-VN-283]; Bac Kan: Ba Be N.P. (22°24–25'N, 105°37–38'E), < 260 m alt. [Eg04-VN-150]; Quang Ninh: Chua Yen Tu (21°09'N, 106°43'E), 520–725 m alt. [Eg04-VN-004]; Vinh Phuc: Tam Dao N.P., 800–900 m alt. [Eg99-VN-033, -039, -40], Tam Dao N.P., 900 m alt. [VN98-SKY-03; Eg99-VN-067], Tam Dao N.P., 900–1100 m alt. [Eg99-VN-058], Tam Dao N.P., 1240 m alt. [VN98-SKY-08]; Ha Tay (misspelled as Ha Tai): Ba Vi N.P., 400 m alt. [Eg99-VN-079], Ba Vi N.P., 400–800 m alt. [Eg99-VN-123]; Ninh Binh: Cuc Phuong N.P. [Eg08vi05-02]. Indonesia: C. Java: Kaliadem, 800–1000 m alt., G. Merapi [JV02/03-SKY-42].

Worker measurements & indices: Major (n=5). — HL 1.69–1.91 mm; HW 1.58–1.82 mm; CI 93–98; SL 1.00–1.12 mm; SI 56–65; FL 1.46–1.62 mm; FI 84–94.

Minor (n=5). — HL 0.71–0.82 mm; HW 0.57–0.66 mm; CI 80–82; SL 0.91–1.07 mm; SI 157–162; FL 1.03–1.22 mm; FI 177–185.

Worker description

Major. — Head in lateral view not or hardly impressed on vertex, in full-face view relatively broadly concave posteriorly; dorsum of head sparsely bearing standing hairs which are much longer and distinctly thicker than many short decumbent-subdecumbent background hairs; frons and anterior part of vertex rugose longitudinally; posterior part of vertex and dorsal and lateral faces of vertexal lobe reticulate or rugoso-reticulate; frontal carina conspicuous; antennal scrobe inconspicuous; clypeus with a conspicuous median longitudinal carina; hypostoma without median and submedian processes, but with a pair of conspicuous lateral processes; antenna with a 3-segmented club; maximal diameter of eye as long as or longer than antennal segment X. Promesonotal dome sparsely with long and thick standing hairs, in dorsal view rugose or rugoso-reticulate transversely, in lateral view with a conspicuous prominence on its posterior slope; humerus not or hardly produced laterad; the dome at the humeri narrower than at the bottom. Petiole shorter than postpetiole (excluding helcium); anterolateral part of petioler peduncle in dorsal view somewhat produced laterad; subpetiolar process absent, or at most present as a longitudinal carina; postpetiole massive. First gastral tergite weakly rugoso-punctured in its anterior 1/3 to 1/2, and shagreened to smooth in the remainder part.

Minor. — Frons and vertex smooth, or rarely shagreened; area between antennal insertion and eye often rugose sparsely and weakly, or rugoso-punctate weakly; preoccipital carina conspicuous dorsally and laterally; median part of clypeus smooth, usually (but not always) with a weak median longitudinal carina; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye shorter than antennal segment X. Promesonotal dome largely smooth, in lateral view with a conspicuous mound on its posterior slope; humerus of the dome in dorso-oblique view not produced/raised; mesopleuron, metapleuron and lateral face of propodeum weakly or dimly punctured at least partly; propodeal spine small, or sometimes reduced to a tiny dent. Petiole shorter than postpetiole (excluding helcium); postpetiole massive.

Recognition: The syntype major of *P. rhombinoda* Mayr agrees well with majors of colony Eg99-HK-40, with only a small difference: the former completely lacks a subpetiolar process but the latter has a subpetiolar process present as a very low carina. I follows the previous view (Yasumatsu 1962) that *P. rhombinoda* is a junior synonym of *P. noda*.

The lectotype and a paralectotype major of *P. rhombinoda stella* agree well with majors of S. Chinese populations (e.g., Eg99-HK-25), with only the following small differences: the former has larger bodies, heads covered with background hairs which are decumbent-subdecumbent but not appressed, and petioles with a well-developed keel ventrally. Despite such differences I treated *Pheidole rhombinoda stella* as a junior synonym of *Pheidole noda*.

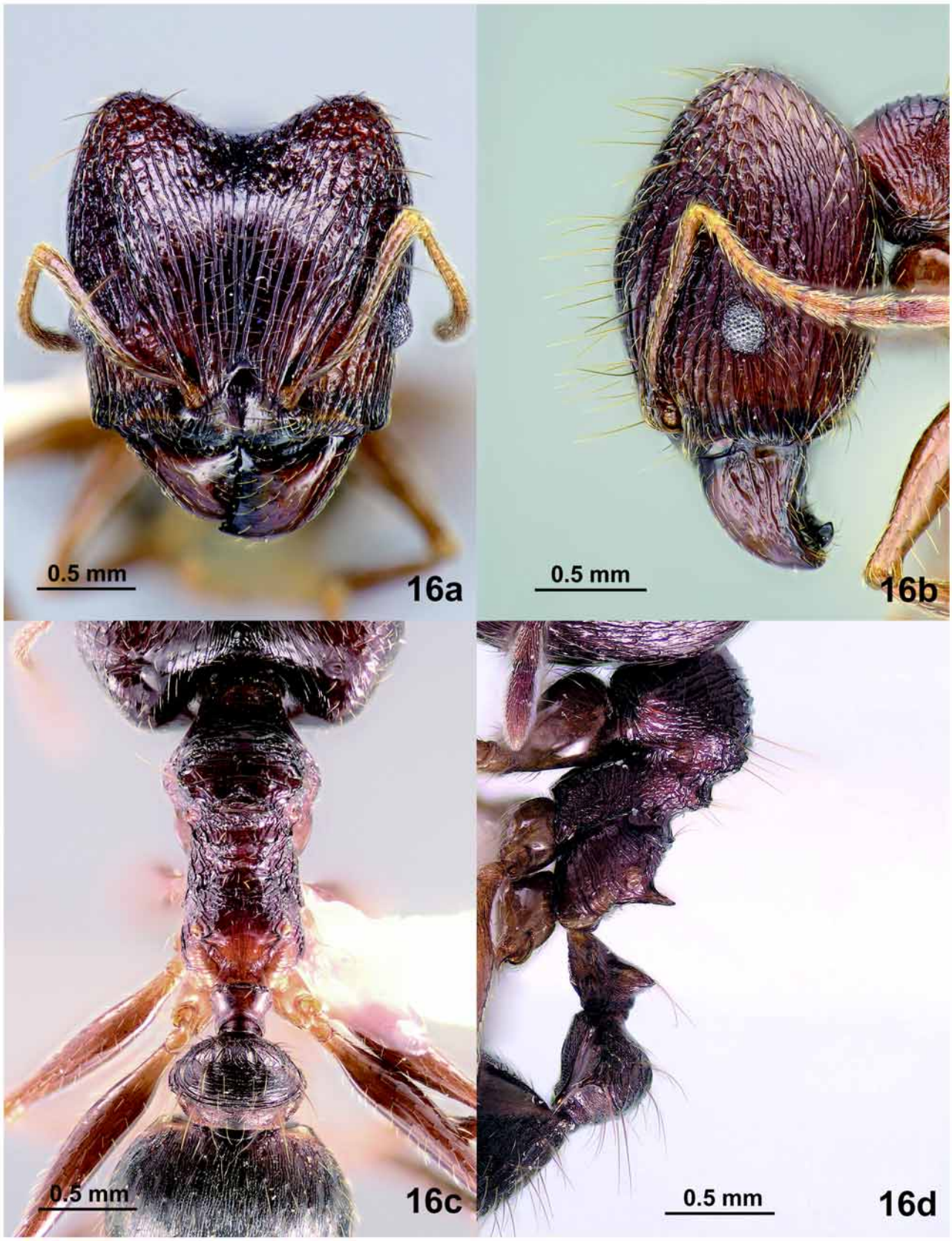

FIGURE 16a–d, *Pheidole noda*, major [Eg99-VN-040] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

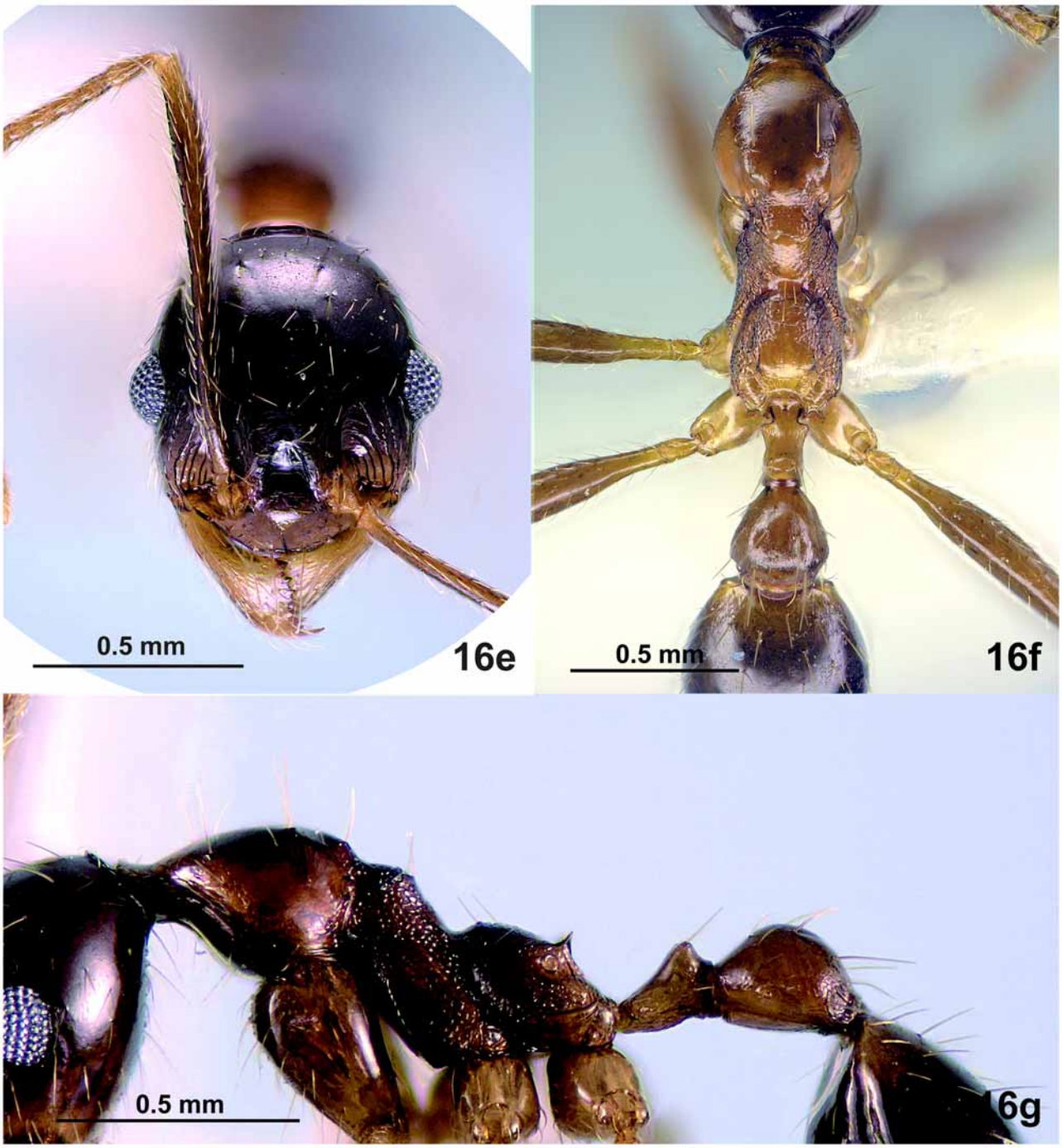

FIGURE 16e–g, *Pheidole noda*, minor [Eg99-VN-040] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Major and minor referable to "*P. noda* st. *rhombinoda* var. *gratiosa*" (unavailable name) agree with those of S. Chinese populations (e.g., Eg99-HK-40), with the following small diferences: in "*gratiosa*" major's head in full-face view is more narrowly concave posteriorly; standing hairs on major's head are shorter; body color of the major and minor is lighter. I conclude that "*gratiosa*" is just a local forms of *P. noda*.

Pheidole noda is distinguished among Indo-Chinese species by the combination of the following characteristics: in the major head in full-face view relatively broadly and deeply concave posteriorly; in the major dorsum of head sparsely bearing standing hairs which are much longer and distinctly thicker than background hairs; in the major posterior part of vertex and dorsal and lateral faces of vertexal lobe rugoso-reticulate; in the

major subpetiolar process absent or at most present as a low carina; in the major and minor postpetiole massive. *Pheidole tumida* is similar to *P. noda*. At present it is impossible to separate the two by minor's morphology. However, the major of *P. tumida* has a very large lobate subpetiolar process.

Distribution & bionomics: Widely distributed in the Manchurian subregion and Oriental region. This species occurs from open lands to relatively developed forests, and nests in the soil, under shelters on the ground, and in rotting logs. According to Eguchi (2004b) workers gather seeds of sesame and amaranthus put on the ground in S. Japan. Majors serve as repletes (e.g., Eg99-HK-21, Eg99-VN-058). In N. Vietnam this species is one of the prey of *Aenictus dentatus* Forel (Eg04-VN-004, det. Sk. Yamane, 2005).

***Pheidole ochracea* sp.n.**
Figs. 17a–h

Type material examined: Holotype: major (IEBR), S. Cat Tien N.P. (forest along Bird Lake Trail < ca. 160 m alt.), Dong Nai, S. Vietnam (K. Eguchi leg., 14 Oct 2004, colony: Eg04-VN-621) [IEBR]; paratypes: 5 majors & 6 minors, same data as holotype (IEBR, MHNG, MCZC & ACKE).

Other material examined: S. China: Guangxi: Guilin City [Eg00-GNGX-06], Nonggang & Longhu, Longzhou [J. Fellowes]; Guangdong: Yangchun Baiyong N.R. [J. Fellowes]; Hong Kong: Victoria Park, Hong Kong I. [Eg99-HK-19, -24, -32]. Vietnam: Lao Cai: Y Linh Ho, ca. 1100 m alt., Sa Pa [Eg02-VN-212]; Bac Giang: W. Yen Tu N.P. (=Tay Yen Tu N.P.), 21°11'N, 106°43'E, 150 m alt. [as preys of a colony (Eg04-VN-146) of *Aenictus dentatus*]; Vinh Phuc: Tam Dao N.P., 800–900 m alt. [Eg99-VN-003, -035, -063]; Ha Tay (mislabeled as Ha Tai): Ba Vi N.P., 21°03'N, 105°22'E, 400–800 m alt. [Eg99-VN-102, -125; Eg01-VN-236; Eg02-VN-016]; Dong Nai: S. Cat Tien N.P., < 160 m alt. [Eg04-VN-583, -602, -614, -790]. Part of specimens to which Eguchi's informal species code "*Pheidole* sp. eg-101" has been applied (Eguchi, Bui *et al.* 2005: 90) is *P. ochracea*, and the remainder is *P. elongicephala.*

Worker measurements & indices: Holotype (major). — HL 1.79 mm; HW 1.61 mm; CI 90; SL 0.98 mm; SI 61; FL 1.31 mm; FI 81.

Nontype major (n=4). — HL 1.74–1.89 mm; HW 1.58–1.65 mm; CI 86–92; SL 0.99–1.03 mm; SI 62–63; FL 1.33–1.39 mm; FI 83–85.

Minor (n=5, including one paratype minor). — HL 0.72–0.83 mm; HW 0.57–0.66 mm; CI 79–80; SL 0.88–1.00 mm; SI 148–154; FL 0.91–1.06 mm; FI 154–162.

Worker description

Major. — Body deep yellowish-brown or sometimes brown or deep reddish-brown, with paler appendages. Head in lateral view at most weakly impressed on vertex; vertexal lobes in full-face view relatively close to each other; frons and anterior part of vertex longitudinally rugose; posterior part of vertex and dorsum of vertexal lobe reticulate or rugoso-reticulate; clypeus without a median longitudinal carina; frontal carina conspicuous; antennal scrobe very shallow; hypostoma with low or inconspicuous median and low or inconspicuous submedian processes in addition to conspicuous lateral processes; antenna with a 3-segmented club; maximal diameter of eye (a little) shorter than antennal segment X. Promesonotal dome smooth and shining, with transverse rugulae; a conspicuous prominence present on its posterior slope; humerus of the dome not or hardly produced laterad; the dome at the humeri much narrower than at the bottom; mesopleuron and metapleuron weakly punctured, overlain by rugoso-reticulation; propodeal spine narrowly based, usually slightly curved apically. Petiole longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite smooth and shining entirely, or rarely shagreened only around its articulation with postpetiole.

Minor. — Body yellowish-brown, with paler appendages. Head in full-face view elliptical; frons and vertex smooth and shining, or partly shagreened; median portion of clypeus smooth and shining, without a

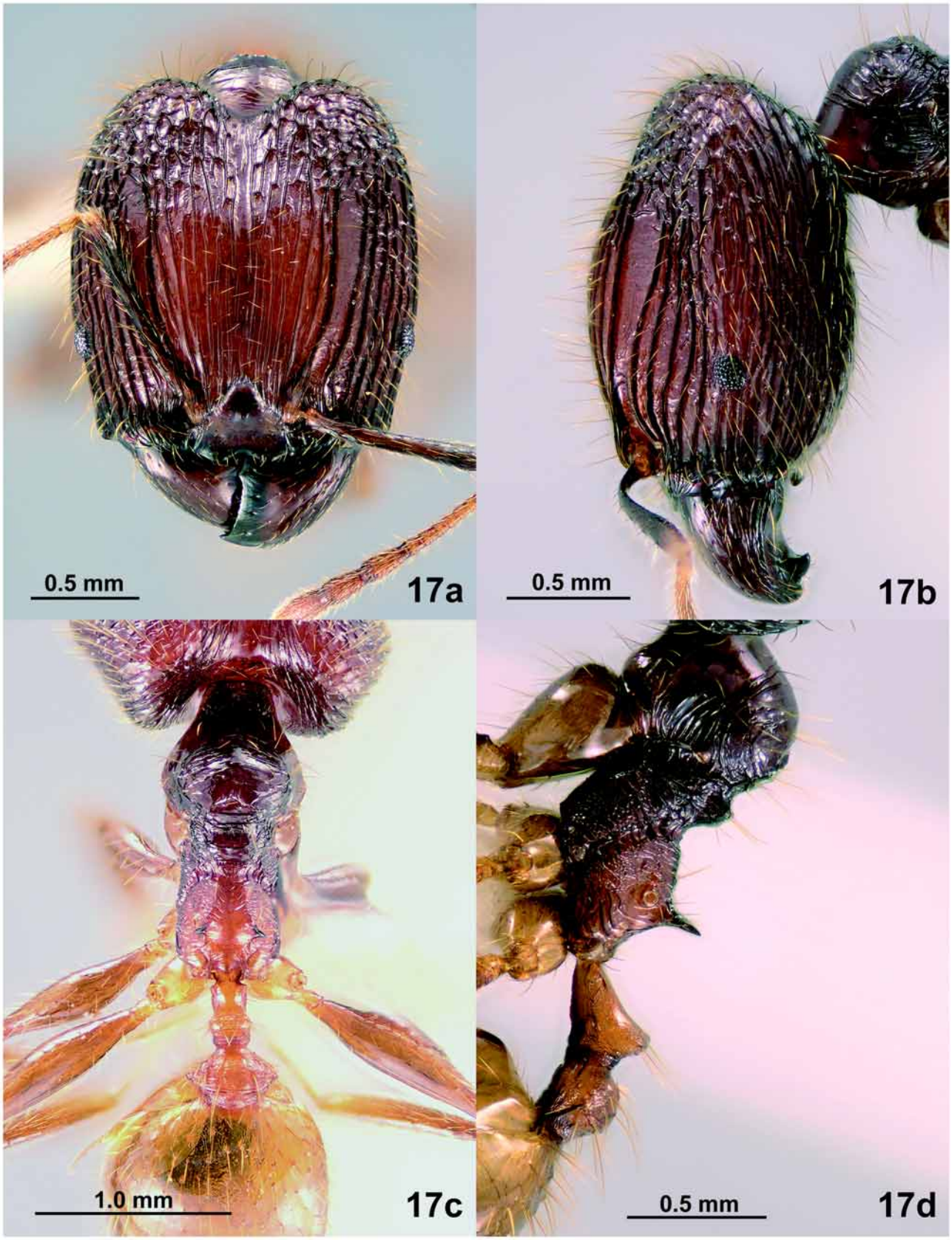

FIGURE 17a–d, *Pheidole ochracea*, holotype (major) [Eg04-VN-621] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

FIGURE 17e–h, *Pheidole ochracea*, paratype minor [Eg04-VN-621] — e, head in full-face view; f, head in lateral view; g, mesosoma and waist in dorsal view; h, mesosoma and waist in lateral view.

median longitudinal carina; occipital carina well-developed; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye much shorter than antennal segment X; 6–7 ommatidia present on the long axis of eye. Promesonotal dome smooth and shining, in lateral view with a

low mound on its gentle posterior slope; humerus in dorso-oblique view not raised/produced; mesopleuron, metapleuron and lateral face of propodeum punctured, often overlain by weak rugulae (sculpure on the lateral face of propodeum often weaker than mesopleuron and metapleuron); propodeal spine elongate-triangular, directing upward. Petiole a little longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: *Pheidole ochracea*, *Pheidole elongicephala* sp.n. and *P. binghamii* are morphologically very similar to each other. Differences between *P. ochracea* and *P. elongicephala* are given under the remaks of *P. elongicephala*. Difference between *P. ochracea* and *P. binghamii* are as follows: mound on the posterior slope of the promesonotal dome is less developed in the minor of *P. ochracea* than in that of *P. binghamii*; body of minor yellowish-brown in the former, but usually brown to dark-brown in the latter. *Pheidole ochracea* and *P. binghamii* are sympatric in S. Vietnam.

Distribution & bionomics: Known from Vietnam and S. China. This species usually occurs in forests and woody habitats, and nests in the soil and sometimes in termite mounds abandoned [e.g., Eg04-VN-621]. This species is prey of *Aenictus dentatus* Forel [Eg04-VN-146, det. Sk. Yamane, 2005].

***Pheidole parva* Mayr**
Figs. 18a–g

Pheidole parva Mayr, 1865: 98. Eguchi, Yamane & Zhou 2007: 261–265 (redescription of major & minor). Syntypes: 1 major & 2 minors, "Ceylon" [= Sri Lanka], NHMW, examined.

Pheidole parva var. *decanica* Forel, 1902: 175. Eguchi, Yamane & Zhou 2007: 261–265 (lectotype designation, junior synonym of *parva*). Lectotype: major, "Cochin (Inde) (Rothney)" [India], MHNG, examined; paralectotypes: 2 majors, "Cochin (Inde) (Rothney)" [India], MHNG, examined; 3 minors, "Kanara XXXI 8 (Aitken)" [India], MHNG, examined; 3 queens, "Belgaum. (Wroughton) XXXII 1c" [India], MHNG, examined; 3 males, "Belgaum (Wroughton) XXXII 1b", MHNG, examined; specimens from Poona [India] and Ceylon [Sri Lanka] (according to the original description), not examined.

Pheidole bugi Wheeler, 1919: 66. Eguchi 2001b: 37–39 (lectotype designation & redescription of major & minor), Eguchi, Yamane & Zhou 2007: 261–265 (junior synonym of *parva*). Lectotype: major, "Sarawak, Borneo, R. Thaxter", MCZC cotype-8947, examined.

Pheidole rinae var. *mala* Forel, 1911a: 205. Eguchi 2001b: 39 (lectotype designation), Eguchi, Yamane & Zhou 2007: 261–265 (junior synonym of *parva*). Lectotype: major, "Semarang Java (Jacobson)", MHNG, examined; paralectotypes: 2 majors & 3 minors, "Semarang Java (Jacobson)", MHNG, examined.

Pheidole rinae r. *tipuna* Forel, 1912a: 68. Eguchi, Yamane & Zhou 2007: 261–265 (lectotype designation, junior synonym of *parva*). Lectotype: major, "Takao Formose (Sauter) 25" [= Kaoshung, Taiwan], MHNG, examined; paralectotypes: 3 minors, "Takao 25 Formose (Sauter)", MHNG, examined.

Pheidole sauteri Wheeler, 1909: 334. Eguchi, Yamane & Zhou 2007: 261–265 (junior synonym of *parva*). Syntypes: 3 majors & 19 minors, "Takao, Formosa, H. Sauter" [= Kaoshung, Taiwan], MCZC cotype 20671, examined.

Other material examined: Ogasawara Is.: Chichi-jima I.: Chichi-jima I. [K. Hamaguchi], pass to Miyanohama, [K. Nakashima]. Ryukyus: Amami-Ôshima I. [Sk. Yamane]; Okinawa-jima I.: Nishihara-cho, [Eg01-JPN-001, -002], Naha-shi [Y. Nishizono], Sueyoshi Park, Syuri, Naha-shi [K. Kishima's colony: A-7]. S. China: Hong Kong: Mai Po Marshes, New Territory [J. Fellowes], Tai Lung Farm, Sheung Shui, New Territory [Sk. Yamane]; Macau: Hac-Sa, Coloane I. [K. Eguchi]. N. Vietnam: Thai Nguyen: My Yen Commune Forest, 21°35'N, 105°36'E, Na Hau Village [Eg01-VN-134, -135, -136, -137, -145, -151, -152]; Ninh Binh: Ninh Binh [K. Ogata: 15 min.-TUS#2], Cuc Phuong N.P., 20°14'N, 105°36'E, 370 m alt. [Eg01-VN-179, -180]. S. Vietnam: Ho Chi Minh City [R.H. Crozier, MCZC]. Thailand: Bangkok: Campus of Kasetsart Univ. [Eg01-TH-585, -586, -587], Bang Khean (Residential area) [TH03-SKY-106]. Philippines: Luzon: Asin Hot

Spring, Benguet, W. Beguio [S. Schödl]; Surigao del N. Dinagat I.: 6.8 road km N. Dinagat vill., Busay [S. Schödl]; Catanduanes: Virac La Tri Lodge and Rest., Virac [H. Zettel]. W. Malaysia: Penang: Campus of Univ. Sains Malaysia [C.Y. Lee]. E. Malaysia: Sabah: Tawau Hills Park [K. Eguchi]. Brunei: Tasek Merimbun [Eg99-BOR-004]. Indonesia: W. Sumatra: Muko Muko, Maninjau [SNS coll.]; Mentawai Is.: Rokot, Plau Sipora [SNS coll.]. Lombok I.: Selong [Eg98-LMB-1020, -1021]; C. Java: Gajah Mada Univ., Yogyakarta [JV02/03-SKY-20]. Nepal: 16 km NE. Tumlingtar, 27°25'N, 87°19'E, 670 m alt. [C. Carpenter]. India: Utter Pradesh: Rajaji N.P., 600–700 m alt., 10 km SE. Dehra Dun [A. Schulz & K. Vock]. Sri Lanka: Kandy: Campus of Univ., Peradeniya [LK01-SKY-16, -26]. Germany: Cottbus [A. Buschiuger]. Austria: Wien: Tiergarten (Zoo) [G. Hillebrand]. Eguchi's informal species code "*Pheidole* sp. eg-56" has been applied to these specimens.

Worker measurements & indices: Major (data from Eguchi, Yamane & Zhou 2007). — HL 0.96–1.07 mm; HW 0.85–0.92 mm; CI 85–92; SL 0.41–0.45 mm; SI 45–51; FL 0.57–0.62 mm; FI 64–68.

Minor (data from Eguchi, Yamane & Zhou 2007). — HL 0.43–0.54 mm; HW 0.39–0.50 mm; CI 88–94; SL 0.38–0.46 mm; SI 84–102; FL 0.39–0.48 mm; FI 93–109.

Worker description

Major. — Head in lateral view not or very weakly impressed on vertex; frons to anterior part of vertex longitudinally rugose; posterior part of vertex rusogo-reticulate; dorsal and dorsolateral faces of vertexal lobe reticulate or rusogo-reticulate; frontal carina absent or inconspicuous (present just as weak rugulae); antennal scrobe absent; median longitudinal carina on clypeus absent, or rarely present but weak; hypostoma with median and submedian processes in addition to conspicuous lateral processes; median process often lower than submedian process, or sometimes almost disappearing; submedian processes usually conspicuous; outer surface of mandible (excluding area around the base) smooth or dimly rugose partly, sparsely with (very) short appressed hairs; antenna with a 3-segmented club; maximal diameter of eye longer than antennal segment X. Promesonotal dome in dorsal view rugoso-reticulate or irregularly rugose with interspaces smooth or dimly to distinctly punctured, or punctured weakly; the dome in lateral view at most with an inconspicuous mound on its posterior slope; humerus weakly produced laterad; the dome at the humeri almost as broad as or broader than at the bottom. Petiole much longer than postpetiole (excluding helcium); petiolar node in lateral view relatively high; postpetiole not massive; first gastral tergite weakly rugoso-punctate in its anterior 1/3 or at least around its articulation with postpetiole.

Minor. — Dorsum of head punctured and often overlain by weak rugoso-reticulation; preoccipital carina absent or inconspicuous dorsally; median part of clypeus smooth or weakly punctured; median longitudinal carina absent, or present but weak; antenna with a 3-segmented club; scape exceeding posterior margin of head by less than half length of antennal segment II, or not reaching the posterior margin; maximal diameter of eye longer than antennal segment X. Mesosoma punctured; punctuation on dorsum of promesonotal dome often overlain sparsely by weak rugulae; promesonotal dome in lateral view relatively weakly convex, at most with an inconspicuous mound on its posterior slope; humerus in dorso-oblique view very weakly produced; propodeal spine elongate-triangular. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: This species is characterized among Indo-Chinese species by the combination of the following features: in the major frontal carina almost absent; in the major hypostoma in the middle with 3 processes (median process is often low, rarely much reduced); in the minor scape exceeding posterior margin of head by less than half length of antennal segment II, or not reaching the posterior margin; in the minor maximal diameter of eye longer than antennal segment X; in the minor dorsal and lateral faces of head and mesosoma punctured; in the major and minor posterior slope of promesonotal dome lacking a conspicuous prominence/mound.

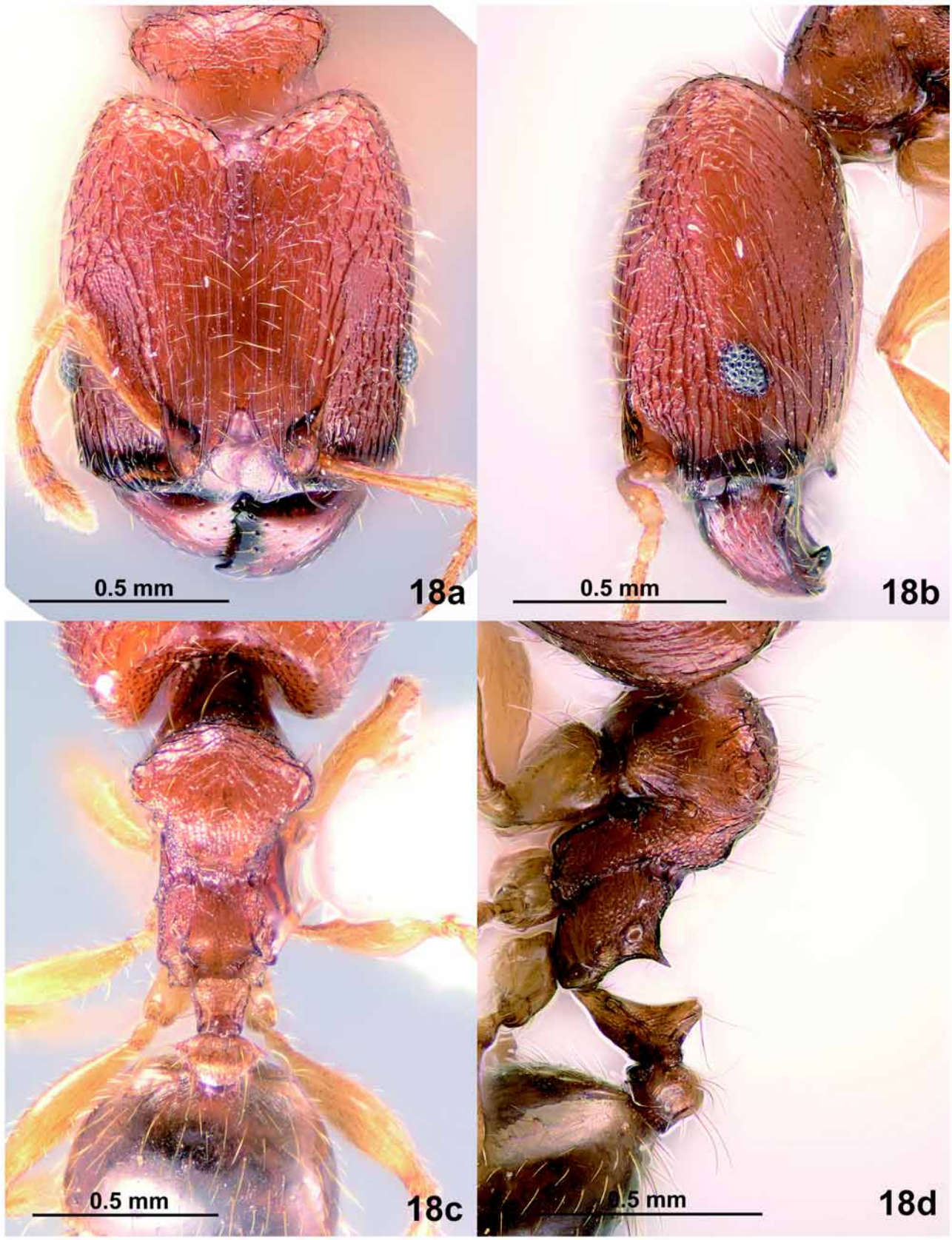

FIGURE 18a–d, *Pheidole parva*, major [K. Ogata: 15 min.-TUS#2] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

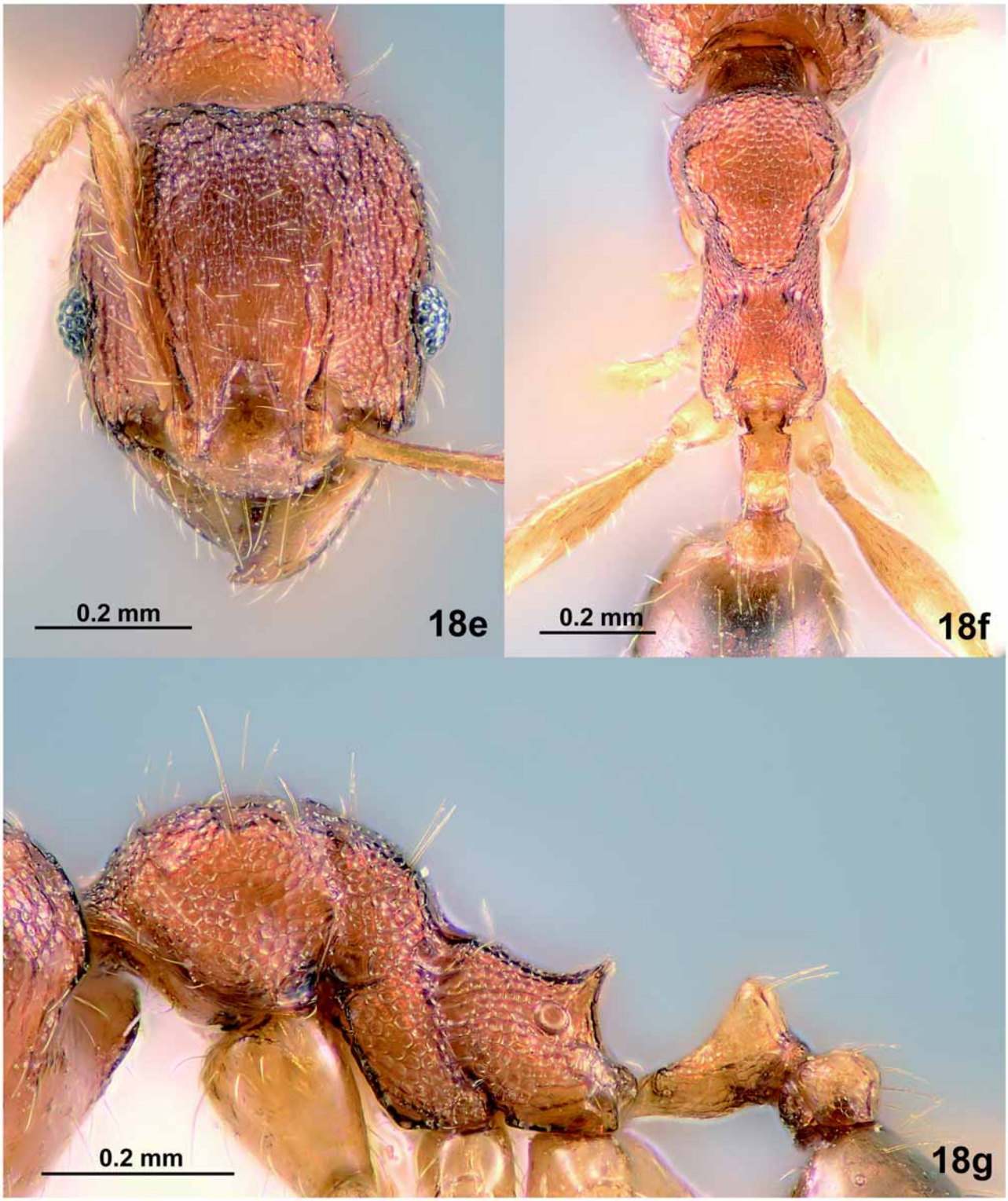

FIGURE 18e–g, *Pheidole parva*, minor [K. Ogata: 15 min.-TUS#2] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

P. parva is most similar to *P. rabo* Forel. In the minor of the latter, however, scape usually exceeds posterior margin of head by almost the length of antennal segment II, and maximal diameter of eye is almost as long as or a little shorter than antennal segment X.

Distribution & bionomics: Widely distributed in the Oriental region, Austro-Malayan subregion and W.

Pacific. This species prefers open lands, tillage and gardens to woody habitats, and nests under the ground. In rural areas of N. Vietnamese this species and *P. yeensis* are the most dominant *Pheidole* species.

Pheidole pieli **Santschi**
Figs. 19a–g

Pheidole pieli Santschi, 1925: 83. Ogata 1982: 195–196 (description of male), Yamane *et al*. 2003: 57 (checklist), Eguchi *et al*. 2004 (ecological study), Eguchi, Bui *et al*. 2005: 90 (checklist), Eguchi, Yamane & Zhou 2007: 265–269 (redescription of major & minor). Syntypes: 2 majors & 9 minors, "Zo-Se 27-7-24" [Zo-Ce, China], NHMB, examined.

Pheidole rinae subsp. *incensa* Wheeler, 1928: 13. Eguchi, Yamane & Zhou 2007: 265–269 (junior synonym of *pieli*). Syntypes: 3 majors & 3 minors, "Peta, Foochow, Silvestri" [Foochow, China], MCZC cotype-20669, examined.

Other material examined: Mainland Japan: Kagoshima: Eboshi-dake, ca. 100 m alt., Hirakawa, Kagoshima-shi [Eg02-JPN-11, -14, -15, -17]. Ryukyus: Tanega-shima I.: Makikawa, 15 m alt., stream-side [M. Yano's colony: No. Ph84010]; Yaku-shima I.: Hanyama, [Y. Nishizono]; Kuchinoerabu-jima I.: Honmura, [S. Handa's colony: No. P.89-33, P.90-09]; Okinoerabu-jima I. [A. Shimono: Bait #29]; Okinawa-jima I.: Nago, [Sk. Yamane], Naha-shi [Y. Nishizono]; Ishigaki-jima I.: Omoto-dake, 90 m alt.; Iriomote-jima I.: [H. Watanabe's colony: No. P.91-06], Ohtomi [M. Terayama], upper Urauchi-gawa River [Y. Nishizono], Udara-gawa, Amitori [Y. Nishizono]; Yonaguni-jima I.: Tindabana, Sonai [H. Watanabe's colony: No. P.91-01]. S. China: Guangxi: New campus of Guangxi Normal Univ., Guilin City [Eg00-GNGX-05], Mt. Mao Er Shan, 690 m alt. [Eg00-GNGX-039]; Hong Kong: Victoria Park, Hong Kong I. [Eg99-HK-33], Taipo Kau N.P., New Territory [Eg99-HK-11; Eg00-HK-20, -026; J. Fellowes]. N. Vietnam: Bac Kan: Ba Be N.P., 22°24'N, 105°38'E, 200–220 m alt. [T.V. Bui]; Bac Giang: W. Yen Tu N.P. (= Tay Yen Tu N.P.), 21°10–11'N, 106°43–44'E, 170 m alt. [Eg03-VN-078], W. Yen Tu N.P., 190 m alt. [Eg03-VN-037], W. Yen Tu N.P., 195 m alt. [B&E03-8], W. Yen Tu N.P., 1070 m alt. [Eg03-VN-123]; Quang Ninh: Ky Thuong N.R., 21°09'N, 107°06'E, 570 m alt. [Eg03-VN-212], Chua Yen Tu, 21°09'N, 106°43'E, 720–845 m alt. [Eg04-VN-040, -041, -046, -068]; Vinh Phuc: Tam Dao N.P., 900 m alt. [Eg99-VN-064, -066; Eg01-VN-107, -113]; Ha Tay (mislabeled as "Ha Tai"): Ba Vi N.P., 21°03'N, 105°22'E, 400–600 m alt. [Eg02-VN-004], Ba Vi N.P., 400–800 m alt. [Eg99-VN-096], Ba Vi N.P., 670 m alt. [Eg01-VN-226], Ba Vi N.P., 800 m alt. [Eg02-VN-056]; Ninh Binh: Cuc Phuong N.P., 20°14'N, 105°36'E [Eg10vi05-23]; Hoa Binh: Moc Chau [K. Ogata: 15 min.-TUS#3]; Nghe An: Pu Mat N.P. (Pha Lai Area) [Eg26iii06-04]; Pu Mat N.P. (Sang Le Forest Area, 19°11'N, 104°37–38'E, < 220 m alt.) [Eg01iv06-12]; Ban Om, 600 m alt., Pu Hoat [T.V. Bui]. Thailand: Chiang Mai: Campus of Chiang Mai Univ. [Eg01-TH-154, -157, -163], Doi Suthep-Pui N.P., 800–900 m alt. [Eg01-TH-104, -106, -108], Doi Suthep-Pui N.P., 900 m alt. [K. Eguchi]; Chanthaburi: Khao Soi Dao [Eg01-TH-026, -028]; Nakonratchasima: nr. Sakaerat Environmental Research Centre [Eg99-TH-011, -015, -021]; Kanchanaburi: Srinakarin Dam N.P., 150–200 m alt. [TH02-SKY-40]; Songkhla: Songkhla Univ., Khao Kor Hong [Eg01-TH-600]. Eguchi's informal species code "*Pheidole* sp. eg-104" has been applied to these specimens.

Worker measurements & indices: Major (data from Eguchi, Yamane & Zhou 2007). — HL 0.79–1.03 mm; HW 0.69–0.97 mm; CI 85–96; SL 0.35–0.48 mm; SI 46–51; FL 0.44–0.60 mm; FI 59–66.

Minor (data from Eguchi, Yamane & Zhou 2007). — HL 0.38–0.47 mm; HW 0.33–0.43 mm; CI 85–92; SL 0.31–0.42 mm; SI 89–108; FL 0.32–0.44 mm; FI 92–111.

Worker description

Major. — Head in lateral view hardly or weakly (rarely strongly) impressed on vertex; frons longitudinally rugose; vertex and dorsal and dorsolateral faces of vertexal lobe reticulate, rugoso-reticulate or obliquely rugose, or rarely sculptured dimly; frontal carina inconspicuous, present just as rugula(e); antennal scrobe

FIGURE 19a–d, *Pheidole pieli*, major [Eg02-VN-004] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

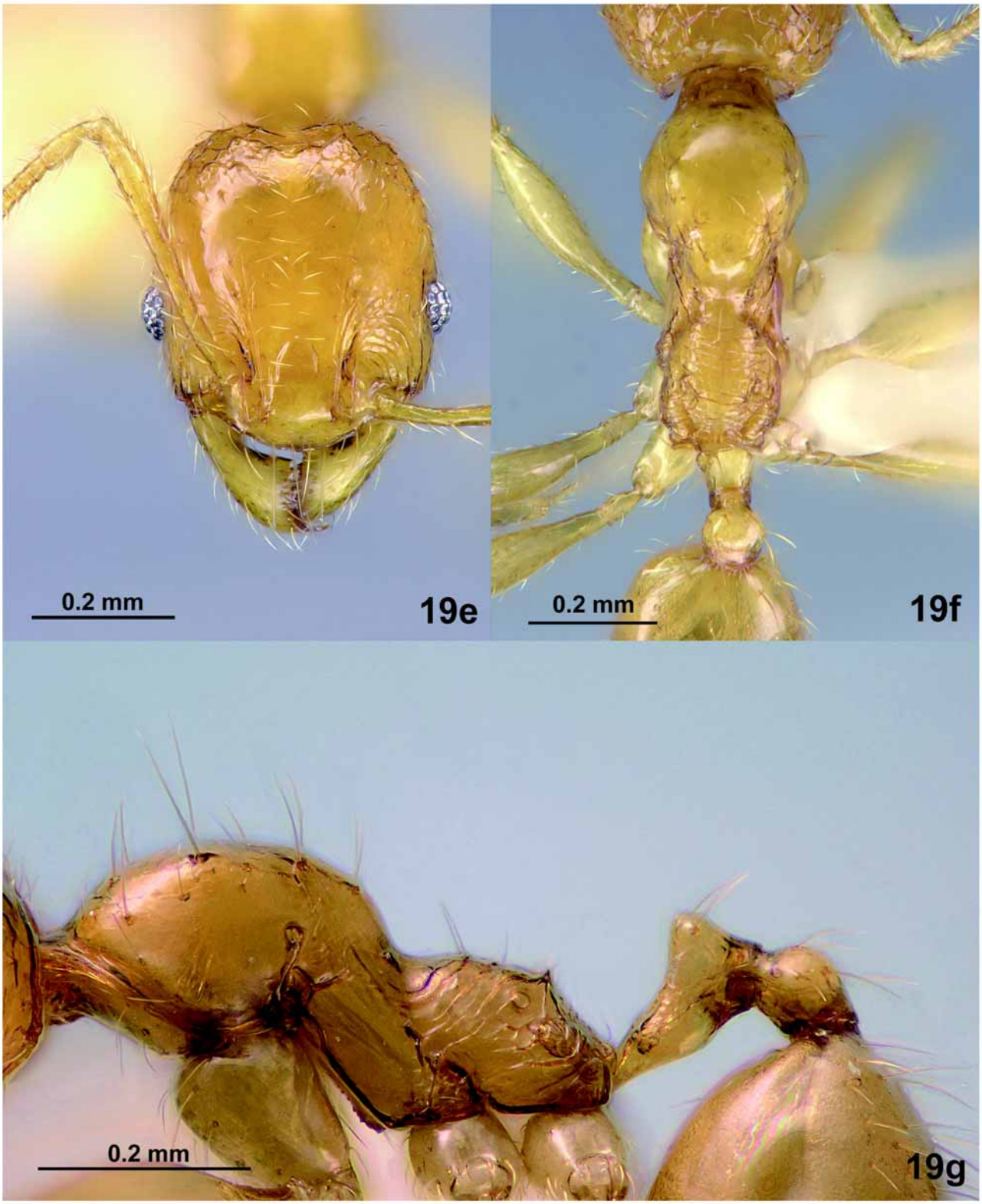

FIGURE 19e–g, *Pheidole pieli*, minor [Eg02-VN-004] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

absent or inconspicuous; median longitudinal carina on clypeus absent or evanescent, or sometimes present but very weak; median process of hypostoma usually conspicuous, but rarely inconspicuous or almost absent; submedian and lateral processes always conspicuous; antenna with a 3-segmented club; maximal diameter of

eye (a little) longer than antennal segment X. Promesonotal dome smooth and shining, sparsely sculptured with transverse or irregular rugulae, in lateral view at most with an inconspicuous mound on its posterior slope; humerus of the dome weakly or sometimes very weakly produced laterad; the dome at the humeri almost as broad as or a little broader than at the bottom (rarely a little narrower than at the bottom). Petiole (much) longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite usually smooth, excluding weakly rugoso-punctate area around its articulation with postpetiole, but rarely shagreened entirely.

Minor. — Frons largely smooth and shining, or rarely shagreened with weak rugulae; vertex and dorsolateral face of head almost smooth, or very weakly rugoso-reticulate or rugoso-punctate; preoccipital carina absent or evanescent dorsally; median part of clypeus smooth and shining; the median longitudinal carina absent, or rarely present but very weak; antenna with a 3-segmented club; scape not reaching or exceeding the posterior margin of head by at most the length of second antennal segment; maximal diameter of eye (a little) longer than antennal segment X (rarely as long as antennal segment X). Promesonotal dome smooth and shining, often with weak transverse rugula(e) on its anterior slope, in lateral view without a mound on its relatively steep posterior slope; humerus of the dome in dorso-oblique view not or hardly produced; mesopleuron, metapleuron and lateral face of propodeum usually almost smooth, but sometimes weakly punctured; propodeal spine usually reduced to a tiny dent. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: This species is characterized among Indo-Chinese species by the combination of the following features: in the major frontal carina inconspicuous, present just as rugula(e); in the major hypostoma in the middle with 3 processes (median process rarely inconspicuous or absent); in the minor preoccipital carina absent or evanescent dorsally; in the minor promesonotal dome smooth and shining, often with weak transverse rugula(e); in the major and minor posterior slope of promesonotal dome without a conspicuous prominence/mound; in the minor propodeal spine usually reduced to a tiny dent.

P. pieli is most similar to *P. laevicolor* and *P. taipoana* among Indo-Chinese species, but the minor of the latter two has rather developed propodeal spines and rather gentle posterior slope of promesonotal dome. Head in lateral view is more strongly concave on vertex in the major of *P. taipoana* than in that of *P. pieli*.

Distribution & bionomics: Known from N. Vietnam, S. Japan, China and Thailand. Indo-Chinese populations usually occur in forest edges and patches with poorly developed vegetation than in well-developed forests, and nest in the soil. On the other hand, Japanese populations usually occur in relatively developed forests, and nest in wood fragments on the ground as well as in the soil (Eguchi *et al.* 2004, Eguchi, Yamane & Zhou 2005). According to Eguchi (2004b) workers gather and feed on seeds of sesame and amaranthus put on the ground in S. Japan. Majors serve as repletes (Handa 1992).

***Pheidole plagiaria* F. Smith**
Figs. 20a–g, 32e, 32f

Pheidole plagiaria F. Smith, 1860: 112. Eguchi, Bui *et al.* 2005: 90 (checklist). Syntypes: 3 majors & 3 minors, “Bac” [Batjan, Indonesia], OXUM TYPE HYM: 983 1-2/6, 3-4/6 & 5-6/6, examined.

Pheidole divergens Mayr, 1867: 97. Mayr, 1879: 675 (junior synonym of *P. plagiaria*). Syntypes: major, minor, queen & male, Indonesia, not examined.

Pheidole peguensis r. *yomensis* Forel, 1903: 253. **Syn.n.** Syntype: 1 major, “Lower Burma Pegu Yoma 1 1900 Bingham” [Myanmer], MHNG, examined, designated as **lectotype** [Fig. 32e, 32f].

Current subspecies (Bolton, 1995): nominal plus *moica* Forel, 1911c: 222, syntype(s): major, Central part of Southern Vietnam, not examined; *palawanica* Stitz, 1925: 118, syntypes: 2 majors, “N. Palawan Binaluan Boettcher” [Philippines], ZMHB, examined; *rectilineata* Viehmeyer, 1916b: 288–289, syntype(s): major, Sulawesi (in copal), not examined.

Other material examined: S. China: Hainan: Jianling N.R., Wanling [J. Fellowes]. Vietnam: Thai Nguyen: My Yen Commune Forest, 21°35'N, 135°36'E, Na Hau Village [Eg01-VN-147]; Vinh Phuc: Tam Dao N.P., 21°27'N, 105°38'E, 800–900 m alt. [Eg99-VN-037, -038], Tam Dao N.P., 900 m alt. [Eg99-VN-001, -005, -008, -009; Eg01-VN-104, -106], Tam Dao N.P., 900–1100 m alt. [Eg99-VN-052], Tam Dao N.P., 1100 m alt. [VN98-SKY-14]; Ha Tay (mislabeled as "Ha Tai"): Ba Vi N.P., 400–800 m alt. [Eg99-VN-119]. Thailand: Chiang Mai: Doi Ang Khang HQ, 1300 m alt. [TH98-SKY-28], Doi Chiang Dao [Eg01-TH-122, -134, -148], Doi Chiang Dao, 500–600 m alt. [TH98-SKY-18], Doi Suthep-Pui N.P., 600 m alt. [TH98-SKY-04], Doi Suthep-Pui N.P., 800 m alt. [TH98-SKY-08], Doi Suthep-Pui N.P., 800–900 m alt. [Eg01-TH-069, -096, -098, -100], Doi Suthep-Pui N.P., 900 m alt. [Eg01-TH-082, -083, -086, -087, -089, -090], Doi Suthep-Pui N.P., 1200 m alt. (Doi Pui) [Eg01-TH-110, -118]; Nakhonratchasima: Khao Yai N.P. [TH00-SKY-24], nr. Sakaerat Environmental Research Centre [Eg99-TH-020; Eg01-TH-532, -549]; Chanthabri: Khao Soi Dao [Eg01-TH-021]; Chacheongsao: Lumchangwat Station, Khao Ang Reu Nai W.S. [TH03-SKY-69]; Pattani: Soi Khao [TH98-SKY-40]; Trang: Khao Chong Waterfall [Eg01-TH-708, -714, -723, -736, -745, -746, -758]; Songkhla: Ton Nga Chang, nr. Hat Yai [Eg01-TH-613, -615, -626, -628], Songkhla Univ. (Khao Kor Hong) [Eg01-TH-597, -598]; Narathiwat: Bala area of Bala-Hala W.S. [Eg01-TH-636]. Myanmar: Chin: between Kampetlet and Natmataung N.P., 1670 m alt. [MM02-SKY-46], between Kampetlet and Natmataung N.P., 1700 m alt. [MM02-SKY-02], between Kampetlet and Natmataung N.P., 1760 m alt. [MM02-SKY-34], Natmataung N.P., 2000 m alt. [MM02-SKY-10], Natmataung N.P., 21°13'N, 93°56'E, 2000 m alt. [MM02-SKY-24, -26, -29]. W. Malaysia: Selangor: Ulu Gombak [FI92MG-174, -383]. E. Malaysia: Sabah: Deramakot Forest Reserve [C. Brühl], Gunong Rara [Eg96-BOR-351, -363; Eg97-BOR-526, -534, -556, -566], Poring, 450–500 m alt. [Eg96-BOR-271], Poring, 500–550 m alt. [Eg96-BOR-294], Poring, 600 m alt., [T. Kikuta's colony: 8-A, 43A, 731, 6XI2306S1-4], Sepilok Forest [Eg97-BOR-412, -418, -460, -464; Eg98-BOR-871], Tawau Hills Park [Sk. Yamane]; Sarawak: Lambir Hills N.P. [Eg98-BOR-803, -808, -817, -819, -825, -829], Lambir Hills N.P. (Inoue Trail) [SR04-SKY-67]. Brunei: Belalong Forest Section [Eg99-BOR-211], Merimbun Heritage Park (=Tasek Merimbun) [Eg99-BOR-007, -008, -028, -030, -035, -070, -074, -123, -150, -552, -567, -568; Eg00-BOR-019, -022, -064]. Indonesia: E. Kalimantan: Sangkimah, Kutai N.P. [Sk. Yamane]; W. Sumatra: Sukarami, nr. Padang [FI92-66, -83; FI96-162; M. Kawamura's colony: 9/29c (1999)]; Krakatau Is.: P. Rakata Besar [Kagoshima Univ. Krakatau Exp.]; W. Java: Cibodas [M. Kawamura's colony: D28 (1997)], Kebun Raya, Bogor [FI95-534, -784; Sk. Yamane; M. Kawamura's colony: 154 (1998), 9/26a (1999), 10/5b (1999), 10/5c (1999)], G. Halimun [FI98-373; M. Kawamura's colony: 5/6a (1998)], Pangandaran [FI95-705], Ciater, 1350 m alt. [Syaukani]; C. Java: Borobudur, nr. Yogyakarta [Sk. Yamane], Kaliadem, 800–1000 m alt., G. Merapi [JV02/03-SKY-38]; E. Java: Sumberbrantas, 1600 m alt., Tulungrejo, Batu [JV02/03-SKY-78, -79]; Bali: Kebun Raya [FI94-137]. Philippines: Leyte: Baybay, Mt. Pangasugan, Calbiga-a River [Zettel].

Worker measurement & indices: Major (n=5). — HL 1.65–1.89 mm, HW 1.59–1.77 mm, CI 91–98, SL 1.03–1.22 mm, SI 59–71, FL 1.42–1.70 mm, FI 85–99.

Minor (n=5). — HL 0.79–0.93 mm, HW 0.67–0.75 mm, CI 81–85, SL 1.01–1.20 mm, SI 146–163, FL 1.12–1.36 mm, FI 162–181.

Worker description

Major. — Head in lateral view not or only very weakly impressed on vertex; posterior margin of head in full-face view relatively widely and deeply concave; longitudinal rugulae running on the frons and then spreading posterolaterad as they run almost transversely on the posteriormost part of the dorsum of vertexal lobe; posterolateral face of head with oblique rugulae which run anteroventrad from dorsal face of vertexal lobe; frontal carina conspicuous; antennal scrobe inconspicuous or only weakly impressed; median longitudinal carina of clypeus present but weak, or rarely absent; median and submedian processes of hypostoma inconspicuous or absent; lateral processes conspicuous; outer surface of mandible covered with relatively long decumbent hairs; antenna with a 3-segmented club; maximal diameter of eye a little longer, as long as, or a

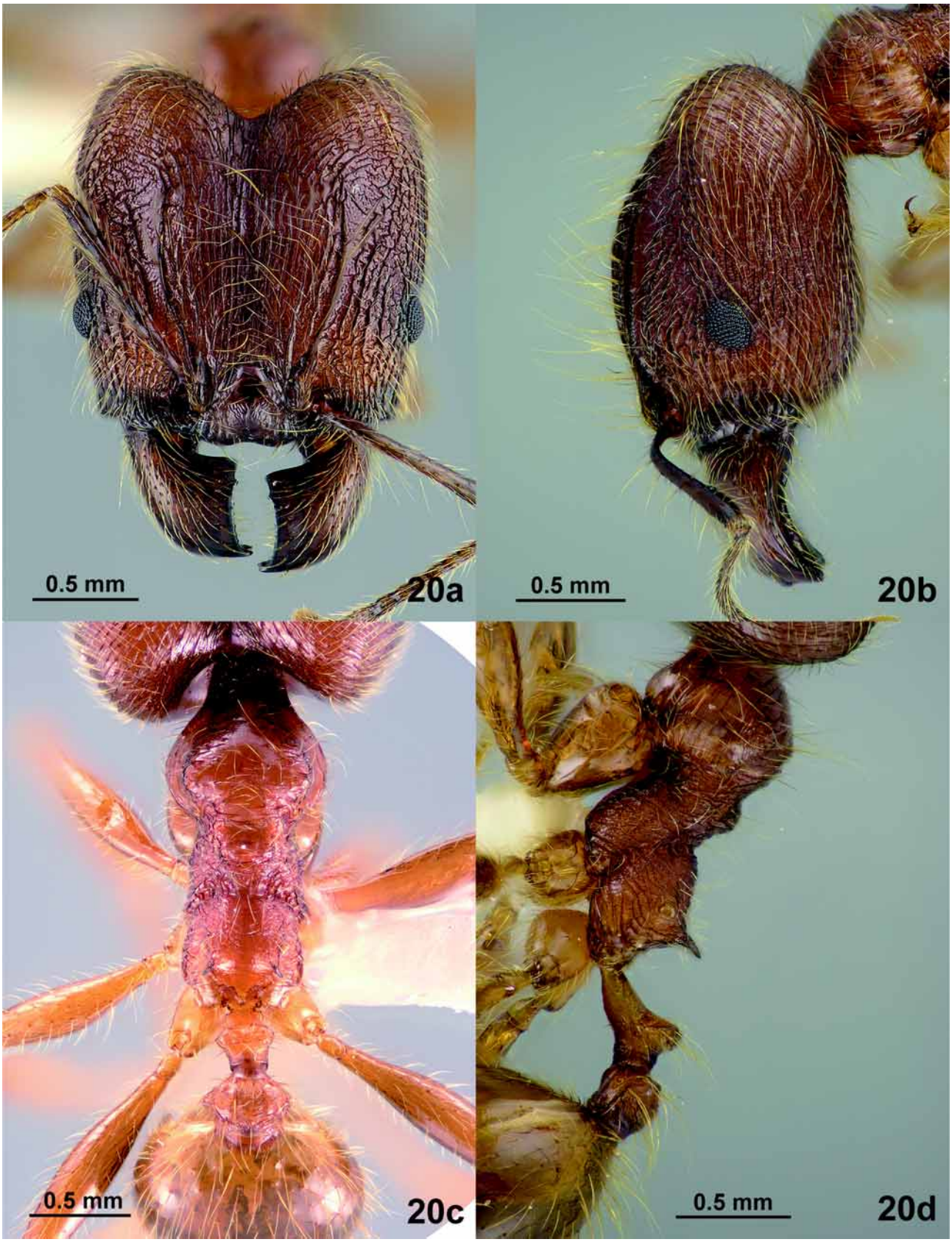

FIGURE 20a–d, *Pheidole plagiaria*, major [Eg99-VN-037] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

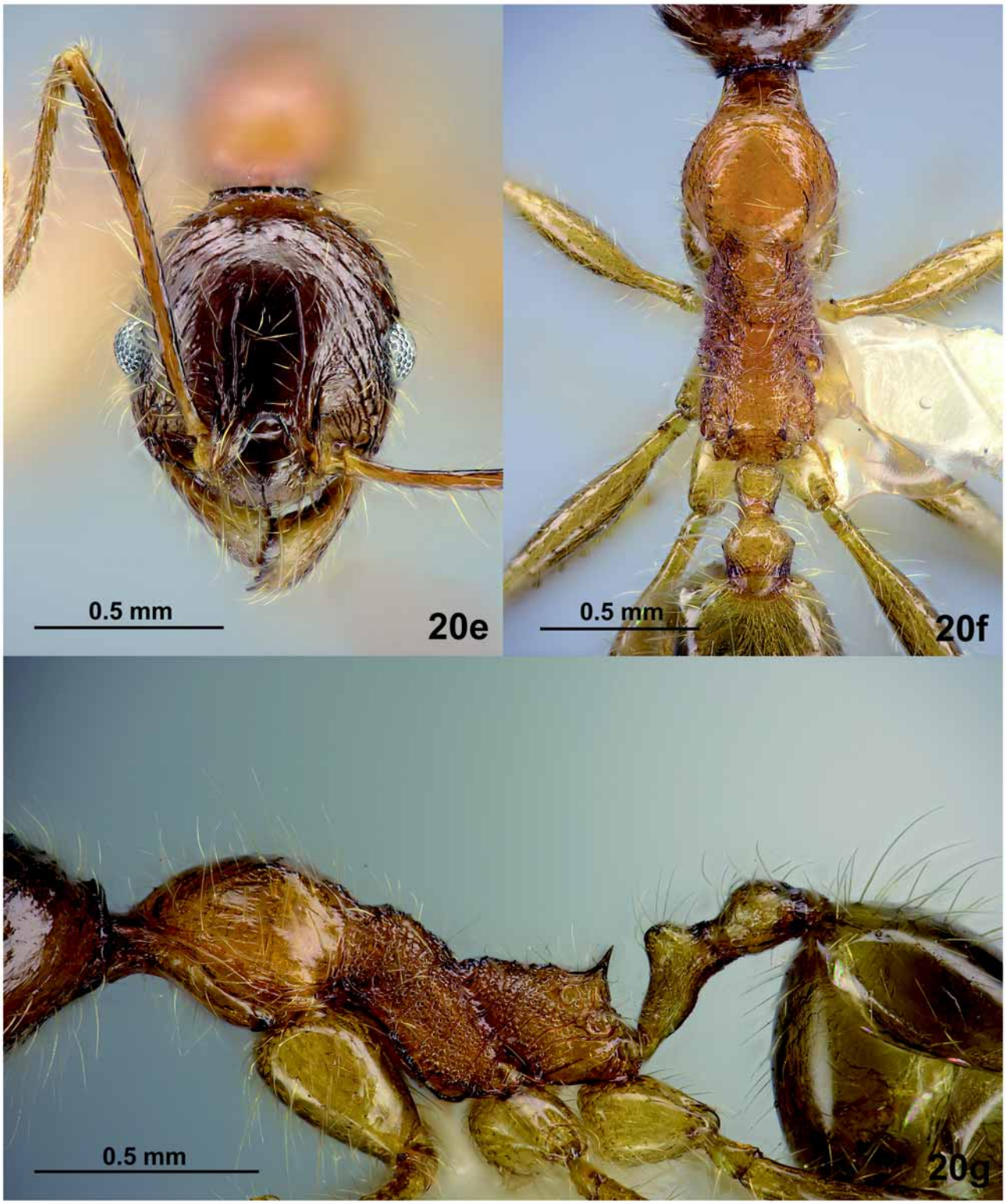

FIGURE 20e–g, *Pheidole plagiaria*, minor [Eg99-VN-037] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

little shorter than antennal segment X. Promesonotal dome in dorsal view transversely rugose with interspaces smooth to shagreened, or smooth to shagreened with sparse several transverse rugulae; the dome in lateral view with a low prominence or mound on its posterior slope; humerus of the dome not or hardly produced laterad; the dome at the humeri narrower than at the bottom; mesopleuron, metapleuron and lateral face of pro-

podeum rugoso-reticulate, with enclosures punctured. Outer surface of foretibia bearing relatively long decumbent-suberect hairs. Petiole longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite largely smooth and shining, but sometimes weakly punctured around its articulation with postpetiole.

Minor. — Frons and dorsal face of vertex smooth and shining, or very weakly punctured or rugoso-punctate; area between antennal insertion and eye rugose or rugoso-punctate; preoccipital carina well-developed; median part of clypeus with a zigzag or ramified (but rarely straight) median carina which is usually accompanied with weak rugulae; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye shorter than antennal segment X. Promesonotal dome smooth and shining, or in dorsal view concentrically rugose, with a median area smooth and shining or very weakly punctured; the posterior slope of the dome with a low mound which bears several (>2) standing hairs; humerus in dorso-oblique view not or hardly produced; mesopleuron, metapleuron and lateral face of propodeum punctured, usually overlain by weak rugoso-reticulation; propodeal spine horn-like or elongate-triangular, narrowly based, directing relatively upward. Petiole longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: The syntype major of *Pheidole peguensis* r. *yomensis* Forel agrees with the majors of Thai populations of *Pheidole plagiaria* (e.g., Eg01-TH-083). Thus, I here synonymize *Pheidole peguensis* r. *yomensis* with *P. plagiaria*. Three *Pheidole* minors which are pinned together and labeled as "*Ph plagiaria* Sm v. *moica* For .... Moïs Cochinchine (Dugas)" were examined (MHNG). The top of the pin is undoubtedly a minor of *Pheidole plagiaria*, while the middle is the other *Pheidole* species, and the bottom is *Pheidologeton* sp. Forel (1911) described "*P. plagiaria* var. *moica*" based on the major subcaste, and so I refrain from resolving the synonymy.

This species is characterized among Indo-Chinese species by the combination of the following features: in the major posterior margin of head in full-face view relatively widely and deeply concave; in the major the posteriormost part of the dorsum of vertexal lobe almost transversely rugose; in the major and minor the posterior slope of promosonotal dome with a prominence or mound; in the major outer surface of foretibia bearing relatively long decumbent-suberect hairs; in the minor median part of clypeus with a zigzag or ramified (but rarely straight) median carina which is usually accompanied with weak rugulae. The minor of this species is similar to that of *P. binghami*, but in the latter median part of clypeus has no rugula and the mound on the posterior slope of promesonotal dome has only a pair of hairs.

Distribution & bionomics: Widely distributed in the Indo-Chinese, Indo-Malayan subregions and Austro-Malayan subregion. Indo-Malayan populations inhabit well-developed forests, and usually nest in rotting logs and wood fragments. On the other hand, Indo-Chinese populations often occur in forest edges and even in open lands adjacent to forests, and usually nest in the soil (Eguchi 2001).

Pheidole planifrons **Santschi**

Figs. 21a–g

Pheidole planifrons Santschi, 1920: 166. Eguchi, Bui *et al.* 2005: 90 (checklist). Syntypes: 2 majors & 3 minors, "Indochine Dalat (Bouvard)" [Dalat, Lam Dong, S. Vietnam], NHMB, examined.

Pheidole sp. eg-75 (? *planifrons* Santschi). Eguchi 2003: 337–338 (description of male genitalia).

Other material examined: Vietnam: Vinh Phuc: Tam Dao, <900 m alt. [Eg99-VN-073]; Bac Giang: W. Yen Tu N.P. (= Tay Yen Tu N.P.), 21°10–11'N, 106°43–44'E, 190 m alt. [Eg03-VN-015]; Nghe An: Pu Mat N.P. (Pha Lai Area) [Eg25iii06-12]; Dong Nai: S. Cat Tien N.P., < 160 m alt. [Eg04-VN-500, -555, -566, -626, -679]. Thailand: Chiang Mai: Doi Suthep-Pui, 800–900 m alt. [Eg01-TH-095, -097, -103, -107, -109], Doi Chiang Dao [Eg01-TH-127, -129, -133, -150, -153]; Nakhonratchashima: nr. Sakaerat Environmental

Research Centre [Eg01-TH-504, -512, -548]; Trang: Khao Chong Waterfall [Eg01-TH-670, -693, -695, -701]; Songkhla: Ton Nga Chang, nr. Hat Yai [Eg01-TH-625]; Narathiwat: Bala area of Bala-Hala W.S. [Eg01-TH-630]. Indonesia: W. Java: Kebun Raya, Bogor [FI90-21, FI95-736], Cidaon, Ujung Kulon N.P. [FI97-125, -135].

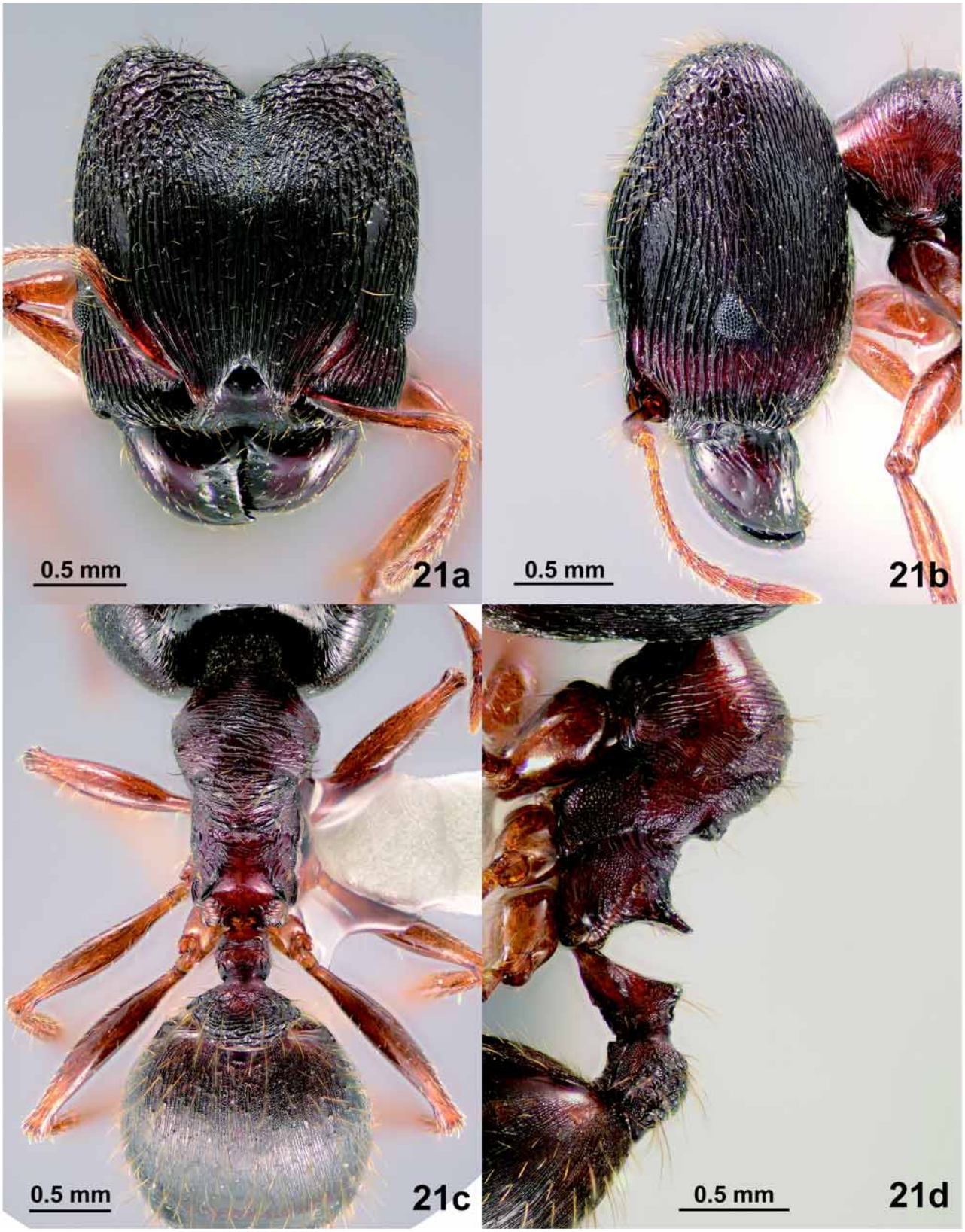

FIGURE 21a–d, *Pheidole planifrons*, major [Eg25iii06-12] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

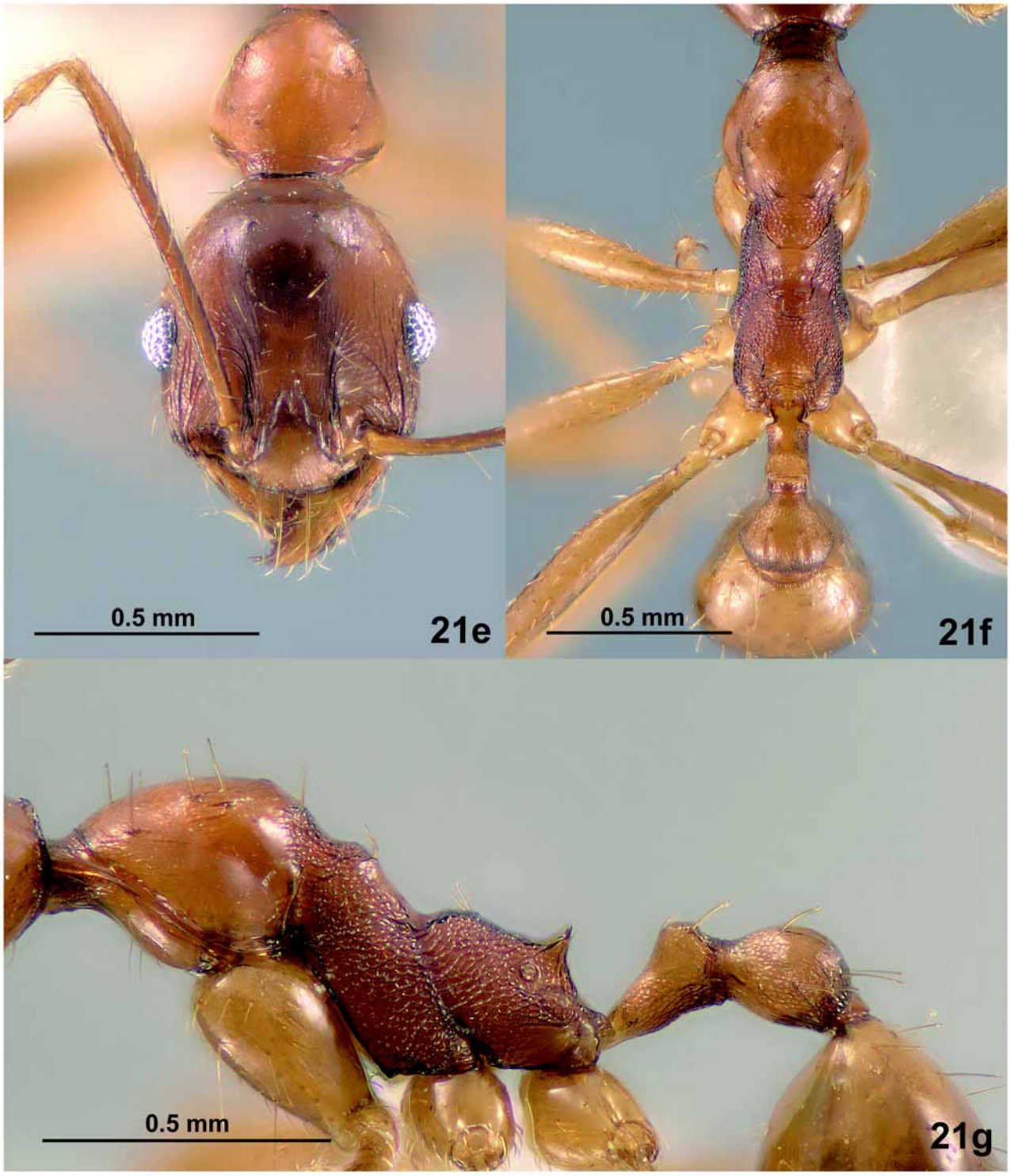

FIGURE 21e–g, *Pheidole planifrons*, minor [Eg25iii06-12] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Worker measurements & indices: Major (n=5). — HL 2.01–2.11 mm; HW 1.75–1.85 mm; CI 86–88; SL 0.84–0.92 mm; SI 45–51; FL 1.38–1.44 mm; FI 75–81.

Minor (n=5). — HL 0.65–0.71 mm; HW 0.54–0.57 mm; CI 80–83; SL 0.83–0.87 mm; SI 153–155; FL 0.90–0.98 mm; FI 167–172.

Worker description

Major. — Head in lateral view with vertex which forms a gentle (and often weakly impressed) slope

toward vertexal lobe; frons flat, densely rugose longitudinally, with sparse and very short appressed hairs, but without standing hairs except on the marginal area; vertex and dorsal and lateral faces of vertexal lobe reticulate or rugoso-reticulate, with standing hairs; frontal carina well developed horizontally, partly overhanging antennal scrobe; clypeus without median longitudinal carina; hypostoma without median and submedian processes, but with relatively small or low lateral processes; outer surface of mandible (excluding area around the base) smooth, with sparse and very short appressed hairs; antenna with a 3-segmented club; maximal diameter of eye longer than or almost as long as antennal segment X. Promesonotal dome in dorsal view rugose or rugoso-reticulate transversely, with interspaces/enclosures smooth or weakly punctured; the dome in lateral view with a conspicuous prominence or mound on its posterior slope; humerus very weakly produced laterad; the dome at the humeri as broad as or narrower than at the bottom. Petiole (a little) longer than postpetiole (excluding helcium); petiolar node in rear view weakly to strongly concave mediodorsally; postpetiole not massive. First gastral tergite longitudinally rugoso-punctate entirely (but its posteromedian part often polished).

Minor. — Dorsum of head with sparse thick standing hairs; frons and vertex smooth or shagreened; preoccipital carina conspicuous dorsally and laterally; median part of clypeus smooth and shining; median longitudinal carina of clypeus absent, or present but very weak; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye shorter than antennal segment X. Dorsum of mesosoma with sparse thick and short standing hairs which are somewhat stubbed apically; promesonotal dome largely smooth and shining, in lateral view with a low mound on its posterior slope; humerus in dorso-oblique view not produced; mesopleuron, metapleuron and lateral face of propodeum well punctured. Petiole as long as or a little longer than postpetiole (excluding helcium); postpetiole relatively large.

Recognition: This species is well characterized among Indo-Chinese species by the combination of the following features: in the major frontal carina well developed horizontally, partly overhanging antennal scrobe; in the major gena much more than 1.5 times as long as maximal diameter of eye; in the minor frons and vertex smooth or shagreened; in the minor preoccipital carina conspicuous dorsally and laterally; in the major hypostoma without median and submedian processes; in the major and minor posterior slope of promesonotal dome with a mound; in the minor dorsum of mesosoma sparsely with thick and short standing hairs which is somewhat stubbed apically; in the major first gastral tergite longitudinally rugoso-punctate entirely or largely.

This species is similar to *P. yeensis* Forel. In the major of the latter, however, vertex in lateral view is strongly impressed in front of vertexal lobe; and frons is sparsely sculptured with longitudinal rugulae. The majors of this species and *P. capellinii* are similar to each other, but morphology of the minor is very different between the two (see under *P. capellinii*).

Distribution & bionomics: Known from N. Vietnam, S. Vietnam, Thailand and Java. This species occurs from forest edges to rather woody habitats, and nests in the soil and rarely in the walls of termite mounds on the ground.

***Pheidole rabo* Forel**
Figs. 22a–g

Pheidole rabo Forel, 1913c: 28–30. Eguchi 2001a: 21–22 (lectotype designation, redescription of major & minor), Eguchi 2001b: 102–104 (redescription of major & minor), Eguchi, Bui *et al.* 2005: 90 (checklist), Eguchi, Yamane & Zhou 2007: 276–279 (reconfirmation of lectotype designation, redescription of major & minor). Lectotype: major, “No. 54a Maxwell’s Hill Taiping Malacca (v. Buttel)” [W. Malaysia], MHNG, examined; paralectotypes: 1 major & 2 minors, same data as the lectotype, MHNG, examined; 2 queens, “No 643 Bandar Baroe Sumatra Malacca (v. Buttel)”, MHNG, examined; original description also included syntype(s) from “Beras Tagi”, not examined.

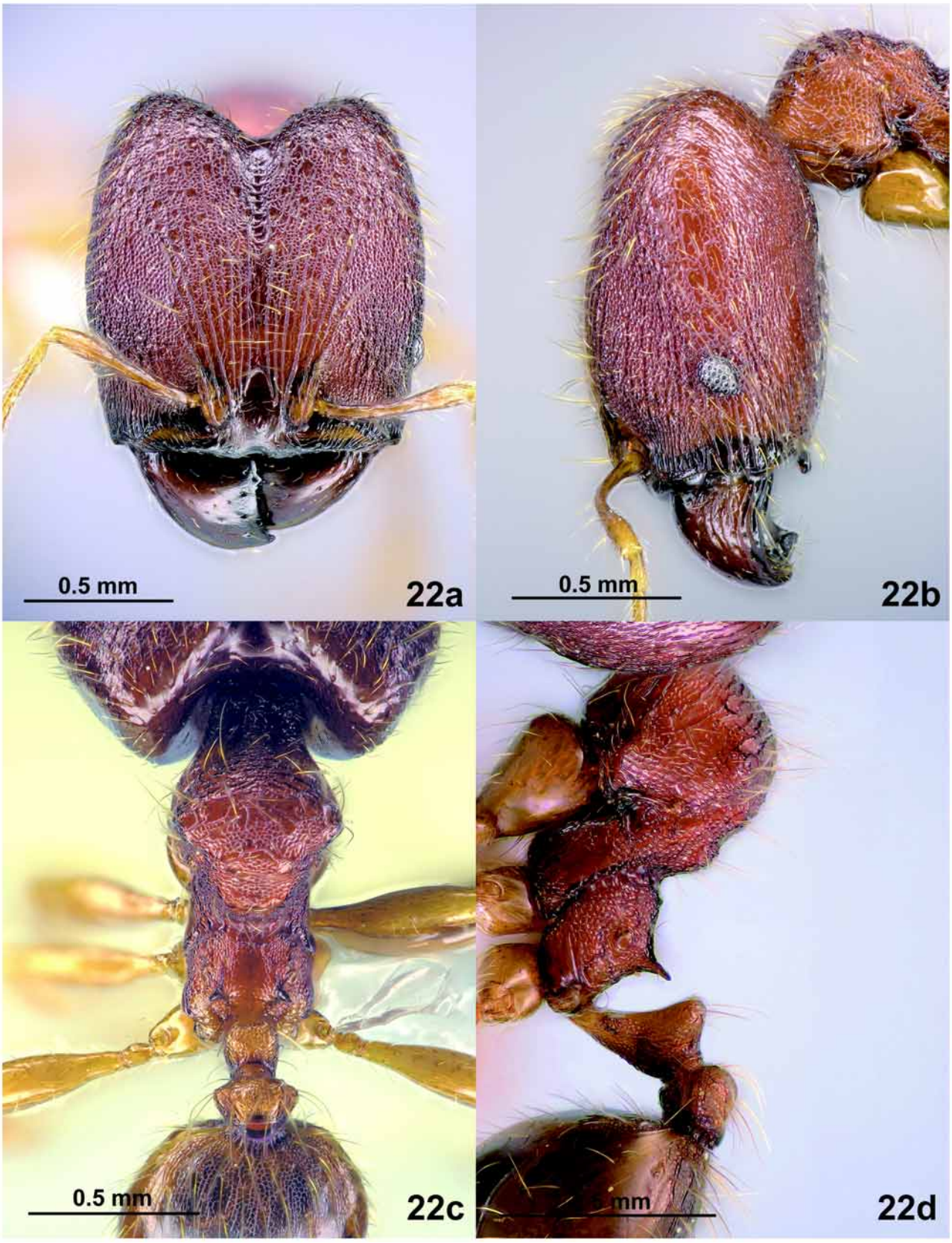

FIGURE 22a–d, *Pheidole rabo*, major [Eg01-VN-232] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

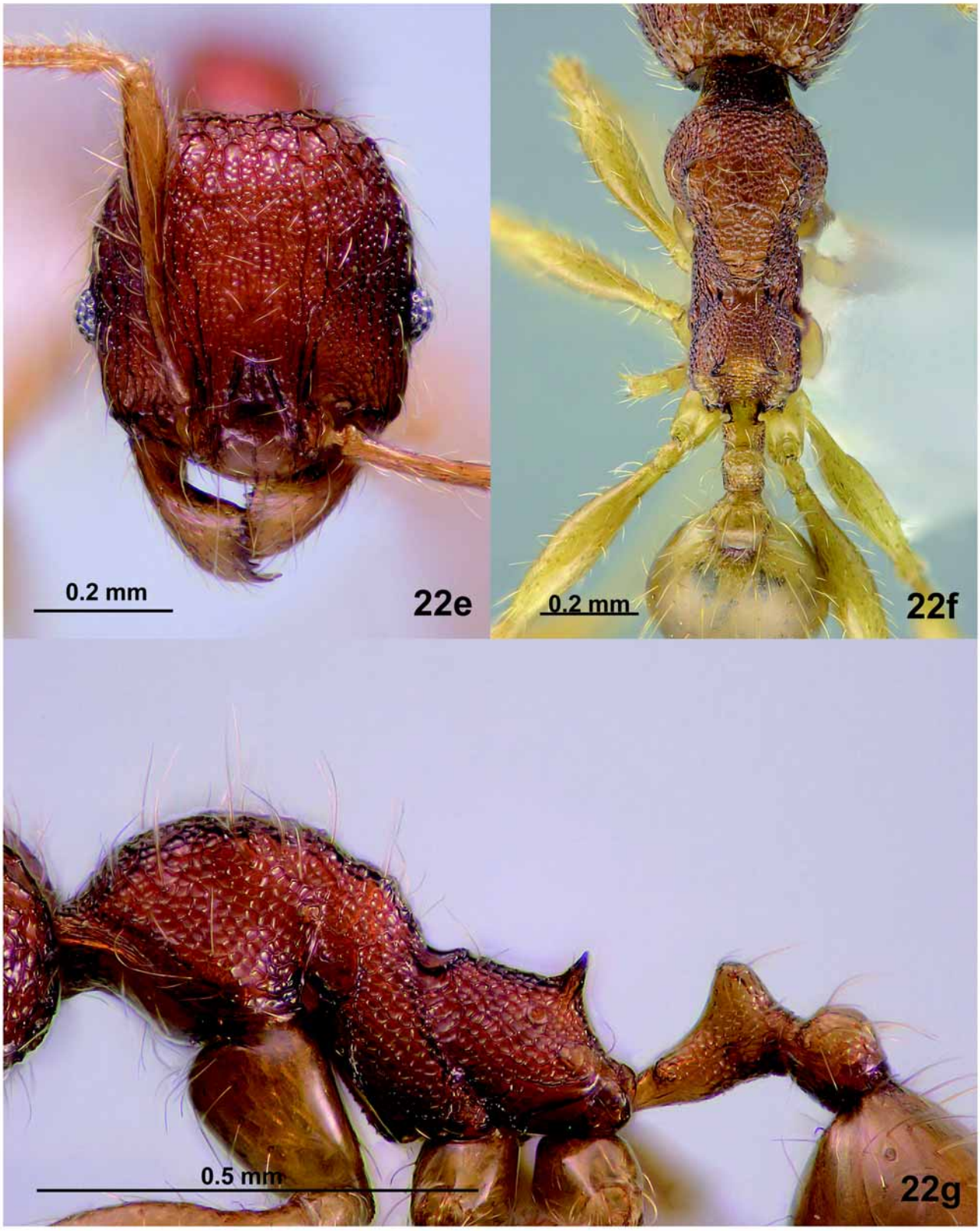

FIGURE 22e–g, *Pheidole rabo*, minor [Eg01-VN-232] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Pheidole concinna Wheeler, 1928: 13–16, junior primary homonym of *P. concinna* Santschi, 1910: 362. Lectotype: major, "Laokay, Indo-China, 2-22-25, F. Silvestri", MCZC cotype-20656, examined; paralecto-

types: 1 major & 6 minors, same data as the lectotype, MCZC cotype-20656, examined.

Pheidole tsailuni Wheeler, 1929: 2, replacement name for *Pheidole concinna*. Eguchi 2001a: 30–32 (lectotype designation & redescription of major & minor), Yamane *et al*. 2003: 57 (checklist), Eguchi, Yamane & Zhou 2007: 276–279 (junior synonym of *rabo*).

Other type examined: S. China: Hong Kong: Taipo Kau N.P., New Territory [Eg00-HK-014, -015, -16, -23, -029]. Taiwan: Nantou: Wushe [S. Kubota's sample 82-A-J14], Lushan Hot Spring [S. Kubota's sample 80-E-G8, 80-E-G2]. Vietnam: Bac Giang: W. Yen Tu N.P. (= Tay Yen Tu N.P.), 21°10–11'N, 106°43–44'E, ca. 170 m alt. [Eg03-VN-080], W. Yen Tu N.P., ca. 190 m alt. [Eg03-VN-009, -019, -029], W. Yen Tu N.P., 240 m alt. [Eg03-VN-113]; Quang Ninh: Chua Yen Tu, 21°09'N, 106°43'E, 720–845 m alt. [Eg04-VN-051], Ky Thuong N.R., 21°09–11'N, 107°06–07'E, 160 m alt. [Eg03-VN-178], Ky Thuong N.R., 550 m alt. [Eg03-VN-231, -238]; Ha Tay (mislabeled as Ha Tai): Ba Vi N.P., 400–800 m alt., [Eg99-VN-113, -122; Eg01-VN-229, -232; Eg02-VN-047, -058]; Ninh Binh: Cuc Phuong N.P., 20°14'N, 105°36'E [Eg01-VN-175, -188]; Nghe An: Pu Mat N.P. (Khe Kem Area, 18°58'N, 104°48'E, 255 m alt.) [Eg15iii06-01]; Dong Nai: S. Cat Tien N.P., < 160 m alt. [Eg04-VN-766]. Thailand: Phang-nga: Khao Sok N.P., 08°55'N, 98°36'E [A. Schulz leg.]; Trang: Khao Chong Waterfall [Eg01-TH-724, -733]; Songkhla: Songkhla Univ. (Khao Kor Hong) [Eg01-TH-599], Ton Nga Chang, nr. Hat Yai [Eg01-TH-621]; Narathiwat: Bala area of Bala-Hala W.S. [Eg01-TH-687]. W. Malaysia: Selangor: Ulu Gombak [FI92MG-111, -203, -468, -511, -576, -577]; Johor: Kota Tinggi [FI92MKT-5]. E. Malaysia: Sabah: Gunong Rara [Eg97-BOR-588].

Worker measurements & indices: Major (data from Eguchi, Yamane & Zhou 2007). — HL 1.11–1.53 mm; HW 1.06–1.42 mm; CI 91–95; SL 0.49–0.59 mm; SI 42–49; FL 0.65–0.87 mm; FI 58–67.

Minor (data from Eguchi, Yamane & Zhou 2007). — HL 0.49–0.60 mm; HW 0.43–0.53 mm; CI 87–91; SL 0.45–0.53 mm; SI 100–108; FL 0.48–0.61 mm; FI 105–116.

Worker description

Major. — Head in lateral view not or very weakly impressed on vertex; frons longitudinally rugose; vertex rugoso-reticulate; dorsal and dorsolateral faces of vertexal lobe reticulate, with enclosures smooth to punctured; frontal carina absent or inconspicuous (present just as rugulae); antennal scrobe absent; median longitudinal carina on clypeus absent or conspicuous; hypostoma with low or inconspicuous median and well-developed submedian processes in addition to conspicuous (but sometimes reduced) lateral processes; outer surface of mandible (excluding area around the base) smooth or dimly rugose, sparsely with a (very) short appressed hairs; antenna with a 3-segmented club; maximal diameter of eye (a little) longer than antennal segment X. Promesonotal dome in lateral view at most with an inconspicuous mound on its posterior slope; humerus weakly produced laterad; the dome at the humeri as broad as or broader than at the bottom (or sometimes a little narrower than at the bottom). Petiole much longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite weakly rugoso-punctate usually in its anterior 1/2 or more (at least around articulation with postpetiole).

Minor. — Dorsum of head punctured dorsally and laterally, and often overlain by weak rugoso-reticulation dorsally; preoccipital carina very weak or inconspicuous dorsally; median part of clypeus smooth, weakly punctured or weakly reticulate; median longitudinal carina absent, inconspicuous or weak; antenna with a 3-segmented club; scape usually exceeding posterior margin of head by almost the length of antennal segment II or more (but sometimes by the half length of II); maximal diameter of eye almost as long as or a little shorter than antennal segment X. Dorsal and lateral faces of mesosoma punctured; punctation on dorsum of promesonotal dome often overlain sparsely by weak rugulae; promesonotal dome in lateral view at most with an inconspicuous mound on its posterior slope; humerus in dorso-oblique view produced weakly or very weakly; propodeal spine elongate-triangular. Petiole (much) longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: This species is distinguishable among Indo-Chinese species by the combination of the following characteristics: in the minor head punctured dorsally and laterally; in the major frontal carina absent or

inconspicuous (present just as rugulae); in the major antennal scrobe absent; in the major submedian processes of hypostoma well developed; in the minor maximal diameter of eye almost as long as or a little shorter than antennal segment X; in the minor scape exceeding posterior margin of head usually by almost the length of antennal segment II or more; in the minor mesosoma punctured; in the major and minor promesonotal dome in lateral view at most with an inconspicuous mound on its posterior slope.

This species is very similar to *P. parva*, but distinguishable from the latter of which the minor has the following characteristics: scape exceeding posterior margin of head by less than half length of antennal segment II, or not reaching the posterior margin; maximal diameter of eye longer than antennal segment X.

Distribution & bionomics: Widely distributed in Indo-Chinese and Indo-Malayan subregions. This species inhabits usually well-developed forests but sometimes forest edges or bamboo forests, and nests under shelters (e.g., stones) or rarely in rotting logs on the ground.

***Pheidole rugithorax* sp.n.**
Figs. 23a–g

Pheidole sp. eg-141. Eguchi, 2003: 338 (description of male genitalia).

Type material examined: Holotype: major, Pha Lai (near forestry station), Pu Mat N.P., Nghe An, N. Vietnam [K. Eguchi leg., colony: Eg26iii06-09] (IEBR); paratypes: 13 majors, 15 minors & 1 queen from the same colony as holotype (IEBR, MCZC, MHNG & ACEG).

Other material examined: S. Vietnam: Dong Nai: S. Cat Tien N.P., < 160 m alt. [Eg04-VN-694]. Thailand: Chiang Mai: Doi Suthep-Pui N.P., ca. 900 m alt. [Eg01-TH-084]; Kanchanaburi: Srinakarin Dam N.P., 150–200 m alt. [TH02-SKY-11]; Chanthaburi: Khao Soi Dao [Eg01-TH-052]. Myanmar: Cat & Kitten Island [Ecoswiss 28/ii/1999]. Eguchi's informal species code "*Pheidole* sp. eg-141" applies to this species.

Worker measurements: Holotype (major). —HL 1.21 mm; HW 1.18 mm; CI 98; SL 0.72 mm; SI 61; FL 0.91 mm; FI 77.

Nontype major (n=4). — HL 1.01–1.21 mm; HW 0.96–1.18 mm; CI 95–99; SL 0.64–0.72 mm; SI 61–69; FL 0.77–0.91 mm; FI 77–85.

Minor (n=5, including one paratype minor, for HL, HW, CI, SL, SI; n=4 including one paratype minor, for FL, FI). — HL 0.55–0.67 mm; HW 0.49–0.59 mm; CI 86–89; SL 0.64–0.76 mm; SI 123–137; FL 0.66–0.81 mm; FI 135–145.

Worker description

Major. — Head in lateral view not impressed on vertex; dorsum of head sparsely bearing long standing hairs which are unclearly distinguished from shorter and thinner background hairs; frons rugose longitudinally; vertex reticulate or rugoso-reticulate; dorsal and dorsolateral faces of vertexal lobe reticulate; frontal carina conspicuous; antennal scrobe inconspicous or very shallow; median longitudial carina of clypeus absent, or present but weak; median and submedian processes of hypostoma absent or inconspicuous; lateral processes developed well, located rather ventrally; antenna with a 3-segmented club; maximal diameter of eye almost as long as, or a little longer than antennal segment X. Promesonotal dome in dorsal view reticulate, or transversely rugose or rugoso-reticulate, in lateral view with a low or inconspicouous mound on its posterior slope; humerus of the dome not or hardly produced; the dome at the humeri narrower than at the bottom; petiole almost as long as, or a little longer than postpetiole (excluding helcium). Petiolar node in lateral view subangulate dorsally; postpetiole massive. First gastral tergite smooth and shining entirely.

Minor. — Frons smooth to shagreened; vertex smooth, shagreened or sculptured (rugoso-reticulate or rugoso-punctate); dorsolateral face of head behind eye rugoso-reticulate or rugoso-punctate at least weakly; preoccipital carina conspicuous to weak dorsally and aterally; median part of clypeus smooth and shining,

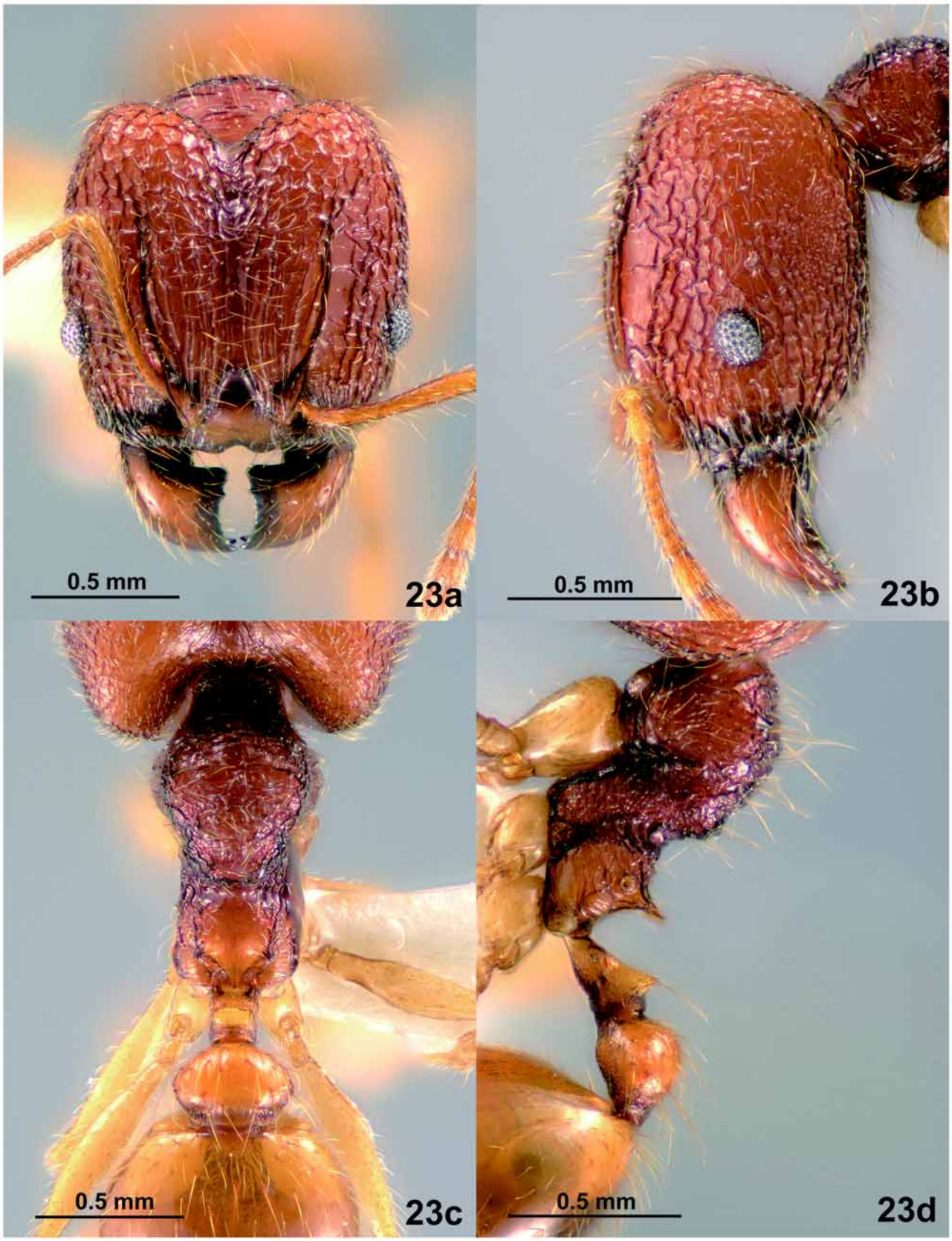

FIGURE 23a–d, *Pheidole rugithorax* sp.n., holotype (major) [Eg26iii06-09] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

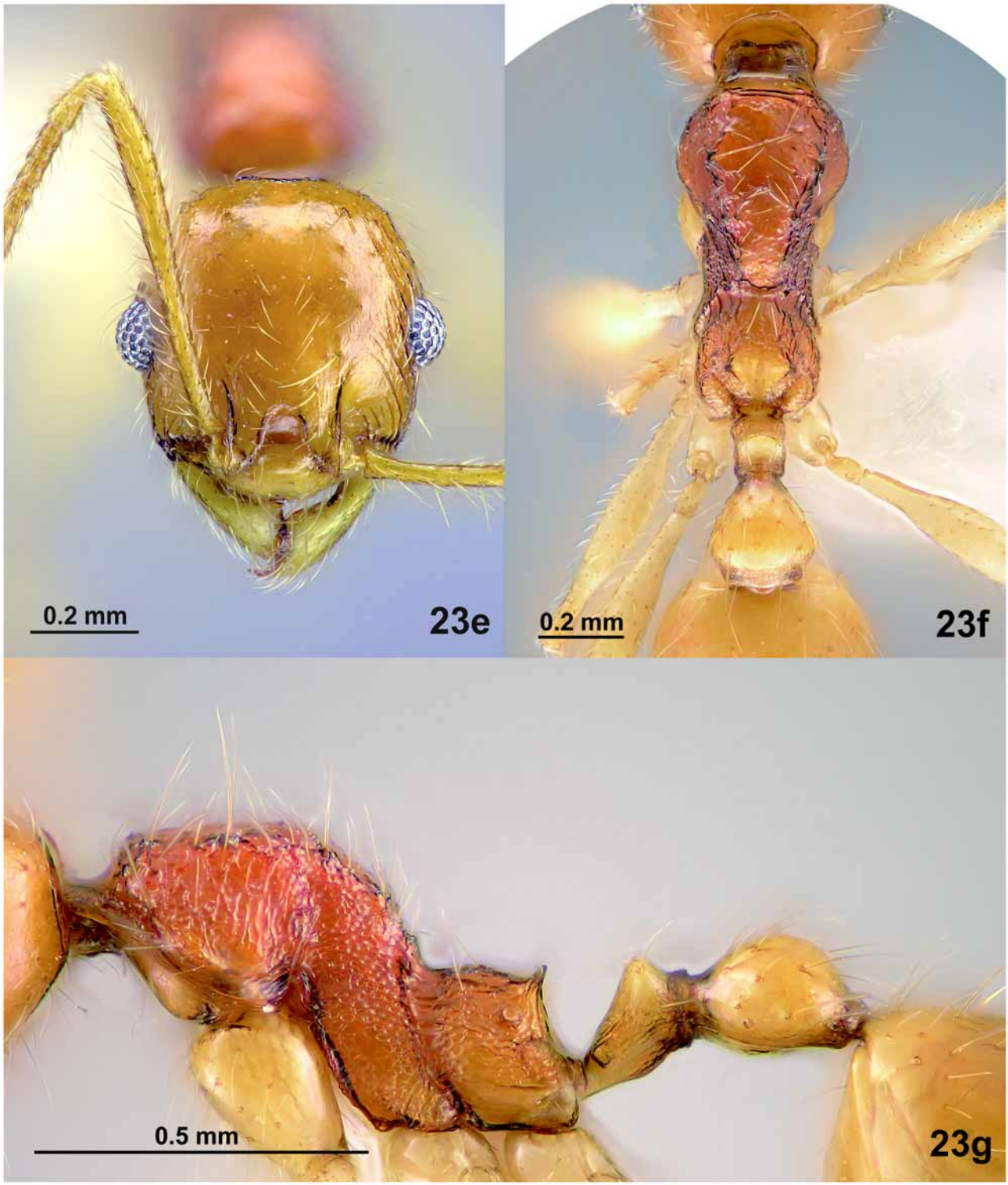

FIGURE 23e–g, *Pheidole rugithorax* sp.n., paratype minor [Eg26iii06-09] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

without a median longitudinal carina; antenna with a 3-segmented club; scape extending far beyond postero-lateral margin of head; maximal diameter of eye almost as long as, or a little shorter than antennal segment X. Promesonotal dome in lateral view usually flattend dorsally (but rarely convex as in the minor of colony Eg01-TH-084), with a low or inconspicuous mound on its posterior slope; dorsum of the dome rugoso-reticulate, or smooth to shagreened but sparsely sculptured with rugulae; lateral face of the dome rugoso-reticulate

or rugoso-punctate at least weakly; humeral area of the dome marked with rugulae, and often forming a low prominence; mesopleuron, metapleuron and lateral face of propodeum punctured or rugoso-punctate weakly, or largely smooth. Petiole as long as or shorter than postpetiole (excluding helcium); postpetiole massive.

Recognition: In Southeast Asia I have recognized two *Pheidole* species (*P.* sp. eg-141 and *P.* sp. eg-174) which, in the major worker, much resemble each other and are also very similar to *P. protea*. Practically these three are hard to separate in the major (and so Eguchi (2004) determined *P.* sp. eg-141 as *P. protea*). However, *P.* sp. eg-141 and *P.* sp. eg-174 are separable from each other by the characteristics of the minor. In the minor of *P.* sp. eg-141 the promesonotal dome is sculptured by rugulae at least laterally, and its humeral area is strongly maked with rugulae and often armed with a low humeral prominence. On the other hand, in the minor of *P.* sp. eg-174, the dome is almost smooth and shining, and its humeral area is neither marked with rugulae nor armed with a humeral prominence. Since *P. protea* was described solely based on the major, the assignment of either of *P.* sp. eg-141 or *P.* sp. eg-174 to *P. protea* would be impossible until decisive characters useful in separating these three in the major are found. In this situation it seems unreasonable to leave *P.* sp. eg-141 and *P.* sp. eg-174 unnamed. Here I describe *P.* sp. eg-141 and *P.* sp. eg-174 as new species (*Pheidole rugithorax* sp.n. and *P. laevithorax* sp.n., respectively).

***Pheidole smythiesii* Forel**
Figs. 24a–g

Pheidole (*Ceratopheidole*) *smythiesii* Forel, 1902: 165, 185. Syntypes: 2 majors, 3 minors & 3 males, "Assam (Smythies) LXVII 8, 17 et 11." [Assam, India], MHNG, examined; 1 major, "Assam (Smythies) LXVII 10", MHNG, examined; 1 queen, "Assam Smythies XCV 4", MHNG, examined.

Pheidole smythiesii Forel. Bolton 1995: 330 (revived combination in *Pheidole*), Bui & Eguchi 2003: 9 (checklist), Eguchi 2003: 335–336 (redescription of male), Eguchi, Bui *et al*. 2005: 90 (checklist).

Ceratopheidole smythiesii Forel. Emery 1922: 113.

Pheidole (*Ceratopheidole*) *smythiesii* var. *bengalensis* Forel, 1902: 186. **Syn.n.** Syntype: 1 minor, Bengal, India, MHNG, examined.

Pheidole smythiesii subsp. *bengalensis* Forel. Bolton 1995: 318 (revived combination). **Syn.n.**

Ceratopheidole smythiesii var. *bengalensis* Forel. Emery 1922e: 113. **Syn.n.**

Pheidole bhavanae Bingham, 1903: 228–229. Bolton 1995: 318 (revived combination in *Pheidole*). **Syn.n.** Syntypes: 1 major, "Sikkim Darjiling Senchal 8000ft 4. 1900 Bingham" [India; according to the original description Rogers collected the material], BMNH, examined; original description also included syntype minor(s) from the same locality, not examined.

Ceratopheidole bhavanae Bingham. Emery 1922e: 113. **Syn.n.**

Other material examined: S. China: Guizhou: Huajiang near Sha Dong, Guanling [L. Latella]; Guangxi: Mao Er Shan, 690 m alt. [Eg00-GNGX-040, -041, -042]. Vietnam: Vinh Phuc: Tam Dao N.P., 900–1240 m alt. [VN98-SKY-13; VN98-HO-011]; Ha Tay (misspelled as "Ha Tai"): Ba Vi N.P., 21°03'N, 105°22'E, 800 m alt. [Eg02-VN-052]; Nghe An: Pu Hoat [T.V. Bui], Pu Hoat, ca. 750 m alt., primary forest [T.V. Bui's bottles: C, E, G, H, I]. Thailand: Chiang Mai: Doi Suthep-Pui N.P. [Sk. Yamane], Doi Suthep-Pui N.P., 800–900 m alt., dry evergreen forest [Eg01-TH-067, -068, -070, -075, -077, -094]. India: Himachal Pradesh: Riwalsar, 1300 m alt. [H. Bharti].

Worker measurements & indices: Major (n=5). — HL 2.63–3.03 mm; HW 2.63–3.09 mm; CI 95–102; SL 1.34–1.46 mm; SI 45–53; FL 2.26–2.39 mm; FI 74–86.

Minor (n=5). — HL 0.95–1.19 mm; HW 0.82–1.03 mm; CI 86–91; SL 1.13–1.33 mm; SI 124–140; FL 1.38–1.67 mm; FI 156–168.

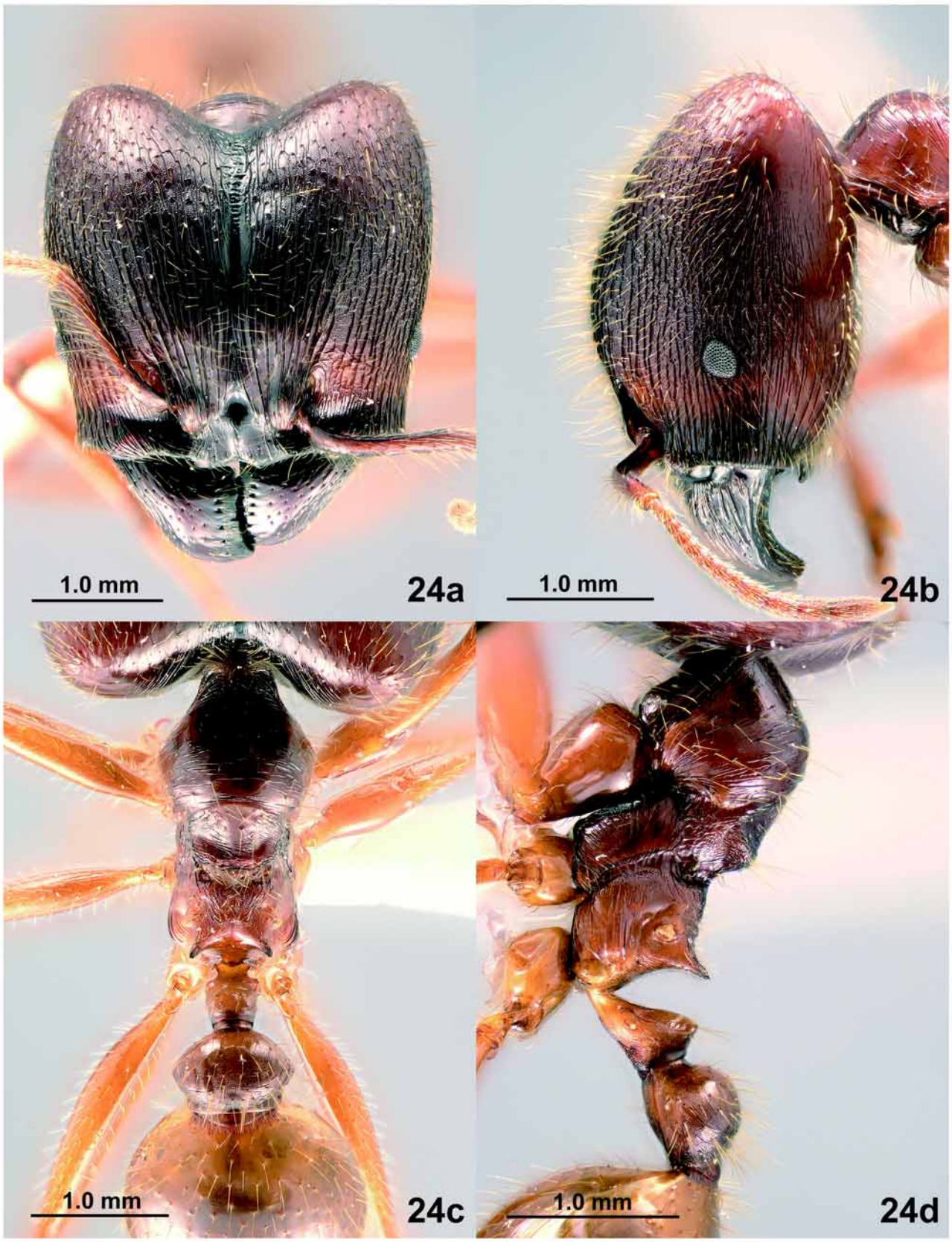

FIGURE 24a–d, *Pheidole smythiesii*, major [T.V. Bui's bottle I] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

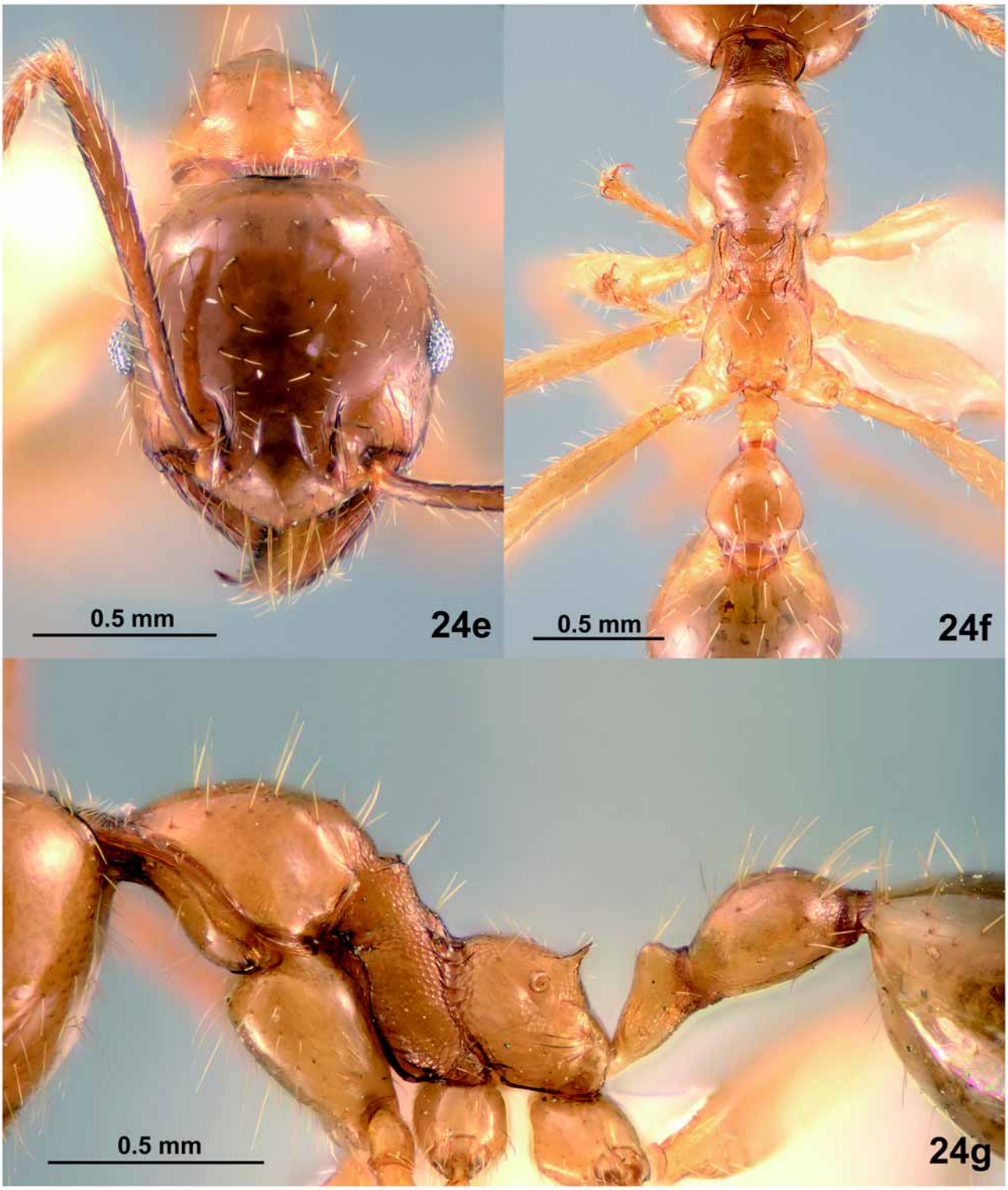

FIGURE 24e–g, *Pheidole smythiesii*, minor [T.V. Bui's bottle I] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Worker description

Major. — Head in lateral view usually not impressed on vertex; frons and vertex longitudinally-obliquely rugose; dorsal and dorsolateral faces of vertexal lobe rugoso-recticulate, rugoso-punctate or almost smooth; frontal carina and antennal scrobe absent; median longitudinal carina of clypeus weak or inconspicuous; median process of hypostoma low or inconspicuous, rarely with a concavity in the center; submedian pro-

cesses low or relatively well developed (but rarely very low); lateral processes conspicuous (but sometimes small); antenna with a 4-segmented club; maximal diameter of eye almost as long as or a little longer than antennal segment X. Promesonotal dome in dorsal view smooth to shagreened, usually with transverse rugulae, in lateral view usually with a conspicuous prominence, but sometimes only with an inconspicuous mound on its posterior slope; humerus not produced; the dome narrower at the humeri than at the bottom. Petiole as long as or shorter than postpetiole (excluding its helcium); postpetiole massive. First gastral tergite shagreened to smooth.

Minor. — Dorsum of head largely smooth or at most dimly punctured; preoccipital carina conspicuous dorsally and laterally; median part of clypeus smooth and shining; median longitudinal carina present at least anteriorly (but sometimes very weak); antenna with a 4-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye shorter than (but rarely as long as) antennal segment X. Promesonotal dome smooth or shagreened, sometimes with weak rugulae, in lateral view with a low mound on its posterior slope; humerus in dorso-oblique view not raised; mesopleuron, metapleuron and lateral face of propodeum weakly punctured or almost smooth. Petiole much shorter than postpetiole (excluding helcium); postpetiole massive.

Recognition: There are no distinct differences between the syntypes of *P. smythiesii* and *P. smythiesii bengalensis* Forel. In Forel's original description (Forel 1902), he mentioned that the head of the minor is longer in the latter than that in the former. The cephalic index is, however, not so different between them: CI 0.86 in the latter and CI 0.88–0.89 in the former. Thus *P. smythiesii bengalensis* is merely a local population of *P. smythiesii*. The differences between *P. smythiesii* and *P. bhavanae* shown by Bingham (1903) seem to be inadequate for separating them at the species level, and in the course of examination of the type material I also could not find definitive evidence which supports Bingham's recognition of *P. bhavanae* from *P. smythiesii*. Thus I conclude that they are conspecific.

In Vietnam only two species, *Pheidole smythiesii* and *P. gatesi*, have 4-segmented antennal clubs, and they are morphologically very similar to each other. Differences between the two species are given under the remarks of *P. gatesi*.

Distribution & bionomics: Known from the Indian and Indo-Chinese subregions. This species usually inhabits woody habitats and sometimes occurs in open lands, and nests in the soil. According to Alfred & Agarwal (1990) workers tend aphid colonies (*Micromyzus kalimponginsis*) on *Hedychium coronarium* (Zingiberaceae) in Shillong, India.

***Pheidole taipoana* Wheeler**
Figs. 25a–g

Pheidole rinae subsp. *taipoana* Wheeler, 1928: 12. Eguchi 2001a: 23 (lectotype designation), Eguchi *et al.* 2004 (ecological study). Lectotype: major, "Taipo, Silvestri" [Taipo, New Territory, Hong Kong], MCZC cotype-20670, examined; paralectotypes: 2 majors & 6 minors, same data as the lectotype, MCZC cotype-20670, examined.

Pheidole taipoana Wheeler. Eguchi, Yamane & Zhou, 2007: 271–273 (raised to species, redescription of major & minor).]

Other material examined: S. China: Guangxi: New campus of Guangxi Normal Univ., Guilin City [Eg00-GNGX-04]; Hong Kong: Taipo Kau N.P., New Territory [Eg00-HK-25]; nr. Taipo Kau N.P. [Eg00-HK-32]; Macau: Hac-Sa, Coloane I. [Eg99-MAC-13, -15]. Taiwan: Shinten, Formosa (Taiwan) [R. Takahashi leg., MCZC]. Vietnam: Quang Ninh: Ky Thuong N.R., 21°11'N, 107°07'E, ca. 210–220 m alt. [B&E03-83, -85; Eg03-VN-184, -189, -193]. Eguchi's informal species code "*Pheidole* sp. eg-73" has been applied to these specimens.

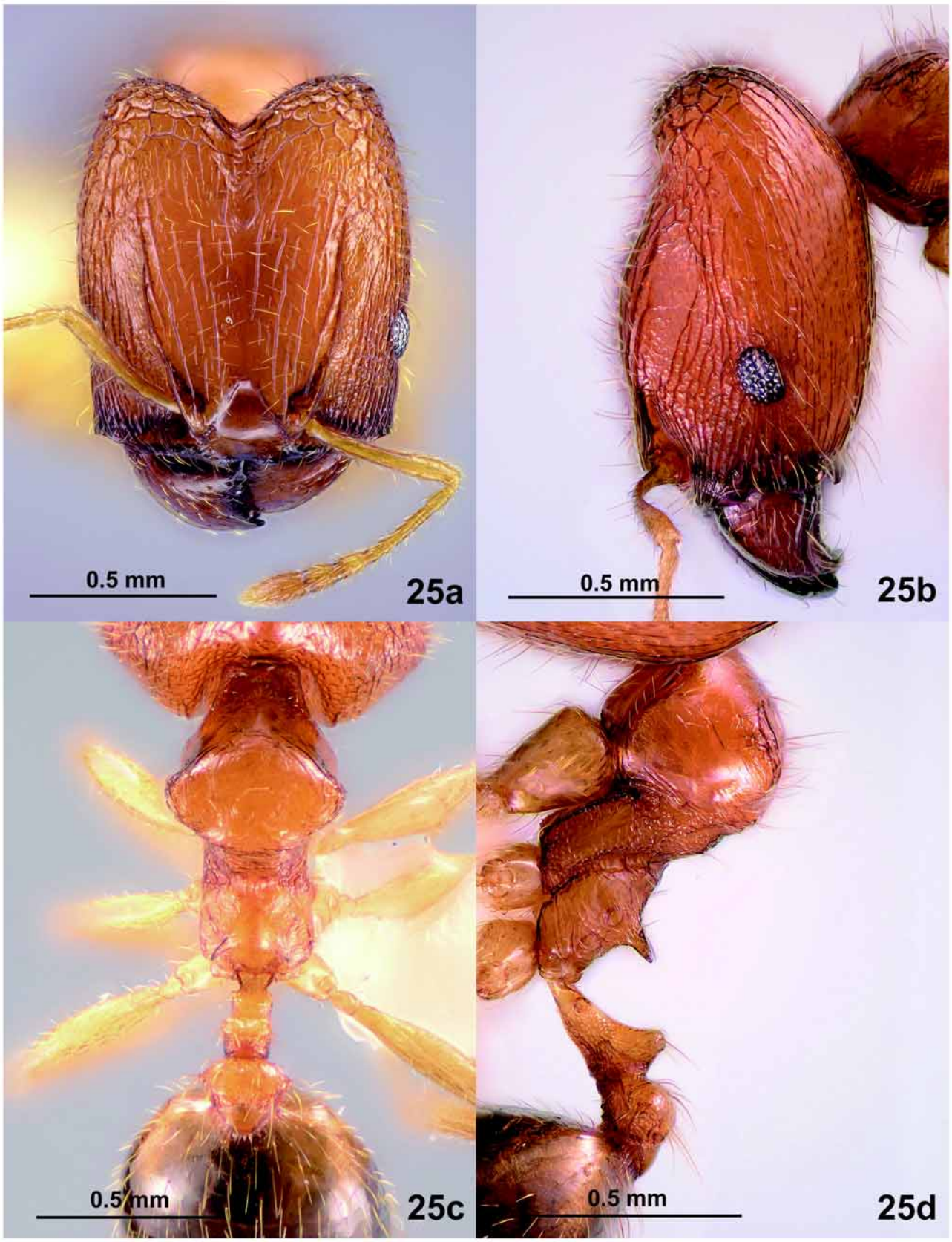

FIGURE 25a–d, *Pheidole taipoana*, major [B&E03-85] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

FIGURE 25e–g, *Pheidole taipoana*, minor [B&E03-85] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Worker measurements & indices: Major (n=6). — HL 1.00–1.08 mm; HW 0.87–0.93 mm; CI 85–88; SL 0.41–0.45 mm; SI 46–50; FL 0.58–0.62 mm; FI 66–69.

Minor (n=6). — HL 0.45–0.48 mm; HW 0.39–0.43 mm; CI 87–89; SL 0.40–0.44 mm; SI 100–104; FL 0.44–0.48 mm; FI 108–113.

Worker description

Major. — Head in lateral view strongly impressed on vertex; frons and anterior part of vertex sparsely

sculptured with weak longitudinal rugulae, with interspaces smooth; posterior part of vertex and dorsal and dorsolateral faces of vertexal lobe reticulate; frontal carina weak, extending beyond midlength of head; antennal scrobe inconspicuous; clypeus without median longitudinal carina; median and submedian processes of hypostoma conspicuous; lateral processes conspicuous to small; antenna with a 3-segmented club; maximal diameter of eye much longer than antennal segment X. Promesonotal dome at most with an inconspicuous mound on its posterior slope; humerus of the dome weakly produced laterad; the dome (a little) broader at the humeri than at the bottom. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite largely smooth and shining, or weakly puctured at most around its articulation with postpetiole.

Minor. — Head smooth and shining; preoccipital carina inconspicuous to very weak dorsally; median part of clypeus smooth and shining, without a median longitudinal carina; antenna with a 3-segmented club; scape exceeding posterior margin of head by half length or almost the length of antennal segment II; maximal diameter of eye longer than antennal segment X. Promesonotal dome smooth and shining, in lateral view at most with an inconspicuous mound on its posterior slope; humerus in dorso-oblique view not or very weakly produced; mesopleuron, metapleuron and lateral face of propodeum almost smooth or very weakly punctured; propodeal spine elongate-triangular or spiniform. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: This species is characterized among Indo-Chinese species by the following combination of features: in the major head in lateral view strongly impressed on vertex; in the minor dorsal and lateral faces of head and promesonotal dome smooth and shining; in the major frons and anterior part of vertex sparsely with weak longitudinal rugulae, with interspaces smooth and shining; in the major posterior part of vertex and dorsal and dorsolateral facecs of vertexal lobe reticulate, with enclosures punctured; in the major hypostoma in the middle with a conspicuous median process and a pair of conspicuous submedian processes; in the minor maximal diameter of eye longer than antennal segment X; in the major and minor promesonotal dome at most with an inconspicuous mound on its posterior slope.

This species is very similar to *Pheidole laevicolor* Eguchi, but distinguished from the latter which has the following characteristics of the major: head in lateral view weakly or hardly impressed on vertex; vertex reticulate entirely, with enclosures punctured.

Distribution & bionomics: Known from Vietnam, S. China and Taiwan. This species occurs more frequently in woody gardens and forest edges than in either open lands or well-developed forests, and nests in the soil (Eguchi *et al.* 2004).

***Pheidole tjibodana* Forel**
Figs. 26a–g

Pheidole nodgii var. *tjibodana* Forel, 1905c: 16. Lectotype: major, "Tjibodas, Java K. Kraepelin leg. 25-28/III/1904" [Cibodas, Java, Indonesia], MHNG, examined; paralectotypes: 1 minor & 1 queen, same data as lectotype, MHNG, examined.

Pheidole tjibodana Forel. Eguchi 2001a: 29–30 (raised to species, lectotype designation, redescription of major & minor).

Pheidole sp. eg-161. Yamane *et al*. 2003: 58.

Other material examined: Vietnam: Bac Kan: Ba Be N.P., 22°24–25N', 105°37–38', < 260 m alt. [Eg04-VN-194, -204, -207, -215]; Quang Ninh: Chua Yen Tu, 21°09'N, 106°43'E, 720–845 m alt. [Eg04-VN-024]; Ky Thuong N.R., 21°09–11'N, 107°06–07'E, 160–570 m alt. [Eg03-VN-175, -215]; Ninh Binh: Cuc Phuong N.P., 20°14'N, 105°36'E [Eg14vi05-05]; Dong Nai: S. Cat Tien N.P., < 160 m alt. [Eg04-VN-584, -644, -651]. Thailand: Nakhonratchasima: Khao Yai N.P., 900–1000 m alt. [TH00-SKY-15]; Chacheong-

sao: Lumchangwat Station, Khao Ang Rew Nai W.S. [TH03-SKY-86]; Trang: Khao Chong Waterfall [Eg01-TH-713]. W. Malaysia: Johor: Kota Tingii Fall, 100 m alt. [P.S. Ward #9586-15]. E. Malaysia: Sabah: Tawau Hills Park [Eg96-BOR-031, -039], Guong Rara [Eg97-BOR-565], Poring, 600 m alt. [T. Kikuta's colony: 6XI0106-16-1], Sayap Kinabalu [K. Eguchi's soil sample: S-27]. Indonesia: W. Java: G. Sarak, nr. Bogor [JA97-SKY-12], Halimun [FI98-382], Cibodas [K. Ohkawara's colony: 10/1a (1999)].

Worker measurements & indices: Major (n=5). — HL 0.97–1.14 mm, HW 0.95–1.05 mm, CI 89–100, SL 0.49–0.53 mm, SI 48–52, FL 0.54–0.63 mm, FI 56–61.

Minor (n=5). — HL 0.51–0.55 mm, HW 0.49–0.55 mm, CI 92–100, SL 0.42–0.47 mm, SI 84–96, FL 0.45–0.51 mm, FI 90–100.

Worker description

Major. — Head in lateral view not or hardly impressed on vertex, sometimes highly raised on the posterior part of frons; anterior part of frons longitudinally rugose; posterior part of frons, vertex and dorsal and dorso-lateral faces of vertexal lobe reticulate; frontal carina well developed horizontally, partly overhanging antennal scrobe; median longitudinal carina of clypeus absent, or sometimes present but very weak; hypostoma with a very large median process in addition to well-developed lateral processes; submedian processes nearly or completely absent; outer surface of mandible (excluding area around the base) smooth, with sparse and very short appressed hairs; antenna with a 3-segmented club; maximal diameter of eye longer or much longer than antennal segment X. Promesonotal dome in dorsal view reticulate, in lateral view at most with an inconspicuous or low mound/process on its posterior slope; humerus moderately produced laterad; the dome at the humeri as broad as or broader than at the bottom; propodeal spine usually well developed as a long horn. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite smooth to shagreened largely, or weakly punctured anteriorly and shagreened posteriorly.

Minor. — Dorsum of head well punctured and overlain by weak rugoso-reticulation, or well reticulate with enclosure weakly or dimly punctured; preoccipital carina inconspicuous or very weak dorsally; median part of clypeus rugoso-reticulate, or punctured and overlain by very weak rugoso-reticulation; median longitudinal carina absent, or present as rugula(e); antenna with a 3-segmented club; scape usually exceeding posterior margin of head by less than the length of antennal segment II, but sometimes not exceeding posterior margin; maximal diameter of eye almost as long as or a little longer than antennal segment X (but rarely a little shorther than antennal segment X). Dorsum of promesonotal dome well punctured and overlain by weak rugoso-reticulation, or well reticulate with enclosure weakly or dimly punctured; lateral face of promesonotal dome, mesopleuron, metapleuron and lateral face of propodeum well punctured; promesonotal dome in lateral view lacking a conspicuous mound on its posterior slope; humerus of the dome in dorso-oblique view produced weakly or forming a small tubercle; propodeal spine variable in size and shape. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive.

Recognition: Based on his examination of the type material Eguchi (2001a) distinguished *Pheidole tjibodana* from *P. nodgii* Forel (lectotype (major) & paralectotype minor, "Depok, Java K. Kraepelin leg. 9. III. 1904" [Jakarta, Java, Indonesia], MHNG; 1 paralectotype queen, "Buitenzorg, Java K. Kraepelin leg. 24. II. - 12. III. 1904" [Bogor, Java], MHNG) based on the following differences: posterior part of frons of the major higher in *P. tjibodana* than in *P. nodgii*; posterior slope of promesonotal dome of the minor steeper in *P. tjibodana* than in *P. nodgii*. Intermediate conditions in each of the two "diagnostic characters" were, however, observed in the present examination of nontype material. On the other hand, postpetiole of the minor of *P. nodgii* were always highly raised and somewhat globular in lateral view. I at present treat them as different species, although only two colonies (FI96-253 & FI97-551 from Bogor, W. Java) referable to *P. nodgii* have been found.

This species is well characterized among Indo-Chinese species by the combination of the following features: in the major frontal carina well developed horizontally, partly overhanging antennal scrobe; in the major

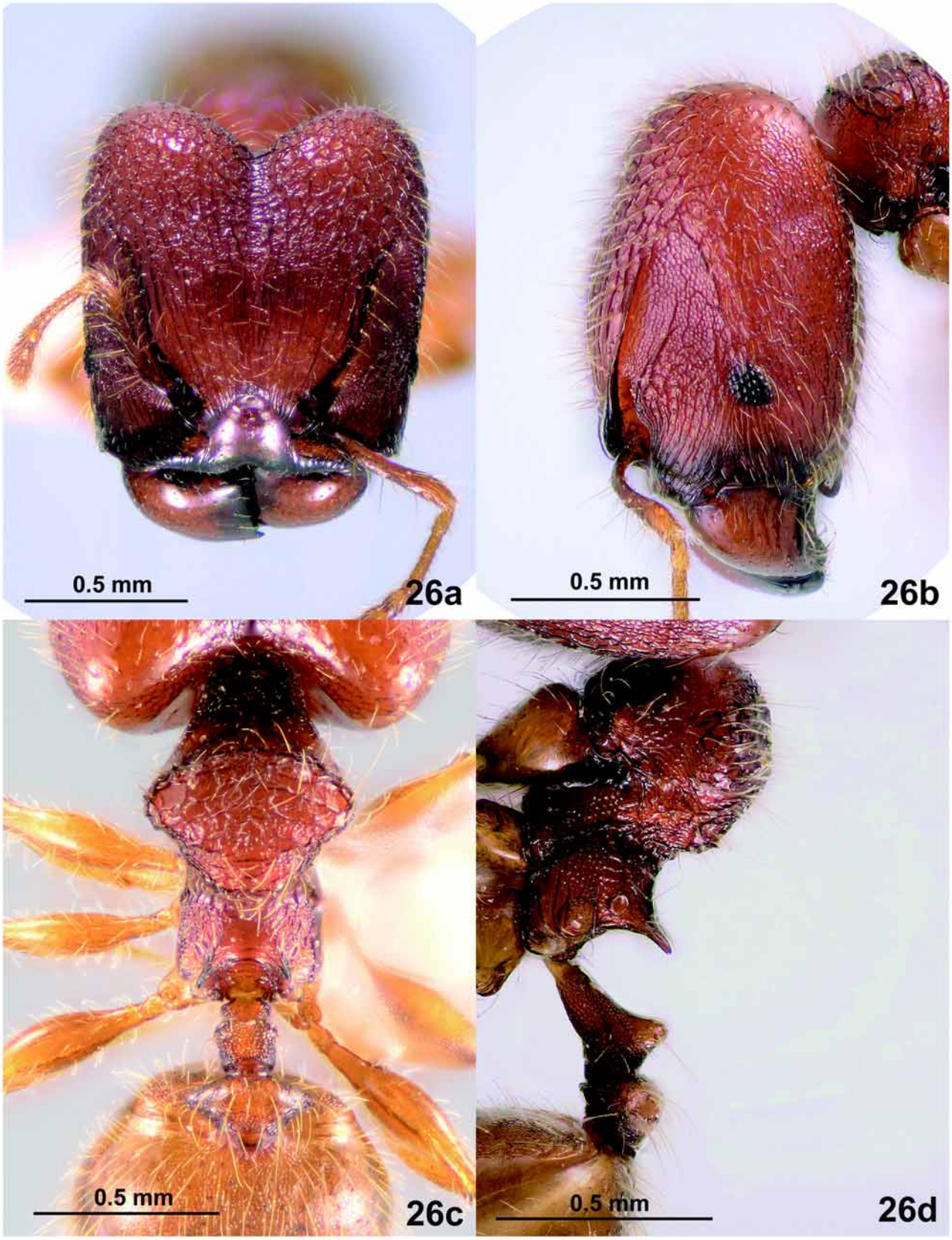

FIGURE 26a–d, *Pheidole tjibodana*, major [Eg03-VN-175] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

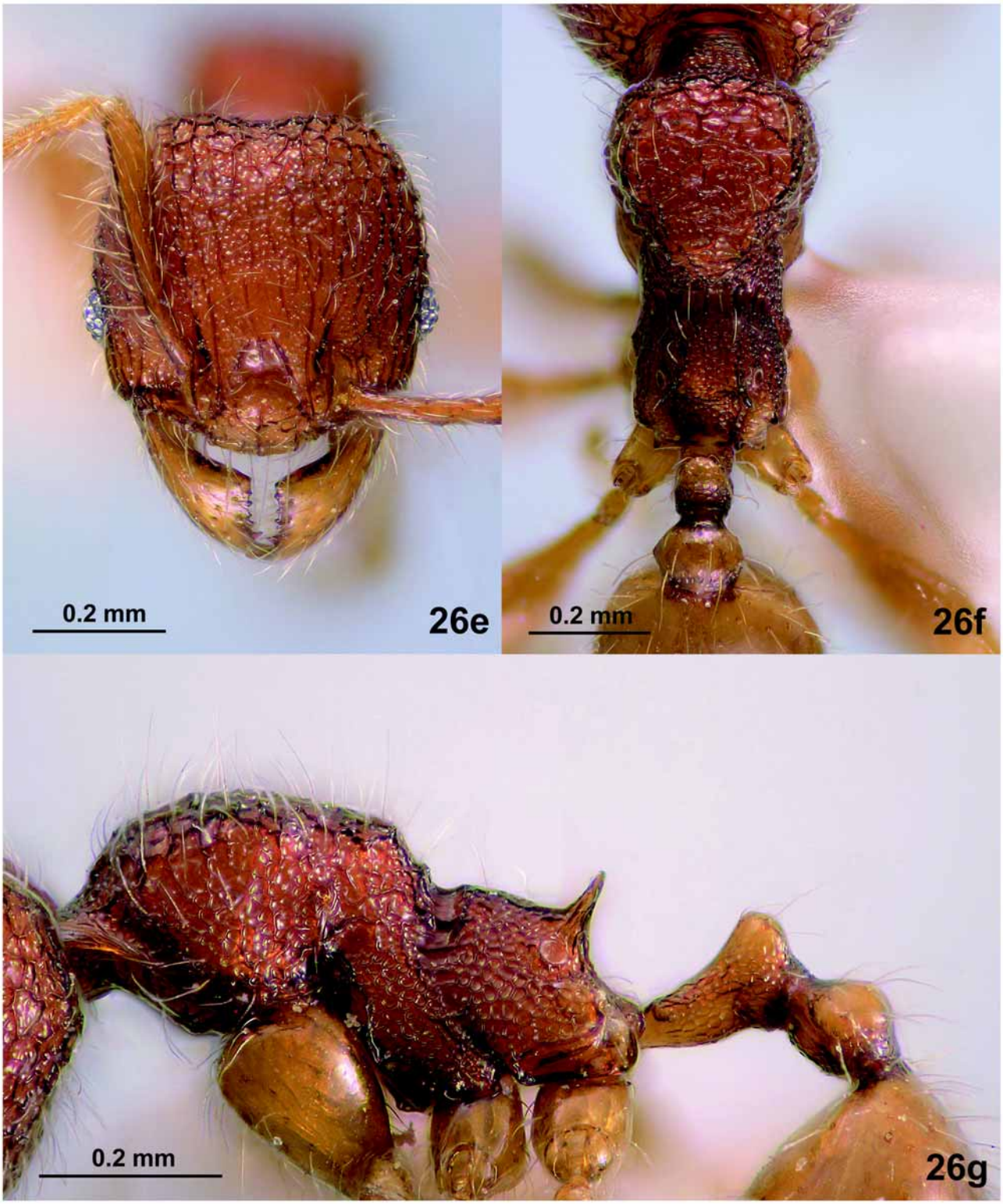

FIGURE 26e–g, *Pheidole tjibodana*, minor [Eg03-VN-175] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

median process well developed but submedian processes absent; in the minor dorsum of head and mesosoma punctured or reticulate with enclosures punctured weakly or dimly; in the major and minor promesonotal dome in lateral view at most with a low or inconspicuous mound on its posterior slope.

Distribution & bionomics: Known from the Indo-Chinese and Indo-Malayan subregions. This species is

wide spread through the Indo-Chinese and Indo-Malayan subregions, and inhabits forest from lowland to hilly areas. Bornean populations usually nest in litter, but Vietnamese populations usually nest in rotting twigs and small wood fragments. Small seeds are sometimes stored inside the nest [Eg96-BOR-031, Eg04-VN-215]. The number of adults per colony is: 8 majors, 71 minors, 1 dealate queen & 3 alate queens [Eg04-VN-204]; 5 majors, 52 minors & 1 dealate queen (with queen pupae) [Eg04-VN-207]; 24 majors, 259 minors, 1 dealate queen & 31 alate queens [Eg04-VN-215].

***Pheidole tumida* sp.n.**
Figs. 27a–g

Pheidole nodifera F. Smith. Eguchi, Bui *et al.* 2005: 90 (checklist).

Pheidole sp. (cf. *nodifera*). Eguchi, Bui & Janssen 2005 (ecological study).

Type material examined: Holotype: major, Cuc Phuong N.P., Ninh Binh, Vietnam (20°14'N, 105°36'E, 370 m alt.) [K. Eguchi leg., colony: Eg01-VN-176] (IEBR); paratypes: 18 majors, 20 minors & 1 queen from the same colony as holotype (IEBR, MCZC, MHNG & ACEG).

Other material examined: S. China: Guangxi: Gao Zhai (300 m alt.), Xing An County [Eg00-GNGX-012]; Hong Kong: Victoria Park, Hong Kong I. [Eg99-HK-22], Taipo Kau, New Territory [Eg99-HK-07]. Vietnam: Bac Kan: Ba Be N.P., 22°24–25'N, 105°37–38'E, < 260 m alt. [Eg04-VN-158, -164, -175, -177, -180, -200, -206]; Quang Ninh: Ky Thuong N.R., 21°09–11'N, 107°06–07'E, 105–550 m alt. [Eg03-VN-165, -191, -247; B&E03-77], Chua Yen Tu, 21°09'N, 106°43'E, 520–845 m alt. [Eg04-VN-006, -010, -025]; Bac Giang: W. Yen Tu N.P. (=Tay Yen Tu N.P.), 21°10–11'N, 106°43–44'N, 170–415 m alt. [Eg03-VN-028, -039, -042, -056, -057, -073, -075, -099; Eg04-VN-086, -095; B&E03-13, -14, -19, -24]; Ha Tay (misspelled as "Ha Tai"): Ba Vi N.P., 21°03'N, 105°22'E, 400–600 m alt. [Eg99-VN-081, -108; Eg02-VN-012]; Ninh Binh: Cuc Phuong N.P., 20°14'N, 105°36'E, 370 m alt. [Eg01-VN-162, -163, -170]; Nghe An: Pu Mat N.P. (Sang Le Forest Area, 19°11'N, 104°37–38'E, < 220 m alt.) [Eg01iv06-09]; Dong Nai: S. Cat Tien N.P., < 160 m alt. [Eg04-VN-553]. Thailand: Chanthaburi: Khao Soi Dao [Eg01-TH-024]; Trang: Khao Chong Waterfall [Eg01-TH-750]; Narathiwat: Bala-Hala W.S. (Bala Area) [Eg01-TH-686]. Malaysia: Selangor: Ulu Gombak [FI98-84]. Indonesia: Sungai Wain, E. Kalimantan [G. Fredriksson]; W. Java: Halimun [FI98-328]; E. Java: Purwodai [FI98-277]; Bali: Dusun PK Jelati, Mendaya [Eg98-BALI-727, -748], Mt. Kelatakan [Eg98-BALL-1111, -1114; IKT. Ginarsa's colony: KT-163]. Eguchi's informal species code "*Pheidole* sp. eg-100" applies to this species.

Worker measurements & indices: Holotype (major). — HL 1.98 mm; HW 1.99 mm; CI 101; SL 1.11 mm; SI 56; FL 1.58 mm; FI 79.

Nontype major (n=4). — HL 1.63–1.90 mm; HW 1.63–1.98 mm; CI 100–105; SL 0.93–1.07 mm; SI 52–60; FL 1.38–1.54 mm; FI 78–85.

Minor (n=5, including one paratype minor). — HL 0.71–0.78 mm; HW 0.57–0.66 mm; CI 79–87; SL 0.91–1.04 mm; SI 147–166; FL 1.03–1.18 mm; FI 166–192.

Worker description

Major. — Head in lateral view not or very weakly impressed on vertex; frons and anterior part of vertex rugose longitudinally; posterior part of vertex and dorsal and dorsolateral faces of vertexal lobe rugoso-reticulate obliquely, or reticulate; frontal carina weak, or present just as rugula(e); antennal scrobe inconspicuous or absent; median longitudinal carina of clypeus usually conspicuous, but sometimes weak or just present as weak rugula(e); median and submedian processes of hypostoma absent, or sometimes present but inconspicuous; lateral processes conspicuous but often small; antenna with a 3-segmented club; maximal diameter of eye longer than or almost as long as antennal segment X. Promesonotal dome in dorsal view rugoso-reticulate transversely or irregularly, in lateral view with a conspicuous prominence or at least low mound on its posterior slope; humerus (very) weakly produced laterad; the dome at the humeri narrower than at the bottom (or

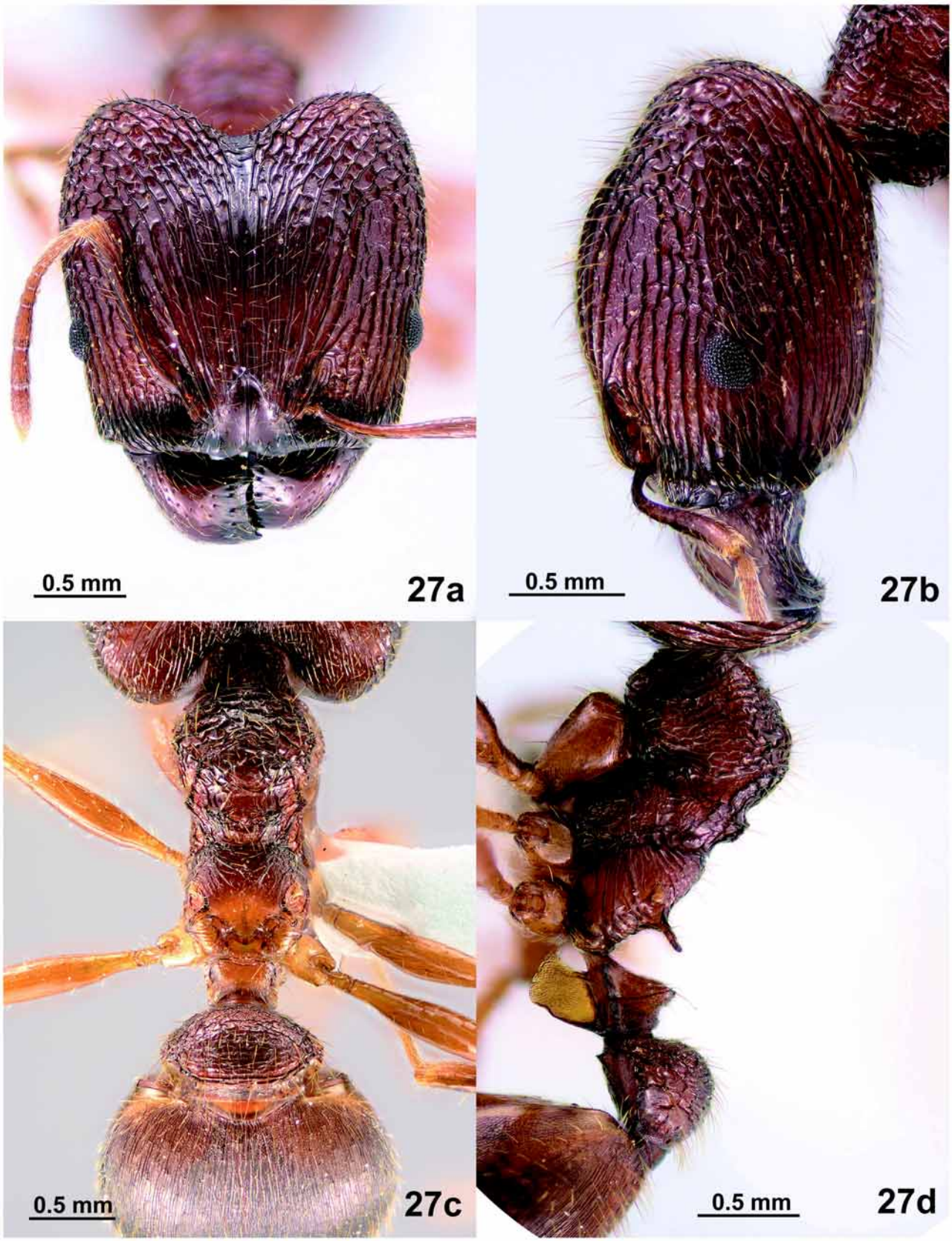

FIGURE 27a–d, *Pheidole tumida* sp.n., holotype (major) [Eg01-VN-176] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

FIGURE 27e–g, *Pheidole tumida* sp.n., paratype minor [Eg01-VN-176] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

sometimes almost as broad as or a little broader than at the bottom); propodeal spine usually finger-shaped or spatulate. Petiole shorter than postpetiole (excluding helcium), in dorsal view with a well-developed flange laterally; subpetiolar process extremely developed, lobate; postpetiole massive. First gastral tergite rugoso-punctate or at least shagreened over the surface.

Minor. — Frons and vertex largely smooth; area between antennal insertion and eye often rugose or rugoso-punctate; preoccipital carina conspicuous dorsally and laterally; median part of clypeus smooth and shining; median longitudinal carina often present; antenna with a 3-segmented club; scape extending far beyond

posterolateral margin of head; maximal diameter of eye shorter than antennal segment X. Promesonotal dome largely smooth, but sometimes shagreened dorsolaterally and/or with several short rugulae on humerus, in lateral view with a conspicuous mound on its posterior slope; humerus of the dome in dorso-oblique view not or hardly produced (rarely produced weakly as a mound); mesopleuron, metapleuron and lateral face of propodeum dimly to weakly punctured at least partly; propodeal spine usually reduced to a short and thin spine or a small dent, or sometimes almost absent. Petiole shorter than postpetiole (excluding helcium); subpetiolar process absent, or present as a longitudinal carina; postpetiole massive.

Recognition: This species has the following combination of diagnostic characteristics: in the minor head and promesonotal dome largely smooth and shining; in the major hypostoma without median and submedian processes; in the major and minor promesonotal dome in lateral view with a conspicuous prominence or mound on its posterior slope; in the major subpetiolar process lobate; in the major and minor postpetiole massive.

Pheidole tumida, *Pheidole noda* and *Pheidole nodifera* are not distinguished from each other in minor's morphology. Thus, there is a certain possibility that *P. tumida* is conspecific with *P. nodifera* which was described by F. Smith (1874) based on the minor alone from N. China. *Pheidole tumida*, characterised by a lobate subpetiolar process in the major, is easily distinguished from *Pheidole noda* and other Indo-Chinese species.

Distribution & bionomics: Known from the Indo-Chinese and Indo-Malayan subregions. Ranging from forests edges to well-develop forests. Nesting in the soil and rotting logs.

***Pheidole vieti* sp.n.**
Figs. 28a–h

Pheidole sp. eg-112. Eguchi, Bui *et al.* 2005: 91 (checklist).

Type material examined: Holotype: major, Ba Vi N.P., 400–600 m alt., Ha Tay (misspelled as "Ha Tai"), Vietnam [K. Eguchi leg., colony: Eg99-VN-092] (IEBR); paratypes: 5 minors from the same colony as holotype (IEBR, MCZC, MHNG & ACEG).

Other material examined: Vietnam: Vinh Phuc: Tam Dao N.P., 21°27'N, 105°38'E, 950 m alt. [Sk. Yamane]; Ha Tay (misspelled as "Ha Tai"): Ba Vi N.P., 600 m alt. [Eg99-VN-104]. Eguchi's informal species code "*Pheidole* sp. eg-112" applies to this species.

Worker measurements & indices: Holotype (major). — HL 1.21 mm; HW 1.16 mm; CI 95; SL 0.62 mm; SI 54; FL 0.81 mm; FI 70.

Nontype major (n=1). — HL 1.22 mm; HW 1.17 mm; CI 96; SL 0.60 mm; SI 51; FL 0.79 mm; FI 68.

Minor (n=3, including one paratype minor). — HL 0.59–0.64 mm; HW 0.55–0.60 mm; CI 92–94; SL 0.59–0.61 mm; SI 103–109; FL 0.63–0.68 mm; FI 114–117.

Worker description

Major. — Body yellowish brown. Head in lateral view not impressed on vertex; frons and anterior part of vertex rugose longitudinally; posterior part of vertex sparsely and interruptedly sculptured with longitudinal rugulae; dorsum of vertexal lobe shagreened or only very weakly rugoso-punctate; frontal carina inconspicuous, present just as rugula(e); antennal scrobe almost absent; clypeus without a median longitudinal carina; median prosess of hypostoma variable in its development, conspicuous (nontype major) or completely absent (the holotype); submedian and lateral processes conspicuous; antenna with a 3-segmented club; eye consisting of less than 20 ommatidia; maximal diameter of eye shorter than antennal segment X. Promesonotal dome smooth and shining, in lateral view lacking a mound on its posterior slope; humerus of the dome not produced; the dome at the humeri much narrower than at the bottom; mesopleuron weakly punctured largely; lateral face of propodeum almost smooth; metapleuron with several rugulae. Petiole a little longer than

postpetiole (excluding helcium); postpetiole relatively massive. First gastral tergite smooth and shining excluding very weakly punctured area around its articulation with postpetiole.

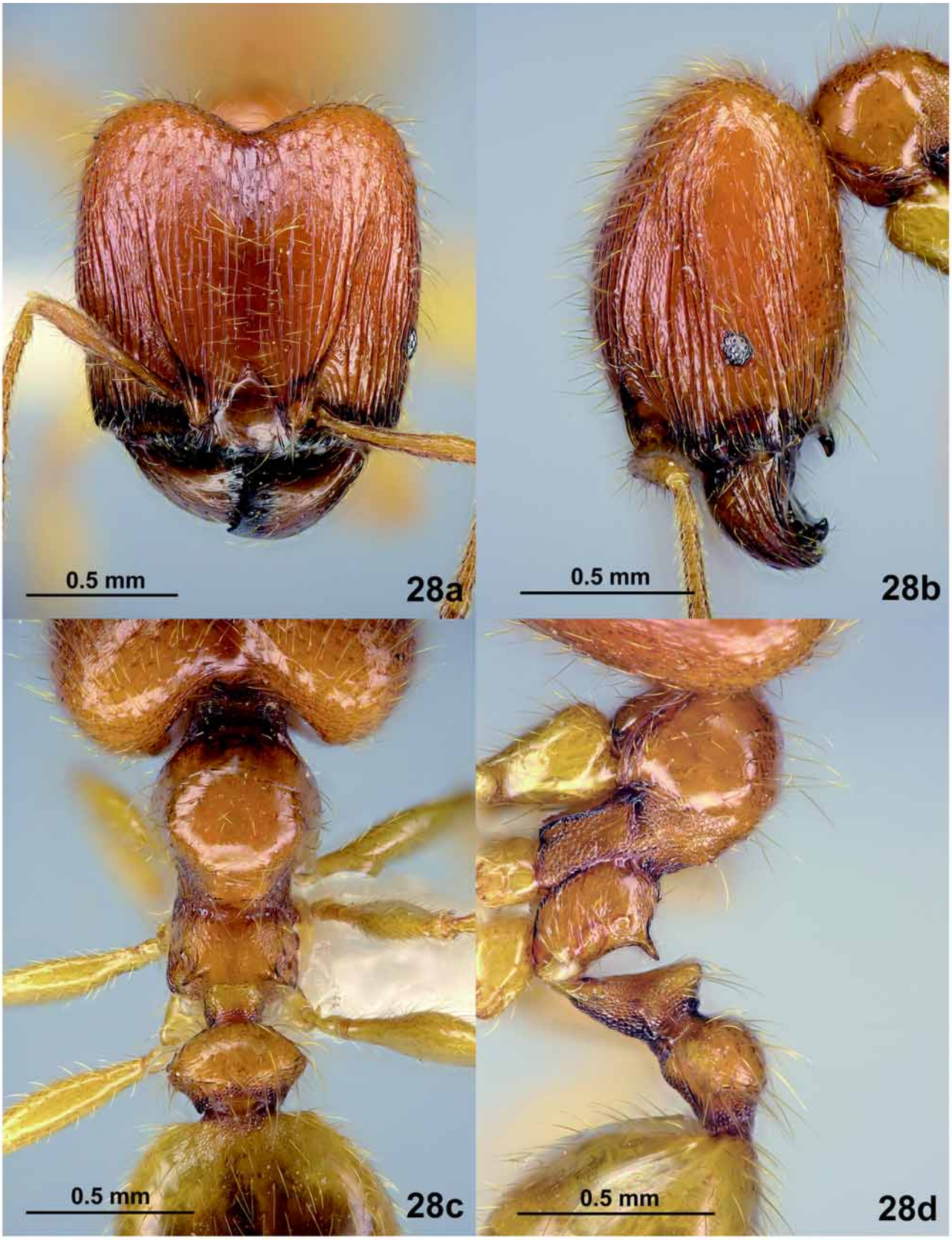

FIGURE 28a–d, *Pheidole vieti* sp.n., holotype (major) [Eg99-VN-092] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

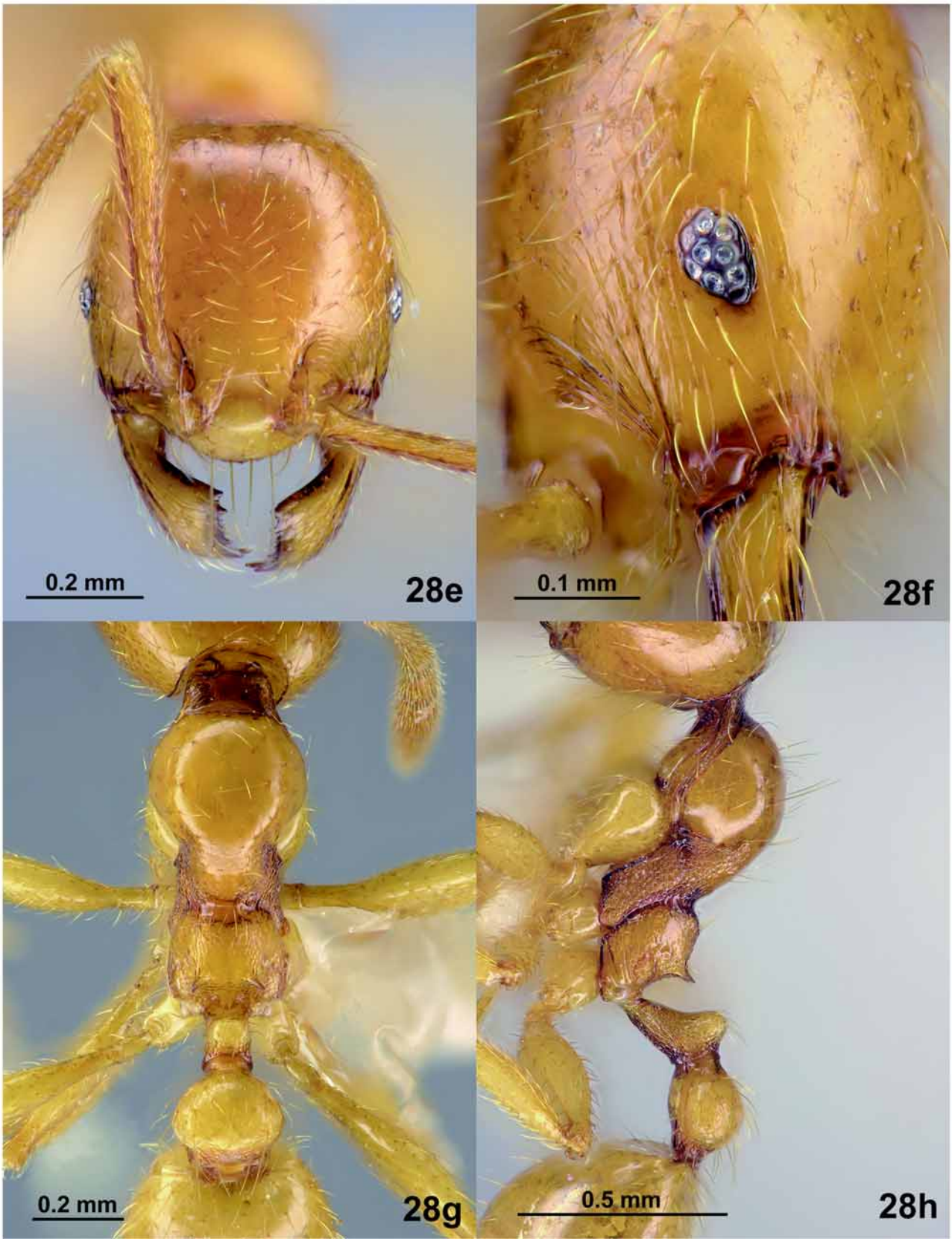

FIGURE 28e–h, *Pheidole vieti* sp.n., paratype minor [Eg99-VN-092] — e, head in full-face view; f, head in lateral view; g, mesosoma and waist in dorsal view; h, mesosoma and waist in lateral view.

Minor. — Body yellowish brown. Frons and vertex smooth; dorsolateral part of head partly to largely rugoso-punctate weakly or dimly; preoccipital carina complete but weak dorsally; median part of clypeus smooth and shining; the median longitudinal carina absent, or present at most anteriorly; antenna with a 3-segmented club; scape exceeding posterior margin of head by 1.5 times the length of antennal segment II or more; eye consisting of only ca. 8–12 ommatidia; maximal diameter of eye shorter than antennal segment X. Promesonotal dome largely smooth and shining, in lateral view lacking a mound on its posterior slope; humerus of the dome in dorso-oblique view not produced; mesopleuron punctured; metapleuron and lateral face of propodeum very weakly punctured or almost smooth; propodeal spine elongate-triangular. Petiole almost as long as or only a little longer than postpetiole (excluding helcium); postpetiole relatively massive.

Recognition: This species has the following combination of diagnostic characteristics: in the major head in lateral view not impressed on vertex; in the minor head and promesonotal dome largely smooth and shining; in the major dorsum of vertexal lobe shagreened or only very weakly rugoso-punctate; in the major frontal carina inconspicuous, present just as rugula(e), and antennal scrobe almost absent; in the major submedian processes of hypostoma conspicuous; eye relatively reduced, consisting of ca. 13–19 ommatidia in the major and 8–12 ommatidia in the minor; in the major and minor promesonotal dome without a mound on its posterior slope; in the major and minor humerus of promesonotal dome not produced laterad; in the major and minor postpetiole relatively massive.

This species is similar to *Pheidole vulgaris* Eguchi, but head is shorter but higher and postpetiole is more massive in the major of the former than in that of the latter.

Distribution & bionomics: Known only from N. Vietnam.

***Pheidole vulgaris* Eguchi**
Figs. 29a–g

Pheidole vulgaris Eguchi, 2006: 127–129. Holotype: major, My Yen Commune Forest, 21°35'N, 105°36'E, Na Hau Village, My Yen Commune, Thai Nguyen, Vietnam, Eg01-VN-155, IEBR, examined; paratypes: 19 majors & 20 minors, same data as holotype, IEBR, MHNG, MCZC, BMNH, FSKU & ACEG, examined.

Pheidole sp. eg-111. Yamane *et al*. 2003: 58 (checklist), Bui & Eguchi 2003: 9 (checklist), Eguchi *et al*. 2004 (ecological study), Eguchi, Bui *et al*. 2005: 90 (checklist).

Other material examined: S. China: Guangxi: Dayaoshan N.R., Jinxiu [J. Fellowes]; Guangdong: Dawuling N.R., Maoming [J. Fellowes]; Da Qiao Town, Ruyuan County[Latella]; Hong Kong: Taipo Kau N.P., New Territories [J. Fellowes]. N. Vietnam: Lao Cai: Y Linh Ho (a small fragment of forest), ca. 1100 m alt., Sa Pa [Eg02-VN-214, -230]; Cat Cat (a trail to Mt. Phansipan), ca. 1300–1400 m alt., Sa Pa [Eg02-VN-265]; Thai Nguyen: My Yen Commune Forest, 21°35'N, 105°36'E), Na Hau Village [Eg01-VN-155]; Bac Giang: W. Yen Tu N.P. (= Tay Yen Tu N.P.), 21°10–11'N, 106°43–44'E, 170 m alt. [Eg03-VN-079], W. Yen Tu N.P., 210 m alt. [Eg03-VN-063], W. Yen Tu N.P., 370 m alt. [B&E03-52, -56, -57; Eg03-VN-147], W. Yen Tu N.P., 400 m alt. [Eg04-VN-106], W. Yen Tu N.P., 415 m alt. [B&E03-41], W. Yen Tu N.P., 435 m alt. [Eg04-VN-144]; Quang Ninh: Chua Yen Tu, 21°09'N, 106°43'E, 520–725 m alt. [Eg04-VN-035]; Ky Thuong N.R., 21°11'N, 107°07'E, ca. 105 m alt. [B&E03-73], Ky Thuong N.R., 160 m alt. [Eg03-VN-166, -173, -179, -181], Ky Thuong N.R., 220 m alt. [Eg03-VN-182]; Vinh Phuc: Tam Dao N.P., 21°27'N, 105°38'E, 800–900 m alt. [Eg99-VN-034], Tam Dao N.P., 900 m alt. [Eg99-VN-002; Eg01-VN-112], Tam Dao N.P., 900–1100 m alt. [Eg99-VN-043]; Ha Tay (part of specimens mislabeled as "Ha Tai"): Ba Vi N.P., 21°03'N, 105°22'E, 400–600 m alt. [Eg99-VN-085, -089, -093; Eg01-VN-209], Ba Vi N.P., 400–800 m alt. [Eg99-VN-120], Ba Vi N.P., 600 m alt. [Eg99-VN-103], Ba Vi N.P., 670 m alt. [Eg01-VN-224, -234], Ba Vi N.P., 700 m alt. [Eg02-VN-027], Ba Vi N.P., 800 m alt. [Eg02-VN-048]; Ninh Binh: Cuc Phuong N.P., 20°14'N, 105°36'E, 320 m alt. [Eg01-VN-193, -195]. Thailand: Chiang Mai: Doi Suthep-Pui N.P., 800–900 m alt.

[Eg01-TH-079 (W. Jaitrong leg., 1997)]; Nakhonratchasima: Khao Yai N.P., 900–1000 m alt. [TH00-SKY-34]. India: Utter Pradesh: Rajaji N.P. [A. Schulz & K. Vock, 1996]. Eguchi's informal species code "*Pheidole* sp. eg-111" has been applied to these specimens.

Worker measurements & indices: Major (data from Eguchi 2006). — HL 1.18–1.38 mm; HW 1.06–1.21 mm; CI 86–91; SL 0.60–0.68 mm; SI 53–59; FI 0.81–0.94 mm; FI 75–81.

Minor (data from Eguchi 2006). — HL 0.54–0.61 mm; HW 0.46–0.53 mm; CI 85–91; SL 0.52–0.61 mm; SI 108–117; FL 0.57–0.67 mm; FI 116–127.

Worker description

Major. — Body covered with relatively long standing hairs. Head in lateral view not or very weakly impressed on vertex; dorsal surface of head variable in sculpture; frons obliquely rugose or largely smooth with sparse interrupted and irregular rugulae; vertex and vertexal lobe largely smooth, or weakly and discontinuously rugose/rugoso-reticulate obliquely toward posterolateral corner of the lobes, often with the interspaces punctured; frontal carina absent or inconspicuous (present just as rugulae); antennal scrobe absent; clypeus sometimes with an evanescent or weak median longitudinal carina; hypostoma with a low or inconspicous median process and a pair of conspicuous submedian processes in addition to a pair of conspicuous lateral processes; outer surface of mandible smooth and shining excluding its basal area, and covered relatively long decumbent hairs; antenna with a 3-segmented club; eye consisting of usually more than 20 ommatidia (but sometimes less than 20 ommatidia); maximal diameter of eye almost as long as, or a little shorter or a little longer than antennal segment X. Promesonotal dome at most with an inconspicuous mound on its posterior slope; humerus of the dome only very weakly produced; the dome usually a little narrower, but sometimes a little broader (as seen in the holotype), at the humeri than at the bottom. Petiole (a little) longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite very weakly punctured at least around its articulation with postpetiole, and smooth or sometimes shagreened in the remainder.

Minor. — Body yellowish-brown. Frons and vertex smooth and shining; preoccipital carina complete but weak dorsally; clypeus without a median longitudinal carina; antenna with a 3-segmented club; scape exceeding posterior margin of head by the length of second antennal segment or more; eye consisting of 12–18 ommatidia; maximal diameter of eye (a little) shorter than antennal segment X. Promesonotal dome largely smooth and shining, in lateral view without a mound on its posterior slope; humerus of the dome in dorso-oblique view not produced; mesopleuron punctured; metapleuron and lateral face of propodeum weakly punctured or almost smooth; propodeal spine small, elongate-triangular. Petiole (a little) longer than postpetiole (excluding helcium); postpetiole not massive but relatively large, in lateral view somewhat globular.

Recognition: This species is characterized among Indo-Chinese species by the combination of the following features: in the major vertex and vertexal lobe largely smooth, or with weak and interrupted rugoso-reticulation directed towards the posterolateral corner of the lobes, often with interspaces punctured; in the minor head and promesonotal dome smooth and shining; in the major hypostoma with conspicuous submedian processes and one very low or vestigial median process; in the minor maximal diameter of eye (a little) shorter than antennal segment X; in the major and minor promesonotal dome lacking a conspicuous prominence/mound on its posterior slope; in the major and minor petiole longer than postpetiole; in the major and minor postpetiole not massive.

This species is very similar to *Pheidole taipoana* Wheeler and *P. laevicolor* Eguchi but well distinguished from the latter two by the following characteristics: the major of the latter two having dorsum of vertexal lobe reticulate; the minor of the latter two having maximal diameter of eye a little longer than the length of antennal segment X. This species is also similar to *Pheidole vieti* (see under *P. vieti*).

Distribution & bionomics: Known from Vietnam, S. China, Thailand and Utter Pradish. This species occurs from forest edges to well-developed forests, and nests in the soil (Eguchi *et al.* 2004). Colonies are at least occasionally polygynous.

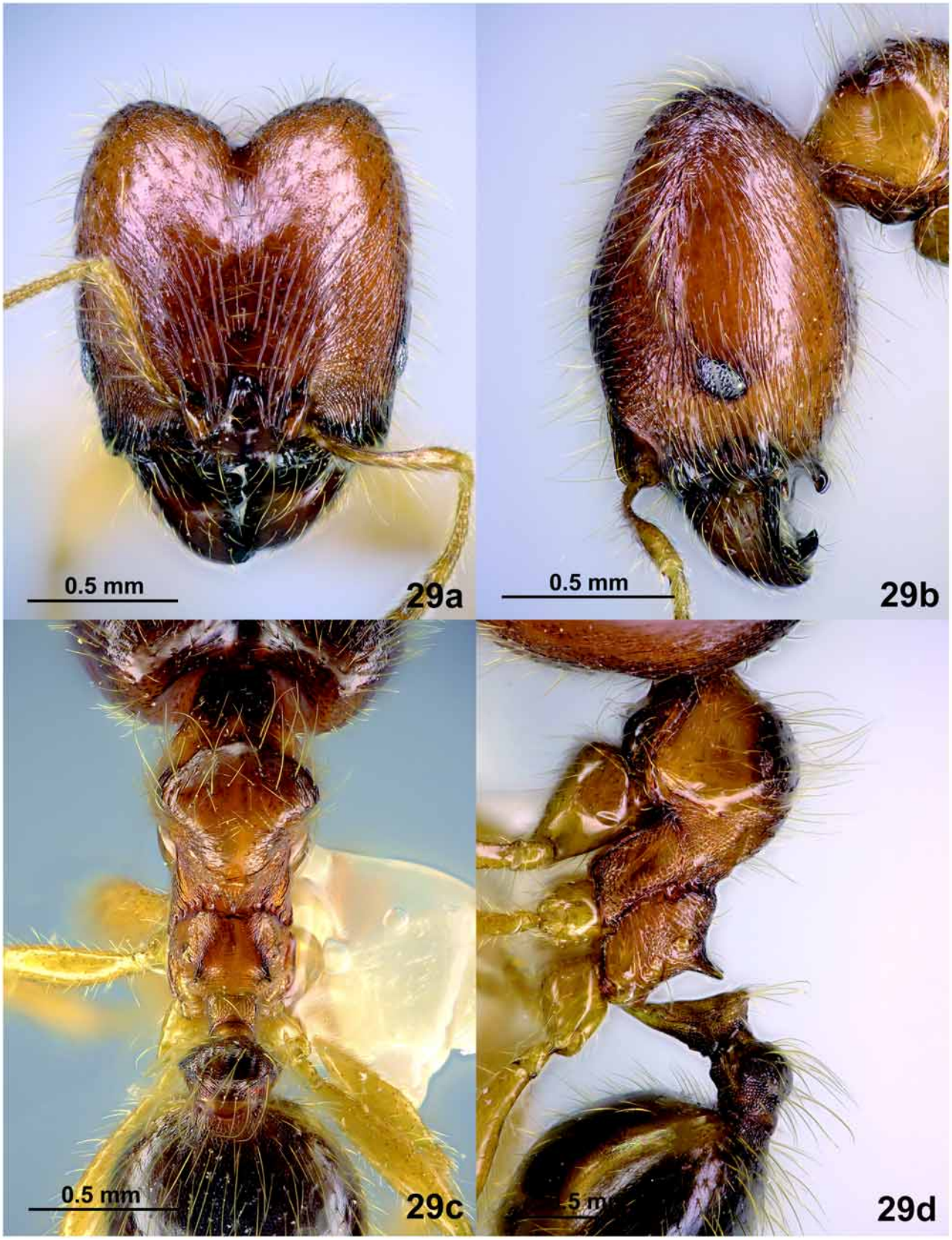

FIGURE 29a–d, *Pheidole vulgaris*, paratype major [Eg01-VN-155] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

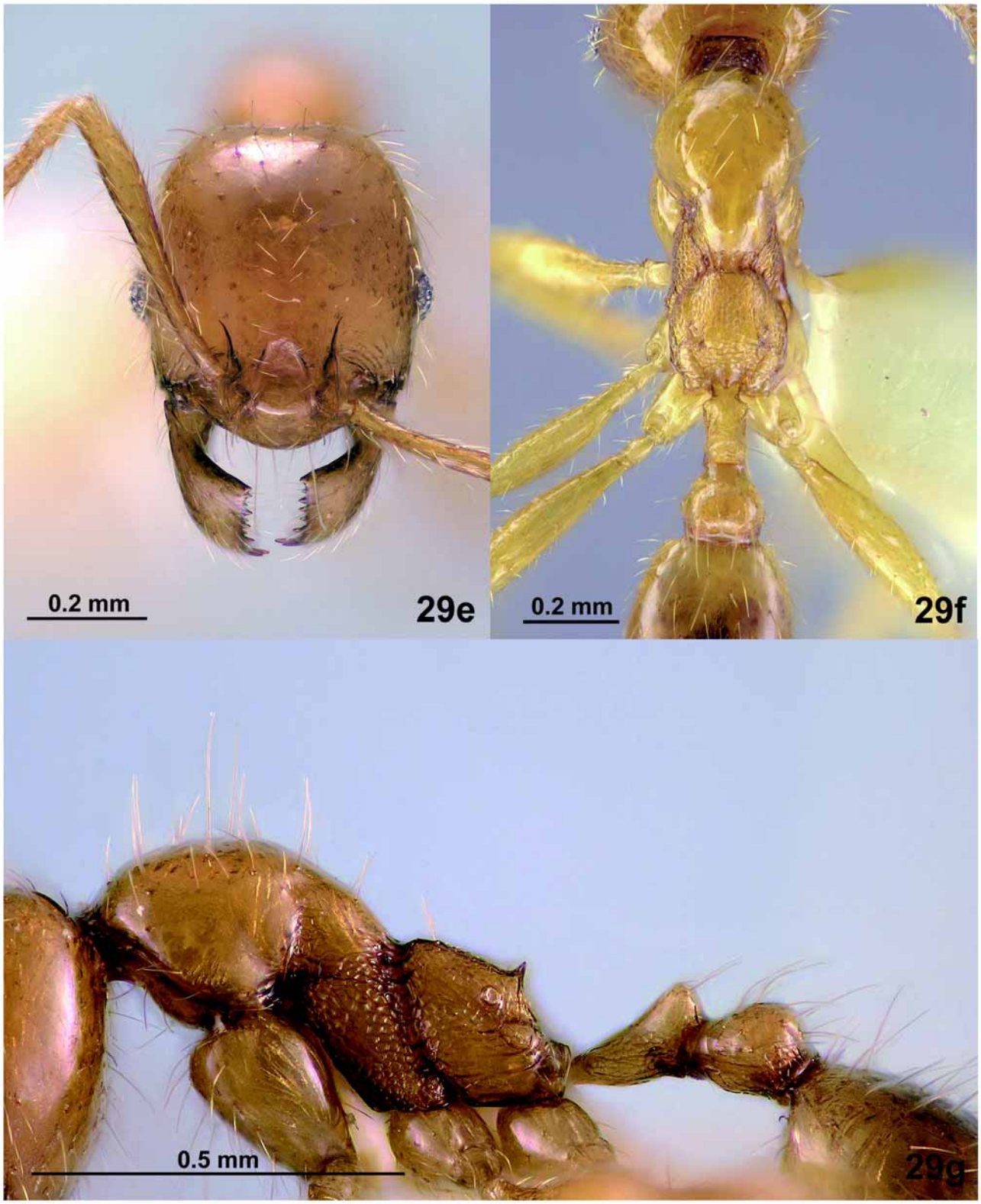

FIGURE 29e–g, *Pheidole vulgaris*, paratype minor [Eg01-VN-155] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

***Pheidole yeensis* Forel**
Figs. 30a–g, 32g, 32h

Pheidole sulcaticeps r. *yeensis* Forel, 1902: 179, 195. Emery 1921: 94 (subspecies of *sulcaticeps*). Syntype: 1 major, "Birmah (Bingham) Ye Valley CCI 14" [Myanmar], MHNG, examined, designated as the **lectotype** [Fig. 32g, 32h].

Pheidole yeensis Forel. Binghami 1903: 252 (raised to species), Eguchi, Bui *et al.* 2005: 90 (checklist).

Pheidole sp. eg-102. Yamane *et al*. 2003: 57.

Other material examined: S. China: Guangxi: Qinglongshan N.R., Longzhou [J. Fellowes]; Hong Kong: Tai Lung Farm, Sheung Shui, New Territory [Eg99-HK-37]; Hainan: Lumuwan N.R., 210 m alt., Danzhou [J. Fellowes], Limushan N.R., 620 m alt., Qiongzhong [J. Fellowes]. N. Vietnam: Bac Kan: Ba Be N.P., 22°24–25'N, 105°37–38'E, < 260 m alt. [Eg04-VN-167]; Thai Nguyen: My Yen Commune Forest, edge of secondary forest, Na Hau Village [Eg01-VN-138, -139, -142, -144]; Bac Giang: W. Yen Tu N.P. (= Tay Yen Tu N.P.), 21°11'N, 106°43–44'E, 150 m alt. [B&E04-2-1, -2, -3, -4, -5, -6, -7, -8], W. Yen Tu N.P., 190 m alt. [Eg03-VN-045, -048], W. Yen Tu N.P., 400 m alt. [Eg04-VN-075]; Quang Ninh: Ky Thuong N.R., 21°11'N, 107°07'E, 220 m alt. [Eg03-VN-187]; Vinh Phuc: Tam Dao N.P., < 900 m alt. [Eg99-VN-072, -074, -075, -077]; Ha Tay (misspelled as "Ha Tai"): Ba Vi N.P., 21°03'N, 105°22'E, ca. 400–550 m alt. [VN01-SKY-75]; Ninh Binh: Cuc Phuong N.P., 20°14'N, 105°36'E [Eg01-VN-202; Eg11vi05-02; Eg12vi05-21], Cuc Phuong N.P., 370 m alt. [Eg01-VN-166]. M. Vietnam: Nghe An: Lung Khung, 640 m alt., Pu Hoat [T.V. Bui], Ban Om, 550 m alt., Pu Hoat [T.V. Bui]. S. Vietnam: Dong Nai: S. Cat Tien N.P., < 160 m alt. [Eg04-VN-515]. Thailand: Nakhonratchashima: nr. Sakaerat Environmental Research Centre [Eg01-TH-519, -520, -521, -541, -542, -556].

Worker measurements & indices: Major (n=5). — HL 2.01–2.09 mm; HW 1.77–1.83 mm; CI 85–89; SL 0.94–0.99 mm; SI 53–55; FL 1.55–1.61 mm; FI 87–88.

Minor (n=5). — HL 0.73–0.93 mm; HW 0.58–0.77 mm; CI 79–83; SL 0.86–0.97 mm; SI 126–149; FL 0.97–1.23 mm; FI 160–170.

Worker description

Major. — Head in lateral view strongly impressed on vertex; frons rugose longitudinally, with interspaces weakly punctured; vertex and dorsal and dorsolaeral faces of vertexal lobe reticulate or rugoso-reticulate, with enclosures weakly punctured; frontal carina well developed, partly overhanging antennal scrobe; median longitudinal carina of clypeus absent, inconspicuous or weak; hypostoma without conspicuous median and submedian processes, but with conspicuous lateral processes; outer surface of mandible smooth excluding its basal area, bearing short appressed hairs; antenna with a 3-segmented club; maximal diameter of eye longer than antennal segment X. Promesonotal dome in dorsal view transversely rugoso-reticulate, with enclosures weakly punctured, in lateral view with a low or inconspicuous mound on its posterior slope; humerus very weakly produced laterad; the dome at the humeri a little narrower than or almost as broad as at the bottom. Petiole (a little) longer than postpetiole (excluding helcium); petiolar node in rear view weakly concave mediodorsally; postpetiole not massive. First gastral tergite longitudinally rugoso-punctate entirely.

Minor. — Dorsum of head and mesosoma sparsely bearing relatively thick standing hairs; frons and vertex smooth or shagreened; dorsolateral part of head often rugoso-punctate weakly; preoccipital carina conspicuous dorsally and laterally; median part of clypeus largely smooth; median longitudinal carina of clypeus absent, or present but weak; antenna with a 3-segmented club; scape extending far beyond posterolateral margin of head; maximal diameter of eye almost as long as or shorter than antennal segment X. Promesonotal dome smooth entirely, or almost smooth dorsally and weakly rugoso-punctate dorsolaterally (and laterally); the dome in lateral view with a low mound on its posterior slope; humerus of the dome in dorso-oblique view not produced; mesopleuron, metapleuron and lateral face of propodeum well punctured. Petiole (a little) longer than postpetiole (excluding helcium); postpetiole relatively large but not massive.

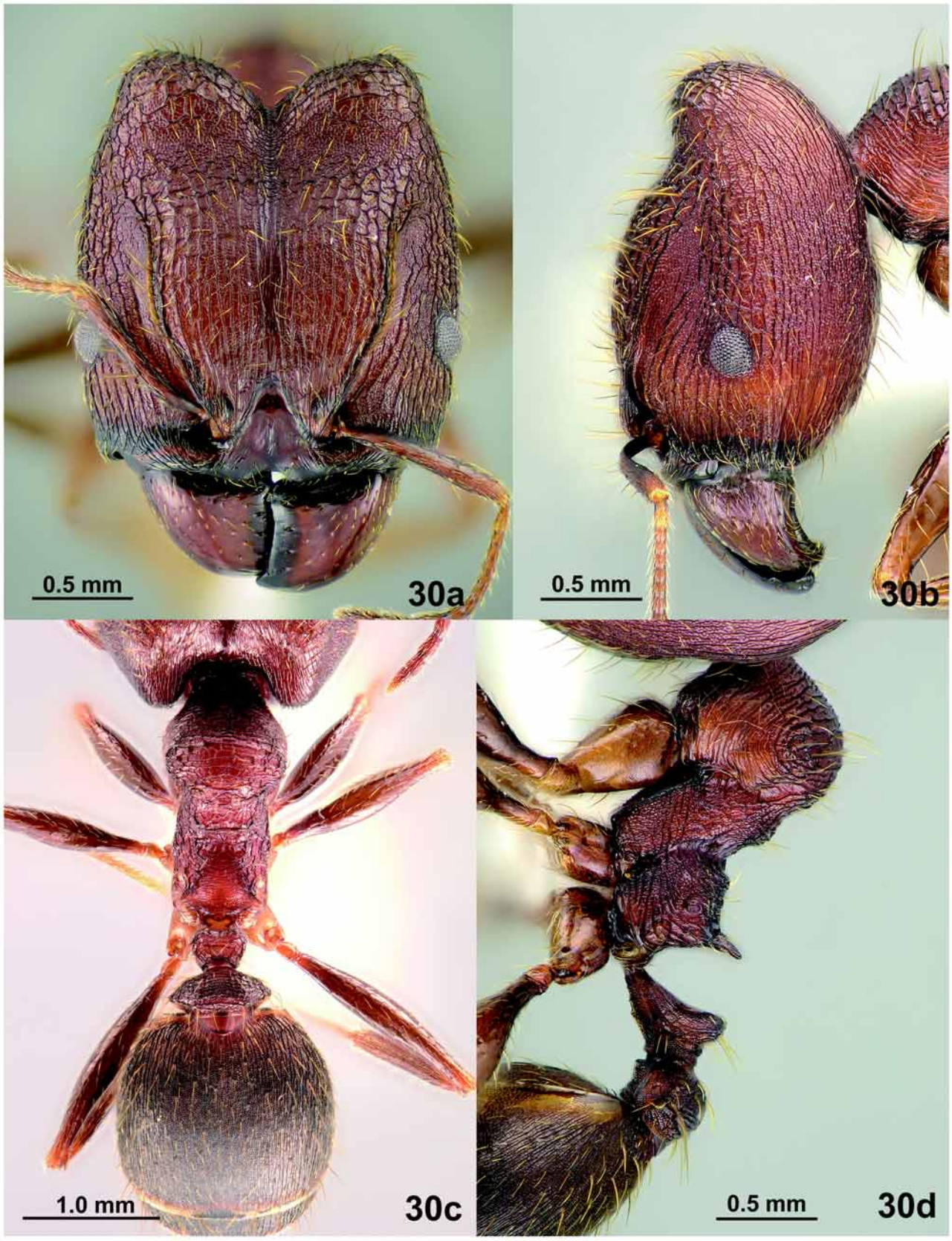

FIGURE 30a–d, *Pheidole yeensis*, major [Eg12vi05-21] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

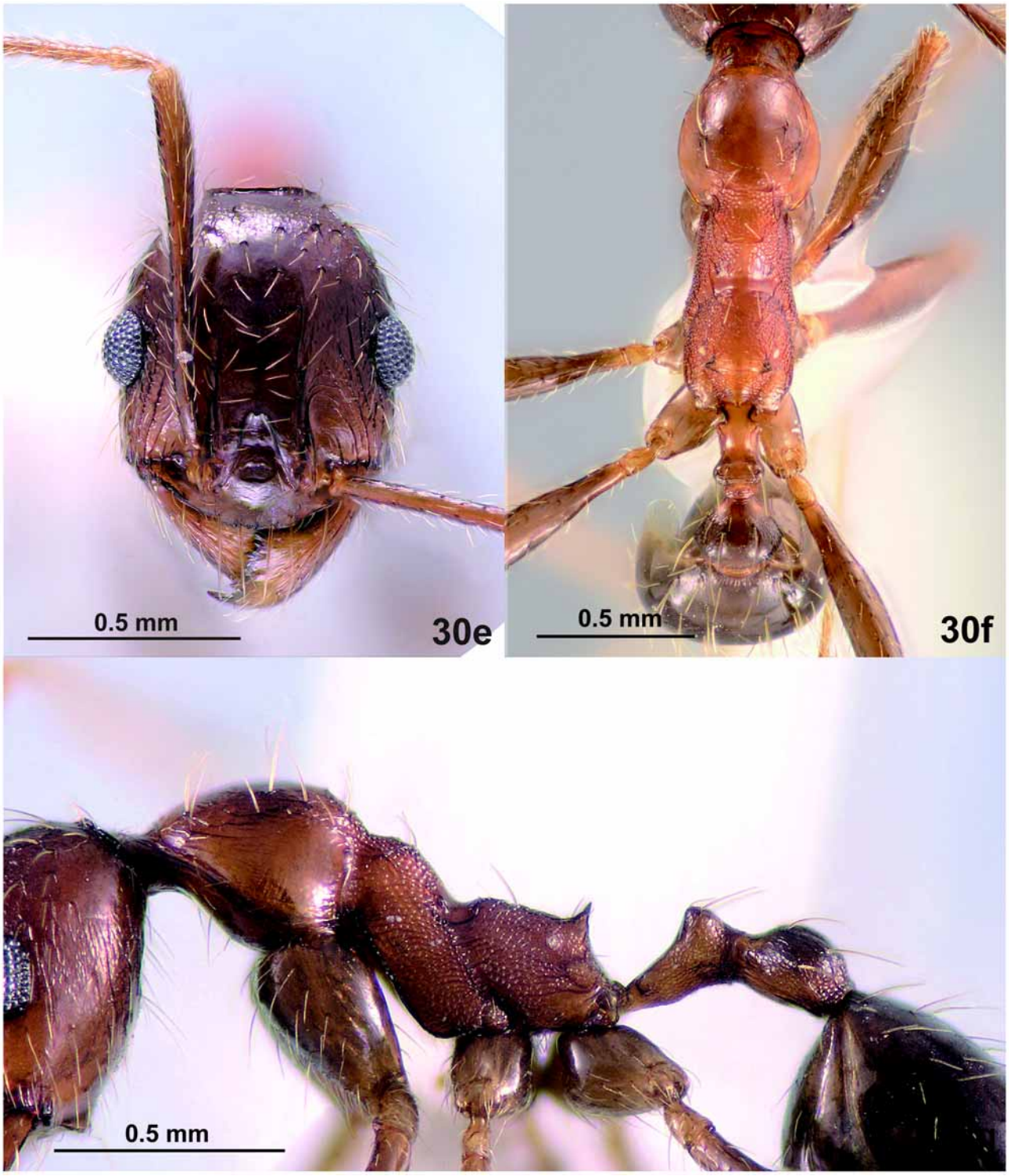

FIGURE 30e–g, *Pheidole yeensis*, minor [Eg12vi05-21] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Recognition: This species is characterized among Indo-Chinese species by the combination of the following features: in the minor dorsum of head and mesosoma sparsely bearing relatively thick standing hairs; in the major head in lateral view strongly impressed on vertex; in the major hypostoma at most with inconspicuous median and submedian processes; in the major and minor promesonotal dome in lateral view with a low mound on its posterior slope; in the major first gastral tergite longitudinally rugoso-punctate entirely.

This species is similar to *P. planifrons* Santschi among Indo-Chinese species (see under *P. planifrons*).

Distribution & bionomics: Known from the Indo-Chinese subregion. This species is more common in open lands, tillage and gardens than in woody habitats, and nests in the soil. In N. Vietnamese rural areas this species and *P. parva* are the most dominant *Pheidole* species. Prominent wall built with soil usually surrounds the nest entrance. Workers actively forage on the ground, and prey and/or scavenge on small invertebrates including other ground-foraging ants, such as *Odontoponera denticulata*.

***Pheidole zoceana* Santschi**
Figs. 31a–g

Pheidole noggii (*sic!*) var. *zoceana* Santschi, 1925: 83. Bui & Eguchi 2003: 9 (checklist). Syntypes: 3 majors & 7 minors, "Chine, Zo-ce, V. Piel, 19.7.24" [China], NHMB, examined.

Pheidole zoceana Santschi. Eguchi, Yamane & Zhou, 2007: 280–283 (raised to species, redescription of major & minor).

Other material examined: Vietnam: Lai Chau: Western slope of Mt. Fansipan, ca. 2100–2200 m alt. [Eg02-VN-322]; Lao Cai: Cat Cat (along a trail to Mt. Fansipan), ca. 1300–1400 m alt., Sa Pa [Eg02-VN-258, -262, -263, -266], Sa Seng (small fragment of limestone forest), Sa Pa [Eg02-VN-277]; Nghe An: Pu Hoat [T.V. Bui]. Thailand: Chiang Mai: Doi Suthep-Pui N.P., ca. 800–900 m alt. [Eg01-TH-099, -101]. Eguchi's informal species code "*Pheidole* sp. eg-159" and "sp. eg-164" have been applied to these specimens.

Worker measurements & indices: Major (n=4). — HL 1.09–1.20 mm; HW 0.93–1.12 mm; CI 85–93; SL 0.44–0.53 mm; SI 47–49; FL 0.65–0.67 mm; FI 59–70.

Minor (n=4). — HL 0.44–0.52 mm; HW 0.38–0.46 mm; CI 86–91; SL 0.41–0.46 mm; SI 97–108; FL 0.44–0.50 mm; FI 105–116.

Worker description

Major. — Head in lateral view not or weakly impressed on vertex; frons longitudinally rugose; anterior part of vertex longitudinally rugose or reticulate; posterior part of vertex and dorsal and dorsolateral faces of vertexal lobe reticulate; frontal carina absent or inconspicuous (present just as rugulae); antennal scrobe absent; median longitudinal carina of clypeus absent, or present but weak; submedian and lateral processes of hypostoma conspicuous; median process relatively developed but lower than submedian processes; outer surface of mandible (excluding area around the base) smooth or dimly rugose, sparsely bearing (very) short appressed hairs; antenna with a 3-segmented club; maximal diameter of eye longer than antennal segment X. Promesonotal dome in lateral view at most with an inconspicuous mound on its posterior slope; humerus of the dome weakly produced laterad; the dome at the humeri a little broader than or almost as broad as at the bottom. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive. First gastral tergite smooth and shining except punctured area around its articulation with postpetiole, or rugoso-punctrued largely.

Minor. — Dorsum of head punctured, and often overlain by weak rugoso-reticulation; preoccipital carina inconspicuous or absent dorsally; median part of clypeus smooth or weakly rugoso-reticulate; median longitudinal carina very weak to weak, or absent; antenna with a 3-segmented club; scape usually exceeding posterior margin of head by the half length of antennal segment II or more; maximal diameter of eye almost as long as antennal segment X. Promesonotal dome in lateral view at most with an inconspicuous mound on its posterior slope; mediodorsal part of the dome variable in sculpture, dimly punctured to smooth sometimes with several rugulae, or rugoso-reticulate but never punctured densely; lateral face of the dome largely smooth; humeral area of the dome rugoso-reticulate or rugoso-punctate, in dorso-oblique view not or weakly produced; mesopleuron, metapleuron and lateral face of propodeum punctured, or sometimes smooth partly; propodeal spine elongate-triangular. Petiole much longer than postpetiole (excluding helcium); postpetiole not massive.

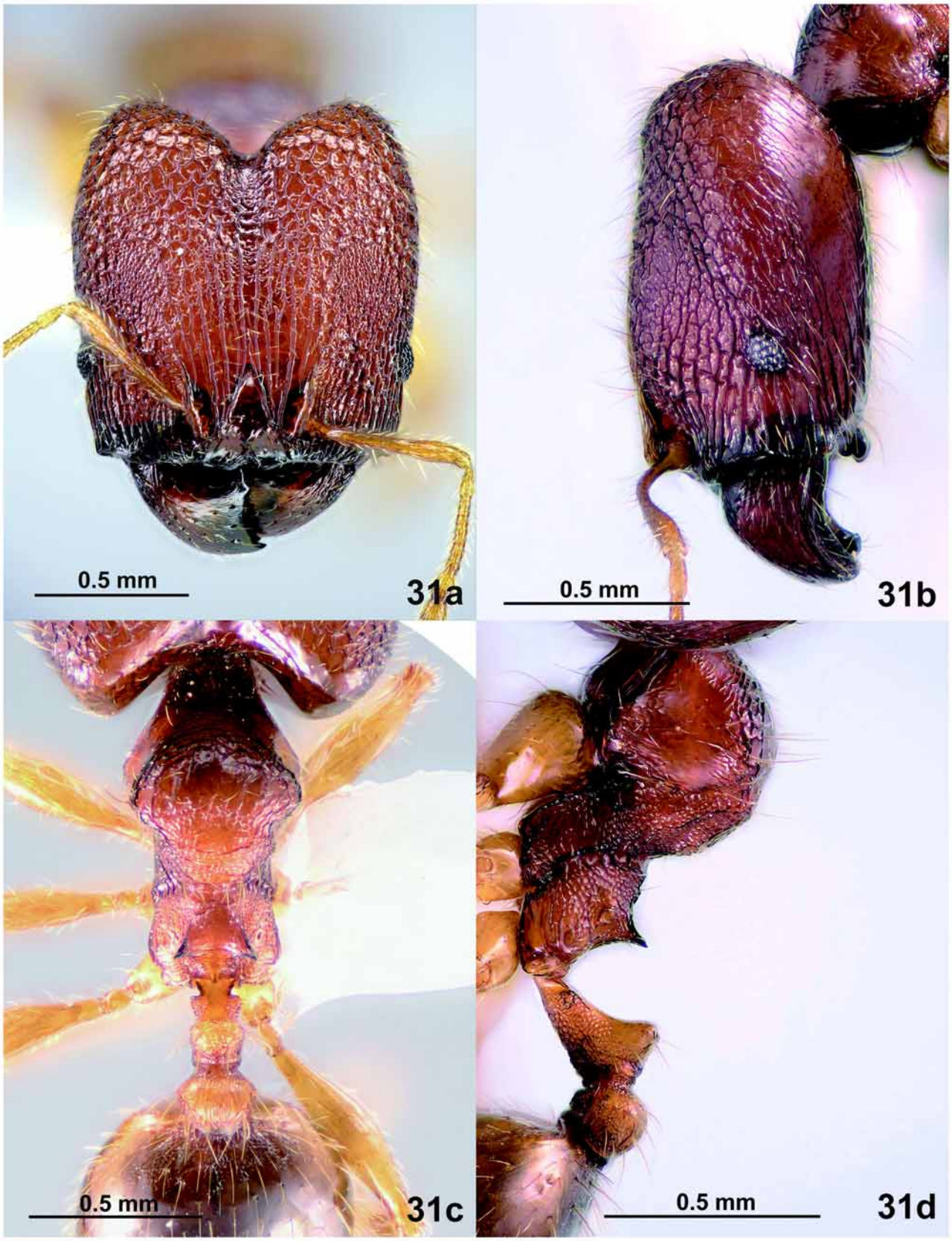

FIGURE 31a–d, *Pheidole zoceana*, major [Eg02-VN-263] — a, head in full-face view; b, head in lateral view; c, mesosoma and waist in dorsal view; d, mesosoma and waist in lateral view.

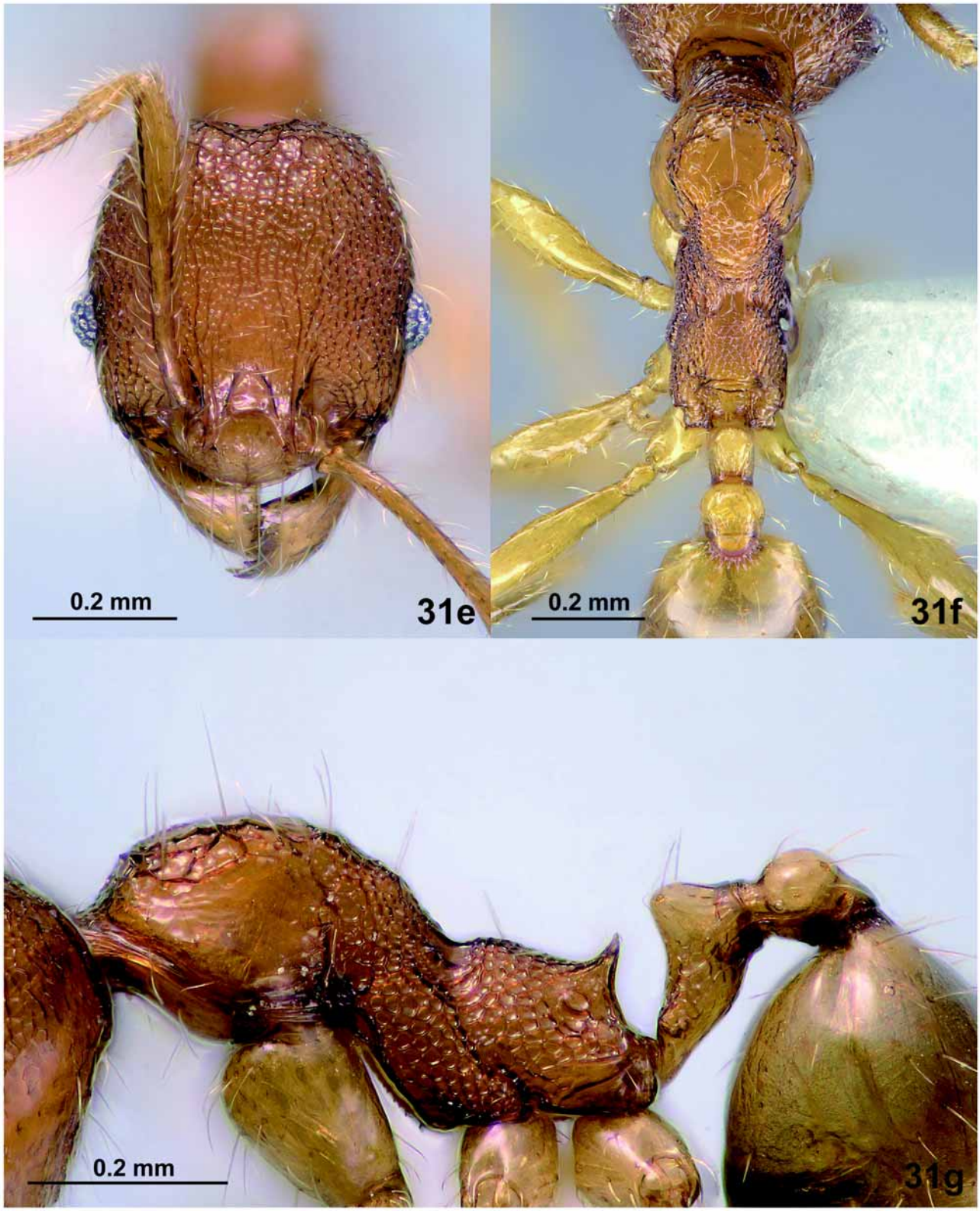

FIGURE 31e–g, *Pheidole zoceana*, minor [Eg02-VN-263] — e, head in full-face view; f, mesosoma and waist in dorsal view; g, mesosoma and waist in lateral view.

Recognition: This species is distinguished among Indo-Chinese species by the combination of the following characteristics: in the major frontal carina absent or inconspicuous (present just as rugulae); in the major median and submedian processes of hypostoma conspicuous; in the major and minor promesonotal dome in

FIGURE 32, Lectotypes (a, c, e, g) designated in the present paper and their labels (b, d, f, h) — a, b, *Pheidole dugasi* Forel (arrows indicating the lectotype); c, d, "*Pheidole rhombinoda stella* Forel"(arrow indicating the lectotype); e, f, "*Pheidole peguensis yomensis* Forel"; g, h, "*Pheidole sulcaticeps yeensis* Forel".

lateral view at most with an inconspicuous mound on its posterior slope; in the minor dorsum of head punctured; in the minor lateral face of promesonotal dome largely smooth; in the minor propodeal spine elongate-triangular.

The major of *P. zoceana* is morphologically very similar to that of *P. parva* Mayr and *P. rabo* Forel, but the minor of the former is distinguished from that of the latter two in which promesonotal dome is punctured entirely.

Distribution & bionomics: Known from Vietnam, China and Thailand. This species occurs along forest edges in hilly and mountainous areas, and nests in the soil.

Acknowledgements

I wish to thank my collaborator Dr. Bui Tuan Viet (Institute of Ecology and Biological Resources, Hanoi) who provides every facility for my research activities in Vietnam. I am also thankful to Dr. Le Xuan Canh (Director, Institute of Ecology and Biological Resources, Hanoi), the director and staff of the following National Parks and Nature Reserves and the authorities concerned for their kind arrangement of official permissions and provision of every facility for my field activities: Ba Be N.P. (Bac Kan Province), Ba Vi N.P. (Ha Tay), Chua Yen Tu (Quang Ninh), Cuc Phuong N.P. (Ninh Binh), Hoang Lien Son N.R. (Sa Pa and Van Ban Districts, Lao Cai), Ky Thuong N.R. (Quang Ninh), My Yen (Thai Nguyen), Pu Mat N.P. (Nghe An), S. Cat Tien N.P. (Dong Nai), Tam Dao N.P. (Vinh Phuc), W. Yen Tu N.P. (Bac Giang). Foresters at the remote field stations and people in local villages always welcome me and provide facilities for my successful and happy days. All of them are indispensable contributors to my project. Dr. Seiki Yamane (Kagoshima Univ., Japan), Dr. Kazuo Ogata (Kyushu Univ., Japan), Dr. Hirofumi Okido (Fukuoka, Japan), Dr. Fuminori Ito (Kagawa Univ., Japan), Dr. A. Buschinger (Germany) and Ms. Gerlinde Hillebrand (Austria) provided me valuable materials and useful comments and suggestions. Dr. Daniel Burckhardt (NHMB), Dr. Stefan Cover (MCZC), Dr. Satoshi Kamitani (Kyushu Univ., Japan), Dr. F. Koch (ZMHB), Dr. Bernhard Merz (MHNG), Dr. Kazuo Ogata (Kyushu Univ.), Dr. Valter Raineri (MCSN), and Dr. Stefan Schödl and Dr. Herbert Zettel (NHMW) gladly arranged type and non-type materials for me. Dr. Gary Alpert (Harvard Univ., USA) accorded every facility to my stay in MCZC. Prof. Taro Yamamoto and members of the Department of International Health (Institute of Tropical Medicine, Nagasaki Univ., Japan) encourage me to conduct myrmecological researches. My research activities were supported by the Research Fellowships of the Japan Society for the Promotion of Science for Young Scientists.

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