

Ants of the genus *Gauromyrmex* Menozzi (Hymenoptera: Formicidae), with description of a new species from China

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ABSTRACT. The taxonomy of the myrmicine genus *Gauromyrmex* Menozzi, 1933 is revised based on the worker caste. Three species are recognized, namely *G. acanthinus*, *G. bengkalisi*, and *G. orbihumerus* sp. nov. The new species can be diagnosed by the following characters of worker: humeral corners of pronotum rounded; lateral portion of head longitudinally striate, promesonotal dorsum feebly longitudinally striate, propodeal dorsum weakly punctulate. A key to the global fauna of *Gauromyrmex* is provided based on the worker caste.

Keywords Crematogasterini, Indomalayan, Myrmicinae, Palearctic, key, taxonomy

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INTRODUCTION

The genus *Gauromyrmex* Menozzi, 1933 was established based on the type species *Gauromyrmex bengkalisi* from Indonesia (Sumatra) and was treated as a junior synonym of *Vollenhovia* Mayr, 1865 (Hölldobler & Wilson, 1990), but Bolton (2003) revived the generic status. The genera *Solenomyrma* Karavaiev, 1935 and *Acalama* Smith, 1949 were synonymized under *Gauromyrmex* by Brown (1953). So far, only two species of this genus have been recorded in the world, namely *Gauromyrmex acanthinus* (Karavaiev, 1935), and *G. bengkalisi* Menozzi, 1933. The former is widespread China, India, Vietnam and Thailand (Karavaiev 1935; Wu & Wang 1995; Huang & Zhou 2006; Terayama 2009; Eguchi *et al.* 2011; General

& Alpert 2012; Cheng *et al.* 2015; Jaitrong & Jeenthong 2015; Bharti *et al.* 2016; Yu *et al.* 2019; Khachonpisitsak *et al.* 2020), whereas the latter is endemic to Indonesia and Borneo (Menozzi 1933; Chapman & Capco 1951). For nearly a century, no records have been published. This is principally because the mysterious species of *Gauromyrmex* are arboreal and nest in the superficial cortex of tree trunks, making them hard to spot by gatherers. Several nests are usually found on the same tree trunk. They're probably connected, because we found that there were many recognizable tunnels in the nests and all the nests only with one queen. The pupae are not enclosed in cocoons, and queens considerably larger than the workers. All individuals are tightly packed into small nests. A nest contains < 50 workers, and they move very

slowly when was disturbed (Bolton 2003; author's observations). In this study, we describe a new species from Daxing Xialei Water Source Forest Reserve of Guangxi, Southern China and present a key to the global fauna of *Gauromyrmex* based on the worker caste.

MATERIAL AND METHODS

The type and non-type specimens are deposited in the Insect Collection of Guangxi Normal University, Guilin, China. Specimens were examined by a Nikon stereomicroscope SMZ745. Images were taken and measured using a Keyence VHX-6000 digital imaging system, and subsequently processing images in Adobe Photoshop CS 6. All measurements are expressed in millimeters (mm). Standard measurements and indices follow Bolton (1975).

- CI** Cephalic Index: $HW*100/HL$.
DPI Dorsal Petiole Index: $DPW*100/PL$.
DPW Dorsal Petiole Width: maximum width of petiole in dorsal view.
ED Eye Diameter: maximum diameter of eye.
HL Head Length: straight-line length of head in full-face view, measured from midpoint of anterior clypeal margin to midpoint of posterior margin, or to terminal horizontal line in some species with a concave posterior margin.
HW Head Width: maximum width of head in full-face view, excluding eyes.
LPI Lateral Petiole Index: $PH*100/PL$.
MSL Mesosoma Length: diagonal length of mesosoma in lateral view, measured from point at which pronotum meets cervical shield to posterior basal angle of metapleuron.
PH Petiole Height: height of petiole measured in lateral view from apex of ventral (subpetiolar) process vertically to a line intersecting dorsal most point of node.
PL Petiole Length: length of petiole measured in lateral view from anterior process to posterior most point of tergite, where it surrounds gastral articulation.
PW Pronotal Width: maximum width of pronotum measured in dorsal view.
SI Scape Index: $SL*100/HW$.

- SL** Scape Length: straight-line length of antennal scape, excluding basal constriction or neck.
TL Total Length: total outstretched length of individual, from mandibular(occlusion) apex to gastral apex (not including the sting).

TAXONOMY

Gauromyrmex Menozzi, 1933

Gauromyrmex Menozzi, 1933: 146. Type-species: *Gauromyrmex bengkalisi*, by monotypy. Synonymized with *Vollenhovia* by Hölldobler & Wilson, 1990: 16; revived from synonymy by Bolton, 2003: 246, 269.

Solenomyrma Karavaiev, 1935: 103. Type-species: *Solenomyrma acanthina*, by monotypy. Synonymized by Brown, 1953: 10.

Acalama Smith, M.R. 1949: 206. Type-species: *Acalama donisthorpei* (junior synonym of *Solenomyrma acanthina*), by original designation. Synonymized by Brown, 1953: 10.

Diagnosis. The worker of this genus is similar to *Vollenhovia*, but with 11-segmented antennae, and petiole in lateral view without a distinct anterior peduncle, but with triangular node forming a dorsal angle or denticle.

Distribution. China, Borneo, India, Indonesia, Thailand, Vietnam.

Synoptic list of world species of *Gauromyrmex*

G. acanthinus (Karavaiev, 1935)

= *G. donisthorpei* Smith, 1949

G. bengkalisi Menozzi, 1933

G. orbihumerus Chen & Chen sp. nov.



Figs. 1 – 9. *Gauromyrmex acanthinus* worker. 1, 4, 7. Head in full-face view; 2, 5, 8. Body in dorsal view; 3, 6, 9. Body in profile view.



Figs. 10 – 13. *Gauromyrmex bengkalisi* Cotype worker. 10. Head in full-face view; 11. Label; 12. Body in dorsal view; 13. Body in profile view. (Cotype, <https://www.antweb.org>, CASENT0172783, images by April Nobile)



Figs. 14–16. *Gauromyrmex orbihumerus* sp. nov. Holotype worker. 14. Head in full-face view; 15. Body in dorsal view; 16. Body in profile view. A. Head in full-face view; B. Mandible in full-face view; C. Body in dorsal view; D. Body in profile view.

Key to known species of *Gauromyrmex* based on worker caste

1. In dorsal view, humeral corners of pronotum with a pair of distinct denticles (Figs. 2, 5, 8).....
 ***G. acanthinus* (Karavaiev, 1935)**
 - In dorsal view, humeral corners of pronotum rounded (Figs. 12, 16)..... **2**
2. In full face view, anteromedian part of clypeus prominent, with anterior margin arc depression, forming rounded lobes laterally; posterior corners of propodeum rounded; subpetiolar process absent; in full face view, head smooth and shiny; in dorsal view, pronotum with longitudinal striation and puncta; mesonotum, propodeum, petiole and postpetiole reticulate-puncture (Figs. 11–13)
 ***G. bengkalisi* Menozzi, 1933**
 - In full face view, anteromedian part of clypeus unremarkable, with anterior margin weakly depression, but no forming rounded lobes laterally; posterior corners of propodeum with marked spines or teeth; subpetiolar process triangular transparently; in full face view, head longitudinally striate; in full face view, promesonotal dorsum weakly and longitudinally striate (Figs. 14–16).....
 ***G. orbihumerus* sp. nov.**

Gauromyrmex acanthinus (Karavaiev, 1935) (Figs. 1–9)

Solenomyrma acanthina Karavaiev, 1935: 103, fig. 23 (w.) VIETNAM. Combination in *Gauromyrmex* by Brown, 1953: 10; in *Vollenhovia* by Bolton, 1995: 422; in *Gauromyrmex* by Bolton, 2003: 269 (Not examined).

Acalama donisthorpei Smith, M.R. 1949: 207, figs. 1, 2 (w.) INDIA. Synonymized by Brown, 1953: 10 (Images of two paratype workers examined, CASENT0172784 & CASENT0172785, <https://www.antweb.org/>, images by April Nobile).

Material examined. 5 workers, CHINA: Hunan, Liuyyang, Daweishan, 1.IX.2004, leg. Jianhua Huang; 1 worker, Guangxi, Longlin, Jinzhongshan Protection Zone, 7.III.2014, leg. Zhilin Chen, No. G140110; 1 worker, Yunnan, Kunming, Panlong District, Longtan Park, 1.VI.2013, leg. Jianyue Qiu, No. G137852.

Diagnosis. Anteromedian margin of clypeus concave in full-face view, with lateral part forming a pair of weak lobes; promesonotal dorsum in lateral view convex; posterodor-

sal corner of propodeum with a triangular tooth and declivity concave; in dorsal view, humeral corners of pronotum with a pair of distinct teeth.

Description. Worker. TL 2.4–2.7, HL 0.57–0.66, HW 0.53–0.63, CI 91–100, SL 0.36–0.38, SI 60–64, ED 0.12–0.14, PW 0.34–0.41, MSL 0.61–0.75, PL 0.17–0.20, PH 0.13–0.16, DPW 0.12–0.15, LPI 72–89, DPI 72–79 (n=7).

Head. Head in full-face view slightly longer than broad, posterior margin weakly concave; eyes median size and weakly convex, located in front of midpoint of lateral margin of head; frontal carina and antennal scrobes absent; mandibles triangular, masticatory margin with 6 teeth, with a large apical tooth, followed by a smaller preapical tooth and 4 denticles; anteromedian margin of clypeus concave, with lateral part forming a pair of weak lobes. **Mesosoma.** Promesonotal dorsum in lateral view convex and higher than metanotum; promesonotal suture absent; metanotal groove concave; propodeum dorsum convex and gradual decline posteriorly, posterodorsal corner with a triangular tooth; propodeal lobes with a blunt posterior margin. In dorsal view, humeral corners of pronotum with a pair of distinct teeth; lateral sides of pronotum almost straight and convergent posteriorly; posterodorsal corner of pronotum with a pair of blunt processes, and not passing smoothly to lateral margins of mesonotum; promesonotal suture absent, but sometimes with a faint trace (Figs. 2, 5, 8); anterior margin of mesonotum convex, lateral margin weakly convex and convergent posteriorly; metanotal groove depressed, and strongly constricted between mesonotum and propodeum; lateral margin of propodeum convex, posterior margin concave, posterolateral corner forming a pair of blunt teeth. **Waist.** Anterodorsal corner of petiole forming a small tooth which points forward and upwards; dorsum with a thick tooth slightly curving backwards; subpetiolar process triangular transparently; in dorsal view, petiole rectangular, blunt denticle in anterolateral corner, with a transverse ridge in middle. Postpetiole in lateral view smaller than petiole, dorsal margin strong convex, sternite of postpetiole much smaller than its stergite,

anteroventral corner with an obtuse angle; in dorsal view anterolateral corner of postpetiole rounded, lateral margin almost straight and weakly convergent posteriorly. **Gaster.** Gaster in lateral view oval, in dorsal view humeral corner of gaster obtuse-angulate. **Sculpture.** Mandibles scattered with piligerous punctures; frontal lobes with longitudinal stria, which sometimes extending backward to a half of head; cheek with longitudinal stria; the rest of the head smooth and shiny, except scattered with piligerous punctures; middle part of mesonotum and propodeum smooth and shiny, but with their lateral parts rugulose; face of metanotal groove scattered with ridges; lateral face of pronotum and upper part of propodeum smooth and shiny, lower part of propodeum reticulate-rugulose; gaster smooth and shiny. **Pilosity.** Body with dense erect hairs and sparse pubescence, antennae with abundant pubescence. **Color.** Body yellow to yellow-brown.

Remarks. This species is easily distinguished from the congeners of this genus by notably dentate shoulder of pronotum.

Distribution. China (Wu & Wang 1995; Huang & Zhou 2006; Terayama 2009; General & Alpert 2012; Cheng *et al.* 2015; Yu *et al.* 2019), India (Bharti *et al.* 2016), Vietnam (Karavaiev 1935; Eguchi *et al.* 2011), Thailand (Jaitrong & Jeenthong 2015; Khachonpisitsak *et al.* 2020).

Gauromyrmex bengkalisi Menozzi, 1933

(Figs. 10–13)

Gauromyrmex bengkalisi Menozzi, 1933: 146, figs. 1–2 (w.) INDONESIA. Combination in *Vollelhovia* by Bolton, 1995: 422; in *Gauromyrmex* by Bolton, 2003: 269. (The Cotype worker images examined, <https://AntWeb.org>, CASENT0172783, images by April Nobile).

Material examined. unexamined.

Diagnosis. Anteromedian part of clypeus prominent, with anterior margin distinctly concave and its lateral part forming a pair rounded lobe. Eyes located a little forward of midpoint of lateral margin. Posterodorsal corner of propodeum unarmed, forming an obtuse angle between dorsal margin and declivity, declivity steep and marginate laterally, about 2 times

as long as its dorsum, and with a small tooth on the mid-lateral edge of declivity. In dorsal view, humeral corners of pronotum rounded and unarmed. Subpetiolar process absent.

Description. Worker. TL 2.22, HL 0.52, HW 0.51, CI 98, SL 0.35, SI 69, ED 0.11, PW 0.32, MSL 0.70, PL 0.15, PH 0.19, DPW 0.10, LPI 127, DPI 67 (n=1, Measurement data obtained from Cotype worker images).

Head. Head in full-face view rectangular, slightly longer than broad, posterior margin in middle weakly concave, posterolateral corner rounded, lateral margin even. Mandibles triangular, masticatory margin with 6 teeth, with a large apical tooth, followed by a smaller preapical tooth and 4 denticles; anteromedian part of clypeus prominent, with anterior margin distinctly concave and its lateral part forming a pair of rounded lobes. Frontal carina and antennal scrobes absent. Antenna 12-segmented, scape not surpassing posterior margin of head. Eyes median size (ED 0.11), located a little forward of midpoint of lateral margin.

Mesosoma. in lateral view, dorsum of pronotum weakly convex; anterior part of dorsum of mesonotum almost straight, and posterior part steep; dorsum of propodeum weakly convex, posterodorsal corner unarmed, forming an obtuse angle between dorsal margin and declivity, declivity steep and marginate laterally, about 2 times as long as its dorsum, and with a small tooth on the mid-lateral edge of declivity. In dorsal view, humeral corners of pronotum rounded and unarmed; lateral sides of pronotum almost straight and convergent posteriorly; posterodorsal corner of pronotum with a pair of blunt processes, and not passing smoothly to lateral margins of mesonotum; promesonotal suture absent; metanotal groove depressed, and strongly constriction between mesonotum and propodeum; lateral margin of propodeum straight and divergent posteriorly, posterolateral corner forming a pair of obtuse angles. **Waist.** Petiole in lateral view peduncle short, anterodorsal corner forming an inconspicuous denticle, dorsum triangular, subpetiolar process absent; in dorsal view, petiole rectangular, anterolateral corner obtuse, with a transverse ridge in middle. Postpetiole in lateral view smaller than petiole, anterior margin

convex, dorsum narrowed, posterior margin steep, sternite of postpetiole much smaller than its stergite, anteroventral obtuse; in dorsal view anterolateral corner of postpetiole rounded, lateral margin convex and almost narrowed posteriorly. **Gaster.** Gaster in lateral view oval, in dorsal view humeral corner of gaster obtuse-angulate. **Sculpture.** Mandibles scattered with piligerous punctures and weak stria; middle part of clypeus smooth and shiny, and its lateral part with several stria; outer face of antennal sockets with concentric stria, the rest of head smooth and shiny, scattered with small piligerous punctures. Lateral face of pronotum smooth and shiny, dorsum of pronotum with dense puncta and about 9-11 stria; face of metanotal groove scattered with five ridges; the rest of mesosoma punctate-reticulate. Lateral face of petiole and postpetiole punctate-reticulate; anterior face of petiole smooth and shiny, posterior face and dorsal face of postpetiole punctate-reticulate weakly. Gaster smooth and shiny. **Pilosity.** Head with sparse erect hairs and medium-density pubescences, mesosoma with abundant erect hairs, gaster with sparse erect hairs, antennae with abundant pubescence. **Color.** Body dark brown, clypeus and antenna yellowish-brown.

Remarks. This species is easily distinguished from *G. bengkalisi* by anteromedian part of clypeus prominent, with anterior margin distinctly concave and its lateral part formed a pair rounded lobes; dorsum of propodeum weakly convex, posterodorsal corner of propodeum unarmed, forming an obtuse angle between dorsal margin and declivity; in dorsal view, humeral corners of pronotum rounded and unarmed; subpetiolar process absent; dorsum of pronotum with dense puncta and about 9-11 stria; the rest of mesosoma punctate-reticulate.

This species is easily distinguished from *G. orbihumerus* by posterodorsal corner of propodeum obtuse and unarmed; subpetiolar process absent; dorsum of petiole triangular; dorsum of pronotum with dense puncta and about 9-11 stria.

Distribution. Indonesia (Menozzi 1933; Chapman & Capco 1951) and Malaysia (data from AntWeb.org).

***Gauromyrmex orbihumerus* Chen & Chen sp. nov.** (Figs. 14-16)

Material examined. Holotype worker, CHINA: Guangxi, Daxin, Xialei Protection Zone, 22.58°N, 106.75°E, 24.VII.2018, leg. Zhilin Chen, No. G187739; Paratypes: 2 workers from the same colony as the holotype worker. Type workers deposited in GXNU (Insect Collection, Guangxi Normal University, Guilin, Guangxi, China).

Diagnosis. Anteromedian margin of clypeus concave. In lateral view, dorsum of pronotum convex; dorsum of mesonotum almost straight, and leaning forward slightly; dorsum of propodeum convex and declining posteriorly, about 1.5 times as long as its declivity, forming a tooth between dorsal margin and declivity, declivity concave. In dorsal view, humeral corners of pronotum rounded. Subpetiolar process triangular translucently; anterior 5/6 part of head with longitudinal stria; dorsum of promesonotum shiny, with fine stria; lateral face of mesosoma rugose longitudinally, dorsum of propodeum punctate-reticulate.

Description. Holotype worker. TL 2.88, HL 0.64, HW 0.61, CI 95, SL 0.36, SI 59, ED 0.13, PW 0.39, MSL 0.77, PL 0.21, PH 0.18, DPW 0.13, LPI 86, DPI 62.

Head. In full-face view head rectangular, slightly longer than broad, narrowed posteriorly, posterior margin in middle weakly concave, posterolateral corner rounded, lateral margin even. Mandibles triangular, masticatory margin with 6 teeth, with large apical tooth and preapical tooth, followed by 4 same size denticles; anteromedian margin of clypeus concave. Frontal carina and antennal scrobes absent. Antenna 12-segmented, scape not surpassing posterior margin of head. Eyes median size, 8 ommatidia in longest row, located midpoint of lateral margin. **Mesosoma.** In lateral view, dorsum of pronotum convex; dorsum of mesonotum almost straight, and leaning forward slightly; dorsum of propodeum convex and declining posteriorly, about 1.5 times as long as its declivity, forming a tooth between dorsal margin and declivity, declivity concave. In dorsal view, humeral corners of pronotum rounded; lateral sides of pronotum concave; posterodorsal corner of pronotum with a pair

of blunt process, and not passing smoothly to lateral margins of mesonotum; promesonotal suture absent; metanotal groove depressed, and strongly constriction between mesonotum and propodeum; lateral margin of propodeum convex, posterolateral corner forming a pair of spines. **Waist.** Petiole in lateral view peduncle short, anterodorsal corner forming an obtuse denticle, dorsum with a strong tooth, subpetiolar process triangular translucently; in dorsal view, petiole rectangular, anterolateral corner obtuse denticle, anterior margin concave, with a transverse ridge in middle. Postpetiole in lateral view smaller than petiole, anterior margin convex, dorsum narrowed, posterior margin steep, sternite of postpetiole much smaller than its stergite, anteroventral obtuse; in dorsal view anterolateral corner of postpetiole rounded, lateral margin convex and narrowed posteriorly. **Gaster.** Gaster in lateral view oval, in dorsal view humeral corner of gaster obtuse-angulate. **Sculpture.** Mandibles scattered with piligerous punctures and weakly stria; middle part of clypeus smooth and shiny, and its lateral part with several stria; outer face of antennal sockets with dense concentric stria, anterior 5/6 part of head with longitudinal stria, and rest of head so shiny. Dorsum of promesonotum shiny, with fine stria; face of metanotal groove scattered with several ridges; lateral face of mesosoma rugose longitudinally, dorsum of propodeum punctate-reticulate. Lateral face of petiolar node and postpetiole reticulate finely; dorsum of petiole and postpetiole smooth and shiny, sometime with sparse ridges. Gaster smooth and shiny. **Pilosity.** Head with abundant erect hairs and sparse pubescences, mesosoma, petiole, postpetiole and gaster sparse with erect hairs pubescence. **Color.** Body yellow to yellowish-brown.

Paratype workers. TL 2.82–2.92, HL 0.64–0.69, HW 0.60–0.63, CI 94–95, SL 0.35–0.37, SI 59–60, ED 0.13, PW 0.38–0.39, MSL 0.76–0.79, PL 0.20–0.22, PH 0.19–20, DPW 0.12–0.13, LPI 85–87, DPI 62–63 (n = 2).

Remarks. The new species is extremely similar to *G. acanthinus*, but can be distinguished from the latter by the following characters of workers: humeral corners of pronotum rounded in dorsal view; anterior 5/6 part of head with longitudinal stria, and rest of head shiny, dorsum of promesonotum fine stria; lateral face of mesosoma rugose longitudinally; dorsum of propodeum punctate-reticulate. In addition, the difference between this species and *G. bengkalisi* is shown in couplet 2 of the key.

Habitat. This species was collected from the trunk of *Elaeocarpus decipiens* Hemsl., about 1.5 meters above the ground.

Etymology. The name “*orbihumerus*” refers to the rounded humeral corners of pronotum.

DISCUSSION

This genus is widely distributed in China, but which is not easily found in the field, so that collection records are relatively limited compared to other species. All species of this genus are arboreal, nesting under loose bark, and rarely attract the attention of myrmecologists, and even if nests are unintentionally excavated, they are difficult to spot due to their slow moving when disturbed. So far there are only three clear records of nesting plants of this genus, namely “Resin trees” (Presumably the common species *Styrax benzoin*) (Menozzi, 1933), *Ficus* sp. (misspelled as *Fiecus* sp. By Smith (1949)), *Elaeocarpus decipiens* (this study). We suggest that *Gauromyrmex* do not nest in a particular plant group, but any tree with loose bark, such that they are suitable for new queens to find shelter and for workers to dig their way through. The workers of this genus are size variable to weakly polymorphic, the head of larger workers in full-face view is narrower anteriorly and the frontal area has longitudinal stria, while smaller workers have a rectangular head with a smooth and shiny surface. Based on the above knowledge, we suggest that caution is used when describing new species of this genus in the future. We also believe that there must be with some undescribed species of this genus, requiring us to pay more attention to arboreal species in future field investigations, expecting more discoveries.

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