European Journal of Taxonomy 936: 1–97
https://doi.org/10.5852/ejt.2024.936.2569
ISSN 2118-9773
www.europeanjournaloftaxonomy.eu
2024 · Qian Y.-H. & Xu Z.-H.

Monograph

urn:lsid:zoobank.org:pub:53A95458-F2C4-4486-A80B-14B121D1BD14

Taxonomy of the ant genera *Leptothorax* Mayr, 1855 and *Temnothorax* Mayr, 1861 (Hymenoptera: Formicidae) of China with descriptions of twenty-eight new species and a key to the known Chinese species

Yu-Han QIAN [1] & Zheng-Hui XU [2,*]

[1,2] Key Laboratory of Forest Disaster Warning and Control in Yunnan Province, College of Biodiversity Conservation, Southwest Forestry University, Kunming, Yunnan Province 650224, China.
[1] Key Laboratory for Forest Resources Conservation and Utilization in the Southwest Mountains of China, Ministry of Education, Southwest Forestry University, Kunming, Yunnan 650224, China.

[*] Corresponding author: xuzhenghui1962@163.com
[1] Email: nerv6667@163.com

[1] urn:lsid:zoobank.org:author:E177BEB3-91D4-4158-86A7-FEE769033DE1
[2] urn:lsid:zoobank.org:author:7C231A34-DFD1-418B-9D2B-5E0757B15EAE

Abstract. The Chinese members of the genera *Leptothorax* Mayr, 1855 and *Temnothorax* Mayr, 1861 are reviewed based on the morphological characters of the worker caste, and 66 species are recognized in China to date. A new synonym is proposed: *T. opaciabdomin* (Chang & He, 2001) is a junior synonym of *T. mongolicus* (Pisarski, 1969). Twenty-eight new species of *Temnothorax*, *T. bailu* sp. nov., *T. chun* sp. nov., *T. chunfen* sp. nov., *T. chushu* sp. nov., *T. dahan* sp. nov., *T. dashu* sp. nov., *T. daxue* sp. nov., *T. dong* sp. nov., *T. dongzhi* sp. nov., *T. guyu* sp. nov., *T. hanlu* sp. nov., *T. jingzhe* sp. nov., *T. lichun* sp. nov., *T. lidong* sp. nov., *T. liqiu* sp. nov., *T. lixia* sp. nov., *T. mangzhong* sp. nov., *T. qingming* sp. nov., *T. qiu* sp. nov., *T. qiufen* sp. nov.,*T. shuangjiang* sp. nov., *T. xia* sp. nov., *T. xiaohan* sp. nov., *T. xiaoman* sp. nov., *T. xiaoshu* sp. nov., *T. xiaoxue* sp. nov., *T. xiazhi* sp. nov., *T. yushui* sp. nov., are described from China based on worker caste. Three species of *Temnothorax*, *T. desioi* (Menozzi, 1939), *T. susamyri* (Dlussky, 1965) and *T. volgensis* (Ruzsky, 1905) are recorded in China for the first time. The following eight species are recorded in a province or autonomous region of China for the first time: *Leptothorax acervorum* (Fabricius, 1793) is a new record in Qinghai, Sichuan and Yunnan; *Temnothorax angulohumerus* Zhou *et al.*, 2010 is a new record in Guizhou and Tibet; *T. argentipes* (Wheeler, 1928) is a new record in Sichuan and Yunnan; *T. mongolicus* (Pisarski, 1969) is a new record in Inner Mongolia; *T. reticulatus* (Chang & He, 2001) is a new record in Beijing, Gansu, Inner Mongolia, Jilin, Shaanxi and Yunnan; *T. spinosior* (Forel, 1901) is a new record in Yunnan; *T. taivanensis* (Wheeler, 1929) is a new record in Guizhou, Sichuan and Yunnan; and *T. zhejiangensis* Zhou *et al.*, 2010 is a new record in Henan and Guangxi. A key based on the worker caste is provided for the 66 known Chinese species.

Keywords. Formicidae, *Leptothorax*, *Temnothorax*, review, new synonym, new species.

Qian Y.-H. & Xu Z.-H. 2024. Taxonomy of the ant genera *Leptothorax* Mayr, 1855 and *Temnothorax* Mayr, 1861 (Hymenoptera: Formicidae) of China with descriptions of twenty-eight new species and a key to the known Chinese species. *European Journal of Taxonomy* 936: 1–97. https://doi.org/10.5852/ejt.2024.936.2569

Introduction

Leptothorax Mayr, 1855 and *Temnothorax* Mayr, 1861 are two closely related myrmicine ant genera. *Leptothorax* is distributed in the Palearctic and Nearctic regions (Janicki *et al.* 2016). Up to now 20 species of the genus were recorded in the world and most species were reported from Europe and North America (Bolton 2023). *Temnothorax* is a large genus which distributed in the Palearctic, Oriental, Afrotropical, Nearctic and Neotropical regions (Janicki *et al.* 2016). To date 466 species of the genus are known in the world and most species were reported from Europe, North Africa and North America (Bolton 2023).

The genus *Leptothorax* was established by Mayr (1855). Afterwards, Mayr (1861) established a closely related genus *Temnothorax*, but the genus was regarded as a subgenus of *Leptothorax* by different authors (Forel 1892; Wheeler 1910, 1922; Ruzsky 1905; Emery 1915, 1924; Bondroit 1918; Donisthorpe 1943), or a junior synonym of *Leptothorax* (Forel 1890; Baroni Urbani 1971; Brown 1973; Bolton 1994; Terayama & Onoyama 1999). Recently, *Temnothorax* was once again regarded as a good genus (Bolton 2003; Radchenko 2004). In addition to morphological evidence, there is molecular phylogenetic evidence for the classification of *Leptothorax* and *Temnothorax* (Ward *et al.* 2015; Prebus 2017).

Although many scholars have summarized the results of studies on *Leptothorax* and *Temnothorax*, there are few systematic revisions of the taxa from China. While Radchenko (2004), Terayama (2009) and Zhou *et al.* (2010) revised the eastern Palearctic and Oriental species of *Leptothorax* and *Temnothorax* and Terayama & Onoyama (1999) revised the species of *Leptothorax* in Japan, an overview on the most recent fauna reviews of the two genera is necessary. Recently, Hamer *et al.* (2023) reported two new species of *Temnothorax*, *T. barrettoi* Hamer & Guénard, 2023 and *T. haveni* Lee *et al.*, 2023 from Hong Kong, China. In the same year, Seifert (2023) revised *Leptothorax zhengi* Zhou & Chen, 2011 as a junior synonym of *Formicoxenus sibiricus* (Forel, 1899) and described a new species, *Leptothorax tibeticum*, from the high Qinghai-Tibet Plateau.

In this study, we carried out a taxonomy of the Chinese species of *Leptothorax* and *Temnothorax* and 66 species are recognized. A new synonym is proposed and 28 new species are described based on the rich collection in Southwest Forestry University accumulated over the past 34 years since 1990. Three species of *Temnothorax* are recorded in China for the first time, and eight species of *Leptothorax* and *Temnothorax* are recorded in provinces or autonomous regions of China for the first time. A key to the 66 known Chinese species of *Leptothorax* and *Temnothorax* based on the worker caste is provided.

Material and methods

Chinese species of *Leptothorax* and *Temnothorax* were studied based on specimens from China and type and non-type specimen images available on the AntWeb (https://www.antweb.org) and AntWiki (https://www.antwiki.org). Ant specimens from China were collected through plot-sampling and search-collecting methods (Xu 2002; Xu *et al.* 2011) over the past 34 years since 1990 and observed under a SDPTOP SZ stereo microscope with a micrometer (Sunny Optical Technology (Group) Co. Ltd, Zhejiang, China). Examined holotypes of *T. opaciabdomin* (Chang & He, 2001), *T. brevispinus* (Chang & He, 2001) and *T. reticulatus* (Chang & He, 2001) were deposited in the Insect Collection, Ningxia University (NXU), Yinchuan, Ningxia Hui Autonomous Region, China. Examined holotype and paratypes of *Temnothorax reduncus* (Wang & Wu, 1988) were deposited in the Organism Specimen Collection, Institute of Forest Ecological Environment and Nature Conservation, Chinese Academy of Forestry (CAF), Haidian District, Beijing, China. Examined paratypes of *T. angulohumerus* Zhou *et al.*, 2010, *T. orchidus* Zhou *et al.*, 2010, *T. striatus* Zhou *et al.*, 2010, *T. shannxiensis* Zhou *et al.*, 2010, *T. maoerensis* Zhou *et al.*, 2010, *T. ruginosus* Zhou *et al.*, 2010, *T. zhejiangensis* Zhou *et al.*, 2010 and *L. zhengi* Zhou & Chen, 2011, as well as holotypes and paratypes of all new species

were deposited in the Insect Collection, Southwest Forestry University (SWFU), Kunming, Yunnan Province, China. Digital images were obtained using a Liyang Super Resolution System LY-WN-YH (Chengdu Liyang Precision Machinery Co., Ltd, China). Image stacking was done using the software Zerene Stacker (Zerene Systems LLC, USA). The key was prepared using the examined specimens, images available on the AntWeb, AntWiki and original descriptions of the species. For the use of terminology and integument sculpture characters, we refered the glossary provided in Hölldobler & Wilson (1990) and the glossary of morphological terms provided in Bolton (1994). The Unique Specimen Identities (USIs) of specimens houses in the Ant Collect of the Southwest Forestry University (SWFU) were included in the Material examined section of each new species descriptions to facilitate repeatability by allowing future researchers to refer to specimens. The format of the ant collection catalog is as "SWFU A90-1", SWFU is the abbreviation of Southwest Forestry University, A (B or C) means ant specimens be in charged by different persons, 90 is the posterior two numbers of 1990, and 1 is the first number of ant specimens collected in 1990. Ant individuals from the same nest were given only one number so as to facilitate people to recognize which individuals were from the same nest.

Acronyms of other specimens' repositories

BMNH = British Museum Natural History, London, UK
GXNU = Guangxi Normal University (Insect Collection), Guilin, Guangxi, China
MCZC = Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA
MHNG = Musée d'Histoire naturelle Genève, Geneva, Switzerland
MIZW = Museum and Institute of Zoology, Polish Academy of Sciences, Warsaw, Poland
MSNM = Museo Civico di Storia Naturale, Milano, Italy
NIAS = National Institute of Agro-Environmental Sciences, Tsukuba, Japan
SIZK = Schmalhausen Institute of Zoology, Ukrainian National Academy of Sciences, Kiev, Ukraine
SMNG = Senckenberg Museum für Naturkunde (Staatliches Museum für Naturkunde), Görlitz, Germany
ZMHF = Zoologiska Muset, Universitets Helsinki (Finnish Museum of Natural History), Helsinki, Finland
ZMUC = Zoologiske Museum, University of Copenhagen, Copenhagen, Denmark
ZMUM = Zoological Museum of Moscow University, Lomonosov Moscow State University, Moscow, Russia
ZRC = Lee Kong Chian Natural History Museum (Zoological Reference Collection), National University of Singapore, Kent Ridge, Singapore

Standard measurements and indices are as defined in Bolton (1983) with supplementary of ED, PL, PH and DPW as outlined below:

CI = Cephalic Index = HW × 100 / HL
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 perfect full-face view, measured from the mid-point of the anterior clypeal margin to the midpoint of the posterior margin. In species where one or both of these margins are concave, the measurement is taken from the mid-point of a transverse line that spans the apices of the projecting portions
HW = Head Width: maximum width of head in full-face view, excluding the eyes
PH = Petiole Height: height of petiole measured in lateral view from the apex of the ventral (subpetiolar) process vertically to a line intersecting the dorsal most point of the node
PL = Petiole Length: length of petiole measured in lateral view from the anterior articulation to the posterior articulation of petiole

PW = Pronotal Width: maximum width of pronotum measured in dorsal view
SI = Scape Index = SL × 100 / HW
SL = Scape Length: straight-line length of the antennal scape, excluding the basal constriction or neck
TL = Total Length: total outstretched length of the individual, from the mandibular apex to the gastral apex
WL = Weber's length (= Alitrunk Length): the diagonal length of the mesosoma (= alitrunk) in profile from the point at which the pronotum meets the cervical shield to the posterior base of the metapleuron

All measurements are expressed in millimeters (mm). The raw measurements and indices of type specimens of new species of *Temnothorax* were provided in the Appendix.

Results

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Family Formicidae Latreille, 1809
Subfamily Myrmicinae Lepeletier de Saint-Fargeau, 1835
Tribe Crematogastrini Forel, 1893

List of known Chinese species of Leptothorax Mayr, 1855

1 *L. acervorum* (Fabricius, 1793)
2 *L. muscorum* (Nylander, 1846)
3 *L. oceanicus* (Kuznetsov-Ugamsky, 1928)
4 *L. tibeticum* Seifert, 2023

List of known Chinese species of Temnothorax Mayr, 1861

1 *T. angulohumerus* Zhou *et al.*, 2010
2 *T. argentipes* (Wheeler, 1928)
3 *T. bailu* sp. nov.
4 *T. barrettoi* Hamer & Guénard, 2023
5 *T. brevispinus* (Chang & He, 2001)
6 *T. chun* sp. nov.
7 *T. chunfen* sp. nov.
8 *T. chushu* sp. nov.
9 *T. confucii* (Forel, 1912)
10 *T. congruus* (Smith, 1874)
11 *T. dahan* sp. nov.
12 *T. dashu* sp. nov.
13 *T. daxue* sp. nov.
14 *T. desioi* (Menozzi, 1939)
15 *T. dong* sp. nov.
16 *T. dongzhi* sp. nov.
17 *T. eburneipes* (Wheeler, 1927)
18 *T. guyu* sp. nov.
19 *T. hanlu* sp. nov.
20 *T. haveni* Lee *et al.*, 2023
21 *T. hengshanensis* (Huang *et al.*, 2004)
22 *T. huatuo* Terayama, 2009
23 *T. jingzhe* sp. nov.

24 *T. koreanus* (Teranishi, 1940)
25 *T. kuixing* Terayama, 2009
26 *T. leigong* Terayama, 2009
27 *T. leimu* Terayama, 2009
28 *T. leyeensis* Zhou *et al.*, 2010
29 *T. lichun* sp. nov.
30 *T. lidong* sp. nov.
31 *T. liqiu* sp. nov.
32 *T. lixia* sp. nov.
33 *T. mangzhong* sp. nov.
34 *T. maoerensis* Zhou *et al.*, 2010
35 *T. mongolicus* (Pisarski, 1969)
36 T. orchidus Zhou *et al.*, 2010
37 *T. pisarskii* Radchenko, 2004
38 T. qingming sp. nov.
39 *T. qiu* sp. nov.
40 *T. qiufen* sp. nov.
41 *T. reduncus* (Wang & Wu, 1988)
42 *T. reticulatus* (Chang & He, 2001)
43 *T. ruginosus* Zhou *et al.*, 2010
44 *T. shannxiensis* Zhou *et al.*, 2010
45 *T. shuangjiang* sp. nov.
46 *T. spinosior* (Forel, 1901)
47 *T. striatus* Zhou *et al.*, 2010
48 *T. susamyri* (Dlussky, 1965)
49 *T. taivanensis* (Wheeler, 1929)
50 *T. tianpeng* Terayama, 2009
51 *T. volgensis* (Ruzsky, 1905)
52 *T. wui* (Wheeler, 1929)
53 *T. xanthos* Radchenko, 2004
54 *T. xia* sp. nov.
55 *T. xiaohan* sp. nov.
56 *T. xiaoman* sp. nov.
57 *T. xiaoshu* sp. nov.
58 *T. xiaoxue* sp. nov.
59 *T. xiazhi* sp. nov.
60 *T. yanwan* Terayama, 2009
61 *T. yushui* sp. nov.
62 *T. zhejiangensis* Zhou *et al.*, 2010

Treatment of new synonym

Temnothorax mongolicus (Pisarski, 1969)
Fig. 1

Leptothorax serviculus subsp. *mongolicus* Pisarski, 1969: 299, figs 5–10 (w.) MONGOLIA. Palearctic. Paratype worker images (Antweb 2023, CASENT 0916693) examined.
Leptothorax opaciabdomin Chang & He, 2001: 2, figs 2, 6, 10 (w.) CHINA. Palearctic. **Syn. nov.**

Leptothorax mongolicus – Radchenko 1994: 156.
Temnothorax mongolicus – Bolton 2003: 271.
Temnothorax opaciabdomin – Zhou *et al.* 2010: 10 (in key). Holotype worker (Fig. 2a–c) examined.

Diagnosis

In full-face view, the shapes of the head capsule, mandibles, clypeus and antennae of the holotype worker of *Leotothorax opaciabdomin* (Fig. 2A) are similar to the ones of the paratype worker of *T. mongolicus* (Fig. 1A). Head roughly rectangular, longer than broad, posterior margin nearly straight, posterior corners broadly rounded, lateral margins weakly convex. Clypeus with median carina, anterior margin weakly convex. Antennae 12-segmented, scapes failing to reach posterior head margin.

In lateral view, the holotype worker of *Temnothorax opaciabdomin* (Fig. 2B) also has similar to shaped mesosoma and petiole the paratype worker of *T. mongolicus* (Fig. 1B). Promesonotum moderately

Fig. 1. *Temnothorax mongolicus* (Pisarski, 1969), paratype worker (MIZW). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0916693, photos by Flavia Esteves.

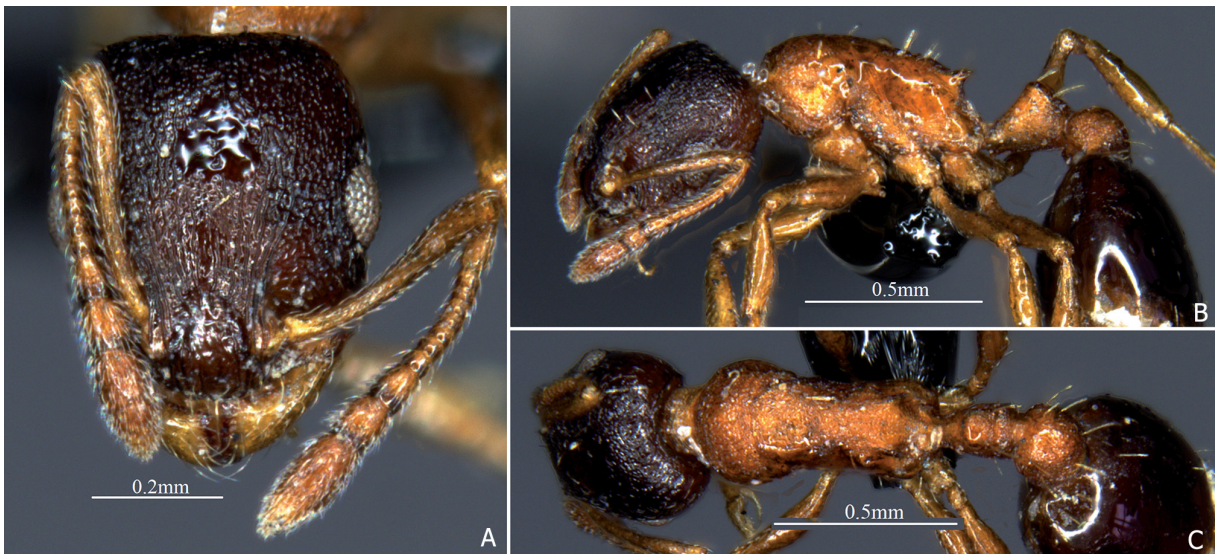

Fig. 2. *Leptothorax opaciabdomin* Chang & He, 2001, holotype worker (NXU 99-161). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

convex. Metanotal groove absent. Propodeal dorsum gently sloping down posteriorly; propodeal spines shorter than declivity. Petiole without anterior peduncle; petiolar node with straight anterior and posterior margins.

In dorsal view, the holotype worker of *Temnothorax opaciabdomin* (Fig. 2C) shows similar to shape in mesosoma and petiole the paratype worker of *T. mongolicus* (Fig. 1C). Pronotum broad, humeral corners broadly rounded, lateral margins strongly convex. Mesothorax moderately constricted and narrowing posteriorly, lateral margins moderately concave. Propodeum roughly rectangular, lateral margins almost straight; spines short, pointed posterolaterally. Petiole widening posteriorly and slightly longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal.

The holotype worker of *Temnothorax opaciabdomin* (Fig. 2) shows similar to characters in body surface sculpture, pilosity and color to paratype worker of *T. mongolicus* (Fig. 1). Head dorsum longitudinally rugose with interface finely reticulate, gradually reticulate posteriorly and laterally. Promesonotum, propodeum, petiole and postpetiole finely reticulate with interface punctate. Gaster smooth and shiny. Head and gaster blackish brown, thorax, petiole and postpetiole light brown.

Taxonomic notes

After the above comparison, we could not find significant differences between the two species. Although in the original description, Chang & He (2001) stated "Gaster finely punctate and therefore not very shiny". In the key, they stated "Gaster relatively coarsely punctate and therefore not very shiny", and the Latin name "opaciabdomin" means the gaster is opaque. Zhou *et al.* (2010) adopted the original description and stated in the key "First gastral tergite coarsely punctuate, opaque". However, after re-examining the images of holotype specimen, we found the gaster of *T. opaciabdomin* is wholly smooth and shiny. Therefore, we are confident that *T. opaciabdomin* is a junior synonym of *T. mongolicus*.

Descriptions of new species

Temnothorax bailu sp. nov.
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Fig. 3

Diagnosis

This new species is similar to *T. angulohumerus* Zhou *et al.*, 2010 (Fig. 4), but differs in the new species humeral corners of pronotum bluntly angled, pronotum weakly convex in lateral view, dorsum of petiolar node sloping down posteriorly, and body color blackish brown, head and gaster black; in *T. angulohumerus* humeral corners of pronotum rightly angled, pronotum strongly convex in lateral view, dorsum of petiolar node almost horizontal, and body color yellowish brown.

Etymology

The specific epithet refers to 'bailu', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Tibet, Chayu County, Zhuwagen Town, Jiangtuo Village; 28°36.771′ N, 97°18.411′ E; 2050 m a.s.l.; 30 Aug. 2010; Xia Liu leg.; canopy sample of *Pinus yunnanensis* forest; SWFU A10-3265.

Paratypes worker

CHINA • 6 workers; same collection data as for holotype; SWFU A10-3265 • 1 worker; same collection data as for holotype; SWFU A10-3264 • 2 workers; same collection data as for holotype; SWFU A10-

3280 • 2 workers; same collection data as for holotype; SWFU A10-3290 • 1 worker; Tibet, Motuo County, Damu Town, 80K; 29.623692° N, 95.488817° E; 1750 m a.s.l.; 15 May 2008; Zheng-Hui Xu leg.; foraging on plants of monsoon evergreen broadleaf forest; SWFU A08-427.

Non-type material examined

CHINA – **Yunnan Province** • 1 worker; Yulong County, Longpan Town, Xionggu Village; 26.861139° N, 100.024366° E; 2500 m a.s.l.; 21 Oct. 2004; Sheng-Li Shi leg.; *Pinus yunnanensis* forest; SWFU A04-1256 • 1 worker; Gengma County, Mengding Town, Jiumuqing; 23.560221° N, 99.089156° E; 1500 m a.s.l.; 10 Mar. 2011; Hai-Bin Li leg.; foraging on the ground in monsoon evergreen broadleaf forest; SWFU A11-69a • 1 worker; Yongde County, Yalian Town, Tatuo Village; 24.239012° N, 99.626429° E; 2020 m a.s.l.; 13 Mar. 2011; Hua Jiang leg.; foraging on the tree of subalpine moist evergreen broadleaf forest; SWFU A11-562. – **Sichuan Province** • 2 workers; Yanbian County, Gesala Town, Huangjue Village; 27.094289° N, 101.319847° E; 2031 m a.s.l.; 24 Jul. 2018; Zheng-Hui Xu leg.; foraging on the ground in subalpine moist evergreen broadleaf forest; SWFU C18-371.

Description

Measurements of holotype worker: TL 3.6, HL 0.76, HW 0.66, CI 88, SL 0.64, SI 97, ED 0.14, PW 0.49, WL 1.00, PL 0.42, PH 0.25, DPW 0.20.

In full-face view head subrectangular, longer than broad, posterior margin almost straight, posterior corners narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes broad, concealing antennal sockets. Frontal carinae short, reaching to the level of midpoint of eyes. Antennae 12-segmented, scapes almost reaching to posterior head margin, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum weakly convex, promesonotal suture absent. Mesonotum almost straight and gently sloping down posteriorly, metanotal groove shallowly impressed. Propodeal dorsum slightly concave; propodeal spines moderately long and acute, about ⅓ length of dorsum, back-curved and pointed posterodorsally; declivity weakly concave, about ½ length of dorsum; propodeal lobes small and rounded apically. Petiole with long anterior peduncle, about as long as petiolar node; petiolar node

Fig. 3. *Temnothorax bailu* sp. nov., holotype worker (SWFU A10-3265). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

roughly trapezoidal, dorsal and anterior margins almost straight, posterior margin weakly convex, anterodorsal corner rightly angled, posterodorsal corner lower and narrowly rounded; ventral margin almost straight, anteroventral corner largely acutely toothed. Postpetiole as high as petiolar node, anterior margin weakly convex, dorsum strongly convex, posterior margin weakly concave; ventral margin short and weakly concave.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners bluntly angled, lateral margin weakly convex, promesonotal suture absent. Mesothorax moderately constricted, lateral margins weakly concave, metanotal groove shallowly impressed. Propodeum roughly rectangular, lateral margins weakly convex; spines moderately long and pointed posterolaterally, weakly in-curved. Petiole roughly rectangular, slightly longer than broad, lateral margins slightly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.4 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins slightly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum loosely longitudinally rugose and reticulate laterally, the longitudinal central strip smooth and shiny, posteroventral part of lateral head margin relatively smooth. Clypeus smooth, each side with two short rugae. Mesosoma finely reticulate; pronotal sides longitudinally rugose; mesonotal dorsum smooth; propodeal dorsum coarsely reticulate. Petiole densely punctate, the node micro-reticulate; postpetiole densely punctate, dorsum smooth and shiny. Gaster smooth and shiny. Body dorsum with abundant erect to suberect apically blunt short hairs and abundant decumbent pubescence, hairs on mesosoma sparse. Scapes and tibiae with dense decumbent pubescence. Body color blackish brown; head dorsum and apical half of gaster black; mandibles, basal segments of flagella, trochanters and tarsi brownish yellow.

Measurements of paratype workers: TL 2.6–3.6, HL 0.70–0.75, HW 0.55–0.63, CI 79–83, SL 0.49–0.50, SI 80–91, ED 0.13–0.15, PW 0.40–0.50, WL 0.80–1.00, PL 0.30–0.40, PH 0.20–0.25, DPW 0.13–0.18 (12 individuals measured). As holotype worker, in some individuals mesonotum weakly punctate, metanotal groove shallowly or indistinctly impressed, lateral head margins weakly rugose.

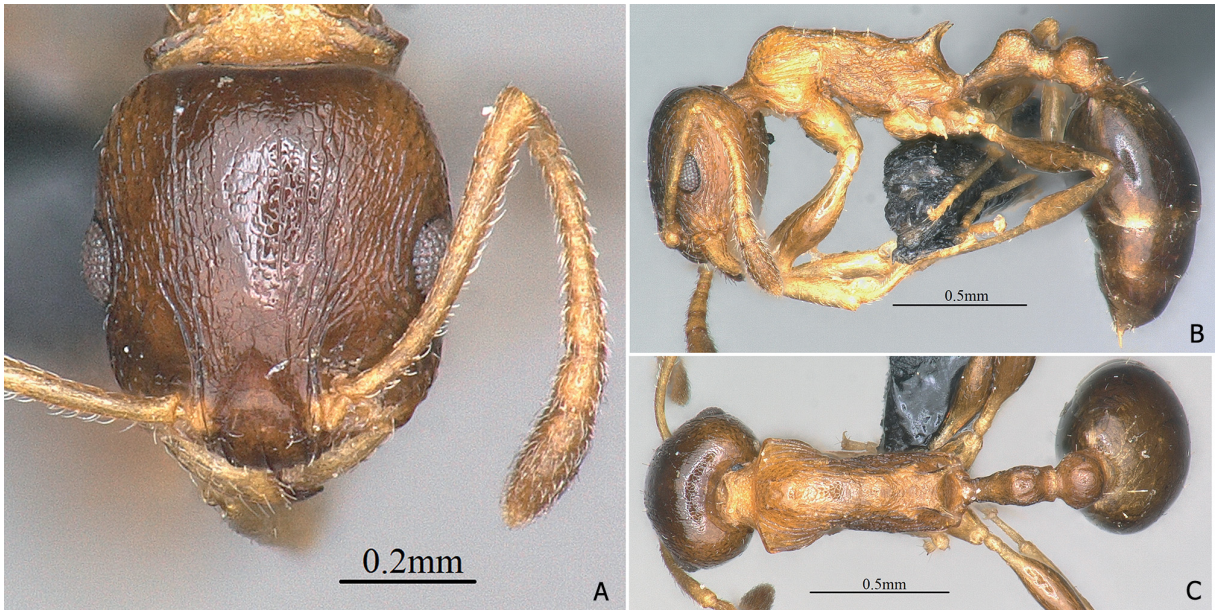

Fig. 4. *Temnothorax angulohumerus* Zhou *et al*., 2010, holotype worker (GXNU0407358). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Photos by Zhi-Lin Chen.

Ecological notes

This new species inhabits *Pinus yunnanensis* Franch. forest (Fig. 69I), monsoon evergreen broadleaf forest (Fig. 70D), and subalpine moist evergreen broadleaf forest (Fig. 69C) at an elevation of 1500–2500 m and forages arboreally, as well as on the ground.

Distribution

China: Tibet, Yunnan, Sichuan.

Temnothorax chun sp. nov.
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Fig. 5

Diagnosis

This new species is similar to *T. xia* sp. nov. (Fig. 35), but differs in the new species head dorsum loosely longitudinally rugose centrally, mesonotal dorsum smooth, and body color almost black; in *T. xia* head dorsum densely longitudinally rugose centrally, mesonotal dorsum coarsely reticulate and body color reddish brown, gaster black. The new species is also similar to *T. lixia* sp. nov. (Fig. 28), but differs in the new species head dorsum loosely longitudinally rugose, pronotal sides coarsely longitudinally rugose, propodeal spines longer than their basal width in lateral view, petiolar node symmetrical, anterodorsal corner as high as posterodorsal corner in lateral view, petiolar node weakly punctate; in *T. lixia* head dorsum densely longitudinally rugose, pronotal sides coarsely reticulate, propodeal spines as long as their basal width in lateral view, petiolar node asymmetrical, anterodorsal corner higher than posterodorsal corner in lateral view, petiolar node finely reticulate.

Etymology

The specific epithet refers to ‘chun’, one of the four seasons.

Material examined

Holotype worker

CHINA • Yunnan Province, Yuanmou County, Laocheng Town, Naneng Village; 25.638800° N, 101.958307° E; 2000 m a.s.l.; 12 Mar. 2013; Wen-Tao Yang leg.; ground sample from conifer-broadleaf mixed forest; SWFU A13-38.

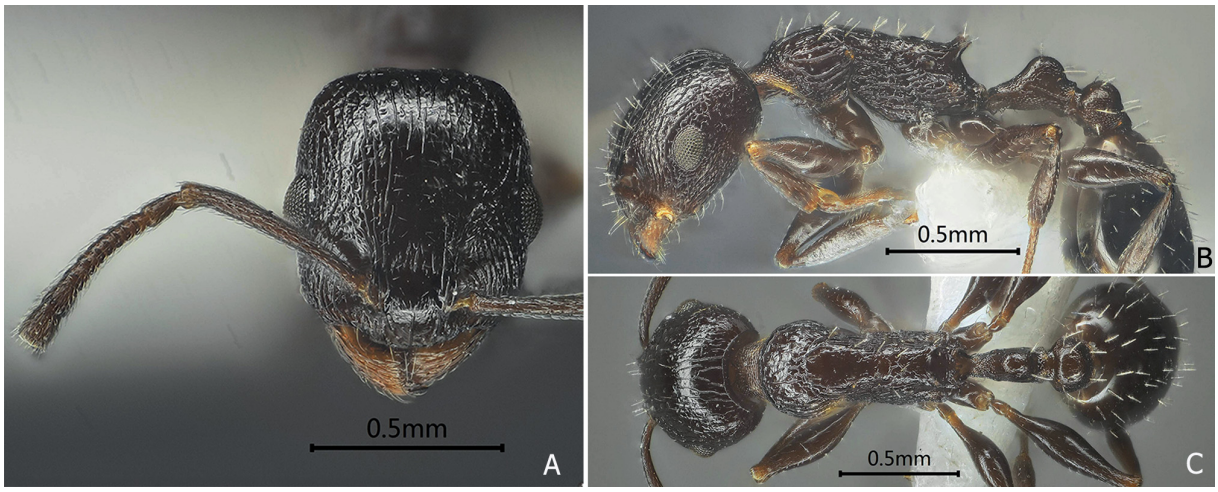

Fig. 5. *Temnothorax chun* sp. nov., holotype worker (SWFU A13-38). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Description

Measurements of holotype worker: TL 3.1, HL 0.74, HW 0.62, CI 84, SL 0.60, SI 97, ED 0.16, PW 0.43, WL 0.91, PL 0.33, PH 0.21, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior margin almost straight, posterior corners narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes broad, concealing antennal sockets. Frontal carinae short, reaching to the level of anterior eye margins. Antennae 12-segmented, scapes just reaching to posterior head margin. Eyes located at midpoint of lateral head margin, nearly occupying ⅓ of lateral margin.

In lateral view pronotum weakly convex, promesonotal suture present but not impressed. Mesonotum almost straight and gently sloping down posteriorly, metanotal groove absent. Propodeal dorsum slightly convex and gently sloping down posteriorly; propodeal spines short and stout, about ⅓ length of dorsum and longer than their basal width, weakly down-curved; declivity almost straight, shorter than dorsum; propodeal lobes short and rounded apically. Petiole with long anterior peduncle, about ¾ length of petiolar node; petiolar node roughly semicircular, anterior and posterior margins weakly convex, dorsal margin narrowly rounded; ventral margin straight anteriorly, moderately concave posteriorly, anteroventral corner triangularly toothed. Postpetiole as high as petiolr node, anterodorsal margin rounded, posterior margin weakly concave, ventral margin angularly concave.

In dorsal view pronotum broadest, anterior and lateral margins moderately convex, humeral corners broadly rounded, promesonotal suture present. Mesothorax weakly constricted, lateral margins weakly concave, metanotal groove absent. Propodeum roughly rectangular, lateral margins almost straight, spines short and pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, anterior peduncle narrower than the node. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.6 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum loosely longitudinally rugose and reticulate laterally, with the longitudinal central strip relatively smooth; genae longitudinally rugose. Clypeus smooth, each side with 3–4 short rugae. Mesosoma reticulate, pronotal sides longitudinally rugose, mesonotal dorsum smooth. Petiole and postpetiole densely finely punctate, dorsa of petiolar node and postpetiole smooth. Gaster smooth and shiny. Body dorsum with abundant erect to suberect apically blunt short hairs and abundant decumbent pubescence. Scapes and tibiae with dense decumbent pubescence. Body color blackish brown; head dorsum, eyes and gaster black; mandibles and tarsi brownish yellow.

Ecological notes

This new species inhabits conifer-broadleaf mixed forest (Fig. 69D) at an elevation of 2000 m and forages on the ground.

Distribution

China: Yunnan.

Temnothorax chunfen sp. nov.
urn:lsid:zoobank.org:act:96705DBF-4EF1-42ED-A1B0-2EB0204ADC0E
Fig. 6

Diagnosis

This new species is similar to *T. congruus* (Smith, 1874) (Fig. 7), but in differs the new species head dorsum wholly smooth, petiolar node relatively shorter with narrower summit, and body color brownish

black, gaster black; in *T. congruus* head dorsum coarsely longitudinally rugose on the central area, petiolar node relatively longer with broader summit, and body color reddish brown, gaster black. The new species is also similar to *T. qingming* sp. nov. (Fig. 30), but differs in the new species pronotum and mesonotal dorsum smooth, in lateral view propodeal spines shorter tan their basal width, petiolar node relatively higher, about 0.8 times as high as petiole length; in *T. qingming* pronotum and mesonotal dorsum finely reticulate, in lateral view propodeal spines longer than their basal width, petiolar node relatively lower, about 0.6 times as high as petiole length.

Etymology

The specific epithet refers to 'chunfen', one of the 24 Solar Terms of China.

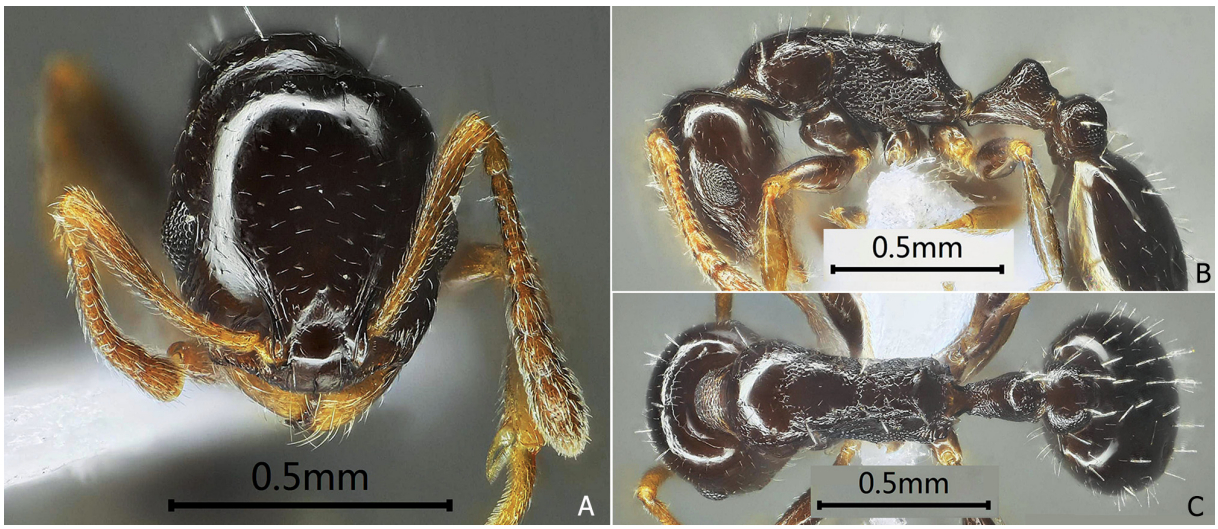

Fig. 6. *Temnothorax chunfen* sp. nov., holotype worker (SWFU A04-713). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Fig. 7. *Temnothorax congruus* (Smith, 1874), holotype worker (BMNH 1014987). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0901786, photos by Ryan Perry.

Material examined

Holotype worker

CHINA • Yunnan Province, Deqin County, Benzilan Town, Benzilan Village; 28.242147° N, 99.281039° E; 2260 m a.s.l.; 12 Oct. 2004; Jun-Wu Yang leg.; canopy sample from dry-warm valley shrubland; SWFU A04-713.

Description

Measurements of holotype worker: TL 2.4, HL 0.58, HW 0.48, CI 82, SL 0.46, SI 96, ED 0.13, PW 0.33, WL 0.74, PL 0.25, PH 0.20, DPW 0.15.

In full-face view head roughly rectangular, longer than broad, posterior margin slightly convex, posterior corner broadly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes broad, concealing antennal sockets. Frontal carinae short, about as long as frontal lobes. Antennae 12-segmented, scapes just reaching to posterior head margin, antennal clubs 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum weakly convex, anterodorsal corner narrowly rounded. Promesonotal suture and metanotal groove absent. Mesonotum almost straight and gently sloping down posteriorly. Propodeal dorsum slightly convex and gently sloping down posteriorly; propodeal spines short and triangular, blunt apically, shorter than their basal width; declivity slightly concave; propodeal lobes broad, truncated apically. Petiole with relatively short anterior peduncle, about ⅔ length of petiolar node; petiolar node roughly conical, anterior margin slightly convex, posterior margin weakly convex, dorsum narrowly rounded; ventral margin slightly concave, anteroventral corner bluntly toothed. Postpetiole as high as petiolar node, anterodorsal margin rounded, posterior margin slightly concave, ventral margin almost straight.

In dorsal view pronotum broadest, anterior margin weakly convex, humeral corners broadly rounded, lateral margin moderately convex. Promesonotal suture and metanotal groove absent. Mesothorax weakly constricted, lateral margins weakly concave. Propodeum roughly rectangular, slightly widening posteriorly, lateral margins almost straight; spines short and triangular, pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.5 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum smooth and shiny, each side with 3 oblique rugae above frontal carinae. Clypeus smooth, each side with 1 short longitudinal ruga. Pronotum smooth and shiny, the rest of mesosoma finely reticulate, mesonotal dorsum smooth. Petiole and postpetiole densely finely punctate, postpetiolar dorsum smooth. Gaster smooth and shiny. Body dorsum with abundent erect to suberect apically blunt short hairs and abundent decumbent pubescence. Scapes with dense subdecumbent hairs and dense decumbent pubescence, tibiae with dense decumbent pubescence. Body brownish black; gaster black; mandibles, antennae, trochanters, tibiae and tarsi brownish yellow.

Ecological notes

This new species inhabits dry-warm valley shrubland (Fig. 69G) at an elevation of 2260 m and forages on plants.

Distribution

China: Yunnan.

Temnothorax chushu sp. nov.
urn:lsid:zoobank.org:act:124D3462-820D-4323-97CE-0566DEF5CAC7
Fig. 8

Diagnosis

This new species is similar to *T. maoerensis* Zhou *et al.*, 2010 (Fig. 9), but differs in the new species head dorsum densely reticulate on the central longitudinal strip, mesopleura densely punctate, petiolar node relatively longer, and body color brownish yellow; in *T. maoerensis* head dorsum almost smooth on the central longitudinal strip, mesopleura reticulate, petiolar node relatively shorter, and body color blackish brown. The new species is also similar to *T. liqiu* sp. nov. (Fig. 27), but differs in the new species scapes with suberect hairs, mesosoma finely reticulate, in lateral view propodeal spines shorter than their basal width, petiolar node weakly reticulate, body color yellow; in *T. liqiu* scapes with decumbent hairs, mesosoma coarsely reticulate, in lateral view propodeal spines longer than their basal width, petiolar node strongly reticulate, body color yellowish brown.

Etymology

The specific epithet refers to 'chushu', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Lushui City, Pianma Town, Pianma; 25.993789° N, 98.660772° E; 2500 m a.s.l.; 25 Apr. 1999; Zheng-Hui Xu leg.; nests inside dead branch in subalpine moist evergreen broadleaf forest; SWFU A99-29.

Paratype workers

CHINA – **Yunnan Province** • 8 workers; same collection data as for holotype; SWFU A99-29 • 1 worker; Zhenyuan County, Heping Town, Baishiyan; 23.932472° N, 101.432475° E; 2500 m a.s.l.; 18 Apr. 2002;

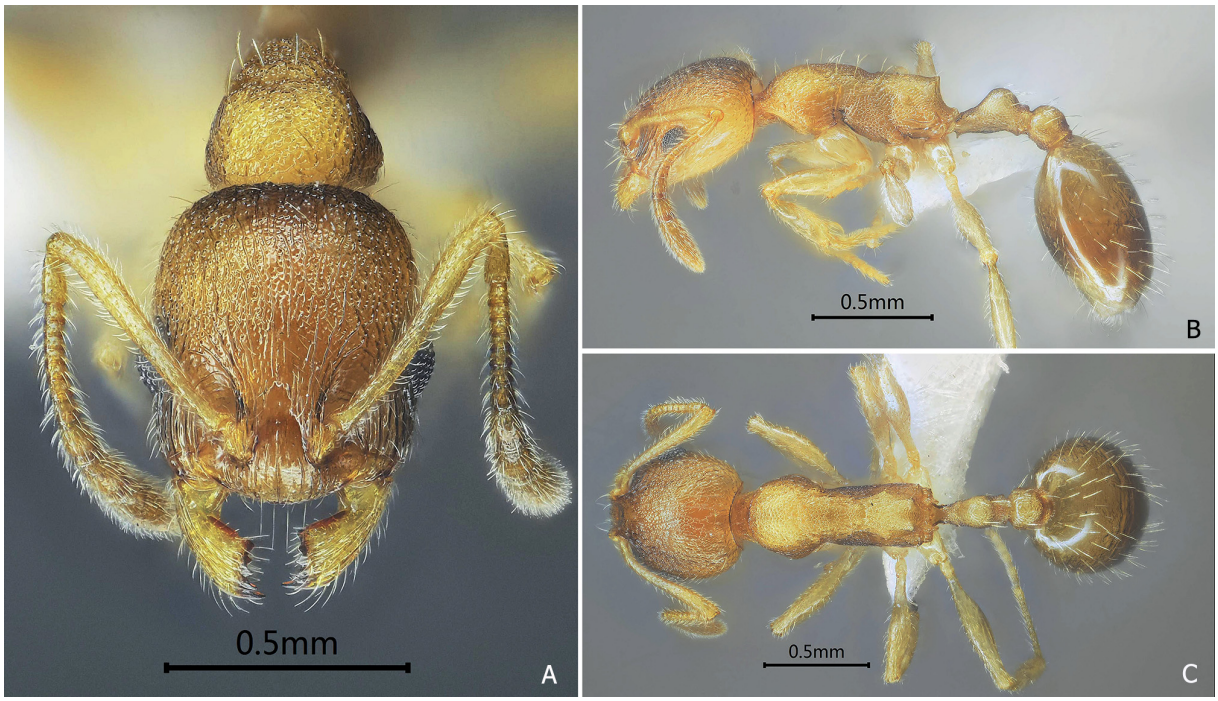

Fig. 8. *Temnothorax chushu* sp. nov., holotype worker (SWFU A99-29). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Zheng-Qun Chai leg.; soil sample from subalpine moist evergreen broadleaf forest; SWFU A1557 • 1 worker; same collection data as for preceding; SWFU A1558 • 1 worker; same collection data as for preceding; foraging on the ground; SWFU A1560 • 1 worker; Jingdong County, Taizhong Town, Xujiaba; 24.543966° N, 101.024948° E; 2250 m a.s.l.; 8 Apr. 2002; Zheng-Hui Xu leg.; soil sample from subalpine moist evergreen broadleaf forest; SWFU A00848 • 1 worker; same collection data as for preceding; SWFU A00849 • 1 worker; same collection data as for preceding; SWFU A00850.

Non-type material examined

CHINA – **Sichuan Province** • 8 workers; Huili County, Baiguowan Town, Baiguowan; 26.953150° N, 102.271897° E; 1810 m a.s.l.; 25 Jul. 2019; Chao Chen leg.; nests inside dead wood in conifer-broadleaf mixed forest; SWFU C19-657.

Description

Measurements of holotype worker: TL 2.9, HL 0.67, HW 0.55, CI 82, SL 0.63, SI 115, ED 0.15, PW 0.41, WL 0.83, PL 0.32, PH 0.18, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior margin moderately convex and slightly concave in the middle, posterior corner broadly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes narrow, concealed half of antennal socket. Frontal carinae short, reaching to midpoint level of eyes. Antennae 12-segmented, scapes surpassing posterior margin by 1/12 of its length, club 3-segmented. Eyes slightly before midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum moderately convex, promesonotal suture slightly impressed. Mesonotum slightly convex and gently sloping down posteriorly. Metanotal groove widely moderately impressed and distinct. Propodeal dorsum nearly straight and gently sloping down posteriorly; propodeal spines very short and acutely toothed, shorter than their basal width; declivity moderately concave, about ½ length of dorsum; propodeal lobes large, narrowly rounded apically. Petiole with anterior peduncle, about ⅔ length of petiolar node; petiolar node roughly trapezoidal, anterior margin straight, dorsal

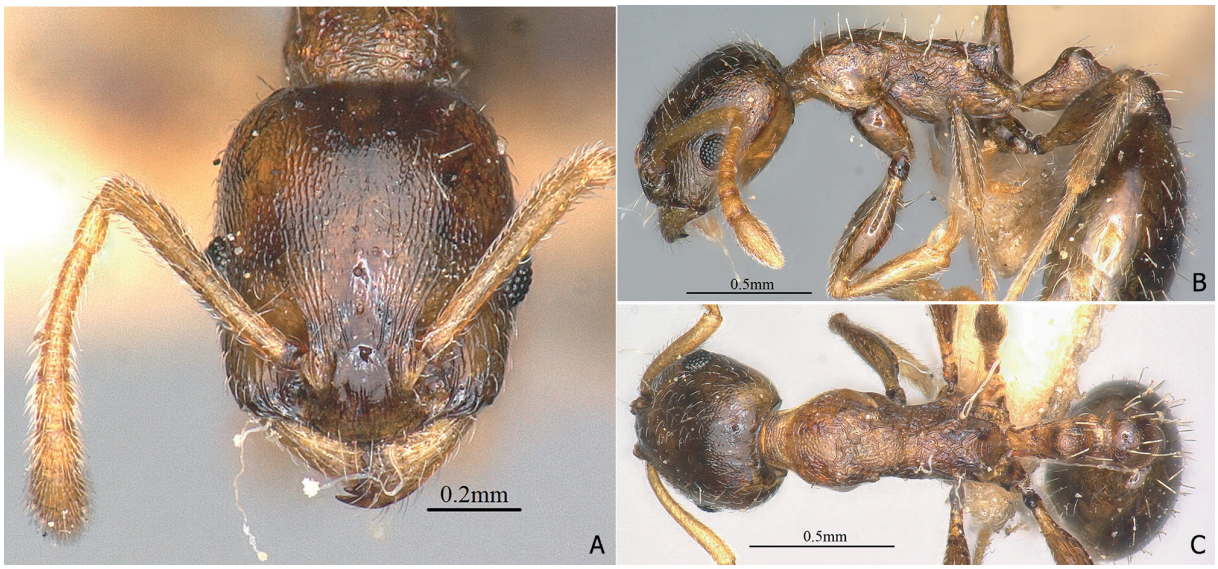

Fig. 9. *Temnothorax maoerensis* Zhou *et al*., 2010, holotype worker (GXNU). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Photos by Zhi-Lin Chen.

margin roundly convex, posterior margin weakly convex; ventral margin weakly convex in the middle, moderately concave posteriorly, anteroventral corner sharply toothed. Postpetiole about as high as petiole, anterodorsal margin roundly convex, posterior margin slightly concave, ventral margin weakly concave.

In dorsal view pronotum broadest, anterior margin moderately convex and weakly marginated, humeral corners broadly rounded, lateral margins strongly convex. Promesotonal suture very shallowly impressed. Mesothorax moderately constricted and narrow, lateral margins strongly concave. Metanotal groove widely impressed. Propodeum roughly rectangular, lateral margins weakly convex; propodeal spines very short and bluntly toothed. Petiole longer than broad, widening posteriorly; petiolar node roughly trapezoidal and widening posteriorly, lateral margins moderately convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.3 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins slightly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum longitudinally rugose before midline of eyes, gradually reticulate posteriorly and laterally with interface densely punctate, genae longitudinally rugose. Clypeus with 3–4 rugae on each side with interface smooth. Mesosoma densely punctate with interface appearing finely reticulate; pronotal sides longitudinally rugose with rugae interweaved; lower part of metapleuron with two strong costulae. Petiole and postpetiole densely weakly punctate. Gaster smooth and shiny. Body dorsum with abundant erect to suberect apically blunt hairs and abundant decumbent pubescence, hairs and pubescence on the head relatively denser. Scapes and tibiae with dense subdecumbent hairs and dense decumbent pubescence. Body color brownish yellow, gaster blackish brown, legs light yellow.

Measurements of paratype workers: TL 2.4–3.1, HL 0.55–0.75, HW 0.45–0.60, CI 80–82, SL 0.50–0.60, SI 100–111, ED 0.12–0.13, PW 0.30–0.35, WL 0.55–0.83, PL 0.29–0.30, PH 0.15–0.20, DPW 0.10–0.15 (14 individuals measured). As holotype worker, in some individuals propodeal spines slightly shorter or longer than in holotype, body color brown to blackish brown.

Ecological notes

This new species inhabits subalpine moist evergreen broadleaf forest (Fig. 69C) and conifer-broadleaf mixed forest (Fig. 69D) at an elevation of 1810–2500 m, forages in soil and on the ground, and nests inside dead branch and dead wood.

Distribution

China: Yunnan, Sichuan.

Temnothorax dahan sp. nov.
urn:lsid:zoobank.org:act:446E22FD-1860-48C6-8FF5-9B6CCDC19299
Fig. 10

Diagnosis

This new species is similar to *T. spinosior* (Forel, 1901) (Fig. 11), but differs in the new species head dorsum finely longitudinally rugose, apices of antennal scapes surpass posterior head margin, mesosomal dorsum weakly convex, propodeal spines relatively shorter about 1.2 times as long as their basal width, and body color black; in *T. spinosior* head dorsum coarsely longitudinally rugose, apices of antennal scapes just reaching to posterior head margin, mesosomal dorsum moderately convex, propodeal spines relatively longer about 2 times as long as their basal width, and body color blackish brown. The new species is also similar to *T. chun* sp. nov. (Fig. 5), but differs in the new species dorsum of mesonotum and propodeum weakly convex in lateral view, pronotal sides finely rugose, propodeal spines straight, petiolar dorsum bluntly angled; in *T. chun* dorsum of mesonotum and propodeum straight in lateral view,

pronotal sides coarsely rugose, propodeal spines curved posteriorly, petiolar dorsum broadly rounded. This new species is also similar to *T. qiufen* sp. nov. (Fig. 33), but differs in the new species dorsum of mesonotum and propodeum weakly convex in lateral view, mesopleura loosely reticulate, anterior face of petiolar node almost straight; in *T. qiufen* dorsum of mesonotum and propodeum straight in lateral view, mesopleura densely reticulate, anterior face of petiolar node weakly concave.

Etymology

The specific epithet refers to 'dahan', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Wenshan City, Bozhu Town, Paomatangpo; 23.389739° N, 105.933033° E; 2530 m a.s.l.; 12 Oct. 2019; Hong Du leg.; ground sample from subalpine moist evergreen broadleaf forest; SWFU A19-6318.

Paratype workers

CHINA – **Yunnan Province** • 3 workers; same collection data as for holotype; SWFU A19-6320 • 3 workers; same collection data as for holotype; SWFU A19-6352 • 2 workers; same collection data as for holotype; SWFU A19-6361 • 3 workers; same collection data as for holotype; nests in soil; SWFU A19-6355 • 1 worker; same collection data as for holotype; soil sample; SWFU A19-6357 • 9 workers; Wenshan City, Bozhu Town, Baiyizhai; 23.408775° N, 103.943328° E; 2027 m a.s.l.; 12 Oct. 2019; Hong Du leg.; ground sample from *Pinus yunnanensis* forest; SWFU A19-6399 • 6 workers; Wenshan City, Bozhu Town, Donggualin; 23.398389° N, 103.942992° E; 2245 m a.s.l.; 12 Oct. 2019; Hong Du leg.; nests in soil in *Pinus yunnanensis* forest; SWFU A19-6384.

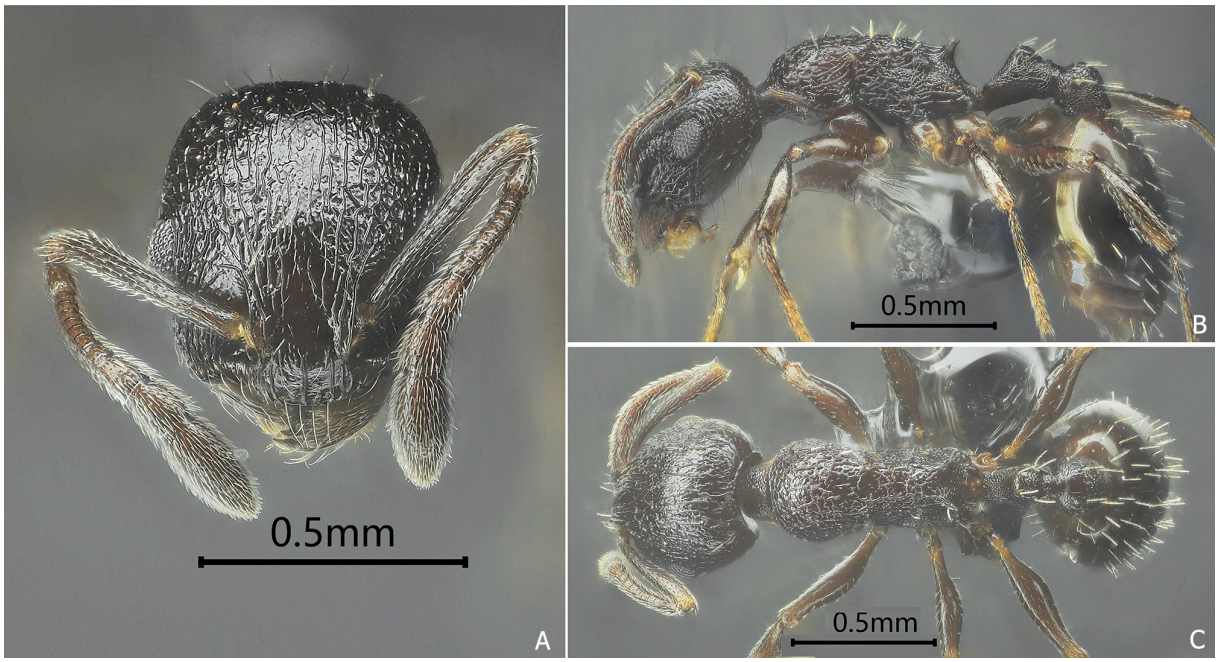

Fig. 10. *Temnothorax dahan* sp. nov., holotype worker (SWFU A19-6318). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Description

Measurements of holotype worker: TL 2.8, HL 0.62, HW 0.53, CI 85, SL 0.53, SI 100, ED 0.14, PW 0.38, WL 0.77, PL 0.29, PH 0.20, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior margin nearly straight, posterior corner broad rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin weakly convex. Frontal lobes broad, concealing antennal sockets. Frontal carinae short, reaching to the level of midpoint of eyes. Antennae 12-segmented, scapes just reaching to posterior head margin. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum moderately convex, promesonotal suture absent. Dorsa of mesonotum and propodeum slightly convex and gently sloping down posteriorly. Metanotal groove absent. Propodeal spines short, about as long as their basal width; declivity straight. Propodeal lobes rounded apically. Petiole with short anterior peduncle, about ⅓ length of petiolar node; petiolar node roughly triangular, anterior margin straight, posterior margin weakly convex, top corner blunt angled; ventral margin weakly concave posteriorly, anteroventral corner toothed. Postpetiole as high as petiole, anterodorsal margin roundly convex, posterior margin almost straight; ventral margin short and almost straight, anteroventral corner rightly angled.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margin weakly convex. Mesothorax moderately constricted and narrowed posteriorly, lateral margins strongly concave. Propodeum roughly square, lateral margins weakly concave, spines short, pointed posterolaterally. Petiole elongate trapezoidal and widening posteriorly, longer than broad; lateral margins weakly convex posteriorly. Postpetiole roughly trapezoidal, about 1.5 times as broad as petiole, narrowing posteriorly, anterior margin moderately convex, lateral margins strongly convex. Gaster elongate oval.

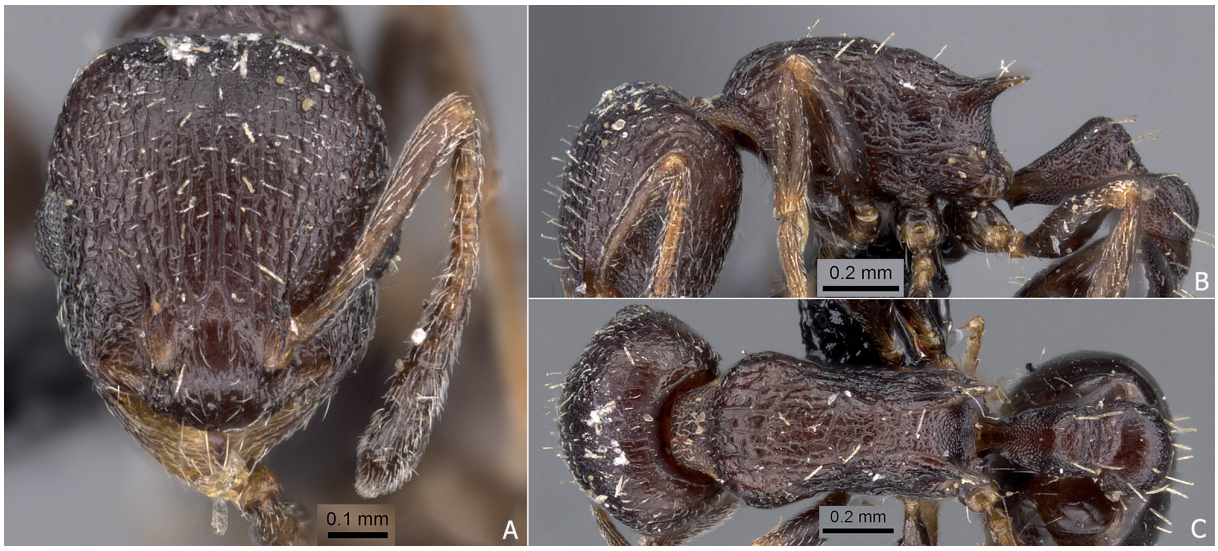

Fig. 11. *Temnothorax spinosior* (Forel, 1901), syntype worker (MHNG). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0909021, photos by Zach Lieberman.

Mandible longitudinally striate. Head dorsum longitudinally rugose with interweaved fine rugulae between the main rugae, and gradually reticulate laterally, interface abundantly punctate. Clypeus with three longitudinal rugae on each side, interface smooth. Dorsum of mesosoma coarsely reticulate, dorsum of mesonotum relatively smooth in the center. Pronotal sides coarsely reticulate anteriorly and longitudinally rugose and micro-reticulate posteriorly. Mesopleura coarsely reticulate anteriorly and micro-reticulate posteriorly; metapleura and propodeal sides densely reticulate. Petiole and postpetiole densely punctate. Gaster smooth and shiny. Head dorsum with sparse erect to suberect apically blunt short hairs and dense decumbent pubescence; mesosoma, petiole and postpetiole with sparse suberect apically blunt short hairs and sparse decumbent pubescence; gaster with abundant suberect apically blunt short hairs and abundant decumbent pubescence. Scapes with dense decumbent pubescence; tibiae with abundant decumbent pubescence. Body color brownish black; mandibles, antennae and legs brown to brownish yellow.

Measurements of paratype workers: TL 2.5–2.7, HL 0.60–0.65, HW 0.45–0.55, CI 75–85, SL 0.55–0.60, SI 109–122, ED 0.10–0.15, PW 0.35–0.40, WL 0.70–0.75, PL 0.25–0.30, PH 0.15–0.2, DPW 0.13–0.15 (15 individuals measured). As holotype worker, but in some individuals mesonotum smooth, petiolar node and postpetiolar node smooth, mesosomal dorsum weakly reticulate.

Ecological notes

This new species inhabits subalpine moist evergreen broadleaf forest (Fig. 69C) and *Pinus yunnanensis* forest (Fig. 69I) at an elevation of 2027–2530 m, forages on the ground and in soil, and nests in soil.

Distribution

China: Yunnan.

Temnothorax dashu sp. nov.
urn:lsid:zoobank.org:act:18BDAFBC-6237-47E1-AA5E-4A83C177F399
Fig. 12

Diagnosis

This new species is similar to *T. yushui* sp. nov. (Fig. 43), but differs in the new species head dorsum coarsely reticulate on the central area, sides of mesosoma coarsely reticulate, posterodorsal corner of propodeum rightly angled, and body color reddish brown, head blackish brown; in *T. yushui* sp. nov. head dorsum densely reticulate with loose longitudinal rugae on the central area, sides of mesosoma finely reticulate, posterodorsal corner of propodeum bluntly angled, and body color light yellow. The new species is also similar to *T. liqiu* sp. nov. (Fig. 27), but differs in the new species posterodorsal corner of propodeum bluntly angled, obviously shorter than their basal width, head dorsum strongly reticulate posteriorly, pronotal sides loosely reticulate; in *T. liqiu* posterodorsal corner of propodeum toothed, weakly longer than their basal width, head dorsum weakly reticulate posteriorly, pronotal sides densely reticulate.

Etymology

The specific epithet refers to ‘dashu’, one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Luquan County, Wumeng Town, Jiaozi Snow Mountain; 26.059833° N, 102.824917° E; 3250 m a.s.l.; 22 Mar. 2013; Xin Chen leg.; ground sample from alpine *Rhododendron* forest; SWFU A13-479.

Paratype workers

CHINA • 1 worker; same collection data as for holotype; SWFU A13-479 • 8 workers; same collection data as for holotype; SWFU A13-482.

Non-type material examined

CHINA – **Tibet** • 6 workers; Bomi County, Gu Town, Xuewa Village; 29.939676° N, 95.395491° E; 2510 m a.s.l.; 6 Sep. 2010; Zheng-Hui Xu leg.; ground sample from *Quercus semecarpifolia* forest; SWFU A10-4169 • 6 workers; Bomi County, Zhamu Town, Chugong Village; 29.893435° N, 95.707397° E; 2750 m a.s.l.; 6 Sep. 2010; Zheng-Hui Xu leg.; nests under stones in *Pinus densata* forest; SWFU A10-4144.

Description

Measurements of holotype worker: TL 2.8, HL 0.68, HW 0.57, CI 84, SL 0.62, SI 109, ED 0.15, PW 0.40, WL 0.84, PL 0.28, PH 0.21, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior margin slightly convex, posterior corners narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes narrow, concealing half of antennal sockets. Frontal carinae short, reaching to the level of anterior eye margin. Antennae 12-segmented, scapes reaching to posterior head margin, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying 1/5 of lateral margin.

In lateral view pronotum moderately convex, promesonotal suture absent. Mesonotum slightly convex and gently sloping down posteriorly. Metanotal groove widely shallowly impressed and distinct, with a blunt prominence in the groove. Propodeal dorsum straight and gently sloping down posteriorly, anterodorsal corner lowly bluntly toothed; propodeal spines short and stout, roughly triangular, blunt apically; declivity weakly concave, about ⅔ length of dorsum; propodeal lobes small, rounded apically. Petiole with anterior peduncle, about ⅔ length of petiolar node; petiolar node roughly triangular, anterior margin straight, posterior margin moderately convex, anterodorsal corner narrowly rounded; ventral margin almost straight, slightly concave posteriorly, anteroventral corner acutely toothed. Postpetiole slightly lower than petiole, anterodorsal margin rounded, posterior margin weakly convex, ventral margin almost straight.

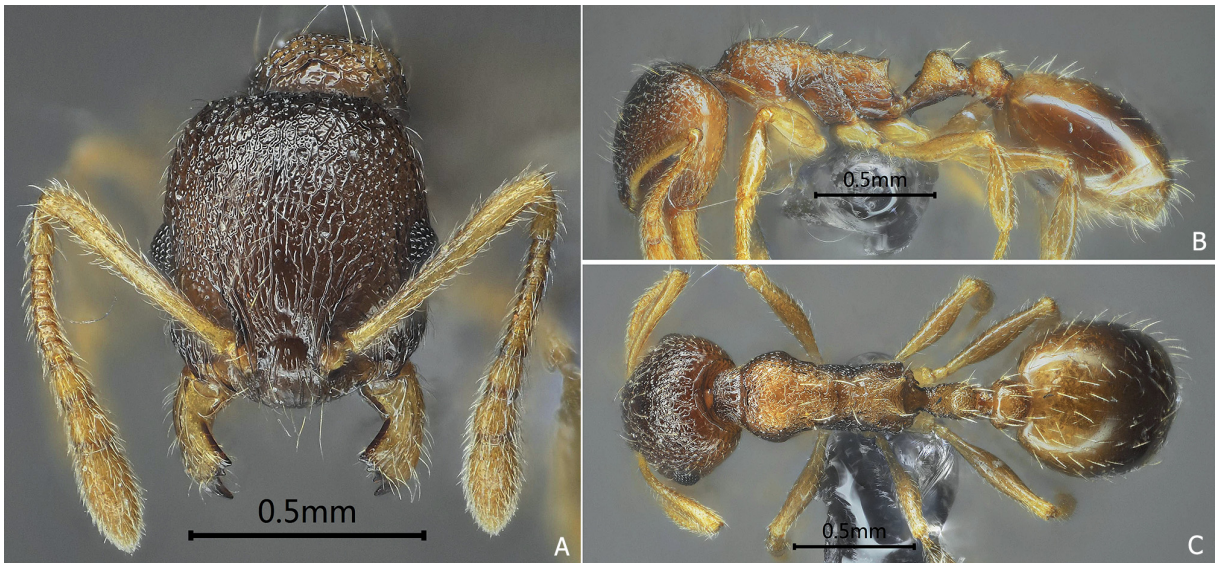

Fig. 12. *Temnothorax dashu* sp. nov., holotype worker (SWFU A13-479). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

In dorsal view pronotum broadest, anterior margin almost straight, humeral corners slightly convex, lateral margins strongly convex. Promesotonal suture absent. Mesothorax weakly constricted and narrow, lateral margins almost straight. Metanotal groove shallowly impressed. Propodeum roughly trapezoidal and widening posteriorly, lateral margins almost straight; spines short and stout, slightly incurved. Petiole longer than broad, the node roughly circular, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.4 times as broad as petiole, anterodoral corners bluntly angled, lateral margins nearly straight. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum longitudinally rugose anteriorly before midline of eyes with rugae divergent posteriorly, gradually reticulate posteriorly and laterally, interface densely punctate; genae longitudinally rougose. Clypeus with 3–4 rugae on each side, interface smooth. Promesonotal dorsum and pronotal sides reticulate, with three transverse rugae near metanotal groove; mesopleura and metapleura finely reticulate; propodeum, petiole and postpetiole densely punctate, postpetiolar dorsum smooth. Gaster smooth and shiny. Body dorsum with abundant suberect to subdecumbent apically blunt short hairs and abundant decumbent pubescence, hairs and pubescence on the head relatively denser. Scapes and tibiae with dense subdecumbent hairs and dense decumbent pubescence. Body color yellowish brown, head dorsum and median portion of gaster blackish brown; mandibles, antennae and legs brownish yellow.

Measurements of paratype workers: TL 2.4–2.9, HL 0.55–0.65, HW 0.45–0.60, CI 82–92, SL 0.50–0.55, SI 91–111, ED 0.13–0.15, PW 0.30–0.31, WL 0.60–0.84, PL 0.20–0.30, PH 0.15–0.18, DPW 0.10–0.11 (9 individuals measured). As holotype worker, in some individuals propodeal spines slightly shorter or longer than in holotype, body color lighter than in holotype.

Ecological notes

This new species inhabits alpine *Rhododendron* L. forest (Fig. 68F), *Quercus semecarpifolia* Sm. (Fig. 68D) forest and *Pinus densata* Masters forest (Fig. 69A) at an elevation of 2510–3250 m, forages on the ground and nests under stones.

Distribution

China: Yunnan, Tibet.

Temnothorax daxue sp. nov.
urn:lsid:zoobank.org:act:78D59108-BC20-41A4-A9CF-A55F39BACCA6
Fig. 13

Diagnosis

This new species is similar to *T. eburneipes* (Wheeler, 1927) (Fig. 14), but differs in the new species dorsum of mesonotum and propodeum weakly convex, propodeal spines suberect; in *T. eburneipes* dorsum of mesonotum and propodeum moderately convex, propodeal spines posterodorsally pointed. The new species is also similar to *T. dongzhi* sp. nov. (Fig. 17), but differs in the new species propodeal spines as long as declivity in lateral view, anterior peduncle shorter than petiolar node, head dorsum nearly smooth on the central longitudinal strip; in *T. dongzhi* propodeal spines shorter than declivity in lateral view, anterior peduncle as long as petiolar node, head dorsum longitudinally rugose on the central longitudinal strip.

Etymology

The specific epithet refers to ‘daxue’, one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Lanping County, Lajing Town, Lajing Village; 26.497406° N, 99.280276° E; 2600 m a.s.l.; 9 Oct. 2003; You Chen leg.; canopy sample from conifer-broadleaf mixed forest; SWFU A3245.

Description

Measurements of holotype worker: TL 3.5, HL 0.83, HW 0.69, CI 84, SL 0.65, SI 94, ED 0.16, PW 0.47, WL 1.03, PL 0.37, PH 0.28, DPW 0.18.

In full-face view head roughly rectangular, longer than broad, posterior margin almost straight, posterior corners narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, without median carina, anterior margin almost straight in the center. Frontal lobes narrow, concealing half of antennal socket. Frontal carinae short, reaching to the level of anterior eye margin. Antennae 12-segmented, scapes failing to reach posterior head margin, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying 1/5 of lateral margin.

In lateral view promesonotum moderately convex and weakly arched, gently sloping down posteriorly, promesonotal suture and metanotal groove absent. Propodeal dorsum almost straight, gently sloping down posteriorly; propodeal spines long and slender, about as long as declivity, weakly back-curved; declivity weakly concave, propodeal lobes short and rounded apically. Petiole with short anterior peduncle, about ½ length of petiolar node; petiolar node roughly conical, anterior margin almost straight, posterior margin weakly convex, apex narrowly rounded; ventral margin weakly concave, anteroventral corner acutely toothed. Postpetiole as high as petiolar node, anterior margin moderately convex, posterior margin almost straight, apex broadly rounded; ventral margin deeply notched, anteroventral corner acutely toothed, posteroventral corner rightly angled.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margin moderately convex. Promesotonal suture absent. Mesothorax weakly constricted, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins almost straight, spines acute

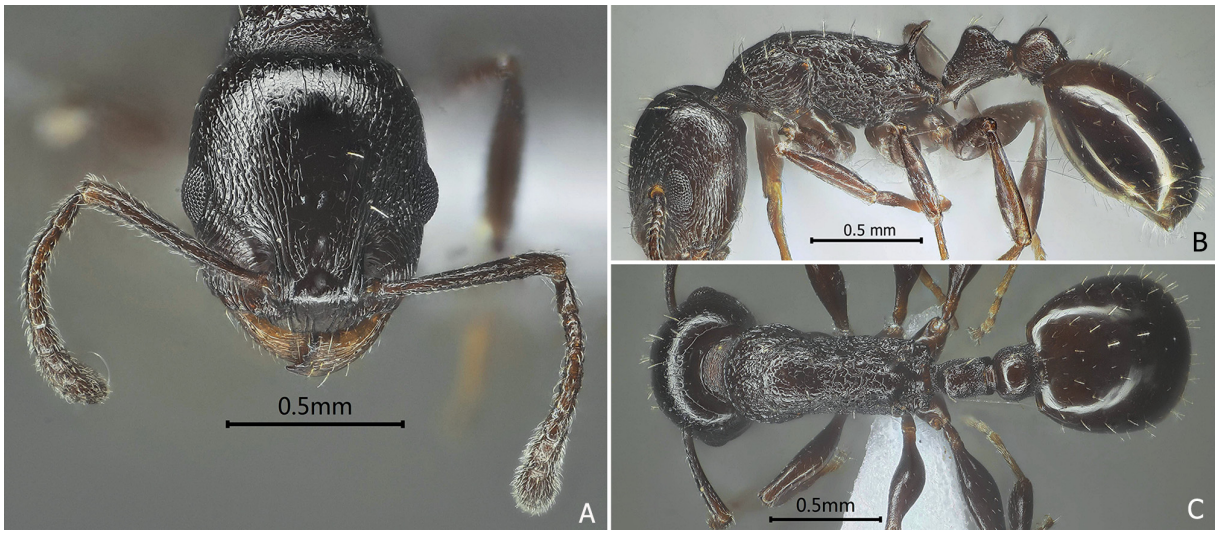

Fig. 13. *Temnothorax daxue* sp. nov., holotype worker (SWFU A3245). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

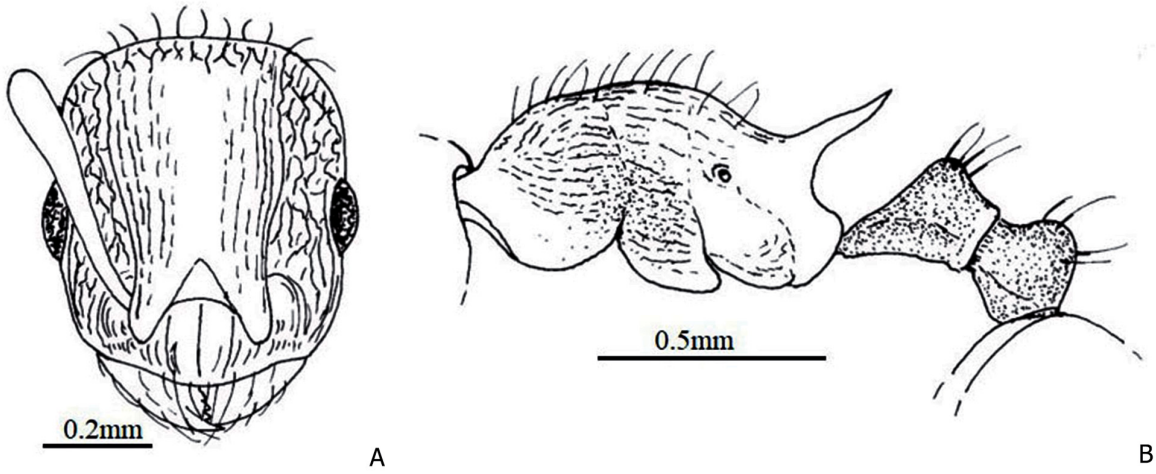

Fig. 14. *Temnothorax eburneipes* (Wheeler, 1927), syntype worker (MCZC). **A**. Head in full-face view. **B**. Body in lateral view. Illustrations cited from Radchenko (2004).

and pointed posterolaterally. Petiole roughly rectangular, slightly longer than broad, lateral margins slightly convex. Postpetiole roughly trapezoidal and weakly narrowing posteriorly, about 1.4 times as broad as petiole, anterolateral corners broadly rounded, lateral margins slightly concave. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum nearly smooth in the central strip, loosely longitudinally rugose beside the central smooth strip, reticulate laterally, longitudinally rugose below eyes, genae with arched rugae. Clypeus smooth, each side with 4–5 short rugae. Mesosomal dorsum coarsely reticulate; pronotal sides longitudinally rugose; mesopleura and metapleura coarsely reticulate; propodeal sides and petiole finely reticulate; postpetiole densely finely punctate, dorsum smooth and shiny. Gaster smooth and shiny. Body dorsum with sparse erect to suberect short apically blunt hairs and sparse decumbent pubescence, hairs on the head abundant. Scapes with abundant subdecumbent hairs and dense decumbent pubescence; tibiae with abundant decumbent pubescence. Body color black; mandible, antennae and legs blackish brown.

Ecological notes

This new species inhabits conifer-broadleaf mixed forest (Fig. 69D) at an elevation of 2600 m, and forages arboreally.

Distribution

China: Yunnan.

Temnothorax dong sp. nov.
urn:lsid:zoobank.org:act:5948192F-526C-48A4-81DA-0ECF8ADDE98B
Fig. 15

Diagnosis

This new species is similar to *T. huatuo* Terayama, 2009 (Fig. 16), but differs in the new species apices of antennal scapes just reaching to posterior head margin, head dorsum densely reticulate on the central area, mesosomal dorsum moderately convex, anterior margin of petiole shallowly concave, and body

color black; in *T. huatuo* apices of antennal scapes failing to reach posterior head margin, head dorsum loosely reticulate on the central area, mesosomal dorsum weakly convex, anterior margin of petiole moderately concave, and body color brownish black. The new species is also similar to *T. lixia* sp. nov. (Fig. 28), but differs in the new species propodeal spines longer than half length of declivity in lateral view, anterodorsal corner of petiolar node rightly angled, pronotal sides finely reticulate; in *T. lixia* propodeal spines shorter than half length of declivity in lateral view, anterodorsal corner of petiolar node bluntly angled, pronotal sides coarsely reticulate. This new species is also similar to *T. xiazhi* sp. nov. (Fig. 41), but differs in the new species propodeal spines longer than half length of declivity in lateral view, anterior peduncle shorter than petiolar node, mesopleura densely punctate; in *T. xiazhi* propodeal spines shorter than half length of declivity in lateral view, anterior peduncle as long as petiolar node, mesopleura reticulate.

Etymology

The specific epithet refers to 'dong', one of the four seasons.

Material examined

Holotype worker

CHINA • Yunnan Province, Tengchong City, Jietou Town, Daying Village; 25.504974° N, 98.687047° E; 1900 m a.s.l.; 2 May. 1999; Lei Fu leg.; ground sample from conifer-broadleaf mixed forest; SWFU A99-428.

Paratype worker

CHINA • 1 worker; same collection data as for holotype; SWFU A99-428.

Description

Measurements of holotype worker: TL 2.8, HL 0.68, HW 0.57, CI 84, SL 0.60, SI 105, ED 0.13, PW 0.41, WL 0.78, PL 0.30, PH 0.21, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corners broadly rounded. Mandibles triangular, masticatory margin with 5 teeth.

Fig. 15. *Temnothorax dong* sp. nov., holotype worker (SWFU A99-428). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes broad, concealing most of antennal sockets. Frontal carinae short, reaching to the level of anterior eye margins. Antennae 12-segmented, scapes slightly surpassing posterior head margin, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view mesosomal dorsum weakly convex and gently sloping down posteriorly, anterodorsal corner of pronotum bluntly angled, promesonotal suture and metanotal groove absent. Propodeal spines moderately long, about ⅔ length of declivity and about 2 times as long as their basal width; declivity weakly concave; propodeal lobes short and rounded apically. Petiole with long anterior peduncle, about as long as petiolar node; petiolar node roughly triangular, anterior margin almost straight, posterior margin weakly convex, top corner rightly angled; ventral margin straight, weakly concave posteriorly, anteroventral corner acutely toothed. Postpetiole about as high as petiolar node, anterior margin almost straight, anterodorsal corner bluntly angled, dorsal margin weakly convex, ventral margin angularly concave.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margins strongly convex, promesonotal suture absent. Mesothorax moderately constricted, lateral margins weakly concave, metanotal groove absent. Propodeum roughly rectangular and slightly widening posteriorly, lateral margins almost straight; spines moderately long and straight, pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly rectangular, about 1.4 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum densely finely reticulate, interface densely punctate; frontal area longitudinally rugose. Clypeus longitudinally rugose. Mesosoma densely reticulate; pronotal sides and lower portion of metapleura longitudinally rugose. Propodeum, petiole and postpetiole densely finely punctate. Gaster smooth and shiny. Body dorsum with abundant erect to suberect apically blunt short hairs and abundant decumbent pubescence. Scapes and tibiae with dense decumbent pubescence. Body color black; antennae and legs blackish brown; mandibles and tarsi brownish yellow.

Measurements of paratype worker: TL 2.4, HL 0.65, HW 0.50, CI 77, SL 0.50, SI 100, ED 0.10, PW 0.35, WL 0.60, PL 0.25, PH 0.18, DPW 0.15 (1 individual measured). As holotype worker.

Fig. 16. *Temnothorax huatuo* Terayama, 2009, holotype worker (NIAS). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antwiki.org, photos by Hiraku Yoshitake & Takashi Kurihara.

Ecological notes

This new species inhabits conifer-broadleaf mixed forest (Fig. 69D) at an elevation of 1900 m, and forages on the ground.

Distribution

China: Yunnan.

Temnothorax dongzhi sp. nov.
urn:lsid:zoobank.org:act:E74787A8-E24A-4757-8681-F48477544D36
Fig. 17

Diagnosis

According to the key, this new species is similar to *T. leyeensis* Zhou *et al.*, 2010 (Fig. 18), but differs in the new species head dorsum loosely longitudinally rugose on the central area, propodeal spines relatively shorter and suberect, and body color blackish brown, head and gaster black; in *T. leyeensis* head dorsum densely reticulate on the central area, propodeal spines relatively longer and posterodorsally pointed, and body color brownish yellow, head and gaster black. The new species is also similar to *T. shuangjiang* sp. nov. (Fig. 34), but differs in the new species propodeal spines suberect and forming a right angle with propodeal dorsum in lateral view, pronotal sides coarsely rugose; in *T. shuangjiang* propodeal spines oblique and forming a blunt angle with propodeal dorsum in lateral view, pronotal sides reticulate. This new species is also similar to *T. xia* sp. nov. (Fig. 35), but differs in the new species propodeal spines suberect and forming a right angle with propodeal dorsum in lateral view, dorsum of petiolar node narrowly rounded; in *T. xia* propodeal spines oblique and forming a very blunt angle with propodeal dorsum in lateral view, dorsum of petiolar node broadly rounded. Meanwhile, the new species is similar to *T. xiaoman* sp. nov. (Fig. 37), but differs in the new species dorsum of mesonotum and propodeam weakly convex in lateral view, propodeal spines about three time as long as their basal width, dorsum of petiolar node narrowly rounded; in *T. xiaoman* dorsum of mesonotum and propodeam straight in lateral view, propodeal spines weakly longer than their basal width, dorsum of petiolar node bluntly angled.

Fig. 17. *Temnothorax dongzhi* sp. nov., holotype worker (SWFU C18-962). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Etymology

The specific epithet refers to 'dongzhi', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Sichuan Province, Muli County, Xiamaidi Town, Xiaochanggou Village; 27.776050° N, 101.216714° E; 2513 m a.s.l.; 28 Jul. 2018; Xin-Min Zhang leg.; canopy sample from *Pinus yunnanensis* forest; SWFU C18-962.

Paratype worker

CHINA • 1 worker; Sichuan Province, Danba County, Zhanggu Town, Gongcha Village; 30.831517° N, 101.801936° E; 2050 m a.s.l.; 23 Aug. 2018; Cheng-Long Luo leg.; canopy sample from semi-evergreen broadleaf forest; SWFU A18-1498.

Description

Measurements of holotype worker: TL 4.0, HL 0.88, HW 0.80, CI 91, SL 0.63, SI 79, ED 0.17, PW 0.57, WL 1.18, PL 0.47, PH 0.30, DPW 0.21.

In full-face view head roughly rectangular, slightly longer than broad, posterior margin slightly concave, posterior corners narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex, narrowly notched in the middle. Frontal lobes broad, concealing antennal sockets. Frontal carinae short, reaching to the level of anterior eye margin. Antennae 12-segmented, scapes failing to reach posterior head margin by 1/5 of its length, antennal clubs 3-segmented. Eyes located slightly before midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum almost straight and sloping down anteriorly, anterodorsal corner rightly angled. Promesonotal suture distinct on the sides. Mesonotum straight and gently sloping down posteriorly, weakly convex anteriorly. Metanotal groove absent. Propodeal dorsum straight and sloping down

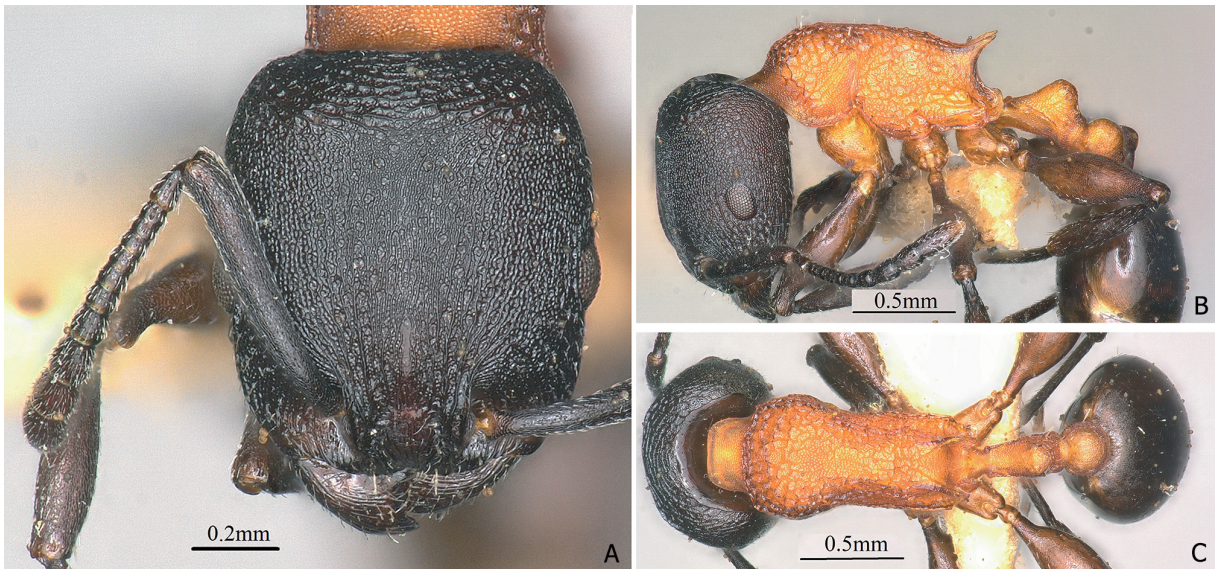

Fig. 18. *Temnothorax leyeensis* Zhou *et al*., 2010, holotype worker **(**GXNU0407356). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Photos by Zhi-Lin Chen.

posteriorly, forming a very blunt angle with mesonotum; propodeal spines relatively short, suberect and slightly back-curved, about ½ length of declivity; declivity almost straight; propodeal lobes broad, truncated apically. Petiole with relatively long anterior peduncle, about ¾ length of petiolar node; petiolar node roughly triangular, anterior margin almost straight, posterior margin slightly convex, dorsal margin weakly convex, anterodorsal corner bluntly angled, posterodorsal corner narrowly rounded; ventral margin weakly concave, anteroventral corner bluntly toothed. Postpetiole slightly lower than petiolar node, anterior margin weakly convex, anterodorsal corner rounded, dorsal margin strongly convex, posterior margin weakly concave, ventral margin weakly concave.

In dorsal view pronotum broadest, anterior margin strongly convex, humeral corners very bluntly angled, lateral margins moderately convex. Promesonotal suture and metanotal groove absent. Mesothorax weakly constricted, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins slightly convex, posterolateral corners bluntly angled; spines relatively short, pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins slightly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.5 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum loosely longitudinally rugose, gradually reticulate laterally with interface densely punctate. Clypeus smooth, each side with 4–5 oblique rugae. Mesosomal dorsum reticulate, sides coarsely longitudinally rugose; Propodeal sides obliquely rugose. Petiolar node finely reticulate, ventral face of petiole and postpetiole densely punctate, anterior face and dorsum of postpetiole smooth. Gaster smooth and shiny. Body dorsum with sparse erect to suberect apically blunt short hairs and sparse decumbent pubescence. Scapes and tibiae with dense decumbent pubescence. Body color blackish brown, head dorsum and gaster black.

Measurements of paratype worker: TL 3.3, HL 0.75, HW 0.68, CI 92, SL 0.60, SI 88, ED 0.16, PW 0.46, WL 0.94, PL 0.33, PH 0.25, DPW 0.18 (1 individual measured). As holotype worker

Ecological notes

This new species inhabits *Pinus yunnanensis* forest (Fig. 69I) and semi-evergreen broadleaf forest (Fig. 69H) at an elevation of 2050-2513 m, and forages arboreally.

Distribution

China: Sichuan.

Temnothorax guyu sp. nov.
urn:lsid:zoobank.org:act:A65525AB-D067-463C-A2A9-A820F73CA95D
Fig. 19

Diagnosis

This new species is similar to *T. desioi* (Menozzi, 1939) (Fig. 20), but differs in the new species head dorsum densely reticulate laterally, dorsum of mesonotum and propodeum weakly convex, posterodorsal corner of propodeum rightly angled, and top of petiolar node narrowly rounded; in *T. desioi* head dorsum loosely rugose laterally, dorsum of mesonotum and propodeum straight, posterodorsal corner of propodeum bluntly angled, and top of petiolar node acute. The new species is also similar to *T. qingming* sp. nov. (Fig. 30), but differs in the new species propodeal spines rightly angled and shorter than their basal width in lateral view, dorsum of mesonotum and propodeum weakly convex, head dorsum smooth on the central longitudinal strip; in *T. qingming* propodeal spines shortly spined and weakly longer than their basal width in lateral view, dorsum of mesonotum and propodeum straight, head dorsum wholly smooth. This new species is also similar to *T. susamyri* (Dlussky, 1965) (Fig. 65), but differs in the

new species propodeal spines rightly angled and shorter than their basal width in lateral view, dorsum of petiolar node narrowly rounded, pronotal sides densely reticulate; in *T. susamyri* propodeal spines shortly spined and longer than their basal width in lateral view, dorsum of petiolar node rightly angled, pronotal sides longitudinally rugose.

Etymology

The specific epithet refers to 'guyu', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Lijiang City, Gucheng District, Heilongtan Park; 26.888242° N, 100.166922° E; 2400 m a.s.l.; 8 Oct. 1991; Zheng-Hui Xu leg.; foraging on the ground in *Pinus yunnanensis* forest; SWFU A91-945.

Paratype workers

CHINA – **Yunnan Province** • 1 worker; Luquan County, Jiaoxi Town, Fazhan Village; 26.252639° N, 102.414177° E; 1840 m a.s.l.; 20 Mar. 2013; Xin Chen leg.; foraging on the ground in dry deciduous broadleaf forest; SWFU A13-378 • 2 workers; Luquan County, Machu; 25.877299° N, 102.52042° E; 2240 m a.s.l.; 27 Nov. 1993; Zheng-Hui Xu leg.; foraging on the ground in conifer-broadleaf mixed forest; SWFU A93-59 • 1 worker; Anning City, Wenquan Town, Yangjiao Village; 24.941854° N, 102.485556° E; 1850 m a.s.l.; 1 Oct. 1991; Zheng-Hui Xu leg.; foraging on the ground in *Keteleeria evelyniana* forest; SWFU A91-880 • 2 workers; Anning City, Yiliujie Town, Monande Village; 24.540213° N, 102.329028° E; 2100 m a.s.l.; 17 Aug. 1991; foraging on the ground in conifer-broadleaf mixed forest; SWFU A91-353 • 1 worker; Kunming City, Xishan Mountain, Gaoqiao; 24.990948° N, 102.624576° E; 2050 m a.s.l.; 7 May 2001; Zheng-Hui Xu leg.; foraging on the ground in conifer-broadleaf mixed forest; SWFU A00636 • 1 worker; Kunming City, Xishan Mountain, Taihua Temple; 24.967782° N, 102.636006° E; 2050 m a.s.l.; 2 May 2001; Ji-Ling Zhang leg.; semi-moist evergreen broadleaf forest; SWFU A2520.

Non-type material examined

CHINA – **Yunnan Province** • 2 workers; Zhenyuan County, Heping Town, Jinkuang; 23.938144° N, 101.431259° E; 2000 m a.s.l.; 19 Apr. 2002; Zheng-Hui Xu leg.; ground sample from monsoon evergreen

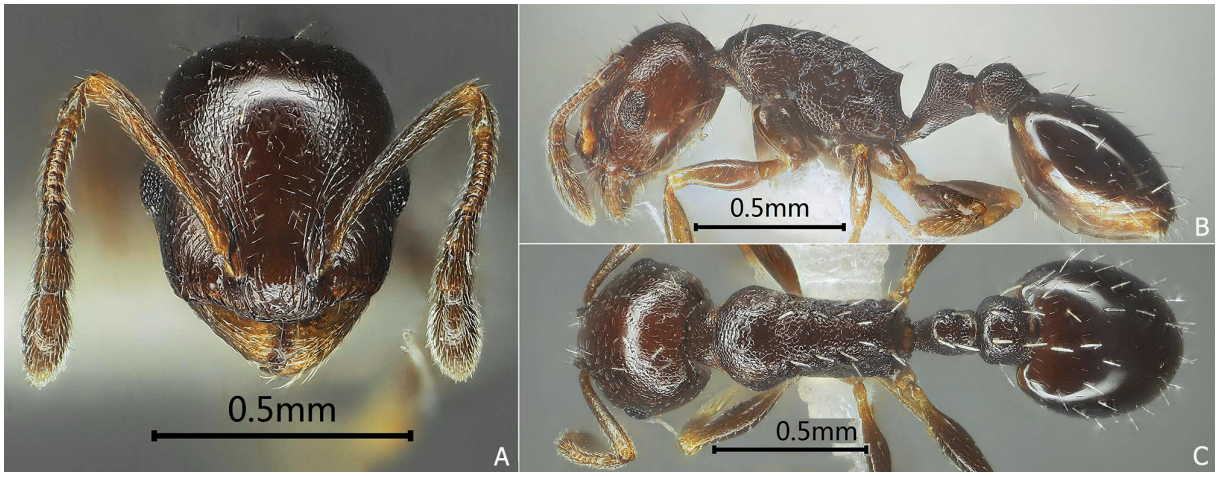

Fig. 19. *Temnothorax guyu* sp. nov., holotype worker (SWFU A91-945). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

broadleaf forest; SWFU A1631. – **Sichuan Province** • 9 workers; Huili County, Baiguowan Town, Lijiapingzi; 26.907283° N, 102.284183° E; 2270 m a.s.l.; 24 Jul. 2019; nests under stones in warm conifer forest; Chao Chen leg.; SWFU C19-566 • 2 workers; Huili County, Waibei Town, Dacaomen; 26.789397° N, 102.265186° E; 2060 m a.s.l.; 24 Jul. 2019; nests under stones in conifer-broadleaf mixed forest; Chao Chen leg.; SWFU C19-439.

Description

Measurements of holotype worker: TL 2.5, HL 0.56, HW 0.48, CI 85, SL 0.50, SI 104, ED 0.12, PW 0.36, WL 0.71, PL 0.26, PH 0.21, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior margin moderately convex, posterior corner broadly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, without median carina, anterior margin moderately convex. Frontal lobes broad, concealing antennal sockets. Frontal carinae relatively short, reaching to the level of midpoint of eyes. Antennae 12-segmented, scapes slightly surpassing posterior head margin, antennal clubs 3-segmented. Eyes located slightly before midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum moderately convex and sloping down anteriorly, promesonotal suture absent. Mesonotum slightly convex and gently sloping down posteriorly, metanotal groove absent. Propodeal dorsum almost straight and gently sloping down posteriorly; propodeal spines very short and dent-like, about as long as propodeal lobes; declivity slightly concave; propodeal lobes short, bluntly angled apically. Petiole with anterior peduncle, about ¾ length of petiolar node; petiolar node roughly conical, anterior margin almost straight, posterior margin weakly convex, dorsum rounded; ventral margin almost straight, anteroventral corner shortly bluntly angled. Postpetiole as high as petiolar node, anterodorsal margin rounded, posterior margin almost straight, ventral margin weakly concave.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners very broadly rounded, lateral margins strongly convex, promesonotal suture absent. Mesothorax slightly constricted, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins almost straight; propodeal spines very short and dent-like. Petiole roughly trapezoidal and widening posteriorly,

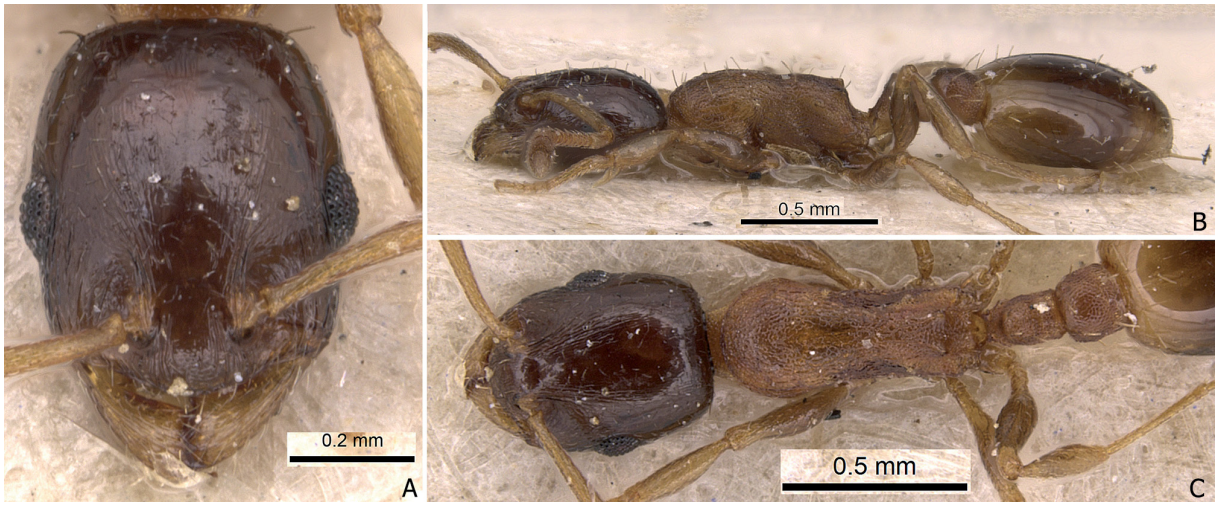

Fig. 20. *Temnothorax desioi* (Menozzi, 1939), syntype worker (MSNM). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0904558, photos by Will Ericson.

longer than broad, lateral margins weakly convex. Postpetiole roughly rectangular, slightly narrowing posteriorly, about 1.5 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins almost straight. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum smooth medially, longitudinally rugose above frontal lobes and on the genae, reticulate laterally, and relatively smooth below eyes. Clypeus smooth medially, longitudinally rugose laterally. Mesosoma, petiole and postpetiole densely coarsely punctate, interface finely reticulate. Gaster smooth and shiny. Body dorsum with abundant erect to suberect apically blunt short hairs and abundant decumbent pubescence. Scapes and tibiae with dense decumbent pubescence. Body color blackish brown; mandibles, antennae, trochanters and tibiae yellowish brown.

Measurements of paratype workers: TL 2.4–2.7, HL 0.55–0.65, HW 0.40–0.55, CI 85–73, SL 0.45–0.55, SI 100–113, ED 0.10–0.15, PW 0.30–0.40, WL 0.60–0.70, PL 0.20–0.25, PH 0.15–0.23, DPW 0.10–0.13 (8 individuals measured). As holotype worker, in some individuals body size slightly different, pronotum and mesonotum reticulate rugose weakly.

Ecological notes

This new species inhabits *Pinus yunnanensis* forest (Fig. 69I), dry deciduous broadleaf forest (Fig. 70B), conifer-broadleaf mixed forest (Fig. 69D), *Keteleeria evelyniana* Mast. forest (Fig. 70C), semi-moist evergreen broadleaf forest (Fig. 70A), monsoon evergreen broadleaf forest (Fig. 70D) and warm conifer forest (Fig. 69F) at an elevation of 1840–2400 m, forages on the ground and nests under stones.

Distribution

China: Yunnan, Sichuan.

Temnothorax hanlu sp. nov.
urn:lsid:zoobank.org:act:210A43E9-D3AD-44C3-A6E5-90B4DF981135
Fig. 21

Diagnosis

This new species is similar to *T. eburneipes* (Wheeler, 1927) (Fig. 14), but differs in the new species head dorsum reticulate on the central longitudinal strip, apices of propodeal spines weakly curved down in lateral view; in *T. eburneipes* head dorsum smooth on the central longitudinal strip, apices of propodeal spines weakly curved up in lateral view. The new species is also similar to *T. ruginosus* Zhou *et al.*, 2010 (Fig. 58), but differs in the new species petiolar node relatively higher and trapezoidal in lateral view, anterior peduncle about as long as petiolar node, gaster black; *T. ruginosus* petiolar node relatively lower and trangular in lateral view, anterior peduncle shorter than petiolar node, gaster brownish yellow. This new species is also similar to *T. reticulatus* (Chang & He, 2001) (Fig. 60), but differs in the new species propodeal spines distinctly curved posteriorly in lateral view, petiolar node trapezoidal, head dorsum reticulate; in *T. reticulatus* propodeal spines relatively straight in lateral view, petiolar node triangular, head dorsum mainly longitudinally rugose.

Etymology

The specific epithet refers to ‘hanlu’, one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Yuanyang County, Nansha Town, Shicaichang; 23.213064° N, 102.822789° E; 518 m a.s.l.; 17 Oct. 2019; Zheng-Hui Xu leg.; ground sample from dry evergreen broadleaf forest; SWFU A19-7128.

Paratype worker

CHINA • 1 worker; same collection data as for holotype; SWFU A19-7128.

Description

Measurements of holotype worker: TL 2.4, HL 0.59, HW 0.47, CI 79, SL 0.52, SI 111, ED 0.12, PW 0.37, WL 0.74, PL 0.28, PH 0.2, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior margin weakly convex, posterior corner narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin weakly convex. Antennae 12-segmented, scapes just reaching to posterior head margin. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view promesonotum weakly convex and gently sloping down posteriorly, promesonotal suture and metanotal groove absent. Dorsum of propodeum slightly convex and sloping down posteriorly; propodeal spines long, weakly curved and pointed posteriorly, longer than propodeal dorsum; declivity weakly concave. Petiole with short anterior peduncle, about ½ length of petiolar node; petiolar node roughly trapezoidal, anterior margin and posterior margin almost straight, dorsal margin weakly convex; ventral margin weakly concave, anteroventral corner toothed. Postpetiole weakly lower than petiolar node, anterodorsal corner rounded, posterior margin straight, ventral margin short and almost straight.

In dorsal view pronotum broadest, lateral margin strongly convex, humeral corners rounded. Mesothorax moderately constricted and narrow, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins almost straight, spines long and pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins slightly convex. Postpetiole roughly trapezoidal, about 1.4 times as broad as petiole, narrowing posteriorly, anterior margin moderately convex, anterolateral corners narrowly rounded, lateral margins nearly straight. Gaster elongate oval.

Fig. 21. *Temnothorax hanlu* sp. nov., holotype worker (SWFU A19-7128). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Mandibles longitudinally striate. Head dorsum coarsely reticulate, longitudinally rugose between frontal carinae. Pronotum, mesonotum and propodeal dorsum coarsely reticulate; mesopleura, metapleura, sides of propodeum, petiole and postpetiole finely reticulate. Gaster smooth and shiny. Body dorsum with sparse erect to suberect apically blunt short hairs and abundant decumbent pubescence, hairs on head relativeky abundant, pubescence on gaster sparse; scapes and tibiae with dense decumbent pubescence. Body color brownish yellow, mandibels, scapes and legs yellow; gaster black, anterior face brownish yellow.

Measurements of paratype worker: TL 2.3, HL 0.55, HW 0.45, CI 82, SL 0.50, SI 111, ED 0.11, PW 0.30, WL 0.60, PL 0.25, PH 0.20, DPW 0.10 (1 individual measured). As holotype worker.

Ecological notes

This new species inhabits dry evergreen broadleaf forest (Fig. 70F) at an elevation of 518 m, and forages on the ground.

Distribution

China: Yunnan.

Temnothorax jingzhe sp. nov.
urn:lsid:zoobank.org:act:043D60A5-F460-4534-9164-B3C5CAC50952
Fig. 22

Diagnosis

This new species is similar to *T. mangzhong* sp. nov. (Fig. 29), but differs in the new species head dorsum without punctate sculpturing between the longitudinal rugae on the central area, posterodorsal corner of propodeum more acutely angled, petiolar node relatively shorter with narrowly rounded dorsum, and body color black; in *T. mangzhong* head dorsum densely punctate between the longitudinal rugae on the central area, posterodorsal corner of propodeum rightly angled, petiolar node relatively longer with broadly rounded dorsum, and body color reddish brown, head and gaster black. The new species is also similar to *T. congruus* (Smith, 1874) (Fig. 7), but differs in the new species dorsum of mesonotum and propodeum straight in lateral view, petiolar node nearly symmetrical and erect, head dorsum finely longitudinally rugose, body color black; in *T. congruus* dorsum of mesonotum and propodeum weakly convex in lateral view, petiolar node asymmetrical and inclined anteriorly, head dorsum coarsely longitudinally rugose, body color blackish brown.

Etymology

The specific epithet refers to ‘jingzhe’, one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Cangyuan County, Menglai Town, Wokan Mountain; 23.332309° N, 99.19831° E; 2450 m a.s.l.; 19 Apr. 2012, Chun-Liang Li leg.; foraging arboreally in moss evergreen broadleaf forest; SWFU A12-1144.

Description

Measurements of holotype worker: TL 3.1, HL 0.72, HW 0.63, CI 87, SL 0.60, SI 95, ED 0.15, PW 0.42, WL 0.85, PL 0.32, PH 0.20, DPW 0.15.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corner broadly rounded. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, median carina indistinct, anterior margin moderately convex. Frontal lobes narrow, concealing half of antennal sockets. Frontal carinae short, reaching to the level of anterior eye margin. Antennae 12-segmented, scapes almost reaching to posterior margin, club 3-segmented. Eyes located slightly before midpoint of lateral head margin, occupying 1/5 of lateral margin.

In lateral view pronotum weakly convex, dorsa of mesonotum and propodeum straight and gently sloping down posteriorly, promesonotal suture and metanotal groove absent. Propodeal spines very short and stout, roughly triangular, about as long as their basal width; declivity almost straight; propodeal lobes short and rounded apically. Petiole with long anterior peduncle, about as long as petiolar node; petiolar node roughly triangular, anterior and posterior margins weakly convex, top corner narrowly rounded; ventral margin almost straight, anteroventral corner minutely toothed. Postpetiole as high as petiolar node, anterodorsal corner rounded, posterior margin almost straight, ventral margin weakly concave.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margin strongly convex, promesonotal suture absent. Mesothorax moderately constricted, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins almost straight; spines short and stout, roughly triangular, pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.4 times as broad as petiole, anterolateral corners broadly rounded. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum densely longitudinally rugose, with interface densely punctate posteriorly and laterally, posteroventral part of lateral head margins smooth and shiny. Clypeus densely longitudinally rugose. Mesosoma reticulate; propodeal dorsum coarsely reticulate, metapleura longitudinally rugose. Propodeal sides, petiole and postpetiole finely reticulate, postpetiolar dorsum relatively smooth. Gaster smooth and shiny. Body dorsum with abundant suberect to subdecumbent short hairs and abundant decumbent pubescence, hair on mesosoma subdecumbent. Scapes and tibiae with dense decumbent pubescence. Body color blackish brown, head and gaster black; mandibles, apices

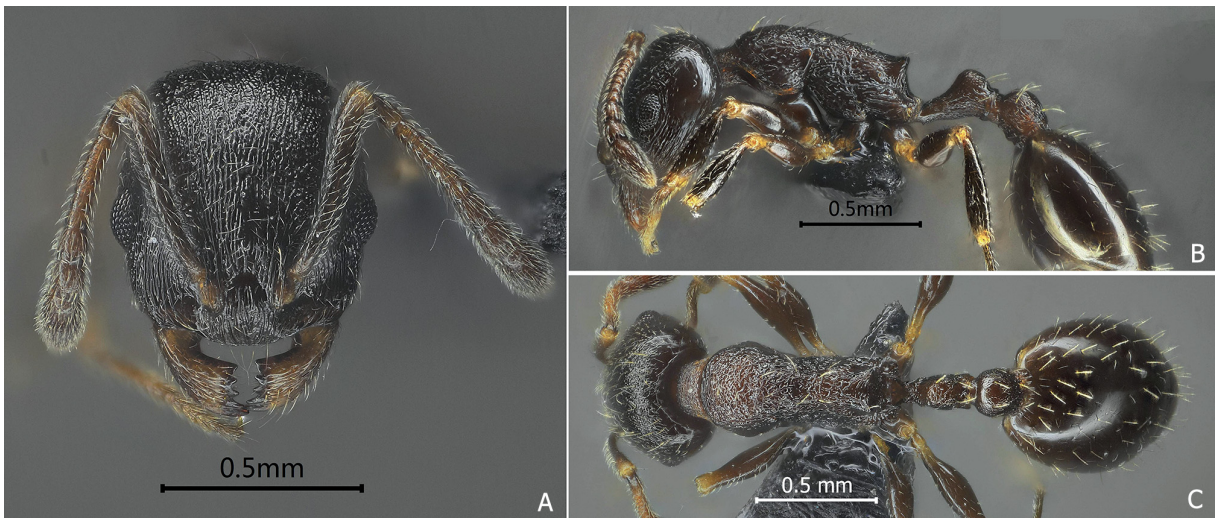

Fig. 22. *Temnothorax jingzhe* sp. nov., holotype worker (SWFU A12-1144). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

and bases of scapes, basal segments of flagella, trochanters, bases and apices of femora, apices of tibiae, and tarsi brownish yellow.

Ecological notes

This new species inhabits moss evergreen broadleaf forest (Fig. 69E) at an elevation of 2450 m, and forages arboreally.

Distribution

China: Yunnan.

Temnothorax lichun sp. nov.
urn:lsid:zoobank.org:act:8E2A2B8F-7085-46E5-B7F5-4A40955D0E7B
Fig. 23

Diagnosis

This new species is similar to *T. taivanensis* (Wheeler, 1929) (Fig. 24), but differs in the new species petiolar node roughly trapezoidal with broadly rounded dorsum in lateral view, apices of antennal scapes just reached to posterior head margin, head dorsum densely reticulate; in *T. taivanensis* petiolar node roughly conical with narrowly rounded dorsum in lateral view, apices of antennal scapes distinctly surpassing posterior head margin, head dorsum loosely reticulate. The new species is also similar to *T. argentipes* (Wheeler, 1928) (Fig. 42), but differs in the new species petiolar node nearly trapezoidal and longer than anterior peduncle in lateral view, propodeal dorsum weakly concave; in *T. argentipes* petiolar node nearly conical and shorter than anterior peduncle in lateral view, propodeal dorsum straight. This new species is also similar to *T. reduncus* (Wang & Wu, 1988) (Fig. 62), but differs in the new species petiolar node nearly trapezoidal and longer than anterior peduncle in lateral view, propodeal dorsum weakly concave; in *T. reduncus* petiolar node nearly triangular and as long as anterior peduncle in lateral view, propodeal dorsum straight.

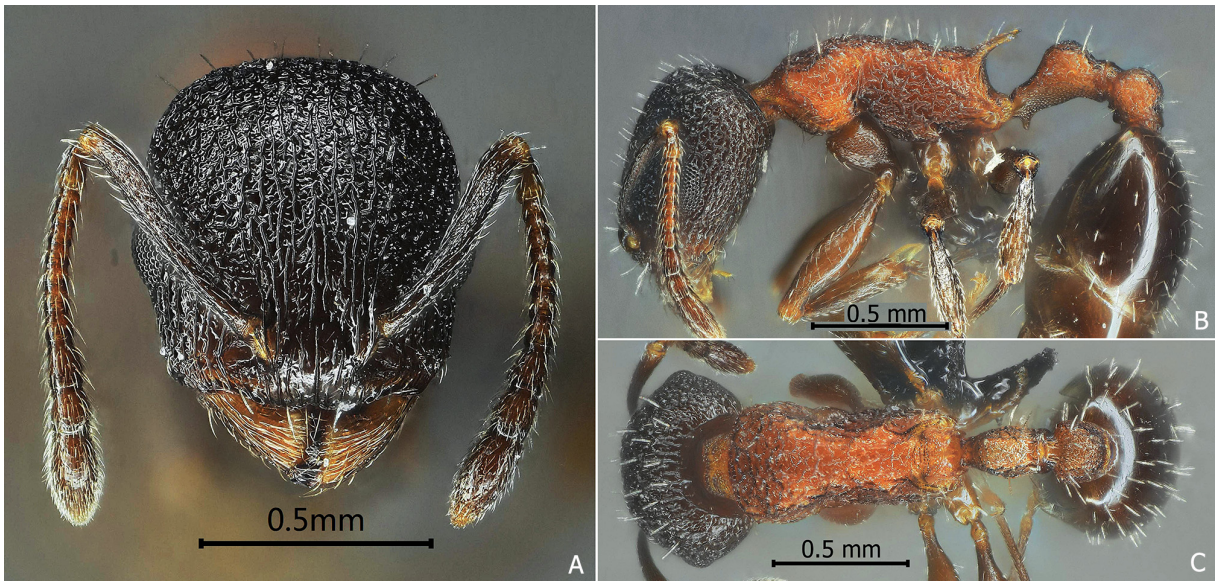

Fig. 23. *Temnothorax lichun* sp. nov., holotype worker (SWFU A10-1994). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Etymology

The specific epithet refers to 'lichun', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Malipo County, Malipo Town, Chongtou Village; 23.101083° N, 104.724083° E; 1050 m a.s.l.; 2 Apr. 2010; Liang Wang leg.; canopy sample from conifer-brodleaf mixed forest; SWFU A10-1994.

Description

Measurements of holotype worker: TL 3.5, HL 0.78, HW 0.70, CI 91, SL 0.62, SI 88, ED 0.17, PW 0.46, WL 0.96, PL 0.37, PH 0.22, DPW 0.20.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corners broadly rounded. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin angularly concave in the center. Frontal lobes narrow, concealing half of antennal sockets. Frontal carinae relatively long, reaching to the level of midpoint of eyes. Antennae 12-segmented, scapes failing to reach posterior head margin by half diameter of scape, antennal clubs 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum almost straight, weakly convex anteriorly, promesonotal suture absent. Mesonotum weakly convex and gently sloping down posteriorly, metanotal groove very shallowly impressed. Propodeal dorsum weakly concave, weakly prominent anteriorly and posteriorly; propodeal spines long, slightly longer than declivity, weakly down-curved; declivity weakly concave; propodeal lobes broad and rounded apically. Petiole with short anterior peduncle, about ½ length of petiolar node; petiolar node roughly trapezoidal and narrowing dorsally, anterior margin almost straight, dorsal and posterior margins weakly convex, anterodorsal and posterodrsal corners broadly rounded; ventral margin straight anteriorly, weakly concave posteriorly, anteroventral corner largely acutely toothed. Postpetiole about as high as petiolar node, roughly trapezoidal and narrowing dorsally, dorsal margin weakly convex, anterodorsal and posterodorsal corners broadly rounded, ventral margin deeply concave.

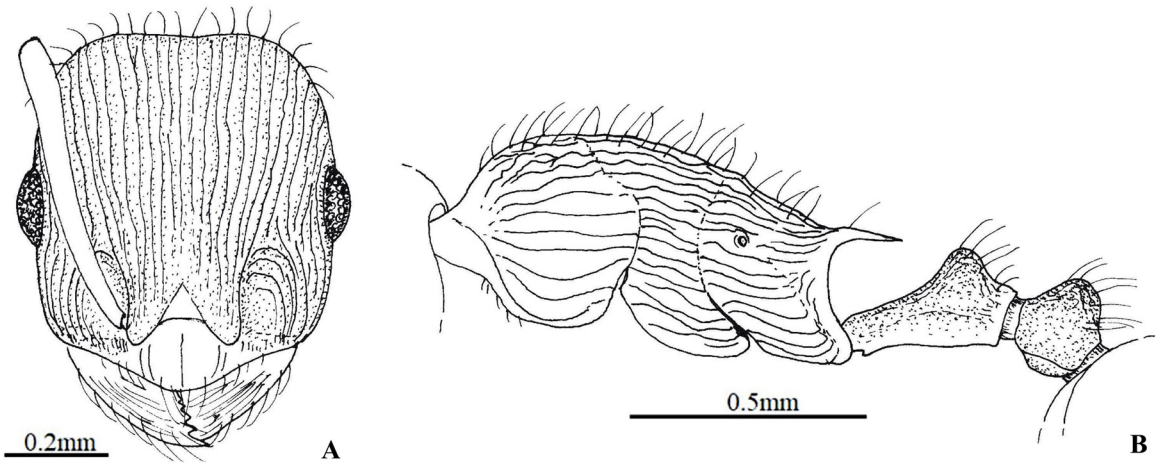

Fig. 24. *Temnothorax taivanensis* (Wheeler, 1929), worker (MCZC). **A**. Head in full-face view. **B**. Body in lateral view. Illustrations cited from Radchenko (2004).

In dorsal view pronotum broadest, anterior and lateral margins weakly convex, humeral corners narrowly rounded, promesonotal suture absent. Mesothorax weakly constricted, lateral margins weakly convex, metanotal groove shallowly impressed. Propodeum roughly rectangular, lateral margins slightly convex; spines long, weakly in-curved. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.2 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum loosely longitudinally rugose anteriorly, gradually reticulate posteriorly and laterally. Clypeus smooth, each side with 3 longitudinal rugae. Mesosoma reticulate. Petiole and postpetiole finely reticulate, ventral face of petiole densely punctate. Gaster smooth and shiny. Body dorsum with abundant erect to suberect apically blunt short hairs and abundant decumbent pubescence. Scapes and tibiae with dense decumbent pubescence. Head and gaster black; mesosoma, petiole and postpetiole reddish brown; mandibles, antennae and legs blackish brown.

Ecological notes

This new species inhabits conifer-brodleaf mixed forest (Fig. 69D) at an elevation of 1050 m, and forages arboreally.

Distribution

China: Yunnan.

Temnothorax lidong sp. nov.
urn:lsid:zoobank.org:act:C44C385F-2D47-4097-8576-2DD3476FFAAC
Fig. 25

Diagnosis

This new species is similar to *T. yanwan* Terayama, 2009 (Fig. 26), but differs in the new species head dorsum almost smooth on the central longitudinal strip, dorsum of promesonotum and mesonotum

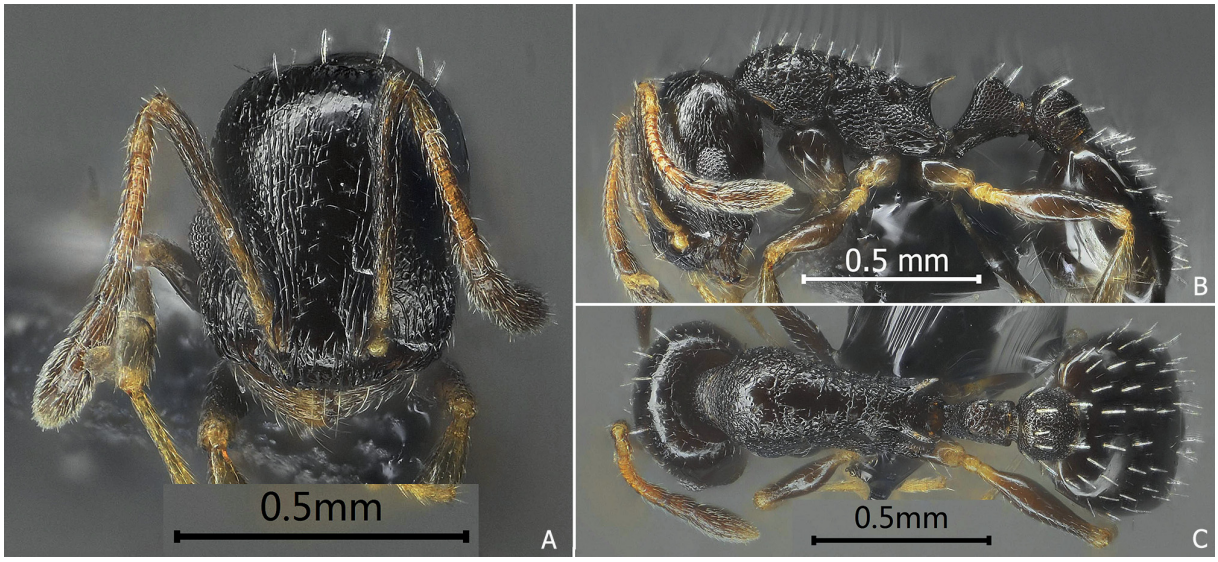

Fig. 25. *Temnothorax lidong* sp. nov., holotype worker (SWFU C18-230). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

almost smooth on the central area, propodeal spines shorter than declivity and weakly curved posteriorly; in *T. yanwan* head dorsum coarsely longitudinally rugose on the central longitudinal strip, dorsum of promesonotum and mesonotum densely reticulate on the central area, propodeal spines about as long as declivity and strongly curved posteriorly. The new species is also similar to *T. bailu* sp. nov. (Fig. 3), but differs in the new species propodeal spines slender in lateral view, petiolar node nearly conical with narrowly rounded dorsum, mesosomal sides densely punctate, body color black; in *T. bailu* propodeal spines stouter in lateral view, petiolar node nearly trapezoidal with sloping dorsum, mesosomal sides reticulate, body color reddish brown. This new species is also similar to *T. daxue* sp. nov. (Fig. 13), but differs in the new species dorsum of mesonotum and propodeum straight in lateral view, propodeal spines sharp, mesosomal sides densely punctate; in *T. daxue* dorsum of mesonotum and propodeum weakly convex in lateral view, propodeal spines stout, mesosomal sides reticulate.

Etymology

The specific epithet refers to 'lidong', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Sichuan Province, Panzhihua City, Tongde Town, Longtang Village; 26.742033° N, 101.571572° E; 1726 m a.s.l.; 22 Jul. 2018; Zheng-Hui Xu leg.; foraging on the ground in monsoon evergreen broadleaf forest; SWFU C18-230.

Paratype workers

CHINA • 2 workers; same collection data as for holotype; SWFU C18-230.

Non-type material examined

CHINA • 3 workers; Yunnan Province, Anning County, Wenquan Town, Zhenquan Village; 24.941854° N, 102.485556° E; 1850 m a.s.l.; 1 Oct. 1991; foraging on the ground in *Keteleeria evelyniana* forest; Zheng-Hui Xu leg.; SWFU A91-880.

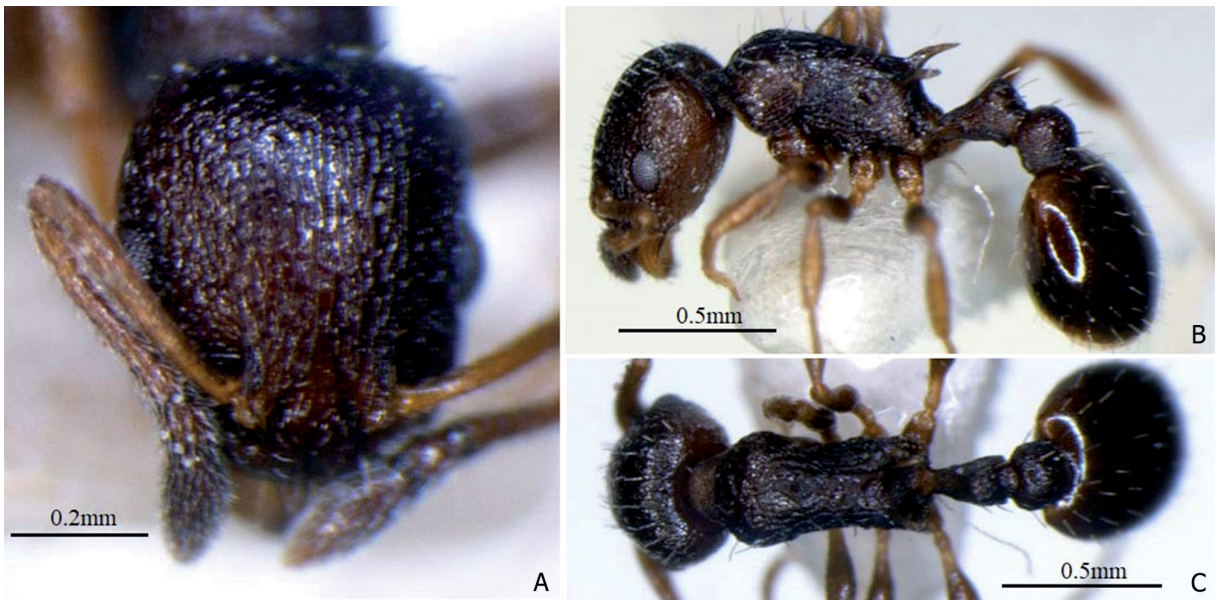

Fig. 26. *Temnothorax yanwan* Terayama, 2009, holotype worker (NIAS). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antwiki.org, photos by Hiraku Yoshitake & Takashi Kurihara.

Description

Measurements of holotype worker: TL 2.3, HL 0.57, HW 0.45, CI 79, SL 0.5, SI 111, ED 0.13, PW 0.33, WL 0.66, PL 0.26, PH 0.17, DPW 0.13.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corners broadly rounded. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, without median carina, anterior margin moderately convex. Frontal lobes narrow, concealing half of antennal sockets. Frontal carinae short, reaching to the level of anterior eye margins. Antennae 12-segmented, scapes just reaching to posterior head margin, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying 1/5 of lateral margin.

In lateral view pronotum moderately convex, promesonotal suture distinct laterally. Mesonotal dorsum gently sloping down posteriorly, weakly convex anteriorly and posteriorly, weakly impressed in the middle. Metanotal groove absent. Propodeal dorsum slightly convex and gently sloping down posteriorly; spines very long, about as long as declivity, pointed posterodorsally and slight down-curved; declivity weakly concave; propodeal lobes short and rounded apically. Petiole with short anterior peduncle, about ½ length of petiolar node; petiolar node roughly conical, anterior and posterior margins weakly convex, dorsum narrowly rounded; ventral margin weakly concave, anteroventral corner bluntly angled. Postpetiole as high as petiolar node, anterior margin strong convex, dorsal margin weakly convex, posterior margin almost straight; ventral margin weakly concave, anteroventral corner acutely toothed.

In dorsal view pronotum broadest, anterior and lateral margins moderately convex, humeral corners broadly rounded. Promesonotal suture and metanotal groove absent. Mesothorax weakly constricted, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins slightly concave; spines stout and long, pointed posterolaterally and weakly in-curved. Petiole roughly trapezoidal, widening posteriorly, longer than broad, lateral margins almost straight. Postpetiole roughly square, about 1.7 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins moderately convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum longitudinally rugose, becoming smooth posteriorly and on the central strip; genae and clypeus longitudinally rugose. Mesosoma finely reticulate; promesonotal dorsum relatively smooth, lower part of metapleura longitudinally rugose. Propodeal sides, petiole and postpetiole densely punctate, interface appearing as micro-reticulation. Gaster smooth and shiny. Body dorsum with abundant erect to suberect apically blunt short hairs and abundant decumbent pubescence. Scapes and tibiae with dense decumbent pubescence. Body color black; mandibles, antennae and legs brownish yellow.

Measurements of paratype workers: TL 2.3–2.5, HL 0.55–0.60, HW 0.45–0.48, CI 79–82, SL 0.40–0.50, SI 89–105, ED 0.10–0.15, PW 0.30–0.35, WL 0.60–0.66, PL 0.20–0.25, PH 0.15–0.20, DPW 0.10–0.11 (2 individuals measured). As holotype worker, in some individuals body size slightly different, propodeal spines slightly shorter and apex not pointed.

Ecological notes

This new species inhabits monsoon evergreen broadleaf forest (Fig. 70D) and *Keteleeria evelyniana* forest (Fig. 70C) at an elevation of 1726–1850 m, and forages on the ground.

Distribution

China: Yunnan, Sichuan.

Temnothorax liqiu sp. nov.
urn:lsid:zoobank.org:act:881EBF56-A5A6-463C-88A0-7A3426F19DAE
Fig. 27

Diagnosis

This new species is similar to *T. xiaoshu* sp. nov. (Fig. 38), but differs in the new species head dorsum and mesosoma finely reticulate, in lateral view petiolar node roughly trapezoidal with broadly rounded dorsum, and body color reddish brown, head blackish brown; in *T. xiaoshu* head dorsum and mesosoma coarsely reticulate, in lateral view petiolar node roughly conical with narrowly rounded dorsum, and body color orange, gaster blackish brown. The new species is also similar to *T. dashu* sp. nov. (Fig. 12), but differs in the new species propodeal spines shortly toothed and weakly longer than their basal width in lateral view, metanotal groove obviously impressed, head dorsum weakly reticulate posteriorly; in *T. dashu* propodeal spines acutely angled and shorter than their basal width in lateral view, metanotal groove slightly impressed, head dorsum strongly reticulate posteriorly. This new species is also similar to *T. xiaohan* sp. nov. (Fig. 36), but differs in the new species metanotal groove obviously impressed in lateral view, petiolar node symmetrical and nearly trapezoidal, pronotal sides reticulate, head dorsum weakly reticulate posteriorly; in *T. xiaohan* metanotal groove absent in lateral view, petiolar node asymmetrical and nearly triangular, pronotal sides longitudinally rugose, head dorsum strongly reticulate posteriorly.

Etymology

The specific epithet refers to 'liqiu', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Sichuan Province, Muli County, Xiamaidi Town, Mianbu Pass; 27.687339° N, 101.221072° E; 3280 m a.s.l.; 26 Jul. 2018; Zhao Huang leg.; soil sample from alpine conifer forest; SWFU C18-795.

Paratype workers

CHINA – **Sichuan Province** • 3 workers; same collection data as for holotype; SWFU C18-795 • 1 worker; Muli County, Xiamaidi Town, Mianbu Pass; 27.687339° N, 101.221072° E; 3280 m a.s.l.; 26 Jul. 2018; Zhao Huang leg.; soil sample from alpine conifer forest; SWFU C18-794 • 9 workers; Muli County, Liziping Town, Mahuanggou; 28.087486° N, 101.172733° E; 3040 m a.s.l.; 30 Jul. 2018; Yu-Cheng He leg.; soil sample from *Pinus yunnanensis* forest; SWFU C18-1407.

Non-type material examined

CHINA – **Yunnan Province** • 1 worker; Huaping County, Xinzhuang Town, Yangtianwo Village; 26.675709° N, 101.141686° E; 2240 m a.s.l.; 15 Mar. 2013; Shun-Rong Pu leg.; ground sample from conifer-broadleaf mixed forest; SWFU A13-208 • 3 workers; Deqin County, Xiaruo Town, Shiba Village; 27.776289° N, 99.264253° E; 2770 m a.s.l.; 14 Oct. 2004; Zheng-Hui Xu leg.; soil sample from warm conifer-broadleaf mixed forest; SWFU A04-755 • 9 workers; Yulong County, Baisha Town, Yulongxueshan; 27.140138° N, 100.210479° E; 3000 m a.s.l.; 20 Oct. 2004; Zheng-Hui Xu leg.; nests in soil in *Pinus yunnanensis* forest; SWFU A04-1209 • 6 workers; Yulong County, Shitou Town, Jinsishan; 26.886519° N, 99.620016° E; 3250 m a.s.l.; 19 Oct. 2004; Xiao Guo leg.; nests in soil in conifer-broadleaf mixed forest; SWFU A04-1132.

Description

Measurements of holotype worker: TL 3.0, HL 0.66, HW 0.55, CI 83, SL 0.62, SI 113, ED 0.15, PW 0.41, WL 0.83, PL 0.29, PH 0.20, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corners broadly rounded. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes narrow, concealing half of antennal socket. Frontal carinae short, reaching to the level of anterior eye margin. Antennae 12-segmented, scapes surpassing posterior head margin by 1/7 of its length, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum moderately convex, promesonotal suture absent. Mesonotum almost straight anteriorly and weakly convex posteriorly. Metanotal groove widely moderately impressed and distinct. Dorsum of propodeum straight and sloping down posteriorly; propodeal spines short and roughly triangular, about as long as their basal width, pointed posterodorsally; declivity weakly concave, shorter than dorsum; propodeal lobes small and rounded apically. Petiole with long anterior peduncle, about as long as petiolar node; petiolar node roughly trapezoidal and narrowed dorsally, anterior margin straight, dorsal margin weakly convex and gently sloping down posteriorly, posterior margin short and weakly convex, anterodorsal corner narrowly rounded, posterodorsal corner broadly rounded; ventral margin almost straight and weakly concave posteriorly, anteroventral corner shortly toothed. Postpetiole about as high as petiole, weakly inclined anteriorly, anterodorsal margin roundly convex, posterior margin straight, ventral margin almost straight.

In dorsal view pronotum broadest, anterior margin weakly convex, humeral corners broadly rounded, lateral margin strongly convex. Promesotonal suture absent. Mesothorax moderately constricted, lateral margins moderately concave. Metanotal groove widely impressed. Propodeum roughly square and weakly widening posteriorly, lateral margins almost straight; spines short, pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.4 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins nearly straight. Gaster elongate oval.

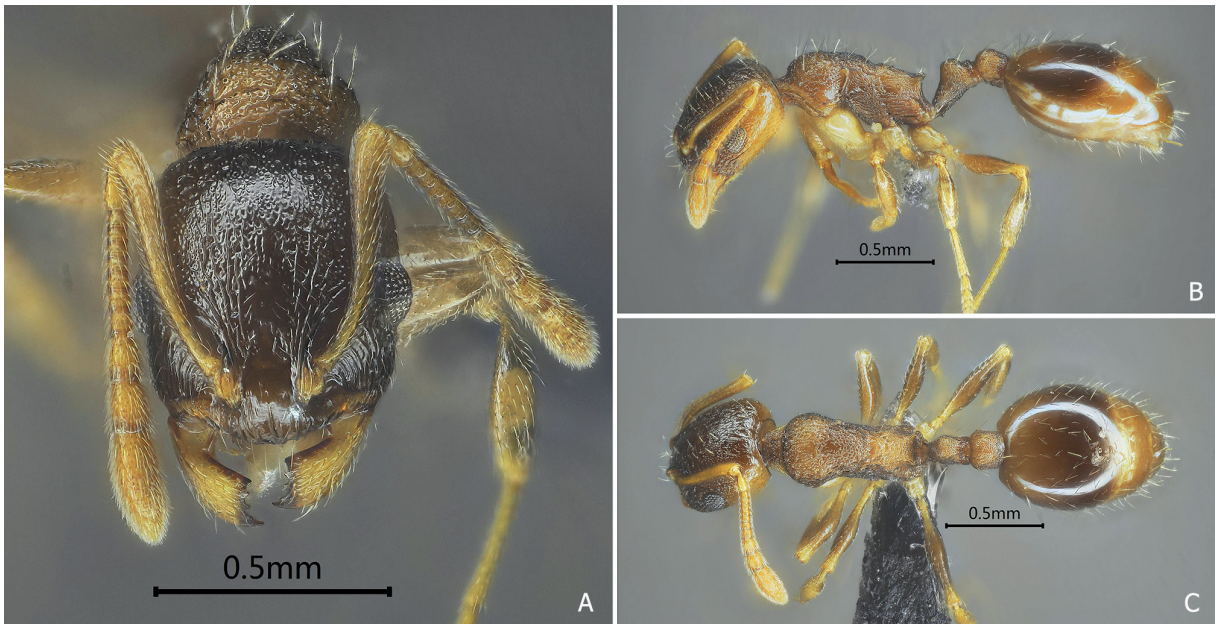

Fig. 27. *Temnothorax liqiu* sp. nov., holotype worker (SWFU C18-795). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Mandibles longitudinally striate. Head dorsum longitudinally rugose anteriorly with rugae divergent posteriorly, and gradually reticulate posteriorly and laterally, interface densely punctate. Clypeus with three rugae on each side. Mesosomal dorsum reticulate; pronotal sides and mesopleura reticulate, metapleura longitudinally rugose; sides of propodeum, petiole and postpetiole finely reticulate. Gaster smooth and shiny. Body dorsum with abundant erect to suberect apically blunt short hairs and abundant decumbent pubescence, pubescence on head dorsum relatively denser; scapes and tibiae with dense subdecumbent to decumbent pubescence. Body color yellowish brown; head dorsum and first gastral segment blackish brown.

Measurements of paratype workers: TL 2.3–3.2, HL 0.6–0.70, HW 0.45–0.60, CI 75–86, SL 0.50–0.55, SI 92–111, ED 0.10–0.11, PW 0.33–0.35, WL 0.60–0.80, PL 0.24–0.25, PH 0.15–0.18, DPW 0.10–0.13 (13 individuals measured). As holotype worker, in some individuals' propodeal spines slightly longer than in holotype, body color lighter, metanotal groove deeply to shallowly impressed.

Ecological notes

This new species inhabits alpine conifer forest (Fig. 68E), *Pinus yunnanensis* forest (Fig. 69I) and conifer-broadleaf mixed forest (Fig. 69D) at an elevation of 2240–3280 m, forages on the ground and in soil, and nests in soil.

Distribution

China: Yunnan, Sichuan.

Temnothorax lixia sp. nov.
urn:lsid:zoobank.org:act:3B5330F3-B584-414B-AB63-C011D07CB7F5
Fig. 28

Diagnosis

This new species is similar to *T. chun* sp. nov. (Fig. 5), but differs in the new species propodeal spines straight in lateral view, petiolar node obviously dissymmetrical with anterodorsal corner bluntly angled and higher than posterodorsal corner, head dorsum densely longitudinally rugose, sides of pronotum reticulate; in *T. chun* propodeal spines weakly posteriorly curved in lateral view, petiolar node nearly symmetrical with anterodorsal corner narrowly rounded and as high as posterodorsal corner, head dorsum loosely longitudinally rugose, and sides of pronotum coarsely longitudinally rugose. The new species is also similar to *T. dong* sp. nov. (Fig. 15), but differs in the new species propodeal spines shorter than half length of declivity in lateral view, petiolar node relatively thick with sloping dorsum, mesosomal sides coarsely reticulate; in *T. dong* propodeal spines longer than half length of declivity in lateral view, petiolar node relatively thin without obvious dorsum, mesosomal sides densely punctate.

Etymology

The specific epithet refers to 'lixia', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Sichuan Province, Kangding County, Pengta Town, Tongling Village; 30.501231° N, 102.300811° E; 2450 m a.s.l.; 31 Aug. 2005; Zheng-Hui Xu leg.; Winkler sample from *Pinus yunnanensis* forest; SWFU A05-945.

Paratype workers

CHINA • 2 workers; same collection data as for holotype; SWFU A05-945 • 1 worker; same collection data as for holotype; 2500 m a.s.l.; 2 Sep. 2005; foraging on the ground; SWFU A05-869.

Description

Measurements of holotype worker: TL 2.4, HL 0.62, HW 0.52, CI 84, SL 0.52, SI 100, ED 0.12, PW 0.38, WL 0.76, PL 0.25, PH 0.20, DPW 0.15.

In full-face view head roughly rectangular, longer than broad, posterior margin slightly convex, posterior corners broadly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, without median carina, anterior margin straight in the middle. Frontal lobes narrow, concealing half of antennal sockets. Frontal carinae short, about as long as frontal lobes. Antennae 12-segmented, scapes almost reaching to posterior head margin, antennal clubs 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view promesonotum weakly convex and gently sloping down posteriorly, promesonotal suture and metanotal groove absent. Propodeal dorsum almost straight and gently sloping down posteriorly, slightly convex anteriorly and medially; propodeal spines short and triangular, as long as their basal width, about ½ length of declivity; declivity slightly concave; propodeal lobes short, rounded apically. Petiole with short anterior peduncle, about ⅔ length of petiolar node; petiolar node roughly triangular, anterior margin straight, posterior margin moderately convex, top corner narrowly rounded; ventral margin almost straight anteriorly, weakly concave posteriorly, anteroventral corner minutely toothed. Postpetiole as high as petiolar node, anterodorsal margin rounded, posterior margin almost straight, ventral margin moderately concave.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners very broadly rounded, lateral margins strongly convex. Promesonotal suture and metanotal groove absent. Mesothorax weaklyly constricted, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins almost straight; spines short, roughly triangular, pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins slightly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.4 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum densely longitudinally rugose, gradually reticulate posteriorly and laterally with interface densely punctate. Clypeus smooth, each side with 2–3 longitudinal rugae. Mesosoma reticulate; pronotal sides coarsely reticulate; mesopleura and upper part of metapleura

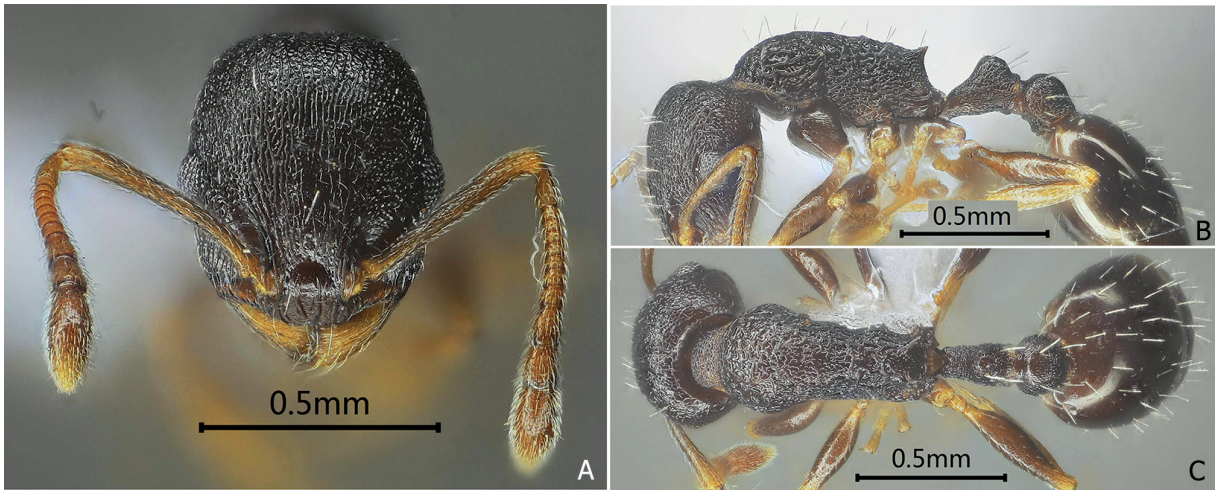

Fig. 28. *Temnothorax lixia* sp. nov., holotype worker (SWFU A05-869). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

finely reticulate; lower part of metapleura longitudinally rugose; propodeal sides, petiolar dorsum and postpetiolar dorsum densely puncate; petiolar sides and postpetiolar sides finely reticulate. Gaster smooth and shiny. Body dorsum with sparse erect to suberect apically blunt short hairs and sparse decumbent pubescence; hairs on head and gaster relatively abundant. Scapes and tibiae with dense decumbent pubescence. Body color black; mandibles, antennae and legs brownish yellow, scapes and femora blackish brown.

Measurements of paratype workers: TL 2.3–2.5, HL 0.60–0.63, HW 0.50–0.55, CI 83–88, SL 0.48–0.50, SI 86–100, ED 0.08–0.10, PW 0.35–0.36, WL 0.70–0.75, PL 0.25–0.30, PH 0.18–0.20, PNW 0.10–0.13 (3 individuals measured). As holotype worker.

Ecological notes

This new species inhabits *Pinus yunnanensis* forest (Fig. 69I) at an elevation of 2450–2500 m, and forages on the ground.

Distribution

China: Sichuan.

Temnothorax mangzhong sp. nov.
urn:lsid:zoobank.org:act:025E6A64-FEB0-438D-B95E-664182724F28
Fig. 29

Diagnosis

This new species is similar to *T. jingzhe* sp. nov. (Fig. 22), but differs in the new species head dorsum densely punctate between the longitudinal rugae on the central area, posterodorsal corner of propodeum rightly angled, petiolar node relatively longer with broadly rounded dorsum, and body color reddish brown, head and gaster black; in *T. jingzhe* head dorsum without punctate sculpturing between the longitudinal rugae on the central area, posterodorsal corner of propodeum acutely angled, petiolar node relatively shorter with narrowly rounded dorsum, and body color black. The new species is also similar to *T. congruus* (Smith, 1874) (Fig. 7), but differs in the new species propodeal spines rightly angled in lateral view, petiolar node symmetrical and nearly semicircular, pronotal sides reticulate, head dorsum finely rugose; in *T. congruus* propodeal spines acutely toothed in lateral view, petiolar node asymmetrical and nearly triangular, pronotal sides longitudinally rugose, head dorsum coarsely rugose.

Etymology

The specific epithet refers to ‘mangzhong’, one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Tengchong City, Shangying County, Dahaoping; 24.979244° N, 98.694517° E; 2000 m a.s.l.; 28 Apr. 1999; Lei Fu leg.; canopy sample from semi-moist evergreen broadleaf forest; SWFU A99-100.

Description

Measurements of holotype worker: TL 3.7, HL 0.79, HW 0.64, CI 82, SL 0.72, SI 113, ED 0.16, PW 0.49, WL 1.14, PL 0.42, PH 0.25, DPW 0.21.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corners broadly rounded. Mandibles triangular, masticatory margin with 5 teeth.

Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes narrow, concealing half of antennal sockets. Frontal carinae very short, about as long as frontal lobes. Antennae 12-segmented, scapes just reaching to posterior head margin, antennal clubs 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum weakly convex, promesonotal suture absent. Mesonotum nearly straight and gently sloping down posteriorly, metanotal groove widely shallowly impressed. Propodeal dorsum almost straight, posterodorsal corner rightly angled; declivity weakly concave, propodeal lobes broad ant truncated apically. Petiole with short anterior peduncle, about ½ length of petiolar node; petiolar node elongate and roundly convex dorsally, anterior margin almost straight, posterior margin weakly convex; ventral margin almost straight anteriorly, weakly concave posteriorly, anteroventral corner lowly minutely toothed. Postpetiole as high as petiolar node, anterodorsal margin moderately convex, posterior margin almost straight, ventral margin weakly convex.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margins strongly convex, promesonotal suture absent. Mesothorax moderately constricted, lateral margins moderately concave, metanotal groove shallowly impressed. Propodeum roughly rectangular, lateral margins slightly convex; propodeal spines acutely toothed. Petiole longer than broad, widening posteriorly, spiracles prominent, lateral margins of the node moderately convex, posterior margins strongly convex. Postpetiole about 1.3 times as broad as petiole, narrowing posteriorly, anterolateral corners broadly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum densely longitudinally rugose, densely finely reticulate posteriorly and laterally with interface densely punctate. Clypeus longitudinally rugose. Mesosoma densely finely reticulate, lower potion of metapleura longitudinally rugose. Petiole and postpetiole densely finely punctate, postpetiolar dorsum smooth. Gaster smooth and shiny. Body dorsum with abundant erect to suberect short hairs and abundant decumbent pubescence, hairs and pubescence denser on head. Scapes and tibiae with abundent subdecumbent hairs and dense decumbent pubescence. Body color reddish brown; head dorsum and gaster black; mandibles, scapes, trochanters and tarsi brownish yellow.

Fig. 29. *Temnothorax mangzhong* sp. nov., holotype worker (SWFU A99-100). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Ecological notes

This new species inhabits semi-moist evergreen broadleaf forest (Fig. 70A) at an elevation of 2000 m, and forages arboreally.

Distribution

China: Yunnan.

Temnothorax qingming sp. nov.
urn:lsid:zoobank.org:act:F976435D-FE1B-47C2-818A-1050D769569E
Fig. 30

Diagnosis

This new species is similar to *T. wui* (Wheeler, 1929) (Fig. 31), but differs in the new species head dorsum wholly smooth, posterior head margin weakly convex, propodeal spines as long as their basal width, and petiolar node roughly conical with narrowly rounded sumit; in *T. wui* head dorsum smooth on the central longitudinal strip, piosterior head margin slightly concave, propodeal spines longer than their basal width, and petiolar node roughly triangular with acute sumit. The new species is also similar to *T. chunfen* sp. nov. (Fig. 6), but differs in the new species propodeal spines sharp and weakly longer than their basal width in lateral view, petiolar node relatively lower, promesonotum finely reticulate; in *T. chunfen* propodeal spines stout and shorter than their basal width in lateral view, petiolar node relatively higher, pronotum and dorsum of mesonotum smooth. This new species is also similar to *T. guyu* sp. nov. (Fig. 19), but differs in the new species dorsum of mesonotum and propodeum straight in lateral view, propodeal spines shortly spined and weakly longer than their basal width, head dorsum wholly smooth; in *T. guyu* dorsum of mesonotum and propodeum weakly convex in lateral view, propodeal spines rightly angled and shorter than their basal width, head dorsum smooth on the central longitudinal strip and reticulate laterally.

Etymology

The specific epithet refers to ‘qingming’, one of the 24 Solar Terms of China.

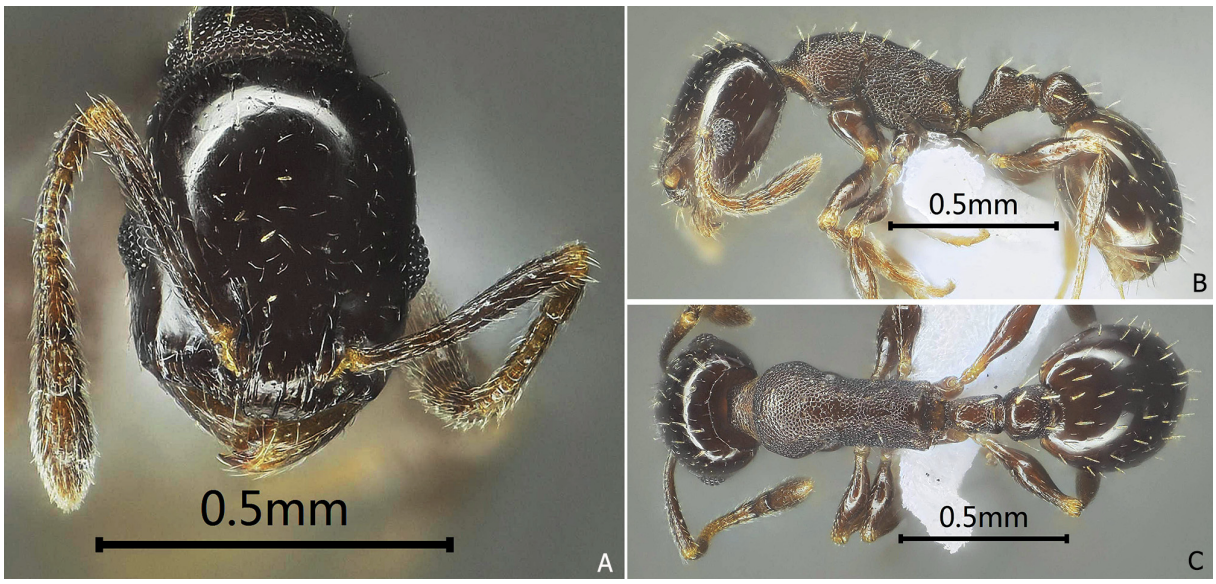

Fig. 30. *Temnothorax qingming* sp. nov., holotype worker (SWFU A07-56). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Material examined

Holotype worker

CHINA • Tibet, Linzhi County, Lulang Town, Dongjiu Village; 29.950200° N, 94.795417° E; 2560 m a.s.l.; 19 Sep. 2007; Long-Guan Chen leg.; forages beneath stones in *Pinus yunnanensis* forest; SWFU A07-56.

Description

Measurements of holotype worker: TL 2.1, HL 0.52, HW 0.40, CI 76, SL 0.44, SI 110, ED 0.10, PW 0.30, WL 0.60, PL 0.22, PH 0.16, DPW 0.12.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corners broadly rounded. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes relatively broad, concealing antennal sockets. Frontal carinae short, reaching to the level of anterior eye margins. Antennae 12-segmented, scapes almost reaching to posterior head margin. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum slightly convex, anterodorsal corner narrowly rounded. Promesonotal suture and metanotal groove absent. Mesonotum weakly convex and gently sloping down posteriorly. Propodeal dorsum straight and sloping down posteriorly; propodeal spines short and sharp, about as long as their basal width, about ½ length of declivity; declivity weakly concave; propodeal lobes broad, truncated apically. Petiole with short anterior peduncle, about ½ length of petiolar node; petiolar node roughly triangular, anterior and posterior margins slightly convex, dorsum narrowly rounded; ventral margin almost straight, weakly concave posteriorly, anteroventral corner acutely toothed. Postpetiole about as high as petiolar node, anterodorsal margin rounded, posterior margin straight, ventral margin deeply notched.

In dorsal view pronotum broadest, anterior and lateral margins moderately convex, humeral corners broadly rounded. Promesonotal suture and metanotal groove absent. Mesothorax moderately constricted, lateral margins moderately concave. Propodeum roughly rectangular, lateral margins almost straight, spines shortly toothed. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins almost straight. Postpetiole roughly rectangular, about 1.5 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins almost straight. Gaster elongate oval.

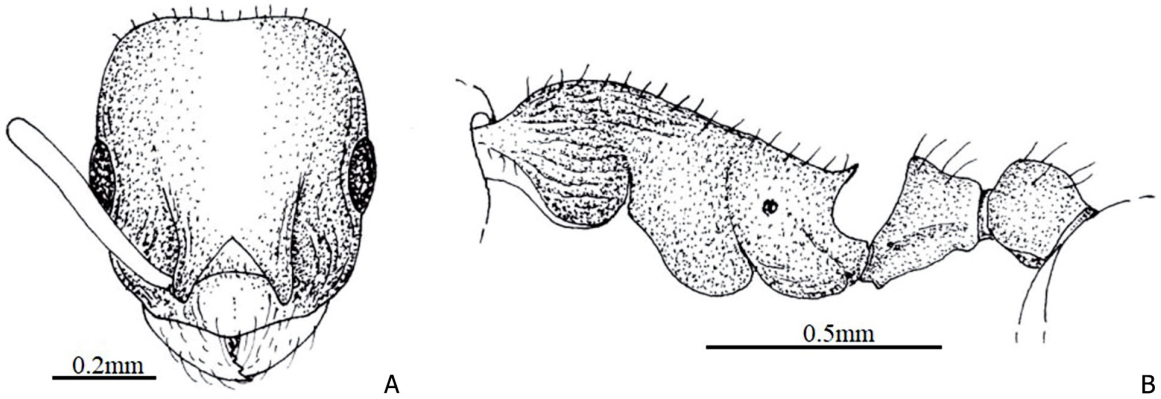

Fig. 31. *Temnothorax wui* (Wheeler, 1929), syntype worker (MCZC). **A**. Head in full-face view. **B**. Body in lateral view. Illustrations cited from Radchenko (2004).

Mandibles longitudinally striate. Head smooth and shiny, inner side of frontal carinae with 3 longitudinal rugae. Central part of clypeus smooth, each side with 3 longitudinal rugae; lateral part obliquely striate. Mesosoma, petiole and postpetiole uniformly densely punctate, dorsum of petiolar node and postpetiolar dorsum smooth. Gaster smooth and shiny. Body dorsum with sparse erect to suberect apically blunt short hairs and abundant decumbent pubescence. Scapes and tibiae with dense decumbent pubescence. Body color blackish brown; head dorsum and gaster black; tarsi yellowish brown.

Ecological notes

This new species inhabits *Pinus yunnanensis* forest (Fig. 69I) at an elevation of 2560 m, and was found foraging beneath a stone.

Distribution

China: Tibet.

Temnothorax qiu sp. nov.
urn:lsid:zoobank.org:act:00DA9E8A-9F01-48C4-9843-6F5D2D56AA1A
Fig. 32

Diagnosis

This new species is similar to *T. shuangjiang* sp. nov. (Fig. 34), but differs in the new species head dorsum parallelly longitudinally rugose on the central area, mesosoma densely reticulate; in *T. shuangjiang* head dorsum irregualarly longitudinally rugose on the central area, mesosoma coarsely reticulate. The new species is also similar to *T. dong* sp. nov. (Fig. 15), but differs in the new species propodeal spines slender in lateral view, petiolar node with narrowly rounded dorsum, pronotal sides finely reticulate; in *T. dong* propodeal spines stout in lateral view, petiolar node with rightly angled anterodorsal corner, pronotal sides coarsely reticulate. This new species is also similar to *T. xiazhi* sp. nov. (Fig. 41), but differs in the new species dorsum of mesonotum and propodeum weakly convex in lateral view, propodeal spines longer than half length of declivity, petiolar node longer than anterior peduncle, body color black; in *T. xiazhi* dorsum of mesonotum and propodeum straight in lateral view, propodeal spines shorter than half length of declivity, petiolar node as long as anterior peduncle, body color blackish brown.

Etymology

The specific epithet refers to ‘qiu’, one of the four seasons.

Material examined

Holotype worker

CHINA • Sichuan Province, Yanyuan County, Boda Town, Hebian Village; 27.375331° N, 101.288239° E; 2280 m a.s.l.; 25 Jul. 2018; Zhao Huang leg.; soil sample from *Pinus yunnanensis* forest; SWFU C18-561.

Paratype workers

CHINA – **Sichuan Province** • 6 workers; same collection data as for holotype; SWFU C18-561 • 2 workers; same collection data as for holotype; SWFU C18-571 • 1 worker; same collection data as for holotype; ground sample from *Pinus yunnanensis* forest; SWFU C18-577 • 1 worker; Yanbian County, Gaoping Town, Gaoping Pass; 26°46′23.11″ N, 101°31′12.93″ E; 2250 m a.s.l.; 19 Oct. 2018; Chao Chen leg.; ground sample from semi-evergreen broadleaf forest; SWFU C18-2480 • 2 workers; same collection data as for preceding; SWFU C18-2461 • 1 worker; same collection data as for preceding; SWFU C18-2496.

Non-type material examined

CHINA – **Sichuan Province** • 1 worker; Mianning County, Tuowu Town, Tuowuheqiao; 28.784206° N, 102.260025° E; 2310 m a.s.l.; 27 Jul. 2019; Xin-Min Zhang leg.; foraging on the ground in subalpine moist evergreen broadleaf forest; SWFU C19-1160 • 2 workers; same collection data as for preceding; SWFU C19-1129 • 1 worker; Kangding County, Pengta Town, Tongling Village; 30.501231° N, 102.300811° E; 2450 m a.s.l.; 31 Aug. 2005; Zheng-Hui Xu leg.; Winkler sample from *Pinus yunnanensis* forest; SWFU A05-964 • 4 workers; same collection data as for preceding; SWFU A05-956 • 1 worker; same collection data as for preceding; SWFU A05-930 • 2 workers; same collection data as for preceding; SWFU A05-961 • 2 workers; same collection data as for preceding; SWFU A05-968. – **Yunnan Province** • 1 worker; Weixi County, Tuozhi Town, Tuozhi Village; 27.126523° N, 99.361553° E; 2750 m a.s.l.; 12 Oct. 2003; Jun-Wu Yang leg.; ground sample from *Pinus yunnanensis* forest; SWFU A3470 • 1 worker; same collection data as for preceding; 2500 m a.s.l.; Zheng-Hui Xu leg.; SWFU A3505 • 1 worker; same collection data as for preceding; 2500 m a.s.l.; 15 Oct. 2003; Zheng-Hui Xu leg.; SWFU A3834 • 1 worker; Luquan County, Sayingpan Town, Shengfa Village; 26.068741° N, 102.599696° E; 2950 m a.s.l.; 21 Mar. 2013; Xin Chen leg.; soil sample from conifer-broadleaf mixed forest; SWFU A13-438 • 1 worker; Luquan County, Sayingpan Town, Sajiuhai Village; 26.039450° N, 102.543262° E; 2500 m a.s.l.; 21 Mar. 2013; Xin Chen leg.; soil sample from *Pinus yunnanensis* forest; SWFU A13-454 • 1 worker; Qiaojia County, Baihetan Town, Hetao Village; 27.050718° N, 102.987330° E; 2557 m a.s.l.; 21 Mar. 2009; Yun Shi leg.; soil sample from *Pinus armandi* forest; SWFU A09-270 • 1 worker; same collection data as for preceding; SWFU A09-292 • 1 worker; same collection data as for preceding; SWFU A09-263.

Description

Measurements of holotype worker: TL 2.4, HL 0.56, HW 0.44, CI 78, SL 0.51, SI 116, ED 0.12, PW 0.33, WL 0.63, PL 0.25, PH 0.20, DPW 0.13.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weaky convex, posterior corners broadly rounded. Mandibles triangular, masticatory margin with 5 teeth.

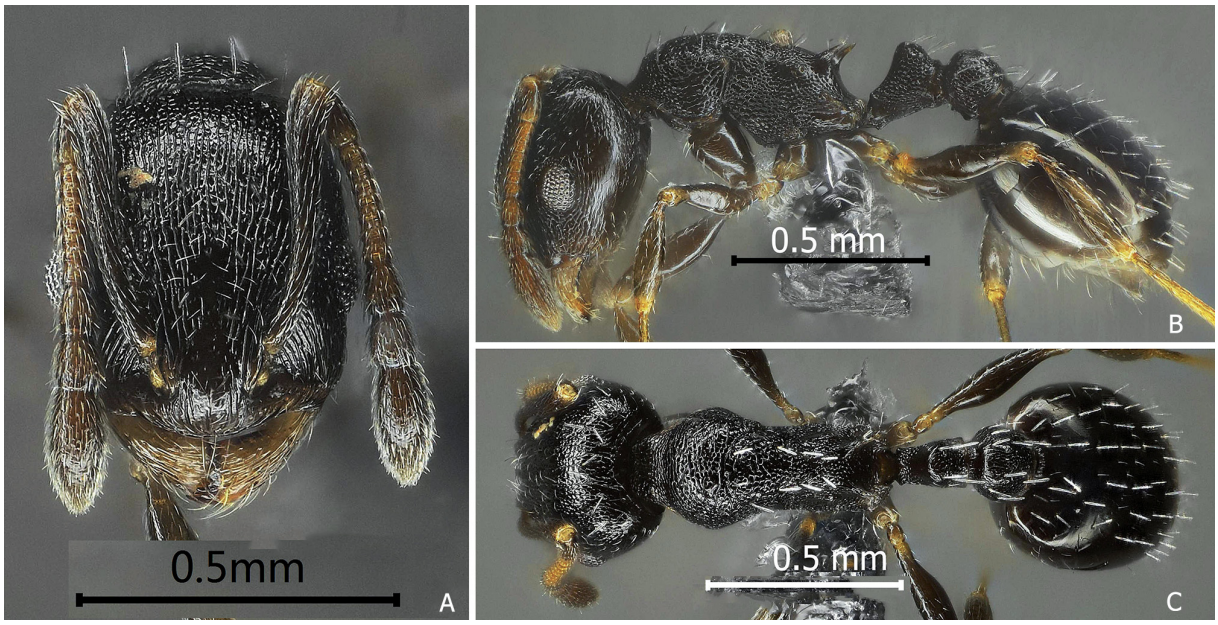

Fig. 32. *Temnothorax qiu* sp. nov., holotype worker (SWFU C18-561). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes narrow, concealing half of antennal sockets. Frontal carinae short, reaching to the level of anterior eye margins. Antennae 12-segmented, scapes slightly surpassing posterior head margin. Eyes located slightly before midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum weakly convex, promesonotal suture present but not impressed. Mesonotum and propodeal dorsum slightly convex and gently sloping down posteriorly, metanotal groove absent. Propodeal spines moderate long, slightly shorter than declivity and about 2 times as long as their basal width; declivity weakly concave; propodeal lobes short and rounded apically. Petiole with short anterior peduncle, about ½ length of petiolar node; petiolar node roughly triangular, anterior margin slightly concave, posterior margin weakly convex, top corner narrowly rounded; ventral margin straight, weakly concave posteriorly, anteroventral corner bluntly angled. Postpetiole slightly lower than petiolar node, anterior margin almost straight, anterodorsal corner narrowly rounded, dorsal margin weakly convex, ventral margin moderately concave.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margins strongly convex, promesonotal suture present. Mesothorax weakly constricted, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins slight convex; spines moderate long and sharp, pointed posterolaterally. Petiole roughly trapezoidal and widening posterior, longer than broad, lateral margins almost straight. Postpetiole roughly spherical, about 1.6 times as broad as petiole, anterolateral corners broadly rounded, lateral margins moderately convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum longitudinally rugose, with interface densely punctate posteriorly and laterally; lateral head margins below eyes relatively smooth. Clypeus smooth, each side with 4–5 short rugae. Mesosoma densely finely reticulate; propodeum, petiole and postpetiole densely punctate. Gaster smooth and shiny. Body dorsum with abundant erect to suberect apically blunt short hairs abundant decumbent pubescence. Scapes and tibiae with dense decumbent pubescence. Body color black; antennae and legs blackish brown; mandibles and tarsi brownish yellow.

Measurements of paratype workers: TL 2.3–2.5, HL 0.55–0.69, HW 0.48–0.54, CI 82–87, SL 0.48–0.55, SI 100–104, ED 0.11–0.13, PW 0.36–0.41, WL 0.63–0.74, PL 0.22–0.24, PH 0.2–0.22, DPW 0.13–0.16 (13 individuals measured). As holotype worker, in some individuals body color blackish brown, anterior margin of petiolar node nearly straight.

Ecological notes

This new species inhabits *Pinus yunnanensis* forest (Fig. 69I), *P. armandi* Franch. forest (Fig. 69B), conifer-broadleaf mixed forest (Fig. 69D), semi-evergreen broadleaf forest (Fig. 69H) and subalpine moist evergreen broadleaf forest (Fig. 69C) at an elevation of 2250–2950 m, and forages on the ground and in soil.

Distribution

China: Yunnan, Sichuan.

Temnothorax qiufen sp. nov.
urn:lsid:zoobank.org:act:6F5E501F-D777-4ADE-8DA8-566A0031508A
Fig. 33

Diagnosis

This new species is similar to *T. xiaohan* sp. nov. (Fig. 36), but differs in the new species apices of antennal scapes just reached to posterior head margin, mesosomal dorsum straight at metanotal groove

position, sides of mesosoma finely reticulate, and body color brownish black, head and gaster black; in *T. xiaohan* apices of antennal scapes surpassed posterior head margin, mesosomal dorsum weakly concave at metanotal groove position, sides of mesosoma coarsely reticulate, and body color reddish brown, head and gaster brownish black. The new species is also similar to *T. lidong* sp. nov. (Fig. 25), but differs in the new species propodeal spines shorter than declivity in lateral view, petiolar node asymmetrical with rightly angled anterodorsal corner, mesosomal sides coarsely reticulate, body color blackish brown; in *T. lidong* propodeal spines as long as declivity in lateral view, petiolar node symmetrical with narrowly rounded dorsum, mesosomal sides finely reticulate, body color black.

Etymology

The specific epithet refers to 'qiufen', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Sichuan Province, Ganzi County, Gonglong Town, Dingdalong Village; 31.696508° N, 99.781661° E; 3480 m a.s.l.; 20 Aug. 2018; Zhong-Ping Xiong leg.; foraging on the ground in *Betula albosinensis* forest; SWFU A18-972.

Paratype worker

CHINA • 1 worker; Qinghai Province, Yushu County, Jiegu Town, Barong; 32.913275° N, 97.038922° E; 3815 m a.s.l.; 18 Aug. 2018; Zheng-Hui Xu leg.; ground sample from alpine shrubland; SWFU A18-478.

Description

Measurements of holotype worker: TL 2.7, HL 0.63, HW 0.51, CI 81, SL 0.60, SI 118, ED 0.13, PW 0.36, WL 0.80, PL 0.29, PH 0.22, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior margin almost straight, posterior corners narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin

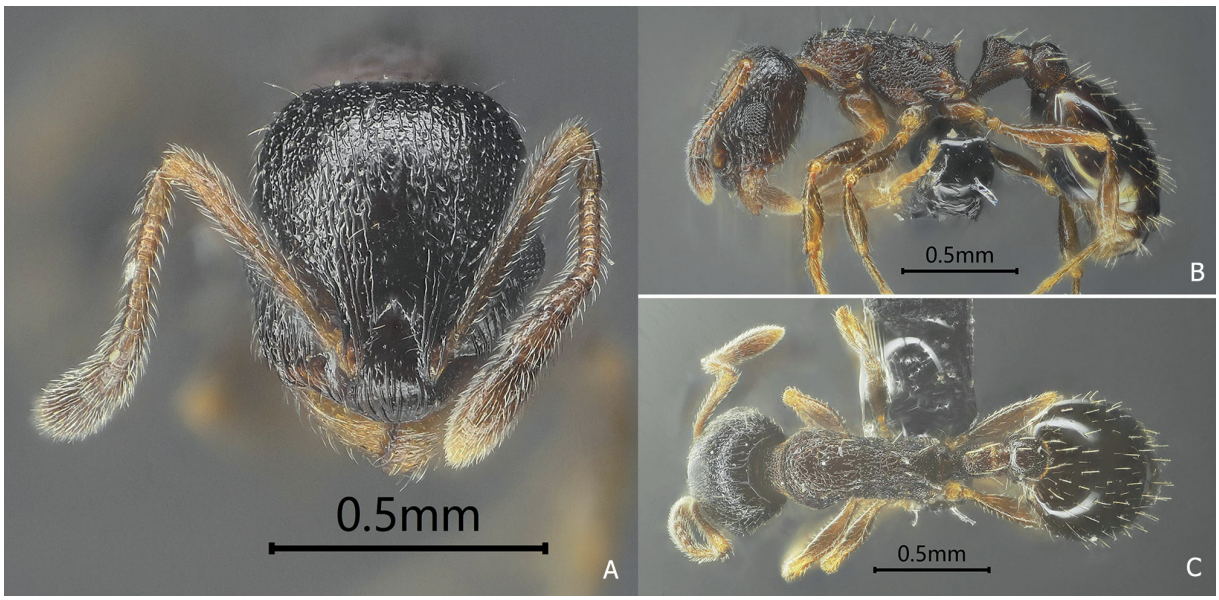

Fig. 33. *Temnothorax qiufen* sp. nov., holotype worker (SWFU A18-972). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes broad, concealing antennal sockets. Frontal carinae short, reaching to the level of anterior eye margins. Antennae 12-segmented, scapes just reaching to posterior head margin. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum slightly convex, anterodorsal corner narrowly rounded, promesonotal suture absent. Mesonotum weakly convex and gently sloping down posteriorly, metanotal groove very shallowly impressed. Propodeal dorsum straight and gently sloping down posteriorly; propodeal spines short and acute, roughly triangular, about as long as their basal width and about ½ length of declivity; declivity weakly concave; propodeal lobes short and rounded apically. Petiole with moderate long anterior peduncle, about ½ length of petiolar node; petiolar node roughly trapezoidal, anterior margin almost straight, posterior margin weakly convex, top margin slight convex; ventral margin straight, anteroventral corner largely acutely toothed. Postpetiole about as high as petiolar node, anterodorsal margin rounded, posterior margin straight, ventral margin moderately concave.

In dorsal view pronotum broadest, humeral corners broadly rounded, lateral margin moderately convex. Mesothorax weakly constricted, lateral margins weakly concave. Metanotal groove very shallowly impreassed. Propodeum roughly trapezoidal, lateral margins almost straight; spines short and triangular, pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.6 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum loosely longitudinally rugose with the longitudinal central strip relatively smooth, and reticulate laterally; genae longitudinally rugose. Clypeus with longitudinal rugosity. Mesosomal dorsum coarsely reticulate, pronotum coarsely rugose, mesonotal dorsum loosely rugose; mesopleura and metapleura reticulate; propodeum, petiole and postpetiole densely punctate. Gaster smooth and shiny. Body dorsum with sparse erect to suberect apically blunt short hairs and sparse decumbent pubescence, hairs on head and gaster relatively abundant. Scapes and tibiae with dense decumbent pubescence. Body color blackish brown, mandibles, antennae and legs brown to brownish yellow.

Measurements of paratype worker: TL 2.6, HL 0.63, HW 0.50, CI 80, SL 0.50, SI 100, ED 0.13, PW 0.35, WL 0.65, PL 0.25, PH 0.2, DPW 0.13 (1 individual measured). As holotype worker.

Ecological notes

This new species inhabits *Betula albosinensis* Burkill forest (Fig. 68C) and alpine shrubland (Fig. 68A) at an elevation of 3480–3815 m, and forages on the ground.

Distribution

China: Sichuan, Qinghai.

Temnothorax shuangjiang sp. nov.
urn:lsid:zoobank.org:act:0A1F23F2-8A1C-4284-8DF7-E9442F71C13E
Fig. 34

Diagnosis

This new species is similar to *T. qiu* sp. nov. (Fig. 32), but differs in the new species head dorsum irregularly longitudinally rugose on the central area, apices of antennal scapes falled to reach posterior

head margin, and mesosoma coarsely reticulate; in *T. qiu* head dorsum parallelly longitudinally rugose on the central area, apices of antennal scapes surpassed posterior head margin, and mesosoma densely reticulate. The new species is also similar to *T. lixia* sp. nov. (Fig. 28), but differs in the new species propodeal spines longer than half length of declivity in lateral view, head dorsum longitudinally wavely rugose; in *T. lixia* propodeal spines shorter than half length of declivity in lateral view, head dorsum longitudinally straightly rugose. This new species is also similar to *T. qiufen* sp. nov. (Fig. 33), but differs in the new species dorsum of mesonotum and propodeum weakly convex in lateral view, propodeal spines longer than half length of declivity, petiolar node with narrowly rounded dorsum, head dorsum wholly wavely rugose; in *T. qiufen* dorsum of mesonotum and propodeum straight in lateral view, propodeal spines about half length of declivity, petiolar node with rightly angled antertodorsal corner, head dorsum smooth on the central longitudinal narrow strip, longitudinally rugose laterally.

Etymology

The specific epithet refers to 'shuangjiang', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Huaping County, Xinzhuang Town, Tianxing Forest Farm; 26.636450° N, 101.149017° E; 2030 m a.s.l.; 15 Mar. 2013; Shun-Rong Pu leg.; soil sample from *Pinus yunnanensis* forest; SWFU A13-198.

Description

Measurements of holotype worker: TL 3.5, HL 0.80, HW 0.72, CI 91, SL 0.59, SI 82, ED 0.18, PW 0.49, WL 1.05, PL 0.38, PH 0.28, DPW 0.20.

In full-face view head roughly rectangular, longer than broad, posterior margin almost straight, posterior corner narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin

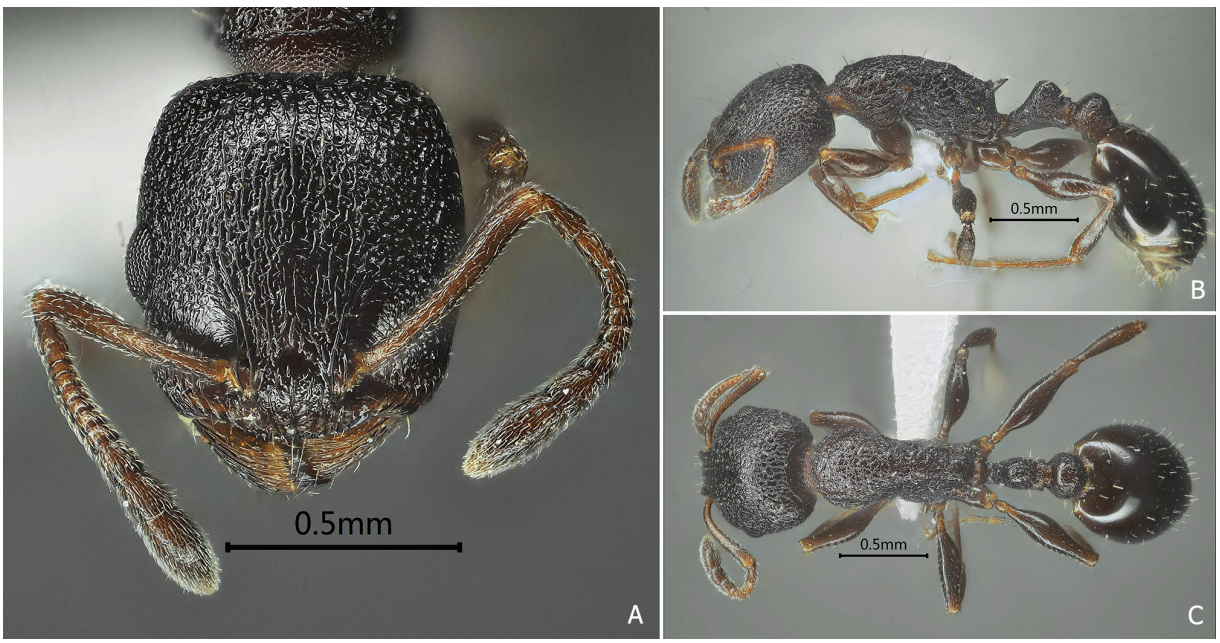

Fig. 34. *Temnothorax shuangjiang* sp. nov., holotype worker (SWFU A13-198). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

with 5 teeth. Clypeal dorsum weakly convex, with waved median carina, anterior margin moderately convex. Frontal lobes broad, concealing antennal sockets. Frontal carinae short, reaching to the level of anterior eye margins. Antennae 12-segmented, scapes failing to reach posterior head margin by 1/7 of its length, antennal clubs 3-segmented. Eyes located slightly before midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view promesonotum weakly convex and weakly arched, antetrodorsal corner of pronotum bluntly angled, promesonotal suture and metanotal groove absent. Propodeal dorsum almost straight and gently sloping down posterriorly; propodeal spines long and slender, as long as declivity, pointed posterodorsally, its dorsal margin weakly convex, ventral margin straight; declivity straight; propodeal lobes relatively large and triangular. Petiole with anterior peduncle, about ⅔ length of petiolar node; petiolar node roughly trapezoidal and narrowing dorsally, anterior margin almost straight, dorsal and posterior margins weakly convex, anterodorsal corner narrowly rounded, posterodorsal corner broadly rounded; ventral margin straight anteriorly, weakly concave posteriorly, anteroventral corner bluntly angled. Postpetiole about as high as petiolar node, anterodorsal margin rounded, posterior margin weakly concave, ventral margin angularly concave.

In dorsal view pronotum broadest, anterior and lateral margin moderately convex and rounded, humeral corners rounded. Promesonotal suture and metanotal groove absent. Mesothorax weakly constricted, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins slightly concave, spines moderately long and straight, pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.4 times as broad as petiole, anterolateral corners broadly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandible longitudinally striate. Head dorsum longitudinally rugose and reticulate posteriorly and laterally, sides below eyes densely finely reticulate. Clypeus loosely irregularly rugose. Mososoma coarsely reticulate. Petiole and postpetiole densely finely reticulate, anterior face of postpetiole smooth. Gaster smooth and shiny. Body dorsum with sparse erect to suberect apically blunt short hairs and sparse decumbent pubescence. Scapes and tibiae with dense decumbent pubescence. Body color black, mandibles, antennae and legs blackish brown.

Ecological notes

This new species inhabits *Pinus yunnanensis* forest (Fig. 69I) at an elevation of 2030 m, and forages in soil.

Distribution

China: Yunnan.

Temnothorax xia sp. nov.
urn:lsid:zoobank.org:act:F577F05A-315A-493E-9C4F-CC2066A46E26
Fig. 35

Diagnosis

This new species is similar to *T. chun* sp. nov. (Fig. 5), but differs in the new species head dorsum densely longitudinally rugose on the central area, mesonotal dorsum coarsely reticulate, and body color reddish brown, gaster black; in *T. chun*, head dorsum loosely longitudinally rugose on the central area, mesonotal dorsum smooth, and body color almost black. The new species is also similar to *T. lixia* sp. nov. (Fig. 28), but differs in the new species propodeal spines longer than half length of declivity in lateral view, petiolar node symmetrical with broadly rounded dorsum, head dorsum loosely longitudinally rugose; in *T. lixia* propodeal spines shorter than half length of declivity in lateral view, petiolar node asymmetrical

with higher anterodorsal corner, head dorsum densely longitudinally rugose. This new species is also similar to *T. qiufen* sp. nov. (Fig. 33), but differs in the new species propodeal spines longer than half length of declivity in lateral view, petiolar node symmetrical with broadly rounded dorsum, head dorsum wholly longitudinally rugose; in *T. qiufen* propodeal spines about half length of declivity in lateral view, petiolar node asymmetrical with rightly angled anterodorsal corner, head dorsum smooth on the central longitudinal narrow strip, longitudinally rugose laterally.

Etymology

The specific epithet refers to 'Xia', one of the four seasons.

Material examined

Holotype worker

CHINA • Yunnan Province, Anning County, Yiliujie Town, Monande Village; 24.543797° N, 102.336396° E; 2000 m a.s.l.; 17 Jul. 1991; Zheng-Hui Xu leg.; foraging on the ground in conifer-broadleaf mixed forest; SWFU A91-353.

Paratype workers

CHINA – **Yunnan Province** • 1 worker; same collection data as for holotype; SWFU A91-353 • 1 workers; Chuxiong City, Xishelu Town, Chahe Village; 24.613659° N, 101.058721° E; 2000 m a.s.l.; 9 Mar. 2003; Wen-Chuan Xu leg.; ground sample from semi-moist evergreen broadleaf forest; SWFU A2440 • 2 workers; Xinping County, Zhelong Town, Dazhuqing Village; 24.312610° N, 101.374036° E; 1750 m a.s.l.; 14 Mar. 2003; Zong-Hui He leg.; ground sample from semi-moist evergreen broadleaf forest; SWFU A2786 • 1 worker; Xinping County, Zhelong Town, Dazhuqing Village; 24.312610° N, 101.374036° E; 1750 m a.s.l.; 14 Mar. 2003; Zong-Hui He leg.; ground sample from semi-moist evergreen broadleaf forest; SWFU A2780.

Non-type material examined

CHINA – **Yunnan Province** • 1 worker; Guangnan County, Nanping Town, Longmao Village; 23.741343° N, 105.265284° E; 1350 m a.s.l.; 30 Mar. 2010; Juan He leg.; foraging on the ground in *Quercus variabilis* forest; SWFU A10-1544 • 1 worker; Maguan County, Dalishu Town, Zhongzhai; 23.020219° N, 104.197705° E; 1490 m a.s.l.; 4 Apr. 2010; Hui-Qin Zhu leg.; foraging on the ground in monsoon evergreen broadleaf forest; SWFU A10-2367 • 1 worker; Maguan County, Dalishu Town, Xiangchang; 23.069188° N, 104.212891° E; 1750 m a.s.l.; 4 Apr. 2010; Hui-Qin Zhu leg.; foraging on the ground in conifer-broadleaf mixed forest; SWFU A10-2416. – **Tibet** • 9 workers; Bomi County, Yupu Town, Daba Village; 29.655976° N, 96.207386° E; 3250 m a.s.l.; 4 Sep. 2010; Xue-Yun Ma leg.; nests under stones in *Quercus semecarpifolia* forest; SWFU A10-4052 • 9 workers; Bomi County, Yupu Town, Zhongba Village; 29.620511° N, 96.363603° E; 3550 m a.s.l.; 4 Sep. 2010; Xue-Yun Ma leg.; nests under stones in *Pinus wallichiana* forest; SWFU A10-4020 • 9 workers; Chayu County, Zhuwagen Town, Cibagou; 28.665801° N, 97.470460° E; 1620 m a.s.l.; 5 Oct. 2007; Long-Guan Chen leg.; nests in soil in *Pinus yunnanensis* forest; SWFU A07-935 • 1 worker; Chayu County, Zhuwagen Town, Gaba; 28.632480° N, 97.425153° E; 2345 m a.s.l.; 1 Oct. 2007; Long-Guan Chen leg.; nests in soil in *Pinus yunnanensis* forest; SWFU A07-579 • 4 workers; Chayu County, Zhuwagen Town, Gaba; 28.632480° N, 97.425153° E; 2330 m a.s.l.; 1 Oct. 2007; Long-Guan Chen leg.; foraging on the ground in *Pinus yunnanensis* forest; SWFU A07-585.

Description

Measurements of holotype worker: TL 2.9, HL 0.66, HW 0.55, CI 83, SL 0.58, SI 106, ED 0.12, PW 0.41, WL 0.79, PL 0.37, PH 0.19, DPW 0.17.

In full-face view head roughly rectangular, longer than broad, posterior margin straight, posterior corners narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5

teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes narrow, concealing half of antennal socket. Frontal carinae short, reaching to the level of anterior eye margin. Antennae 12-segmented, scapes reaching to posterior head margin, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying 1/5 of lateral margin.

In lateral view promesonotum relatively higher and weakly convex. Dorsa of posterior part of mesonotum and propodeum almost straight and gently sloping down posteriorly. Promesonotal suture and metanotal groove absent. Propodeal spines short and weakly down-curved, about 1.5 times as long as their basal width; declivity almost straight; propodeal lobes triangular, with apex bluntly angled. Petiole with moderately long anterior peduncle, about ⅔ length of petiolar node; petiolar node roughly semicircular, dorsal margin rounded, anterior and posterior margins sloping down; ventral margin straight for most of its length, concave posteriorly, anteroventral corner acutely toothed. Postpetiole as high as petiole, dorsum roundly convex, ventral margin short and almost straight.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margins strongly convex. Promesotonal suture and metanotal groove absent. Mesothorax moderately constricted and narrowing posteriorly, lateral margins moderately concave. Propodeum roughly rectangular, lateral margins almost straight; spines relatively short, pointed posterolaterally and weakly in-curved. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.4 times as broad as petiole, anterolateral corners strongly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum longitudinally rugose, gradually reticulate laterally, with interface densely punctate. Clypeus with several short rugae on each side. Mesosomal dorsum coarsely reticulate; sides of pronotum obliquely costulate; mesopleura and metapleura coarsely reticulate; propodeal sides densely punctate. Petiole and postpetiole finely rugulose, dorsum of petiolar peduncle densely punctate. Gaster smooth and shiny. Body dorsum with sparse erect to suberect apically blunt short hairs and sparse depressed pubescence. Scapes and tibiae with dense decumbent pubescence. Body color blackish brown; gastral dorsum black, mandibles, antennae and legs yellowish brown.

Measurements of paratype workers: TL 2.4–2.8, HL 0.63–0.70, HW 0.50–0.55, CI 79–80, SL 0.50–0.51, SI 91–100, ED 0.10–0.15, PW 0.33–0.35, WL 0.65–0.70, PL 0.25–0.26, PH 0.15–0.20, DPW 0.10–0.15 (5 individuals measured). As holotype worker, in some individuals promesonotum weakly rugose, sides of pronotum obliquely indistinctly costulate, mesopleura and metapleura coarsely weakly reticulate.

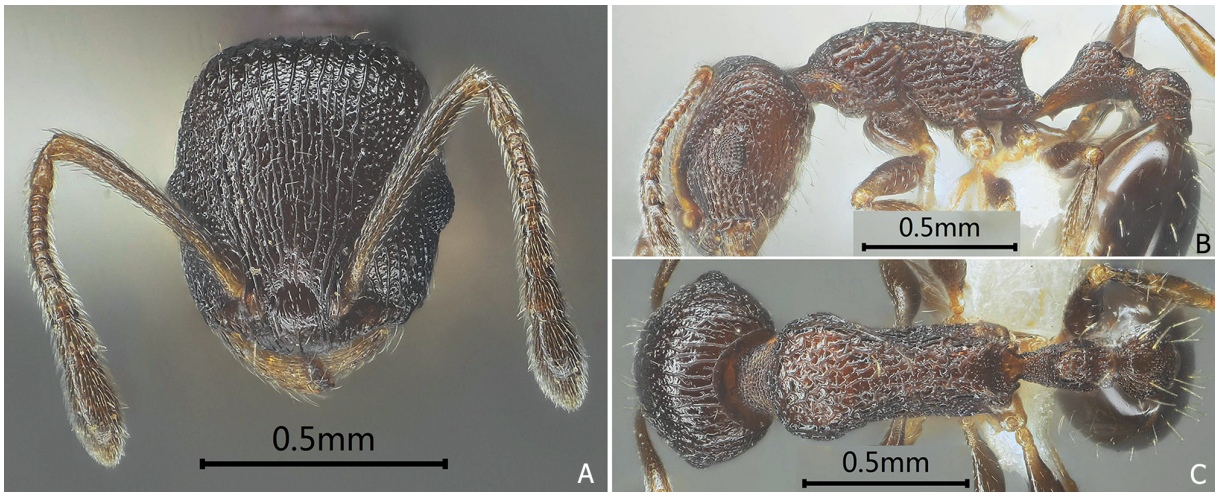

Fig. 35. *Temnothorax xia* sp. nov., holotype worker (SWFU A91-353). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Ecological notes

This new species inhabits monsoon evergreen broadleaf forest (Fig. 70D), conifer-broadleaf mixed forest (Fig. 69D), semi-moist evergreen broadleaf forest (Fig. 70A), *Quercus variabilis* Blume forest (Fig. 70E), *Q. semecarpifolia* forest (Fig. 68D), *Pinus yunnanensis* forest (Fig. 69I) and *P. wallichiana* A.B.Jacks. forest (Fig.68B) at an elevation of 1350–3350 m, forages on the ground, and nests under stones and in soil.

Distribution

China: Yunnan, Tibet.

Temnothorax xiaohan sp. nov.
urn:lsid:zoobank.org:act:4F69E5A1-2B0A-4337-AD78-55926199E8F4
Fig. 36

Diagnosis

This new species is similar to *T. qiufen* sp. nov. (Fig. 33), but differs in the new species sides of mesosoma coarsely reticulate, and body color reddish brown, head and gaster brownish black; in *T. qiufen* sides of mesosoma finely reticulate, and body color brownish black, head and gaster black. The new species is also similar to *T. dashu* sp. nov. (Fig. 12), but differs in the new species propodeal spines weakly longer than their basal width in lateral view, petiolar node asymmetrical with higher anterodorsal corner; in *T. dashu* propodeal spines shorter than their basal width in lateral view, petiolar node symmetrical with narrowly rounded dorsum. This new species is also similar to *T. liqiu* sp. nov. (Fig. 27), but differs in the new species metanotal groove absent in lateral view, petiolar node asymmetrical with higher anterodorsal corner, head dorsum strongly reticulate posteriorly; in *T. liqiu* metanotal groove weakly impressed in lateral view, petiolar node symmetrical with narrowly rounded dorsum, head dorsum weakly reticulate posteriorly.

Etymology

The specific epithet refers to ‘xiaohan’, one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Tibet, Linzhi County, Pailong Town, Zhaqu Village; 29.928517° N, 95.156467° E; 2740 m a.s.l.; 27 Sep. 2007; Zheng-Hui Xu leg.; foraging on the ground in subalpine moist evergreen broadleaf forest; SWFU A07-543.

Paratype workers

CHINA – **Tibet** • 2 workers; Linzhi County, Pailong Town, Ganglang; 29.885082° N, 95.145677° E; 2050 m a.s.l.; 26 Sep. 2007; Zheng-Hui Xu leg.; nests under stones in subalpine moist evergreen broadleaf forest; SWFU A07-513 • 7 workers; Motuo County, Damu Town, 70K; 29.695050° N, 95.521333° E; 2540 m a.s.l.; 22 Jul. 2011; Cheng-Lin Zhang leg.; canopy sample from subalpine moist evergreen broadleaf forest; SWFU A11-4156 • 1 worker; same collection data as for preceding; SWFU A11-4163; • 1 worker; same collection data as for preceding; SWFU A11-4173.

Non-type material examined

CHINA • 1 worker; Tibet, Chayu County, Zhuwagen Town, Cibagou; 28.655674° N, 97.489766° E; 2500 m a.s.l.; 10 Oct. 2007; Long-Guan Chen leg.; foraging aborally in subalpine moist evergreen broadleaf forest; SWFU A07-1156.

Description

Measurements of holotype worker: TL 3.0, HL 0.68, HW 0.58, CI 85, SL 0.66, SI 114, ED 0.15, PW 0.38, WL 0.86, PL 0.33, PH 0.20, DPW 0.15.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corners broadly rounded. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, without median carina, anterior margin moderately convex. Frontal lobes broad, concealing most of antennal sockets. Antennae 12-segmented, scapes surpassing posterior head margin, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying 1/5 of lateral margin.

In lateral view pronotum weakly convex, promesonotal suture absent. Mesonotum slightly convex and gently sloping down posteriorly, metanotal groove absent. Propodeal dorsum straight; propodeal spines very short, about as long as their basal width, and about ½ length of declivity; declivity weakly concave; propodeal lobes very short and rounded apically. Petiole with long anterior peduncle, about ⅔ length of petiolar node; petiolar node roughly triangular, anterior margin almost straight, posterior margin weakly convex, top corner narrowly rounded; ventral margin straight for most of its length, weakly concave posteriorly, anteroventral corner very bluntly angled. Postpetiole slightly lower than petiolar node, anterodorsal margin rounded, posterior margin straight, ventral margin moderately concave.

In dorsal view pronotum broadest, lateral margins strongly covex, humeral corners broadly rounded. Promesotonal suture absent. Mesothorax moderately constricted, lateral margins deeply concave. Metanotal groove absent. Propodeum roughly rectangular, lateral margins slightly convex; spines short, weakly in-curved. Petiole roughly rectangulay, longer than broad, lateral margins of the node weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.4 times as broad as petiole, anterolateral corners bluntly angled, lateral margins almost straight. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum loosely longitudinally rugose and gradually reticulate posteriorly and laterally, interface coarsely reticulate. Clypeus very loosely longitudinally rugose, interface smooth. Mesosoma reticulate; pronotal sides and lower portion of metapleura longitudinally rugose. Petiole and postpetiole finely reticulate. Gaster smooth and shiny. Body dorsum with abundant suberect to subdecumbent short hairs and abundant decumbent pubescence, hairs on head dorsum relatively denser and erect. Scapes with abundant subdecumbent hairs and dense decumbent pubescence, tibiae with dense decumbent pubescence. Body color brownish yellow, head and gaster light black.

Fig. 36. *Temnothorax xiaohan* sp. nov., holotype worker (SWFU A07-543). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Measurements of paratype workers: TL 2.6–3.3, HL 0.55–0.65, HW 0.45–0.62, CI 82–97, SL 0.50–0.64, SI 100–111, ED 0.10–0.15, PW 0.3–0.43, WL 0.65–0.93, PL 0.25–0.34, PH 0.15–0.21, DPW 0.10–0.14. (9 individuals measured). As holotype worker, in some individuals propodeal spines shorter than holotype and body color ligther.

Ecological notes

This new species inhabits subalpine moist evergreen broadleaf forest (Fig. 69C) at an elevation of 2050–2740 m, forages on the ground and on plants, and nests under stones.

Distribution

China: Tibet.

Temnothorax xiaoman sp. nov.
urn:lsid:zoobank.org:act:A78A4A0D-00C1-484F-9E79-F6668C970D99
Fig. 37

Diagnosis

This new species is similar to *T. xiaohan* sp. nov. (Fig. 36), but differs in the new species propodeal spines thin and suberect, anterodorsal corner of petiolar node bluntly angled, and pronotal dorsum coarsely reticulate; in *T. xiaohan* propodeal spines thick and posterodorsally pointed, anterodorsal corner of petiolar node narrowly rounded, and pronotal dorsum finely reticulate. The new species is also similar to *T. congruus* (Smith, 1874) (Fig. 7), but differs in the new species petiolar node relatively higher, with rightly angled anterodorsal corner in lateral view, head dorsum finely longitudinally rugose with the central area smooth; in *T. congruus* petiolar node relatively lower, with bluntly angled anterodorsal corner in lateral view, head dorsum coarsely longitudinally rugose without smooth central area. This new species is also similar to *T. susamyri* (Dlussky, 1965) (Fig. 65), but differs in the new species propodeal spines not forming an arch with declivity in lateral view, anterodorsal corner of petiolar node bluntly angled, head dorsum longitudinally rugose with the central area smooth; in *T. susamyri* propodeal spines formed an arch with declivity in lateral view, anterodorsal corner of petiolar node acutely angled, head dorsum smooth on the central longitudinal strip and reticulate laterally.

Etymology

The specific epithet refers to ‘Xiaoman’, one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Shaanxi Province, Qinling Mountains, Huangbaiyuan Scenic Area; 33.813848° N, 107.526568° E; 1400 m a.s.l.; 27 Jun. 1997; Cong Wei leg.; foraging on the ground in conifer-broadleaf mixed forest; SWFU A97-4109.

Description

Measurements of holotype worker: TL 2.9, HL 0.66, HW 0.56, CI 85, SL 0.54, SI 96, ED 0.14, PW 0.42, WL 0.87, PL 0.32, PH 0.24, DPW 0.17.

In full-face view head roughly rectangular, longer than broad, posterior margin slightly convex, posterior corner narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin weakly convex. Frontal lobes broad, concealing antennal sockets. Frontal carinae very short, about half length of frontal

lobe. Antennae 12-segmented, scapes failing to reach posterior head margin, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying 1/5 of lateral margin.

In lateral view pronotum moderately convex, promesonotal suture absent. Dorsa of mesonotum and propodeum straight and gently sloping down posteriorly. Metanotal groove absent. Propodeal spines short, about as long as their basal width and pointed posterodorsally; declivity straight. Propodeal lobes roughly triangular, rounded apically. Anterior peduncle of petiole very short, about ½ length of petiolar node; petiolar node roughly triangular, anterior margin straight, posterior margin weakly convex, top corner blunt angled; ventral margin weakly concave posteriorly, anteroventral corner toothed. Postpetiole as high as petiole, anterodorsal margin roundly convex, posterior margin almost straight; ventral margin short and almost straight, anteroventral corner rightly angled.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margin weakly convex. Promesotonal suture absent. Mesothorax moderately constricted and narrowing posteriorly, lateral margins strongly concave. Metanotal groove absent. Propodeum roughly square, lateral margins weakly concave, spines short, pointed posterolaterally. Petiole elongate trapezoidal and widening posteriorly, longer than broad; lateral margins with a prominence each side anteriorly, and weakly convex posteriorly. Postpetiole roughly trapozoidal, about 1.4 times as broad as petiole, narrowing posteriorly, anterior margin moderately convex, lateral margins strongly convex, posterior margin short and nearly straight. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum longitudinally rugose with interweaved fine rugulae between the main rugae, and gradually reticulate posteriorly and laterally, interface abundantly punctate. Clypeus with three longitudinal rugae on each side, interface smooth. Dorsum of mesosoma coarsely reticulate, dorsum of mesonotum smooth in the center. Pronotal sides coarsely reticulate anteriorly and longitudinally costulate posteriorly. Mesopleura, metapleura and propodeal sides densely reticulate. Petiole and postpetiole finely reticulate, anterior face of petiolar node finely punctate, postpetiolar dorsum smooth. Gaster smooth and shiny. Head dorsum with dense erect apically blunt short hairs and dense decumbent pubescence; mesosoma, petiole and postpetiole with sparse suberect apically blunt short hairs and sparse decumbent pubescence; gaster with abundant suberect apically blunt short hairs

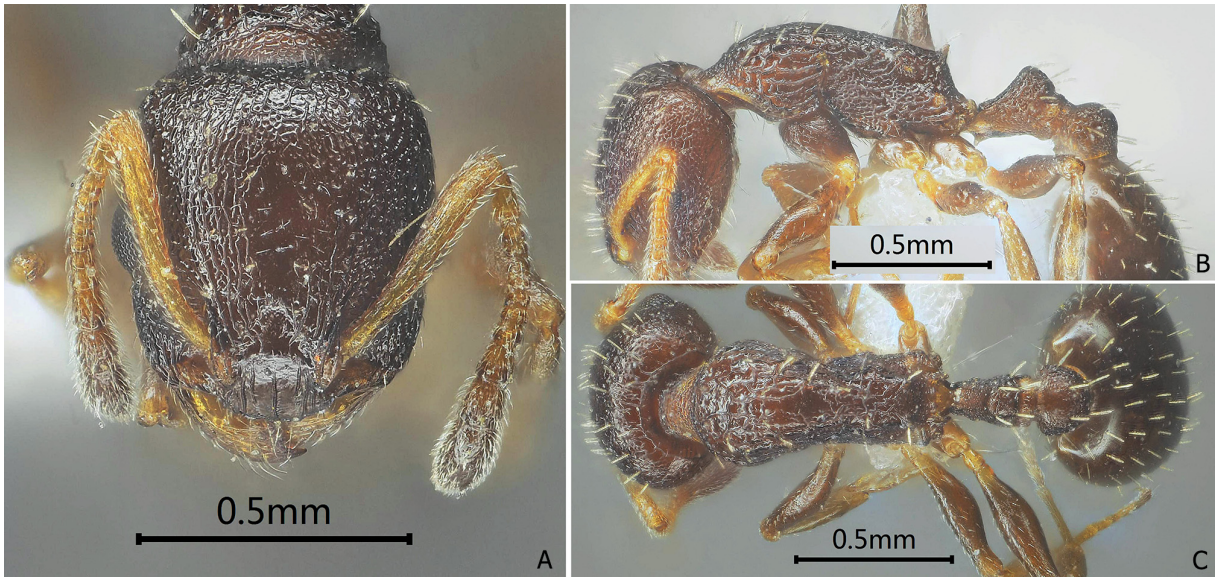

Fig. 37. *Temnothorax xiaoman* sp. nov., holotype worker (SWFU A97-4109). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

and abundant decumbent pubescence. Scapes with dense decumbent pubescence; tibiae with abundant decumbent pubescence. Body color blackish brown; mandibles, antennae and legs yellowish brown.

Ecological notes

This new species inhabits conifer-broadleaf mixed forest (Fig. 69D) at an elevation of 1400 m, and forages on the ground.

Distribution

China: Shaanxi.

Temnothorax xiaoshu sp. nov.
urn:lsid:zoobank.org:act:FC6EFC81-BD5A-44A5-8D09-18EEE838A0B7
Fig. 38

Diagnosis

This new species is similar to *T. liqiu* sp. nov. (Fig. 27), but differs in the new species head dorsum and mesosoma coarsely reticulate, in lateral view petiolar node roughly conical with narrowly rounded dorsum, and body color orange, gaster blackish brown; in *T. liqiu* head dorsum and mesosoma finely reticulate, in lateral view petiolar node roughly trapezoidal with broadly rounded dorsum, and body color reddish brown, head blackish brown. The new species is also similar to *T. dashu* sp. nov. (Fig. 12), but differs in the new species metanotal groove strongly impressed in lateral view, propodeal spines as long as their basal width, anterior peduncle as long as petiolar node, head dorsum wholly reticulate; in *T. dashu* metanotal groove slightly impressed in lateral view, propodeal spines shorter than their basal width, anterior peduncle shorter than petiolar node, head dorsum mainly longitudinally rugose on the central area and reticulate laterally.

Etymology

The specific epithet refers to ‘xiaoshu’, one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Lushui City, Pianma Town, Pianma; 25.993789° N, 98.660772° E; 2500 m a.s.l.; 25 Apr. 1999; Zheng-Hui Xu leg.; foraging inside dead branch in subalpine moist evergreen broadleaf forest; SWFU A99-24.

Paratype worker

CHINA • 1 worker; same collection data as for holotype; SWFU A99-24.

Description

Measurements of holotype worker: TL 3.3, HL 0.77, HW 0.64, CI 84, SL 0.74, SI 114, ED 0.16, PW 0.46, WL 0.93, PL 0.34, PH 0.22, DPW 0.18.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corners broadly rounded. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes narrow, concealing half of antennal socket. Frontal carinae short, reaching to the level of anterior eye margin. Antennae 12-segmented, scapes surpassing posterior head margin by 1/12 of its length, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view promesonotum moderately convex and gently sloping down posteriorly, anterior margin of pronotum marginated, promesonotal suture absent. Metanotal groove widely moderately impressed and distinct. Propodeal dorsum almost straight and gently sloping down posteriorly; propodeal spines short and stout, about as long as their basal width, blunt apically; declivity slightly concave, about ½ length of dorsum; propodeal lobes large and rounded apically. Petiole with anterior peduncle, about ¾ length of petiolar node; petiolar node roughly triangular, anterior margin almost straight, posterior margin weakly convex, top corner narrowly rounded; ventral margin almost straight, weakly concave posteriorly, anteroventral tooth indistinct. Postpetiole as high as petiole, anterodorsal margin roundly convex, posterior margin short and almost straight, ventral margin short and weakly concave.

In dorsal view pronotum broadest, anterior margin strongly convex and weakly marginated, humeral corners broadly rounded, lateral margin strongly convex, promesotonal suture absent. Mesothorax moderately constricted and narrow, lateral margins moderately concave. Metanotal groove widely impressed. Propodeum roughly trapezoidal and weakly widening posteriorly, lateral margins weakly convex; spines short and weakly in-curved; propodeal lobes acutely toothed. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex, the node roughly circular. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.3 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins nearly straight. Gaster elongate oval.

Mandibles longitudinally striate. Head coarsely reticulate, anterior 1/5 longitudinally rugose and divergent posteriorly. Clypeus with 3–4 rugae on each side, interface smooth. Mesosoma coarsely reticulate, lower part of metapleuron with 2 longitudinal costulae. Petiole finely reticulate, postpetiole densely punctate. Gaster smooth and shiny. Body dorsum with abundant suberect to subdecumbent hairs and abundant decumbent pubescence, head dorsum with dense erect short hairs and dense decumbent pubescence. Scapes and tibiae with dense subdecumbent hairs and dense decumbent pubescence. Body color brownish yellow; first gastral segment blackish brown.

Measurements of paratype worker: TL 3.3, HL 0.75, HW 0.60, CI 80, SL 0.60, SI 100, ED 0.10, PW 0.40, WL 0.85, PL 0.25, PH 0.20, DPW 0.13 (1 individual measured). As holotype worker.

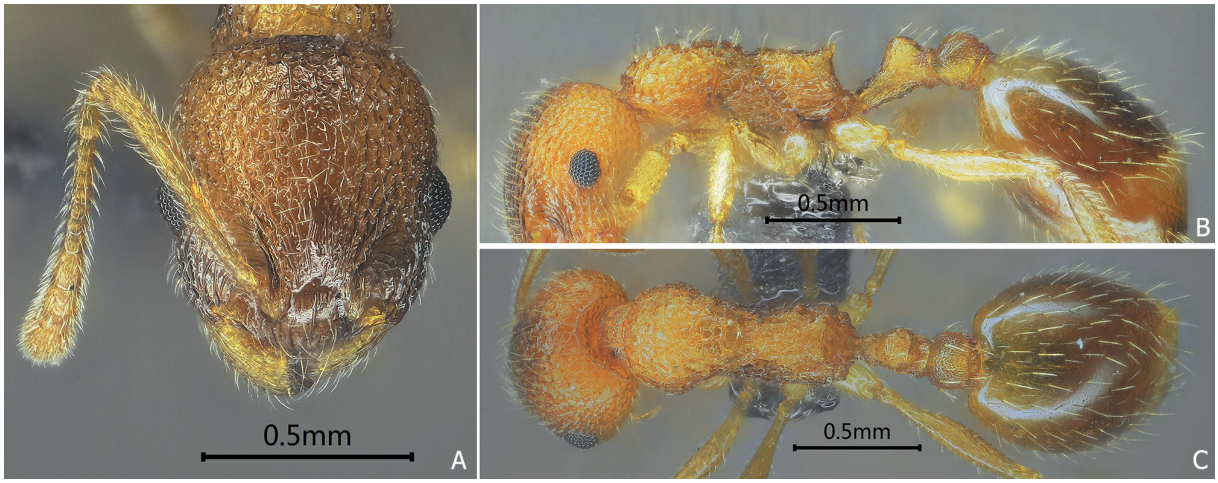

Fig. 38. *Temnothorax xiaoshu* sp. nov., holotype worker (SWFU A99-24). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Ecological notes

This new species inhabits subalpine moist evergreen broadleaf forest (Fig. 69C) at an elevation of 2500 m, and forages inside dead branches.

Distribution

China: Yunnan.

Temnothorax xiaoxue sp. nov.
urn:lsid:zoobank.org:act:7AE11F1F-B746-44AD-A4E1-5BD0A46B4DA2
Fig. 39

Diagnosis

This new species is similar to *T. striatus* Zhou *et al.*, 2010 (Fig. 40), but differs in the new species petiolar node roughly trapezoidal with obvious posterior corner in lateral view, apices of antennal scapes obviously surpassing posterior head margin, and body color reddish brown; in *T. striatus* petiolar node roughly triangular without obvious posterior corner in lateral view, apices of antennal scapes just reached to posterior head margin, and body color yellowish brown. The new species is also similar to *T. xia* sp. nov. (Fig. 35), but differs in the new species anterior peduncle shorter than petiolar node in lateral view, pronotal sides reticulate, scapes with suberect hairs; in *T. xia* anterior peduncle about as long as petiolar node in lateral view, pronotal sides coarsely longitudinally rugose, scapes with only decumbent pubescence. This new species is also similar to *T. qiufen* sp. nov. (Fig. 33), but differs in the new species propodeal spines longer than half length of declivity in lateral view, petiolar node symmetrical and nearly trapezoidal, head dorsum wholly longitudinally rugose; in *T. qiufen* propodeal spines as long as half length of declivity in lateral view, petiolar node asymmetrical and nearly triangular, head dorsum longitudinally rugose but smooth on the central narrow strip.

Etymology

The specific epithet refers to ‘xiaoxue’, one of the 24 Solar Terms of China.

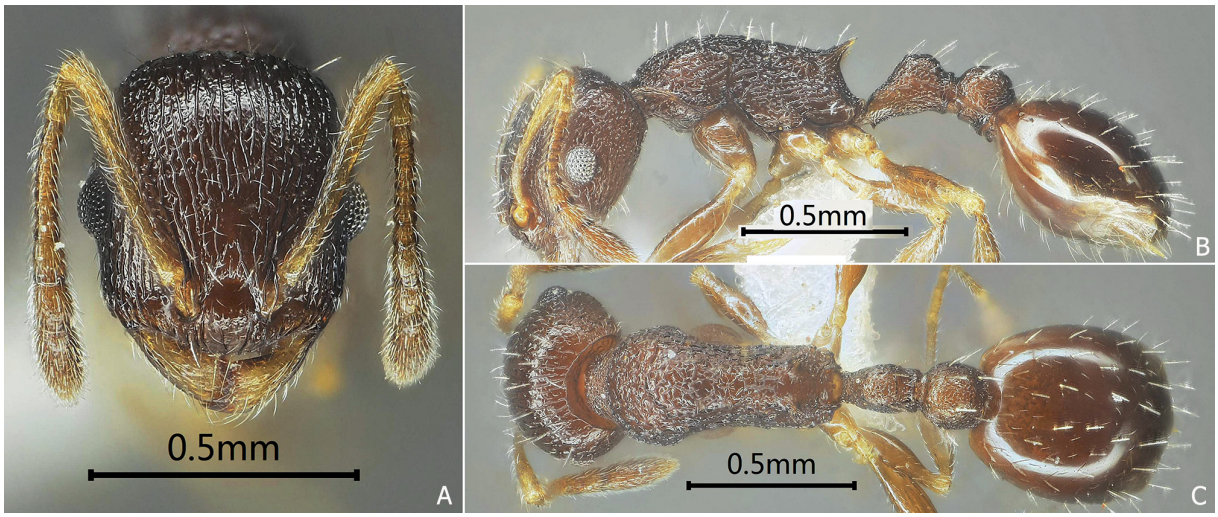

Fig. 39. *Temnothorax xiaoxue* sp. nov., holotype worker (SWFU A00436). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Material examined

Holotype worker

CHINA • Yunnan Province, Kunming City, Xishan Mountain, Taihua Temple; 24.967782° N, 102.636006° E; 1950 m a.s.l.; 2 May 2001; Ji-Ling Zhang leg.; ground sample from conifer-broadleaf mixed forest; SWFU A00436.

Paratype worker

CHINA • 1 worker; same collection data as for holotype; SWFU A00436.

Description

Measurements of holotype worker: TL 2.5, HL 0.58, HW 0.48, CI 82, SL 0.59, SI 123, ED 0.14, PW 0.37, WL 0.74, PL 0.28, PH 0.25, DPW 0.16.

In full-face view head roughly rectangular, longer than broad, posterior and lateral margins weakly convex, posterior corners narrowly rounded. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, without median carina, anterior margin moderately convex. Frontal lobes narrow, concealing half of antennal sockets. Frontal carinae relatively long, reaching to the level of midpoint of eyes. Antennae 12-segmented, scapes surpassing posterior head margin by 1/9 of its length, antennal clubs 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view promesonotum weakly convex and weakly arched, promesonotal suture and metanotal groove absent. Propodeal dorsum straight and gently sloping down posteriorly; propodeal spines moderately long and straight, slightly shorter than declivity, pointed posterodorsally; declivity almost straight; propodeal lobes triangular, bluntly angled apically. Petiole with short anterior peduncle, about ⅔ length of petiolar node; petiolar node roughly trapezoidal and narrowing dorsally, anterior and dorsal margins straight, posterior margin weakly convex, anterodorsal corner bluntly angled, posterodorsal corner narrowly rounded; ventral margin slightly concave anteriorly and posteriorly, slightly convex in the middle, anteroventral corner acutely toothed. Postpetiole as high as petiolar node, dorsum rounded, ventral margin weakly concave.

Fig. 40. *Temnothorax striatus* holotype worker (GXNU084432). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Photos by Zhi-Lin Chen.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margins strongly convex. Promesonotal suture and metanotal groove absent. Mesothorax moderately constricted, lateral margins weakly concave. Propodeum roughly rectangular, lateral margins slightly convex; spines moderately long and blunt apically, slightly in-curved. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.6 times as broad as petiole, anterolateral corners broadly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum loosely longitudinally rugose and reticulate laterally. Clypeus smooth, each side with 3–4 longitudinal rugae. Mesosomal dorsum reticulate; mesosomal sides longitudinally rugose, interface finely reticulate. Petiole and postpetiole finely reticulate. Gaster smooth and shiny. Body dorsum with sparse erect to suberect apically blunt short hairs and sparse decumbent pubescence. Scapes with abundant subdecumbent hairs and dense decumbent pubescence, tibiae with dense decumbent pubescence. Body color blackish brown; mandibles, antennae and legs brownish yellow.

Measurements of paratype worker: TL 3.0, HL 0.65, HW 0.55, CI 85, SL 0.55, SI 100, ED 0.15, PW 0.40, WL 0.75, PL 0.30, PH 0.2, DPW 0.15 (1 individual measured). As holotype worker.

Ecological notes

This new species inhabits conifer-broadleaf mixed forest (Fig. 69D) at an elevation of 1950 m, and forages on the ground.

Distribution

China: Yunnan.

Temnothorax xiazhi sp. nov.
urn:lsid:zoobank.org:act:CB401976-C0FE-459A-89A7-7153385314D6
Fig. 41

Diagnosis

Accoring to the key, this new species is similar to *T. argentipes* (Wheeler, 1928) (Fig. 42), but differs in the new species head dorsum densely longitudinally rugose on the central area, propodeal spines roughly triangular and slightly longer than its base, and body color brownish black, gaster black; in *T. argentipes* head dorsum coarsely reticulate on the central area, propodeal spines slender and much longer than its base, and body color reddish brown, head and gaster black. The new species is also similar to *T. dong* sp. nov. (Fig. 15), but differs in the new species dorsum of mesonotum and propodeum straight in lateral view, propodeal spines shorter than half length of declivity, head dorsum longitudinally rugose, interface without punctures; in *T. dong* dorsum of mesonotum and propodeum weakly convex in lateral view, propodeal spines longer than half length of declivity, head dorsum longitudinally rugose, interface with punctures. This new species is also similar to *T. lixia* sp. nov. (Fig. 28), but differs in the new species dorsum of mesonotum and propodeum straight in lateral view, petiolar node relatively thin and without dorsal face, mesosomal sides finely reticulate; in *T. lixia* dorsum of mesonotum and propodeum weakly convex in lateral view, petiolar node relatively thick and with sloping dorsal face, mesosomal sides coarsely reticulate.

Etymology

The specific epithet refers to ‘xiazhi’, one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Yunnan Province, Yulong County, Baisha Town, Yulongxueshan Village; 27.134850° N, 100.259831° E; 3000 m a.s.l.; 20 Oct. 2004; Zheng-Hui Xu leg.; ground sample from *Pinus yunnanensis* forest; SWFU A04-1198.

Paratype workers

CHINA • 5 workers; same collection data as for holotype; SWFU A04-1198.

Description

Measurements of holotype worker: TL 2.9, HL 0.69, HW 0.58, CI 84, SL 0.60, SI 104, ED 0.13, PW 0.40, WL 0.83, PL 0.33, PH 0.22, DPW 0.15.

In full-face view head roughly rectangular, longer than broad, posterior margin almost straight, posterior corners narrowly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin moderately convex. Frontal lobes broad, concealing antennal sockets. Frontal carinae short, reaching to the level of anterior eye margins. Antennae 12-segmented, scapes just reaching to posterior head margin, club 3-segmented. Eyes located at midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum slightly convex, anterodorsal corner narrowly rounded, promesonotal suture absent. Mesonotum weakly convex and gently sloping down posteriorly, metanotal groove very shallowly impressed. Propodeal dorsum straight and gently sloping down posteriorly; propodeal spines short and acute, roughly triangular, about as long as their basal width and about ½ length of declivity; declivity weakly concave; propodeal lobes short and rounded apically. Petiole with long anterior peduncle, about as long as petiolar node; petiolar node roughly triangular, anterior margin almost straight, posterior margin weakly convex, top corner bluntly angled; ventral margin straight, anteroventral corner largely acutely toothed. Postpetiole about as high as petiolar node, anterodorsal margin rounded, posterior margin straight, ventral margin moderately concave.

In dorsal view pronotum broadest, humeral corners broadly rounded, lateral margin moderately convex, promesonotal suture absent. Mesothorax weakly constricted, lateral margins weakly concave. Metanotal

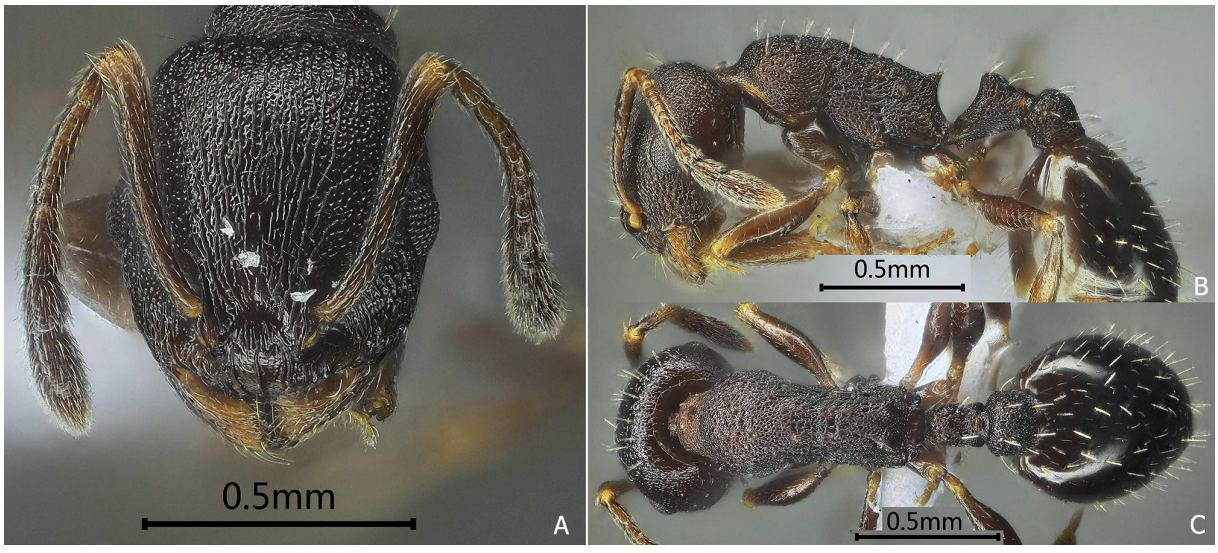

Fig. 41. *Temnothorax xiazhi* sp. nov., holotype worker (SWFU A04-1198). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

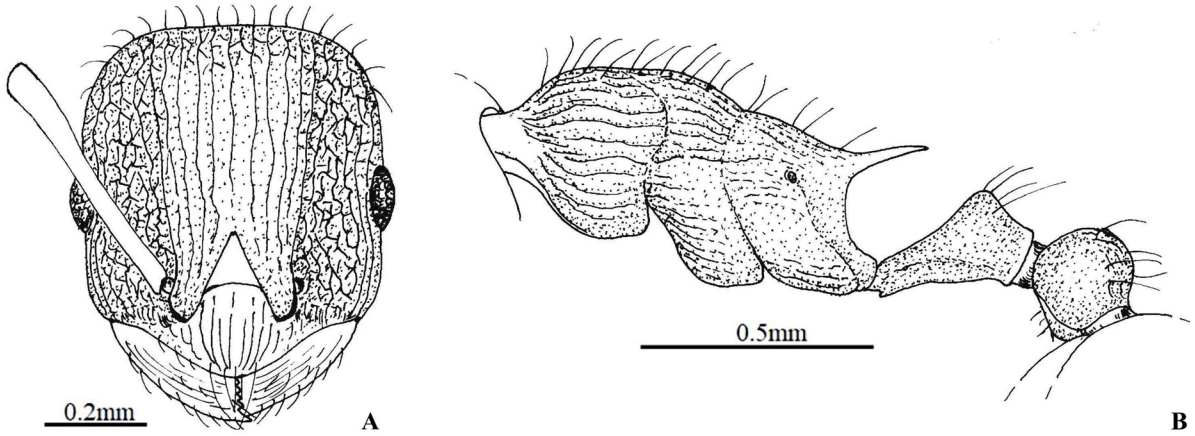

Fig. 42. *Temnothorax argentipes* (Wheeler, 1928), worker (MCZC). **A**. Head in full-face view. **B**. Body in lateral view. Illustrations cited from Radchenko (2004).

groove very shallowly impressed. Propodeum roughly trapezoidal and weakly widening posteriorly, lateral margins almost straight; spines short and triangular, pointed posterolaterally. Petiole roughly trapezoidal and widening posteriorly, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.5 times as broad as petiole, anterolateral corners narrowly rounded, lateral margins weakly convex. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum densely longitudinally rugose, and gradually reticulate posteriorly and laterally, interface between reticulation densely punctate. Clypeus smooth in the center, longitudinally rugose posteriorly and laterally. Mesosoma and petiolar node finely reticulate; mesopleura and metapleura reticulate; anterior face of pronotum, sides of propodeum, petiole except the node and postpetiole densely punctate with interface micro-reticulate. Gaster smooth and shiny. Body dorsum with sparse erect to suberect apically blunt short hairs and sparse decumbent pubescence, hairs on head and gaster relatively abundant. Scapes and tibiae with dense decumbent pubescence. Body color blackish brown, head dorsum and gaster black; mandibles, antennae and legs blackish brown to brownish yellow.

Measurements of paratype workers: TL 2.7–2.8, HL 0.63–0.65, HW 0.45–0.5, CI 71–77, SL 0.50–0.51, SI 100–111, ED 0.10–0.11, PW 0.34–0.35, WL 0.75–0.83, PL 0.24–0.25, PH 0.15–0.20, DPW 0.10–0.15 (5 individuals measured). As holotype worker, in some individuals body size slightly different.

Ecological notes

This new species inhabits *Pinus yunnanensis* forest (Fig. 69I) at an elevation of 3000 m, and forages on the ground.

Distribution

China: Yunnan.

Temnothorax yushui sp. nov.
urn:lsid:zoobank.org:act:630E075F-0B11-4377-B977-19E70D0417EF
Fig. 43

Diagnosis

This new species is similar to *T. dashu* sp. nov. (Fig. 12), but differs in the new species head dorsum densely reticulate with loose longitudinal rugae on the central area, sides of mesosoma finely reticulate, posterodorsal corner of propodeum bluntly angled, and body color light yellow; in *T. dashu* head dorsum

coarsely reticulate on the central area, sides of mesosoma coarsely reticulate, posterodorsal corner of propodeum rightly angled, and body color reddish brown, head blackish brown. The new species is also similar to *T. chushu* sp. nov. (Fig. 8), but differs in the new species propodeal spines bluntly angled in lateral view, anterior face of petiolar node nearly straight, metapleura longitudinally rugose; in *T. chushu* propodeal spines acutely angled in lateral view, anterior face of petiolar node weakly concave, metapleura reticulate.

Etymology

The specific epithet refers to 'yushui', one of the 24 Solar Terms of China.

Material examined

Holotype worker

CHINA • Sichuan Province, Muli County, Liziping Town, Lizigou; 28.055228° N, 101.183367° E; 2766 m a.s.l.; 30 Jul. 2018; Yu-Cheng He leg.; soil sample from conifer-broadleaf mixed forest; SWFU C18-1446.

Paratype workers

CHINA – **Sichuan** • 1 worker; same collection data as for holotype; SWFU C18-1446 • 4 workers; same collection data as for holotype; SWFU C18-1445 • 9 workers; same collection data as for holotype; SWFU C18-1443 • 1 worker; same collection data as for holotype; SWFU C18-1444 • 1 worker; same collection data as for holotype; foraging beneath stones in conifer-broadleaf mixed forest; SWFU C18-1461 • 9 workers; Muli County, Liziping Town, Mahuanggou; 28.087486° N, 101.172733° E; 3040 m a.s.l.; 30 Jul. 2018; Yu-Cheng He leg.; soil sample from *Pinus yunnanensis* forest; SWFU C18-1399.

Non-type material examined

CHINA – **Sichuan** • 9 workers; Mianning County, Tuowu Town, Tuowuheqiao; 28.784206° N, 102.260025° E; 2310 m a.s.l.; 27 Jul. 2019; Xin-Min Zhang leg.; soil sample from subalpine moist evergreen broadleaf forest; SWFU C19-1136 • 1 worker; same collection data as for preceding; foraging on the ground in subalpine moist evergreen broadleaf forest; SWFU C19-1147. – **Yunnan Province** • 2 workers; Ninglang County, Yongning Town, Luguhu Village; 27.659264° N, 100.815072° E; 2700 m a.s.l.; 18 Mar. 2013; Zheng-Hui Xu leg.; ground sample from conifer-broadleaf mixed forest; SWFU A13-282 • 3 workers; same collection data as for preceding; foraging SWFU A13-274 • 1 worker; same collection data as for preceding; foraging soil sample from conifer-broadleaf mixed forest; SWFU A13-280 • 3 workers; same collection data as for preceding; foraging nests in soil in conifer-broadleaf mixed forest; SWFU A13-281.

Description

Measurements of holotype worker: TL 2.8, HL 0.58, HW 0.50, CI 86, SL 0.50, SI 100, ED 0.13, PW 0.36, WL 0.71, PL 0.29, PH 0.16, DPW 0.13.

In full-face view head roughly rectangular, longer than broad, posterior margin moderately convex, posterior corners broadly rounded, lateral margins weakly convex. Mandibles triangular, masticatory margin with 5 teeth. Clypeal dorsum weakly convex, with median carina, anterior margin of clypeus moderately convex. Frontal lobes narrow, concealing half of antennal socket. Frontal carinae short, reaching to the midpoint level of eye. Antennae 12-segmented, scapes almost reaching posterior head margin, club 3-segmented. Eyes located slightly before midpoint of lateral head margin, occupying ¼ of lateral margin.

In lateral view pronotum moderately convex, promesonotal suture absent. Anterior part of mesonotum almost straight, posterior part weakly convex and sloping down posteriorly. Metanotal groove widely

moderately impressed. Propodeal dorsum almost straight and gently sloping down posteriorly; propodeal spines bluntly angled; declivity weakly concave, shorter than dorsum; propodeal lobes small and bluntly angled apically. Petiole with anterior peduncle, about ⅔ length of petiolar node; petiolar node roughly triangular, anterior margin straight, posterior margin weakly convex, top corner narrowly rounded; ventral margin almost straight, weakly concave posteriorly, anteroventral corner with a tiny tooth. Postpetiole as high as petiole, anterodorsal margin roundly convex, posterior margin short and straight, ventral margin short and almost straight.

In dorsal view pronotum broadest, anterior margin moderately convex, humeral corners broadly rounded, lateral margins strongly convex. Promesotonal suture absent. Mesothorax moderately constricted and narrow, lateral margins almost straight. Metanotal groove widely impressed. Propodeum roughly rectangular, lateral margins almost straight; propodeal spines very short and acutely toothed. Petiole roughly rectangular, longer than broad, lateral margins weakly convex. Postpetiole roughly trapezoidal and narrowing posteriorly, about 1.5 times as broad as petiole, anterolateral corners bluntly angled, lateral margins nearly straight. Gaster elongate oval.

Mandibles longitudinally striate. Head dorsum and genae longitudinally rugose with interface smooth before posterior margins of eyes, gradually reticulate posteriorly and laterally with interface densely punctate. Clypeus with 4–5 rugae on each side, interface smooth. Mesosomal dorsum reticulate; pronotal sides and mesoplura reticulate; metapleura longitudinally rugose, the rugae become coarse ventrally; propodeal sides, petiole and postpetiole finely reticulate with interface densely punctate, postpetiolar dorsum smooth. Gaster smooth and shiny. Body dorsum with abundant erect to suberect short hairs and abundant decumbent pubescence, pubescence become denser on head dorsum, hairs become denser and subdecumbent on gastral dorsum. Scapes with sparse subdecumbent hairs and dense decumbent pubescence; tibiae with dense decumbent pubescence, but without standing hairs. Body color brownish yellow; mandibles, antennae and legs light yellow; dorsum of first gastral segment and eyes light black.

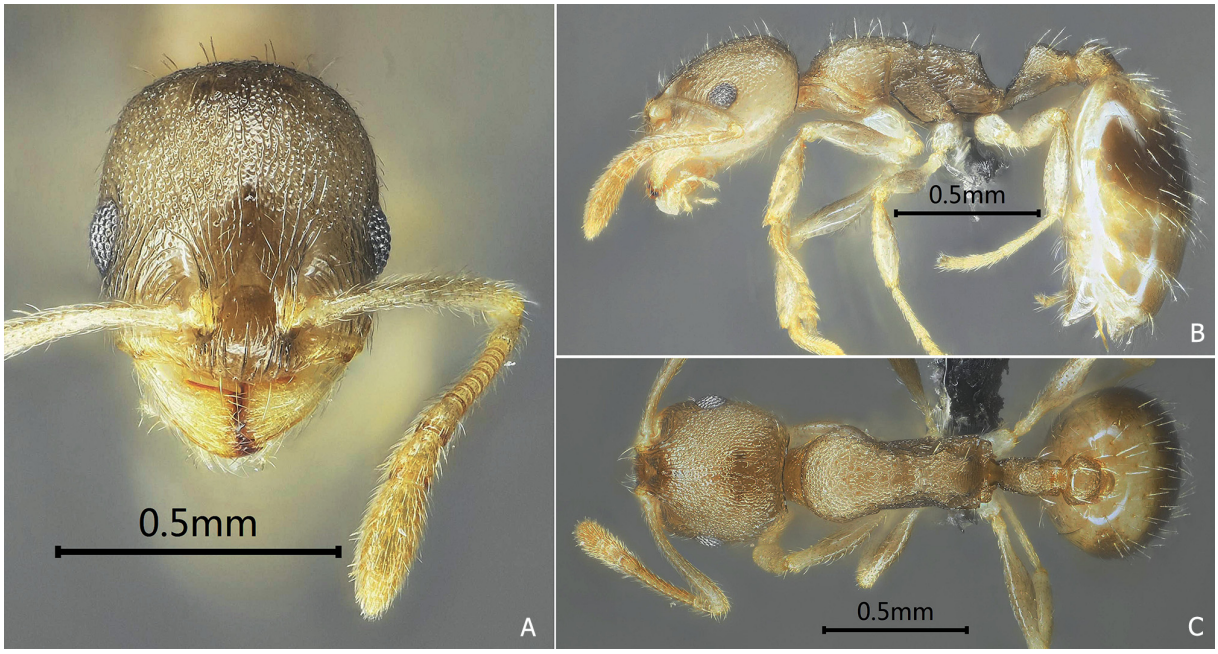

Fig. **43.** *Temnothorax yushui* sp. nov., holotype worker (SWFU C18-1446). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Measurements of paratype workers: TL 2.5–2.6, HL 0.57–0.70, HW 0.48–0.55, CI 79–85, SL 0.50–0.56, SI 91–117, ED 0.10–0.12, PW 0.33–0.40, WL 0.70–0.75, PL 0.23–0.31, PH 0.17–0.20, DPW 0.10–0.14 (15 individuals measured). As holotype worker, in some individuals metanotal groove deeply to shallowly impressed, propodeal spines bluntly angled or slightly longer and with sharp apices.

Ecological notes

This new species inhabits conifer-broadleaf mixed forest (Fig. 69D), *Pinus yunnanensis* forest (Fig. 69I) and subalpine moist evergreen broadleaf forest (Fig. 69C) at an elevation of 2310–3040 m, forages on the ground, beneath stones and in soil, and nests in soil.

Distribution

China: Yunnan, Sichuan.

Preliminary key to the known Chinese species of Leptothorax and Temnothorax based on worker caste

1. Median clypeal dorsum weakly longitudinally depressed, without median carina. Antennae 11-segmented (**Genus *Leptothorax***) (Figs 45A, 46A, 47A) 2
– Median clypeal dorsum weakly longitudinally convex, with or without median carina. Antennae usually 12-segmented, rarely 11-segmented then median clypeal dorsum weakly longitudinally convex and with median carina (**Genus *Temnothorax***) (Figs 1A, 3A, 4A) 5

2. In lateral view anterior and posterior faces of petiolar node meet at an acute angle, the node is sharply triangular [**Palearctic Region:** China: Jilin; Democratic People's Republic of Korea, Russian Federation (type locality)] (Fig. 44) ..... ***L. oceanicus*** (Kuznetsov-Ugamsky, 1928)
– In lateral view anterior and dorsal faces of petiolar node meet at a rounded blunt angle, the node has a distinct, often rounded dorsal plate (Figs 45B, 46B, 47B) 3

3. Tibiae and antennal scape with numerous standing hairs [**Nearctic Region:** United States. **Palearctic & Oriental Regions:** China: Qinghai, Sichuan and Yunnan; Andorra, Armenia, Austria, Belarus, Belgium, Bulgaria, Croatia, Czech Republic, Democratic People's Republic of Korea, Denmark (type locality), Estonia, Finland, France (type locality), Georgia, Germany, Greece, Hungary, Iberian Peninsula, Iran, India, Japan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Mongolia, Netherlands, Norway, Pakistan, Poland, Republic of Korea, Republic of Moldova, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland] (Fig. 45) .... ***L. acervorum*** (Fabricius, 1793)
– Tibiae and antennal scape without standing hairs, with decumbent pilosity only 4

4. Head dorsum mainly reticulate. In lateral view body dorsum with very sparse suberect hairs. Propodeal spines relatively shorter, shorter than half of declivity. Postpetiolar node not inclining anteriorly. In dorsal view promesonotum finely reticulate. Head and gaster blackish brown [**Palearctic Region:** China: Xinjiang; Andorra, Armenia, Austria, Belarus, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland (type locality), France, Georgia, Germany, Greece, Hungary, Iberian Peninsula, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Mongolia, Montenegro, Netherlands, Norway, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine] (Fig. 46) ...***L. muscorum*** (Nylander, 1846)
– Head dorsum mainly longitudinally rugose. In lateral view body dorsum with abundant suberect hairs. Propodeal spines relatively longer, longer than half of declivity. Postpetiolar node inclining

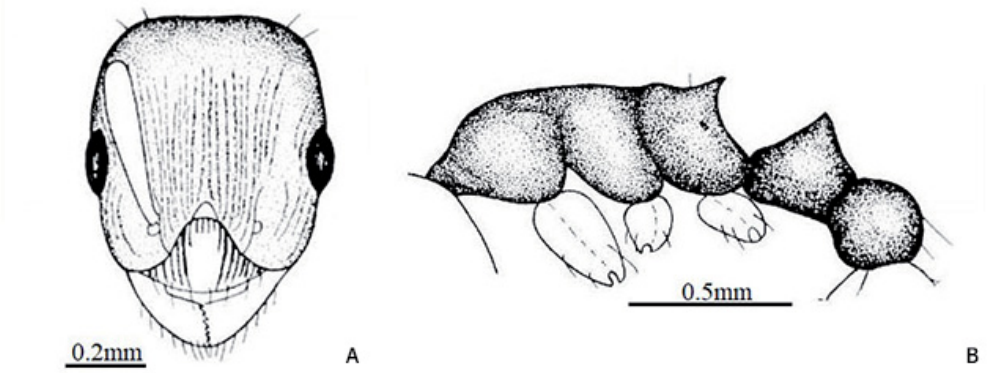

Fig. 44. *Leptothorax oceanicus* (Kuznetsov-Ugamsky, 1928), worker (ZMUM). **A**. Head in full-face view. **B**. Body in lateral view. Illustrations cited from Radchenko & Heinze (1997).

Fig. 45. *Leptothorax acervorum* (Fabricius, 1793), syntype worker (ZMUC). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0912889, photos by Zach Lieberman.

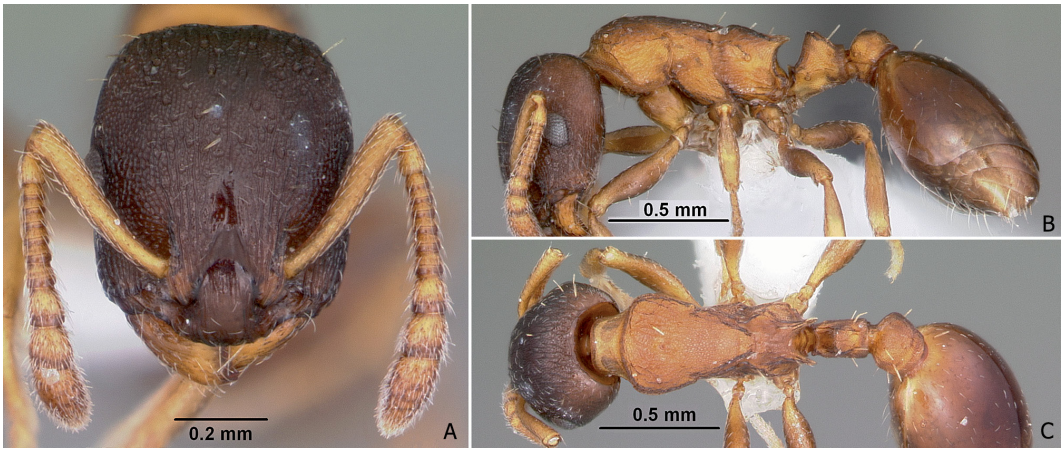

Fig. 46. *Leptothorax muscorum* (Nylander, 1846), worker (ZMHF). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0104847, photos by April Nobile.

anteriorly. In dorsal view promesonotum coarsely reticulate. Head and gaster black [**Palearctic Region:** China: Qinghai] (Fig. 47) ..... ***L. tibeticum*** Seifert, 2023

5. Antennae 11-segmented [**Palearctic Region:** China: Hubei; Democratic People's Republic of Korea, Japan, Republic of Korea (type locality)] (Fig. 48) ..... ***T. koreanus*** (Teranishi, 1940)
– Antennae 12-segmented 6

6. Posterodorsal corner of propodeum rounded in lateral view (Figs 49B, 50B) 7
– Posterodorsal corner of propodeum rightly angled (Figs 19B, 20B), toothed (Figs 27B, 38B) or spined (Figs 23B, 24B) in lateral view 8

7. Posterior head margin moderately convex. Posterodorsal corner of propodeum narrowly rounded in lateral view. Petiolar node roughly triangular and without obvious dorsal margin [**Oriental Region:** China: Hunan, Yunnan] (Fig. 49) ..... ***T. hengshanensis*** (Huang *et al.*, 2004)

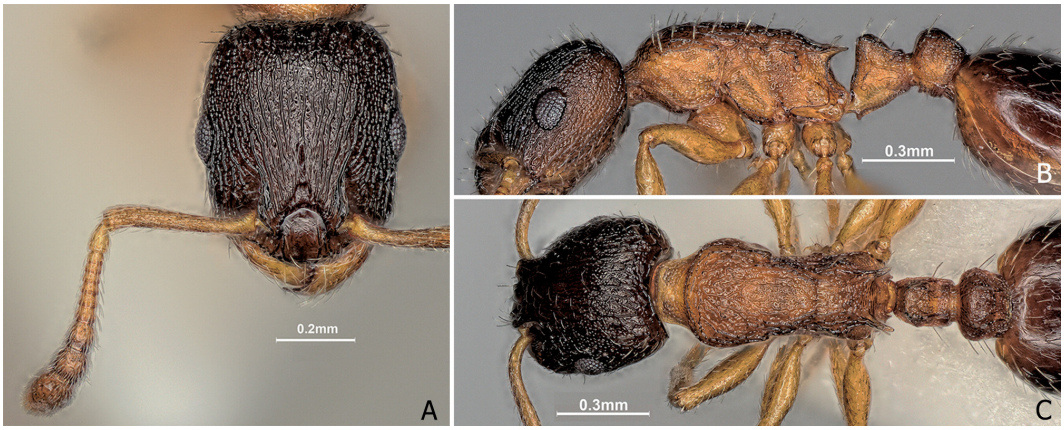

Fig. 47. *Leptothorax tibeticum* Seifert, 2023, holotype worker (SMNG). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from Seifert (2023), photos by Bernhard Seifert.

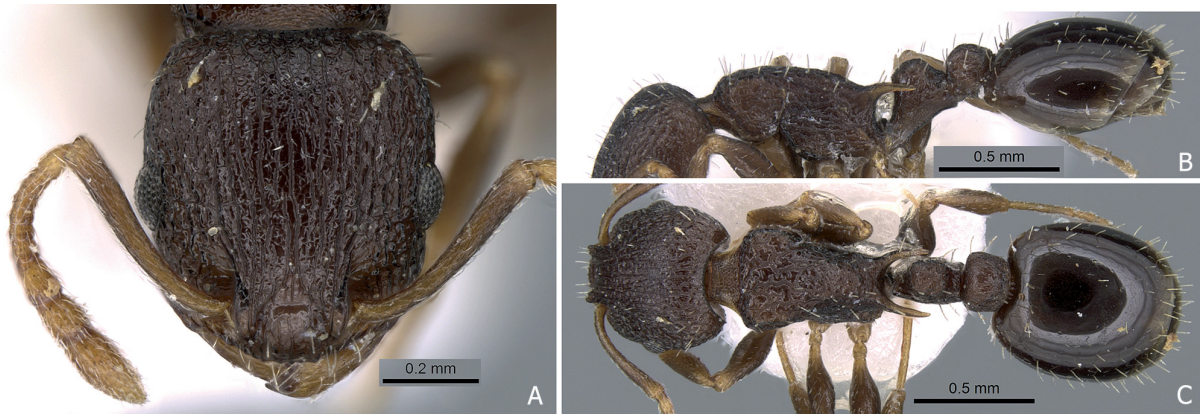

Fig. **48.** *Temnothorax koreanus* (Teranishi, 1940), worker. **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0906181, photos by Estella Ortega.

– Posterior head margin slightly convex. Posterodorsal corner of propodeum broadly rounded in lateral view. Petiolar node roughly trapezoidal and with obvious dorsal margin [**Oriental Region:** China: Taiwan (type locality)] (Fig. 50) ..... ***T. leimu*** Terayama, 2009

8. Posterodorsal corner of propodeum rightly to bluntly angled in lateral view, if very shortly toothed then the teeth obviously shorter than their basal width 9
– Posterodorsal corner of propodeum toothed or spined in lateral view, the teeth or spines obviously longer than their basal width 18

9. Anterior margin of petiolar node almost straight in lateral view 10
– Anterior margin of petiolar node obviously concave in lateral view 13

10. Head dorsum smooth on the central longitudinal strip 11
– Head dorsum reticulate or reticulate with loose longitudinal rugae on the central longitudinal strip 12

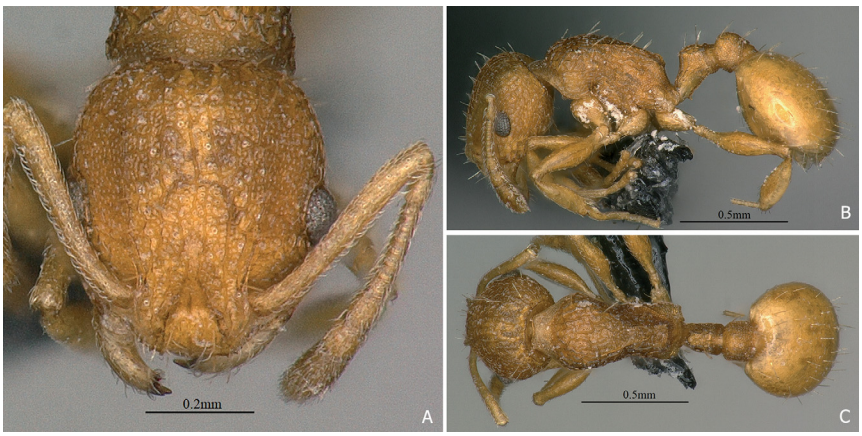

Fig. 49. *Temnothorax hengshanensis* (Huang *et al*., 2004), holotype worker (GXNU0303217). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Photos by Zhi-Lin Chen.

Fig. 50. *Temnothorax leimu* Terayama, 2009, holotype worker (NIAS). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antwiki.org, photos by Hiraku Yoshitake & Takashi Kurihara.

11. Head dorsum loosely rugose laterally. Dorsum of mesonotum and propodeum straight in lateral view. Posterodorsal corner of propodeum bluntly angled. Top of petiolar node acute [**Palearctic and Oriental Regions:** China: Tibet; India (type locality), Pakistan] (Fig. 20) .... ***T. desioi*** (Menozzi, 1939)
– Head dorsum densely reticulate laterally. Dorsum of mesonotum and propodeum weakly convex in lateral view. Posterodorsal corner of propodeum rightly angled. Top of petiolar node narrowly rounded [**Oriental Region:** China: Sichuan and Yunnan] (Fig. 19) ..... ***T. guyu*** sp. nov.

12. Head dorsum coarsely reticulate on the central area. Sides of mesosoma coarsely reticulate. Posterodorsal corner of propodeum rightly angled in lateral view. Body color reddish brown, head blackish brown [**Palearctic and Oriental Region:** China: Tibet, Yunnan] (Fig. 12) .... ***T. dashu*** sp. nov.
– Head dorsum densely reticulate with loose longitudinal rugae on the central area. Sides of mesosoma finely reticulate. Posterodorsal corner of propodeum bluntly angled in lateral view. Body color light yellow [**Oriental Region:** China: Sichuan, Yunnan] (Fig. 43) ..... ***T. yushui*** sp. nov.

13. Metanotal groove present and weakly concave in lateral view 14
– Metanotal groove absent in lateral view 15

14. Head dorsum almost smooth on the central longitudinal strip. Mesopleura reticulate. Petiolar node relatively shorter in lateral view, about 1.5 times as long anterior peduncle. Body color blackish brown [**Oriental Region:** China: Guangxi (type locality)] (Fig. 9) .... ***T. maoerensis*** Zhou *et al.*, 2010
– Head dorsum densely reticulate on the central longitudinal strip. Mesopleura densely punctate. Petiolar node relatively longer in lateral view, about twice as long as anterior peduncle. Body color brownish yellow [**Oriental Region:** China: Sichuan, Yunnan] (Fig. 8) ..... ***T. chushu*** sp. nov.

15. Head dorsum wholly smooth [**Oriental Region:** China: Yunnan] (Fig. 6) .... ***T. chunfen*** sp. nov.
– Head dorsum coarsely or finely longitudinally rugose on the central area 16

16. Head dorsum coarsely longitudinally rugose on the central area. Dorsum of pronotum longitudinally rugose. Dorsum of mesonotum and propodeum weakly convex in lateral view [**Palearctic and Oriental Regions:** China: Beijing, Guangxi, Yunnan; Democratic People's Republic of Korea, Japan (type locality), Republic of Korea, Russian Federation] (Fig. 7) .... ***T. congruus*** (Smith, 1874)
– Head dorsum finely longitudinally rugose on the central area. Dorsum of pronotum finely reticulate. Dorsum of mesonotum and propodeum straight in lateral view 17

17. Head dorsum without punctate sculpture between the longitudinal rugae on the central area. Posterodorsal corner of propodeum more acutely angled in lateral view. Petiolar node relatively shorter with narrowly rounded dorsum. Body color black [**Oriental Region:** China: Yunnan] (Fig. 22) ..... ***T. jingzhe*** sp. nov.
– Head dorsum densely punctate between the longitudinal rugae on the central area. Posterodorsal corner of propodeum rightly angled in lateral view. Petiolar node relatively longer with broadly rounded dorsum. Body color reddish brown, head and gaster black [**Oriental Region:** China: Yunnan] (Fig. 29) ..... ***T. mangzhong*** sp. nov.

18. Humeral corners of pronotum protruding, rightly to bluntly angled in dorsal view 19
– Humeral corners of pronotum rounded in dorsal view 21

19. Humeral corners of pronotum bluntly angled in dorsal view. Dorsum of petiolar node sloping down posteriorly. Body color blackish brown, head and gaster black [**Palearctic and Oriental Regions:** China: Sichuan, Tibet, Yunnan] (Fig. 3) ..... ***T. bailu*** sp. nov.
– Humeral corners of pronotum rightly angled in dorsal view. Dorsum of petiolar node almost horizontal. Body color yellowish brown, head and gaster blackish brown 20

20. In full-face view antennal scapes surpassing posterior head margin. Pronotum strongly convex in lateral view. Propodeal spines about 2 times as long as their basal width in lateral view, tips slightly curved posterodorsally [**Palearctic and Oriental Regions:** China: Guangxi, Guizhou, Hunan, Tibet, Yunnan] (Fig. 4) ..... ***T. angulohumerus*** Zhou *et al.*, 2010
– In full-face view antennal scapes falled to reach posterior head margin. Pronotum weakly convex in lateral view. Propodeal spines about 1.2 times as long as their basal width in lateral view, tips strongly curved posteriorly [**Oriental Region:** China: Guangxi, Sichuan and Yunnan] (Fig. 51) ..... ***T. orchidus*** Zhou *et al.*, 2010

21. Metanotal groove present and obviously impressed in lateral view 22
– Metanotal groove absent in lateral view 28

22. Propodeal spines shorter than declivity in lateral view 23
– Propodeal spines about as long as declivity in lateral view 24

23. Head dorsum and mesosoma finely reticulate.Petiolar node roughly trapezoidal with broadly rounded dorsum in lateral view. Body color reddish brown, head blackish brown [**Oriental Region:** China: Sichuan, Yunnan] (Fig. 27) ..... ***T. liqiu*** sp. nov.
– Head dorsum and mesosoma coarsely reticulate. Petiolar node roughly conical with narrowly rounded dorsum in lateral view. Body color orange, gaster blackish brown [**Oriental Region:** China: Yunnan] (Fig. 38) ..... ***T. xiaoshu*** sp. nov.

24. In lateral view petiolar node triangular with rightly angled summit. Body color yellow [**Oriental Region:** China: Hong Kong (type locality)] (Fig. 52) ..... ***T. haveni*** Lee *et al.*, 2023
– In lateral view petiolar node roughly trapezoidal with broadly rounded dorsum or roughly conical with narrowly rounded dorsum 25

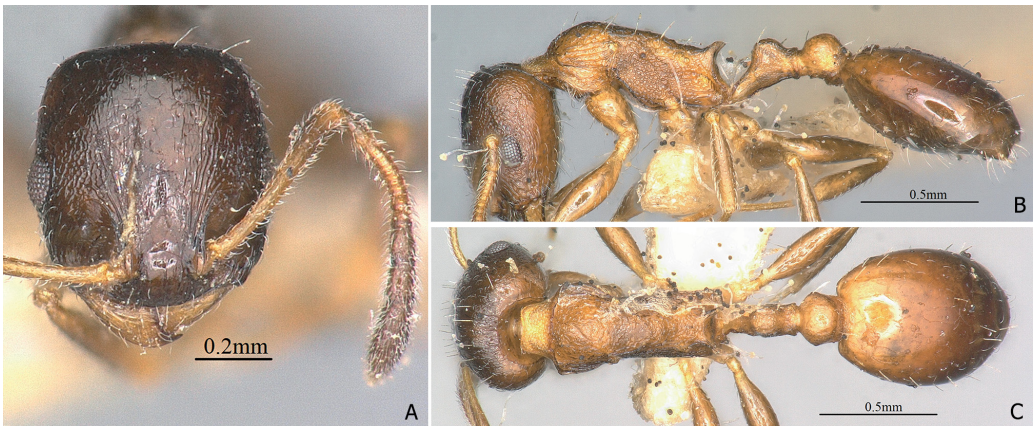

Fig. 51. *Temnothorax orchidus* Zhou *et al.*, 2010, holotype worker (GXNU0804431). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Photos by Zhi-Lin Chen.

25. In lateral view petiolar node roughly trapezoidal with broadly rounded dorsum [**Oriental Region:** China: Yunnan] (Fig. 23) ..... ***T. lichun*** sp. nov.
– In lateral view petiolar node roughly conical with narrowly rounded dorsum 26

26. Anterior margin of petiolar node weakly concave in lateral view. Head dorsum coarsely reticulate [**Oriental Region:** China: Fujian, Guangdong, Guangxi, Hainan, Hunan, Taiwan, Yunnan] (Fig. 24) ..... ***T. taivanensis*** (Wheeler, 1929)
– Anterior margin of petiolar node deeply concave in lateral view. Head dorsum finely reticulate or densely punctate with loose longitudinal rugae 27

27. Anterior peduncle about as long as petiolar node in lateral view. Head dorsum densely punctate with loose longitudinal rugae. Body color brownish yellow, head blackish brown, gaster black [**Oriental Region:** China: Taiwan (type locality)] (Fig. 53) ..... ***T. leigong*** Terayama, 2009
– Anterior peduncle shorter than petiolar node in lateral view. Head dorsum finely reticulate. Body color blackish brown, gaster black [**Oriental Region:** China: Taiwan (type locality)] (Fig. 54) ..... ***T. kuixing*** Terayama, 2009

28. Propodeal spines as long as or longer than declivity in lateral view 29
– Propodeal spines shorter than declivity in lateral view 42

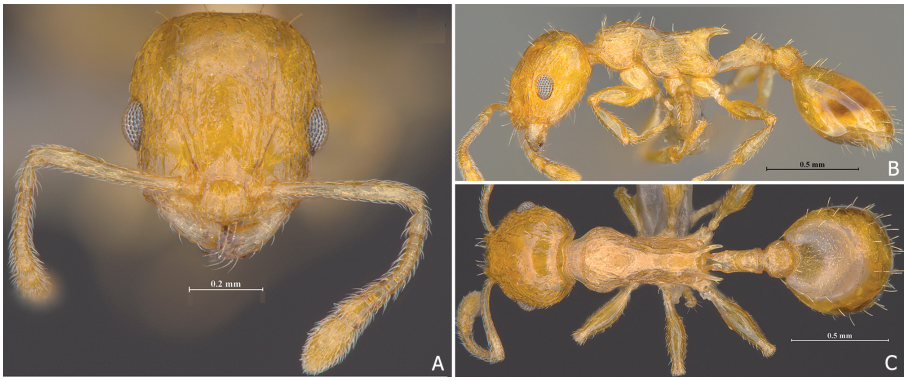

Fig. 52. *Temnothorax haveni* Lee *et al*., 2023, holotype worker (ZRC). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from Hamer *et al.* (2023), photos by Matthew T. Hamer *et al.*

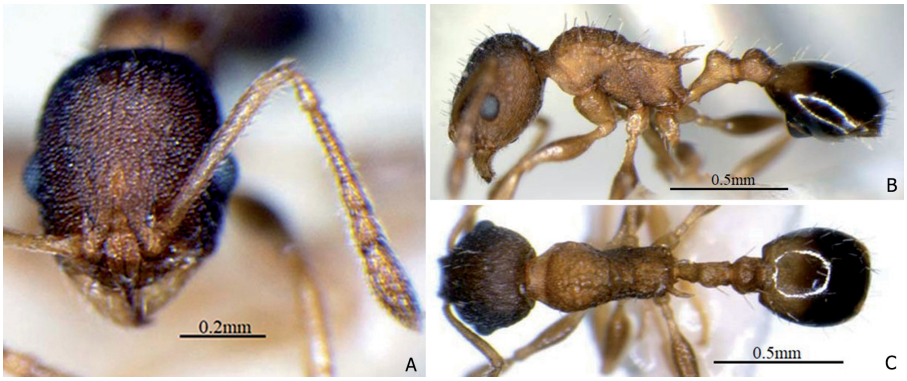

Fig. 53. *Temnothorax leigong* Terayama, 2009, holotype worker (NIAS). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antwiki.org, photos by Hiraku Yoshitake & Takashi Kurihara.

29. In lateral view petiolar node asymmetrical, posterior margin more convex than anterior margin 30
– In lateral view petiolar node symmetrical, posterior margin as convex as anterior margin 35

30. Dorsum of mesonotum and propodeum straight in lateral view. Anterior peduncle as long as petiolar node [**Oriental Region:** China: Taiwan (type locality)] (Fig. 55) .....***T. confucii*** (Forel, 1912)
– Dorsum of mesonotum and propodeum weakly convex in lateral view. Anterior peduncle shorter than petiolar node 31

31. Head dorsum densely reticulate. In lateral view anterior margin of petiolar node straight [**Oriental Region:** China: Guangxi, Henan, Zhejiang] (Fig. 56) .....***T. zhejiangensis*** Zhou *et al.*, 2010
– Head dorsum loosely reticulate. In lateral view anterior margin of petiolar node weakly concave 32

Fig. 54. *Temnothorax kuixing* Terayama, 2009, holotype worker (NIAS). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antwiki.org, photos by Hiraku Yoshitake & Takashi Kurihara.

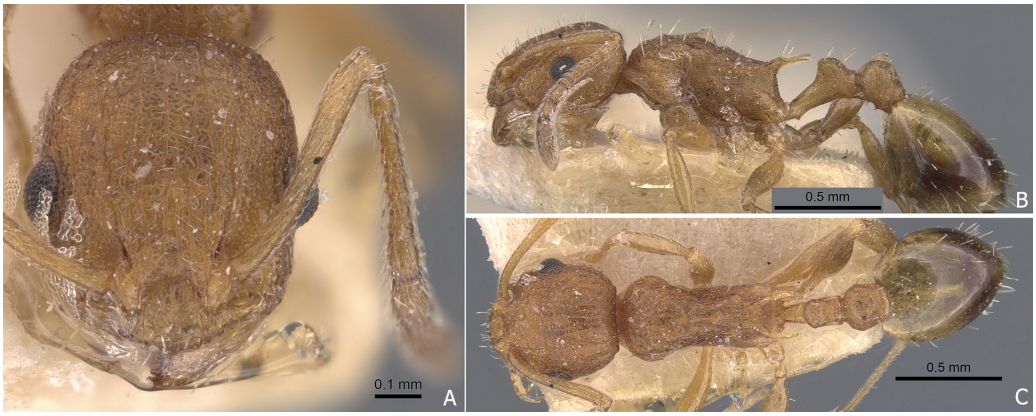

Fig. 55. *Temnothorax confucii* (Forel, 1912), syntype worker (MHNG). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0909164, photos by Will Ericson.

32. Head dorsum mainly reticulate on the central area. In lateral view petiolar node relatively lower with anterior margin obviously shorter than posterior margin 33
– Head dorsum mainly longitudinally rugose on the central area. In lateral view petiolar node relatively higher with anterior margin about as long as posterior margin 34

33. Dorsal outline of mesosoma weakly convex in lateral view. Mesosomal dorsum coarsely reticulate [**Palearctic Region:** China: Jiangsu; Democratic People's Republic of Korea] (Fig. 57) .... ***T. xanthos*** Radchenko, 2004
– Dorsal outline of mesosoma moderately convex in lateral view. Mesosomal dorsum finely reticulate [**Oriental Region**: China: Guizhou, Hunan, Zhejiang] (Fig. 58) ..... ***T. ruginosus*** Zhou *et al.*, 2010

34. Head dorsum coarsely longitudinally rugose on the central area. Mesosomal dorsum densely reticulate. Body color yellowish brown, head blackish brown [**Palearctic Region:** China: Qinghai; Russian Federation (type locality)] (Fig. 59) ..... ***T. volgensis*** (Ruzsky, 1905)

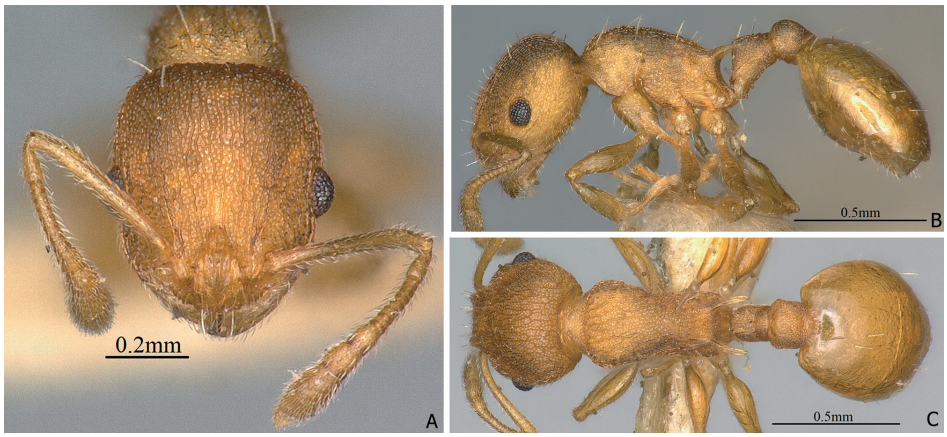

Fig. 56. *Temnothorax zhejiangensis* Zhou *et al*., 2010, holotype worker (GXNU075326). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Photos by Zhi-Lin Chen.

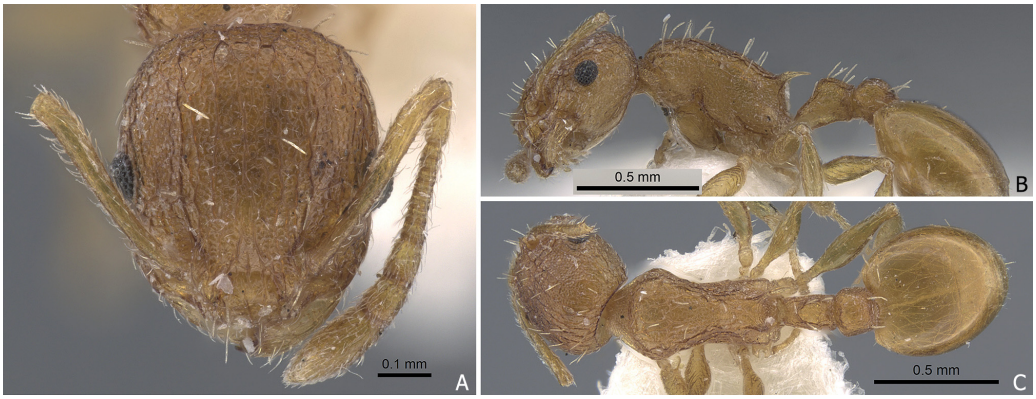

Fig. 57. *Temnothorax xanthos* Radchenko, 2004, holotype worker (MIZW). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0917212, photos by Kate Martynova.

– Head dorsum finely longitudinally rugose on the central area. Mesosomal dorsum loosely reticulate. Body color brownish yellow, head and gaster blackish brown [**Palearctic and Oriental Regions:** China: Beijing, Gansu, Inner Mongolia, Jilin, Ningxia, Qinghai, Shaanxi, Yunnan] (Fig. 60) .... ***T. reticulatus*** (Chang & He, 2001)

35. Dorsum of mesonotum and propodeum weakly to moderately convex in lateral view 36
– Dorsum of mesonotum and propodeum straight in lateral view 38

36. Head dorsum reticulate on the central longitudinal strip [**Oriental Region:** China: Yunnan] (Fig. 21) ..... ***T. hanlu*** sp. nov.
– Head dorsum smooth on the central longitudinal strip 37

37. Dorsum of mesonotum and propodeum moderately convex in lateral view. Propodeal spines stout and straight at base, weakly up-curving at apex [**Palearctic and Oriental Regions:** China: Jiangxi (type locality); Democratic People's Republic of Korea] (Fig. 14) ... ***T. eburneipes*** (Wheeler, 1927)
– Dorsum of mesonotum and propodeum weakly convex in lateral view. Propodeal spines slender and evenly curving posteriorly [**Oriental Region:** China: Yunnan] (Fig. 13) ..... ***T. daxue*** sp. nov.

Fig. **58.** *Temnothorax ruginosus* Zhou *et al*., 2010, holotype worker (GXNU0407357). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Photos by Zhi-Lin Chen.

Fig. 59. *Temnothorax volgensis* (Ruzsky, 1905), neotype worker (SIZK). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0917440, photos by Kate Martynova.

38. Head dorsum smooth on the central longitudinal strip [**Oriental Region:** China: Sichuan, Yunnan] (Fig. 25) ..... ***T. lidong*** sp. nov.
– Head dorsum longitudinally rugose or reticulate on the central longitudinal strip 39

39. Anterior margin of petiolar node almost straight in lateral view 40
– Anterior margin of petiolar node obviously concave in lateral view 41

40. Head dorsum mainly longitudinally rugose. Body color brownish black [**Oriental Region:** China: Taiwan (type locality)] (Fig. 26) ..... ***T. yanwan*** Terayama, 2009
– Head dorsum coarsely reticulate. Body color yellow [**Oriental Region:** China: Hong Kong (type locality)] (Fig. 61) ..... ***T. barrettoi*** Hamer & Guénard, 2023

41. Head dorsum loosely reticulate, interface relatively smooth. Propodeal spines straight in lateral view [**Palearctic and Oriental Regions**: China: Fujian, Gansu, Hubei, Sichuan] (Fig. 62) .... ***T. reduncus*** (Wang & Wu, 1988)
– Head dorsum mainly longitudinally rugose, interface densely punctate. Propodeal spines weakly down-curved at base in lateral view [**Oriental Region:** China: Taiwan (type locality)] (Fig. 63) ..... ***T. tianpeng*** Terayama, 2009

42. Dorsum of mesonotum and propodeum straight in lateral view 43
– Dorsum of mesonotum and propodeum weakly to moderately convex in lateral view 55

43. Anterior margin of petiolar node almost straight in lateral view 44
– Anterior margin of petiolar node obviously concave in lateral view 48

44. Head dorsum smooth on the central longitudinal strip 45
– Head dorsum longitudinally rugose on the central longitudinal strip 46

45. Head dorsum wholly smooth. Petiolar node roughly conical with narrowly rounded summit in lateral view [**Palearctic Region:** China: Tibet] (Fig. 30) ..... ***T. qingming*** sp. nov.
– Head dorsum smooth on the central longitudinal strip. Petiolar node roughly triangular with acute summit in lateral view [**Palearctic and Oriental Regions:** China: Beijing, Hebei, Hunan, Sichuan, Yunnan] (Fig. 31) ..... ***T. wui*** (Wheeler, 1929)

46. In lateral view petiolar node roughly trapezoidal, with obvious posterodorsal corner. Body color reddish brown [**Oriental Region:** China: Yunnan] (Fig. 39) ..... ***T. xiaoxue*** sp. nov.

Fig. 60. *Temnothorax reticulatus* (Chang & He, 2001), holotype worker (NXU 98-610). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

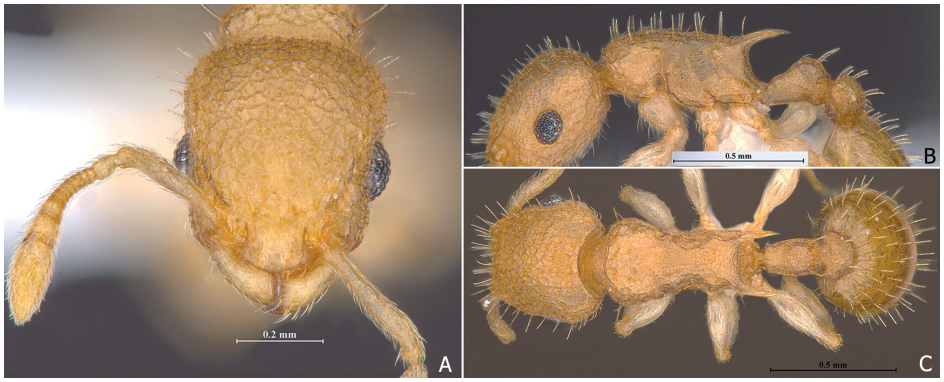

Fig. 61. *Temnothorax barrettoi* Hamer & Guénard, 2023, holotype worker (ZRC). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from Hamer *et al.* (2023), photos by Matthew T. Hamer *et al.*

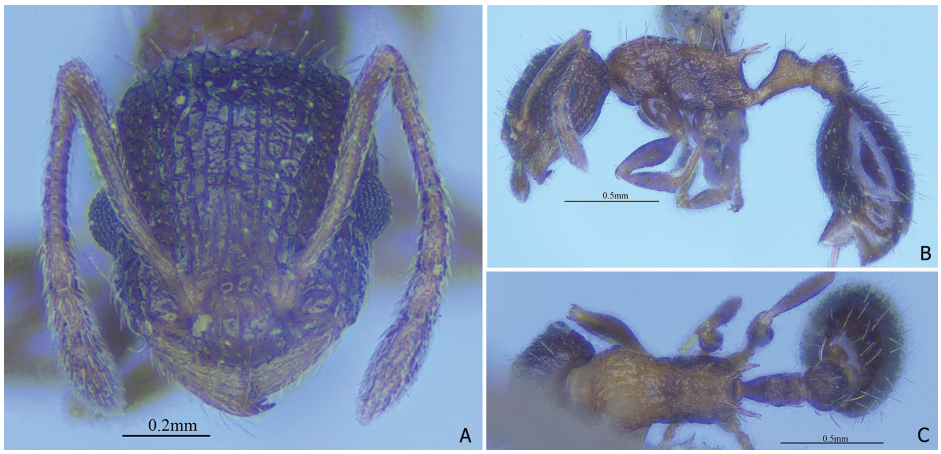

Fig. 62. *Temnothorax reduncus* (Wang & Wu, 1988), holotype worker (CAF). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Fig. 63. *Temnothorax tianpeng* Terayama, 2009, holotype worker (NIAS). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antwiki.org, photos by Hiraku Yoshitake & Takashi Kurihara.

– In lateral view petiolar node roughly triangular, without obvious posterodorsal corner. Body color yellowish brown 47

47. In full-face view head dorsum mainly longitudinally rugose, the rugae almost reaching to posterior head margin. Sides of pronotum coarsely reticulate [**Palearctic and Oriental Regions:** China: Henan, Hubei, Ningxia, Sichuan, Yunnan] (Fig. 40) ..... ***T. striatus*** Zhou *et al.*, 2010
– In full-face view head dorsum longitudinally rugose in the anterior half and reticulate in the posterior half. Sides of pronotum longitudinally rugose [**Palearctic Region:** China: Shaanxi] (Fig. 64) .... ***T. shannxiensis*** Zhou *et al.*, 2010

48. In lateral view petiolar node roughly trapezoidal, with obvious posterodorsal corner 49
– In lateral view petiolar node roughly triangular, without obvious posterodorsal corner 51

49. In lateral view petiolar node asymmetrical, anterodorsal corner higher than posterodorsal corner [**Oriental Region** China: Sichuan] (Fig. 28) ..... ***T. lixia*** sp. nov.
– In lateral view petiolar node symmetrical, anterodorsal corner as high as posterodorsal corner ... 50

50. Head dorsum loosely longitudinally rugose on the central area. Mesonotal dorsum smooth. Body color almost black [**Oriental Region:** China: Yunnan] (Fig. 5) ..... ***T. chun*** sp. nov.
– Head dorsum densely longitudinally rugose on the central area. Mesonotal dorsum coarsely reticulate. Body color reddish brown, gaster black [**Palearctic and Oriental Regions:** China: Tibet, Yunnan] (Fig. 35) ..... ***T. xia*** sp. nov.

51. Anterior peduncle about as long as petiolar node in lateral view 52
– Anterior peduncle obviously shorter than petiolar node in lateral view 53

52. Head dorsum coarsely reticulate on the central area. Propodeal spines slender and much longer than their basal width in lateral view. Body color reddish brown, head and gaster black [**Palearctic and Oriental Regions:** China: Beijing, Fujian, Guangxi, Hebei, Henan, Jiangxi, Liaoning, Ningxia, Shaanxi, Sichuan, Yunnan] (Fig. 42) ..... ***T. argentipes*** (Wheeler, 1928)
– Head dorsum densely longitudinally rugose on the central area. Propodeal spines roughly triangular and slightly longer than their basal width in lateral view. Body color brownish black, gaster black [**Oriental Region:** China: Yunnan] (Fig. 41) ..... ***T. xiazhi*** sp. nov.

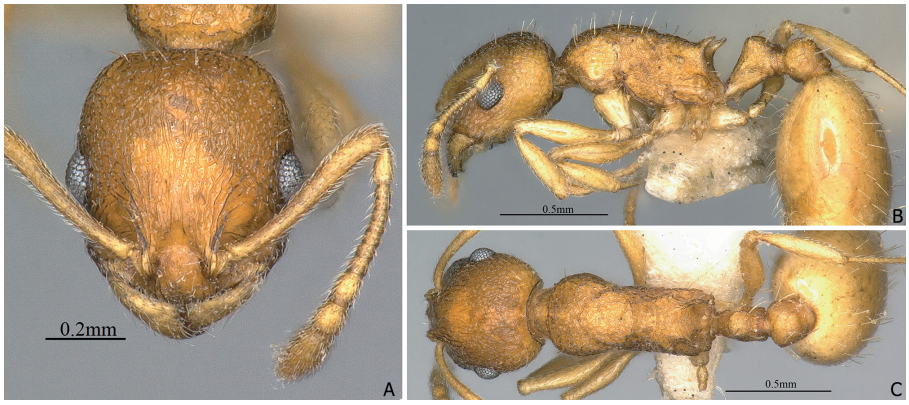

Fig. 64. *Temnothorax shannxiensis* Zhou *et al.*, 2010, holotype worker (GXNU056481). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Photos by Zhi-Lin Chen.

53. Propodeal spines thin and smaller, not forming a curve with declivity in lateral view. Anterodorsal corner of petiolar node bluntly angled. Pronotal dorsum coarsely reticulate [**Palearctic Region:** China: Shaanxi] (Fig. 37) ..... ***T. xiaoman*** sp. nov.
– Propodeal spines thick and larger, forming a curve with declivity in lateral view. Anterodorsal corner of petiolar node narrowly rounded. Pronotal dorsum finely reticulate 54

54. Sides of mesosoma coarsely reticulate. Body color reddish brown, head and gaster brownish black **[Palearctic Region:** China: Tibet] (Fig. 36) ..... ***T. xiaohan*** sp. nov.
– Sides of mesosoma finely reticulate. Body color brownish black, head and gaster black [**Palearctic and Oriental Regions:** China: Sichuan, Qinghai] (Fig. 33) ..... ***T. qiufen*** sp. nov.

55. Head dorsum smooth on the central longitudinal strip [**Palearctic Region:** China: Tibet; Kyrgyzstan (type locality)] (Fig. 65) ..... ***T. susamyri*** (Dlussky, 1965)
– Head dorsum longitudinally rugose or reticulate on the central longitudinal strip 56

56. Anterior margin of petiolar node obviously concave in lateral view 57
– Anterior margin of petiolar node almost straight in lateral view 60

57. Anterodorsal corner of petiolar node rightly angled in lateral view 58
– Anterodorsal corner of petiolar node narrowly rounded in lateral view 59

58. Head dorsum longitudinally rugose on the central area. Body color brownish black [**Oriental Region:** China: Taiwan (type locality)] (Fig. 16) ..... ***T. huatuo*** Terayama, 2009
– Head dorsum densely reticulate on the central area. Body color black [**Oriental Region:** China: Yunnan] (Fig. 15) ..... ***T. dong*** sp. nov.

59. Head dorsum parallelly longitudinally rugose on the central area. Mesosoma densely reticulate [**Oriental Region:** China: Sichuan, Yunnan] (Fig. 32) ..... ***T. qiu*** sp. nov.
– Head dorsum irregualarly longitudinally rugose on the central area. Mesosoma coarsely reticulate [**Oriental Region:** China: Yunnan] (Fig. 34) ..... ***T. shuangjiang*** sp. nov.

60. Petiole without anterior peduncle in lateral view 61
– Petiole with anterior peduncle in lateral view 62

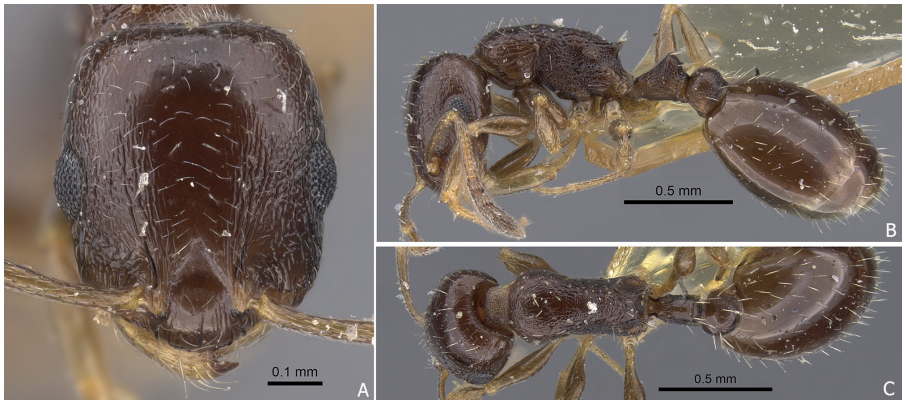

Fig. 65. *Temnothorax susamyri* (Dlussky, 1965), paratype worker (ZMUM). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. Images cited from www.antweb.org, CASENT 0917448, photos by Kate Martynova.

61. Head dorsum longitudinally rugose on the central area. Propodeal spines thin in lateral view. Body color yellow, head and gaster blackish brown [**Palearctic Region:** China: Hebei, Inner Mongolia; Democratic People's Republic of Korea, Mongolia (type locality), Russian Federation] (Fig. 1) ..... ***T. mongolicus*** (Pisarski, 1969)
– Head dorsum finely reticulate on the central area. Propodeal spines thick in lateral view. Body color reddish brown, head and gaster brownish black [**Palearctic Region:** China: Ningxia, Qinghai] (Fig. 66) ..... ***T. brevispinus*** (Chang & He, 2001)

62. In lateral view petiolar node roughly trapezoidal, with obvious dorsal margin 63
– In lateral view petiolar node roughly triangular or conical, without obvious dorsal margin 64

63. Head dorsum densely reticulate on the central area. Propodeal spines relatively longer and posterodorsally pointed in lateral view. Body color brownish yellow, head and gaster black [**Oriental Region**: China: Guangxi (type locality)] (Fig. 18) ..... ***T. leyeensis*** Zhou *et al.*, 2010
– Head dorsum loosely longitudinally rugose on the central area. Propodeal spines relatively shorter and suberect in lateral view. Body color blackish brown, head and gaster black [**Oriental Region:** China: Sichuan] (Fig. 17) ..... ***T. dongzhi*** sp. nov.

Fig. 66. *Temnothorax brevispinus* (Chang & He, 2001), holotype worker (NXU 99-253). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view.

Fig. 67. *Temnothorax pisarskii* Radchenko, 2004, paratype worker (MIZW). **A**. Head in full-face view. **B**. Body in lateral view. **C**. Body in dorsal view. . Images cited from www.antweb.org, CASENT 0917459, photos by Kate Martynova.

64. Petiolar node roughly triangular in lateral view, anterodorsal corner rightly angled. Head dorsum reticulate on the central area. Body color brownish yellow, gaster blackish brown [**Palearctic Region:** China: Hebei, Heilongjiang, Liaoning, Shaanxi; Democratic People's Republic of Korea] (Fig. 67) ..... ***T. pisarskii*** Radchenko, 2004
– Petiolar node roughly conical in lateral view, dorsal corner narrowly rounded. Head dorsum longitudinally rugose on the central area. Body color blackish brown or black 65

65. Head dorsum coarsely longitudinally rugose. Mesosomal dorsum moderately convex in lateral view. Propodeal spines relatively longer, about twice as long as their basal width. Body color blackish brown [**Palearctic and Oriental Regions:** China: Anhui, Beijing, Guangdong, Guangxi, Hebei, Henan, Hubei, Hunan, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang; Japan (type locality), Republic of Korea] (Fig. 11) ..... ***T. spinosior*** (Forel, 1901)
– Head dorsum finely longitudinally rugose. Mesosomal dorsum weakly convex in lateral view. Propodeal spines relatively shorter, slightly longer than their basal width. Body color black [**Oriental Region:** China: Yunnan] (Fig. 10) .....***T. dahan*** sp. nov.

Discussion

This study is based on a large number of specimens mainly from southwestern, northwestern and northeastern China, which were collected over more than 34 years since 1990. For the rest specimens from southern, southeastern, eastern and northern China, Forel (1912), Wheeler (1927, 1928, 1929), Wang *et al.* (1988), Huang *et al.* (2004), Radchenko (2004), Terayama (2009), Zhou *et al.* (2010) and Hamer *et al.* (2023) have carried out related researches. The present work substantially improves our understanding of Chinese species of *Leptothorax* and *Temnothorax*, with 28 species newly described for the country in addition to the one new synonymy and three newly recorded species for China. The increase from 31 to 62 documented species of *Temnothorax* represents a startling increase in faunal richness. China has a very complex topography, including the Qinghai-Tibetan Plateau with lower ant species richness and, central and southern China with greater species richness. In this study which concentrated on the Qinghai-Tibetan Plateau and southwestern China, we found a remarkable diversity of *Temnothorax* in Yunnan, where a total of 32 known species (including 22 new species) are recorded. The topographic variation, multiple climatic zones and tropical rainforests in Yunnan may create a diversity of microhabitats for supporting a diverse set of species of *Temnothorax*. Further investigation should focus on the central and eastern regions of China.

Furthermore, the taxonomy of *Leptothorax* and *Temnothorax* still suffers from the absence of clearly define morphological characters and species group boundaries are an issue for China and Asia, so future studies integrating morphological descriptions with molecular data will prove especially important for understanding diversification patterns within Chinese *Leptothorax* and *Temnothorax*.

Acknowledgments

This study was supported by National Natural Science Foundation of China (Nos. 31860615, 31750002, 31260521, 30870333, 30260016, 39500118), Applying and Basic Research Foundation of Yunnan Province (Nos. 2004C0041M, 2001C0042M, 97C006G, 95C067Q) and Yunnan Provincial High-level Talent Training Support Program "Youth Top-notch Talent" Special Project (YNWR-QNBJ-2020-176). We thank the following persons and institutions for their special help in this study: Professor Cong Wei (Northwest A&F University, Xi'an), Mr Xue-Yun Ma, Mr Long-Guan Chen, Mr Wen-Chuan Xu, Mr Zong-Hui He, Miss Juan He, Miss Hui-Qin Zhu, Mr Zhao Huang, Mr Yu-Cheng He, Mr Shun-Rong Pu, Mr Xiao Guo, Mr Xin-Min Zhang, Mr Chao Chen, Miss Zheng-Qun Chai, Mr You Chen, Miss Xia Liu, Mr Sheng-Li Shi, Mr Hai-Bin Li, Mr Hua Jiang, Mr Chun-Liang Li, Miss Cheng-Lin

Fig. **68.** Higher elevational vegetations. **A**. Alpine shrubland (3815 m, Yushu, Qinghai). **B**. *Pinus wallichiana* A.B.Jacks. forest (3550 m, Bomi, Tibet). **C**. *Betula albosinensis* Burkill forest (3480 m, Ganzi, Sichuan). **D**. *Quercus semecarpifolia* Sm. forest (3250 m, Bomi, Tibet). **E**. Alpine conifer forest (3250 m, Yanyuan, Sichuan). **F**. Alpine *Rhododendron* L. forest (3250 m, Luquan, Yunnan). Photos by Zheng-Hui Xu.

Fig. 69. Middle elevational vegetations. **A**. *Pinus densata* Masters forest (2750 m, Bomi, Tibet). **B**. *Pinus armandi* Franch. forest (2557 m, Qiaojia, Yunnan). **C**. Subalpine moist evergreen broadleaf forest (2500 m, Lushui, Yunnan). **D**. Conifer-broadleaf mixed forest (2500 m, Huaping, Yunnan). **E**. Moss evergreen broadleaf forest (2450 m. Cangyuan, Yunnan). **F**. Warm conifer forest (2230 m, Huili, Sichuan). **G**. Dry-warm valley shrubland (2230 m, Muli, Sichuan). **H**. Semi-evergreen broadleaf forest (2050 m, Danba, Sichuan). **I**. *Pinus yunnanensis* forest (2030 m, Huaping, Yunnan). Photos by Zheng-Hui Xu.

Fig. 70. Lower elevational vegetations. **A**. Semi-moist evergreen broadleaf forest (2000 m, Tengchong, Yunnan). **B**. Dry deciduous broadleaf forest (1840 m, Luquan, Yunnan). **C**. *Keteleeria evelyniana* Mast. forest (1820 m, Anning, Yunnan). **D**. Monsoon evergreen broadleaf forest (1500 m, Gengma, Yunnan). **E**. *Quercus variabilis* Blume forest (1350 m, Guangnan, Yunnan). **F**. Dry evergreen broadleaf forest (518 m, Yuanyang, Yunnan). Photos by Zheng-Hui Xu.

Zhang, Mr Wen-Tao Yang, Mr Lei Fu, Mr Jun-Wu Yang, Mr Xin Chen, Miss Yun Shi, Mr. Liang Wang, Miss Ji-Ling Zhang, Mr Cheng-Long Luo, Mr Jun-Wu Yang, Mr Zhong-Ping Xiong, Miss Hong Du (all students or postgraduates of Southwest Forestry University, Kunming) collected the type specimens. Professor Shan-Yi Zhou (Guangxi Normal University, Guilin) donated the paratypes of *Temnothorax angulohumerus*, *T. orchidus*, *T. striatus*, *T. shannxiensis*, *T. maoerensis*, *T. ruginosus*, *T. zhejiangensis* and *L. zhengi* to us. Dr Zhi-Lin Chen (Guangxi Normal University, Guilin) provided images of *T. angulohumerus*, *T. orchidus*, *T. striatus*, *T. shannxiensis*, *L. zhengi*, *T. leyeensis*, *T. maoerensis*, *T. ruginosus* and *T. zhejiangensis*. Dr Ming Xin (Ningxia University, Yinchuan) provided the holotype of *T. opaciabdomin*, *T. brevispinus* and *T. reticulatus* for us to observe and take images. Professor Hong-Bin Wang and Dr Mei Wang (Organism Specimen Collection, Institute of Forest Ecological Environment and Nature Conservation, Chinese Academy of Forestry, Beijing) provided the holotype and paratypes of *T. reduncus* for us to observe and take images. Professor Bernhard Seifert (Senckenberg Museum of Natural History Görlitz, Germany) provided holotype images of *Leptothorax tibeticum* and his paper for this study. Mr Matthew T. Hamer (The University of Hong Kong, Hong Kong SAR, China) provided holotype images of *Temnothorax barrettoi* and *T. haveni* and their paper for our reference. Mr Jin-Hong Xiang, Mr Chong-Xin Xie, Mr Jun Wen, Miss Dan Shen, Miss Cui Li, Miss Gen-Ying Zhao, Mr Jun Cai, Miss Lin Sun, Miss Jia-Hui Shao, Miss Jiao Guo, Miss Lin-Mei Pu and Miss Ji-Ling Huang (all students or postgraduates of Southwest Forestry University, Kunming) assisted to process images and references of the new species and known species. California Academy of Sciences (San Francisco) permitted us to use images form the AntWeb. Dr Benjamin D. Blanchard (Postdoctoral Researcher of myrmecology, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Menglun, Yunnan) provided English editing assistance on a late version of this manuscript. The section editor Enrico Schifani and three anonymous referees carefully reviewed the manuscript and provided very valuable and detailed suggestions and comments on the manuscript, we thank a lot for their time and energy to read and review the long manuscript repeatedly.

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Manuscript received: 27 February 2023
Manuscript accepted: 30 November 2023
Published on: 13 June 2024
Topic editor: Toby Robillard
Section editor: Enrico Schifani
Desk editor: Pepe Fernández

Appendix (continued on next four pages). The raw measurements and indices of type specimens of new species of *Temnothorax* Mayr, 1861. H = holotype; P = paratype.

Species and types	TL	HL	HW	CI	SL	SI	ED	PW	WL	PL	PH	DPW
T. bailu H	3.6	0.75	0.66	88	0.64	97	0.14	0.49	1.00	0.42	0.25	0.20
T. bailu P	3.6	0.75	0.63	83	0.50	80	0.15	0.50	0.95	0.40	0.25	0.18
T. bailu P	2.6	0.75	0.55	73	0.50	91	0.13	0.40	0.80	0.30	0.20	0.13
T. bailu P	2.7	0.70	0.58	83	0.49	84	0.13	0.45	0.95	0.34	0.25	0.15
T. bailu P	3.5	0.72	0.60	83	0.50	83	0.15	0.49	1.00	0.40	0.25	0.15
T. bailu P	3.3	0.71	0.59	83	0.50	85	0.14	0.50	1.00	0.40	0.25	0.18
T. bailu P	3.0	0.70	0.55	79	0.50	91	0.13	0.49	0.95	0.40	0.25	0.16
T. bailu P	2.9	0.70	0.56	80	0.50	89	0.13	0.45	0.90	0.40	0.25	0.16
T. bailu P	2.8	0.71	0.55	77	0.50	91	0.13	0.43	0.90	0.40	0.23	0.15
T. bailu P	3.5	0.73	0.60	82	0.50	83	0.14	0.50	1.00	0.40	0.25	0.18
T. bailu P	3.6	0.75	0.62	83	0.50	81	0.14	0.49	1.00	0.40	0.25	0.18
T. bailu P	3.2	0.70	0.55	79	0.50	91	0.15	0.50	0.90	0.40	0.25	0.18
T. bailu P	2.9	0.75	0.55	73	0.49	89	0.15	0.50	0.90	0.40	0.25	0.18
Mean of P	**3.1**	**0.72**	**0.58**	**80**	**0.50**	**87**	**0.14**	**0.47**	**0.94**	**0.39**	**0.24**	**0.16**
T. chun H	3.1	0.74	0.62	84	0.60	97	0.16	0.43	0.91	0.33	0.21	0.16
T. chunfen H	2.4	0.58	0.48	82	0.46	96	0.13	0.33	0.74	0.25	0.20	0.15
T. chushu H	2.9	0.67	0.55	82	0.63	115	0.15	0.41	0.83	0.32	0.18	0.16
T. chushu P	2.6	0.75	0.60	80	0.60	100	0.12	0.35	0.60	0.29	0.15	0.15
T. chushu P	2.9	0.60	0.48	80	0.50	104	0.13	0.30	0.70	0.30	0.15	0.10
T. chushu P	2.5	0.55	0.45	82	0.50	111	0.13	0.30	0.56	0.29	0.15	0.10
T. chushu P	2.4	0.55	0.45	82	0.50	111	0.13	0.30	0.55	0.29	0.15	0.10
T. chushu P	2.6	0.60	0.49	81	0.53	109	0.13	0.30	0.60	0.29	0.15	0.10
T. chushu P	2.7	0.70	0.57	82	0.60	105	0.13	0.35	0.70	0.30	0.20	0.10
T. chushu P	3.1	0.75	0.60	80	0.60	100	0.12	0.35	0.83	0.30	0.20	0.15
T. chushu P	3.0	0.70	0.57	81	0.60	106	0.13	0.35	0.80	0.30	0.20	0.15
T. chushu P	2.6	0.61	0.50	82	0.54	108	0.13	0.30	0.66	0.29	0.15	0.10
T. chushu P	2.5	0.56	0.46	82	0.50	109	0.13	0.33	0.56	0.29	0.15	0.10
T. chushu P	2.5	0.60	0.49	81	0.53	109	0.13	0.30	0.60	0.29	0.15	0.10
T. chushu P	2.7	0.71	0.58	81	0.60	104	0.13	0.33	0.72	0.30	0.20	0.10
T. chushu P	2.9	0.66	0.54	82	0.60	111	0.15	0.40	0.82	0.31	0.18	0.15
T. chushu P	2.7	0.70	0.57	81	0.57	100	0.13	0.30	0.66	0.29	0.15	0.10
Mean of P	**2.7**	**0.65**	**0.52**	**81**	**0.56**	**106**	**0.13**	**0.33**	**0.67**	**0.30**	**0.17**	**0.11**
T. dahan H	2.8	0.62	0.53	85	0.53	100	0.14	0.38	0.78	0.29	0.20	0.16
T. dahan P	2.5	0.60	0.45	75	0.55	122	0.10	0.35	0.70	0.25	0.15	0.13
T. dahan P	2.6	0.60	0.46	77	0.55	120	0.13	0.38	0.70	0.26	0.16	0.13
T. dahan P	2.6	0.60	0.45	75	0.55	122	0.13	0.35	0.70	0.25	0.15	0.13
T. dahan P	2.5	0.61	0.46	75	0.54	117	0.10	0.36	0.70	0.25	0.15	0.13

Appendix (continued). The raw measurements and indices of type specimens of new species of *Temnothorax* Mayr, 1861. H = holotype; P = paratype.

Species and types	TL	HL	HW	CI	SL	SI	ED	PW	WL	PL	PH	DPW
T. dahan P	2.7	0.63	0.51	81	0.56	110	0.12	0.37	0.72	0.26	0.15	0.13
T. dahan P	2.6	0.60	0.50	83	0.57	114	0.13	0.40	0.74	0.30	0.20	0.15
T. dahan P	2.7	0.65	0.53	82	0.60	113	0.13	0.40	0.73	0.30	0.20	0.14
T. dahan P	2.5	0.60	0.47	78	0.51	109	0.12	0.36	0.71	0.26	0.20	0.14
T. dahan P	2.7	0.65	0.55	85	0.60	109	0.11	0.35	0.73	0.27	0.20	0.14
T. dahan P	2.7	0.63	0.51	81	0.56	110	0.12	0.37	0.72	0.26	0.15	0.13
T. dahan P	2.6	0.60	0.47	78	0.56	119	0.13	0.36	0.74	0.30	0.20	0.15
T. dahan P	2.7	0.65	0.53	82	0.60	113	0.13	0.40	0.73	0.30	0.20	0.15
T. dahan P	2.7	0.65	0.55	85	0.60	109	0.15	0.40	0.75	0.30	0.20	0.15
T. dahan P	2.5	0.60	0.45	75	0.55	122	0.10	0.35	0.70	0.25	0.15	0.13
T. dahan P	2.6	0.60	0.46	77	0.55	120	0.13	0.38	0.70	0.26	0.16	0.13
Mean of P	**2.6**	**0.62**	**0.49**	**79**	**0.56**	**115**	**0.12**	**0.37**	**0.72**	**0.27**	**0.17**	**0.14**
T. dashu H	2.8	0.68	0.57	84	0.62	109	0.15	0.39	0.84	0.28	0.21	0.16
T. dashu P	2.9	0.65	0.60	92	0.55	92	0.15	0.30	0.75	0.30	0.18	0.11
T. dashu P	2.6	0.60	0.53	88	0.52	98	0.13	0.30	0.62	0.25	0.18	0.11
T. dashu P	2.7	0.63	0.55	87	0.55	100	0.15	0.30	0.65	0.25	0.18	0.10
T. dashu P	2.4	0.55	0.45	82	0.50	111	0.13	0.30	0.60	0.20	0.15	0.10
T. dashu P	2.8	0.65	0.57	88	0.55	96	0.15	0.31	0.74	0.27	0.18	0.10
T. dashu P	2.8	0.65	0.58	89	0.55	95	0.14	0.31	0.67	0.22	0.16	0.11
T. dashu P	2.5	0.56	0.47	84	0.50	106	0.13	0.30	0.61	0.23	0.15	0.10
T. dashu P	2.7	0.65	0.55	85	0.53	96	0.15	0.30	0.63	0.25	0.17	0.11
T. dashu P	2.5	0.60	0.50	83	0.50	100	0.13	0.30	0.60	0.20	0.15	0.10
Mean of P	**2.6**	**0.62**	**0.53**	**87**	**0.53**	**99**	**0.14**	**0.30**	**0.65**	**0.24**	**0.17**	**0.10**
T. daxue H	3.5	0.83	0.69	84	0.65	94	0.16	0.47	1.03	0.37	0.28	0.18
T. dong H	2.8	0.68	0.57	84	0.60	105	0.13	0.41	0.78	0.30	0.21	0.16
T. dong P	2.4	0.65	0.50	77	0.50	100	0.10	0.35	0.60	0.25	0.18	0.15
T. dongzhi H	4.0	0.88	0.80	91	0.63	79	0.17	0.57	1.18	0.47	0.30	0.21
T. dongzhi P	3.3	0.75	0.68	92	0.60	88	0.16	0.46	0.94	0.33	0.25	0.18
T. guyu H	2.5	0.56	0.48	85	0.50	104	0.12	0.36	0.71	0.26	0.21	0.16
T. guyu P	2.7	0.65	0.55	85	0.55	100	0.15	0.40	0.60	0.25	0.23	0.13
T. guyu P	2.5	0.60	0.50	83	0.50	100	0.15	0.40	0.60	0.25	0.20	0.13
T. guyu P	2.5	0.60	0.50	83	0.50	100	0.15	0.30	0.60	0.20	0.18	0.10
T. guyu P	2.5	0.60	0.50	83	0.50	100	0.15	0.35	0.60	0.20	0.20	0.13
T. guyu P	2.5	0.55	0.40	73	0.45	113	0.10	0.30	0.60	0.20	0.15	0.10
T. guyu P	2.4	0.55	0.40	73	0.45	113	0.10	0.30	0.60	0.20	0.15	0.10
T. guyu P	2.6	0.60	0.45	75	0.50	111	0.10	0.40	0.65	0.25	0.20	0.13
T. guyu P	2.5	0.60	0.45	75	0.50	111	0.10	0.35	0.60	0.20	0.18	0.10
Mean of P	**2.5**	**0.59**	**0.47**	**79**	**0.49**	**106**	**0.13**	**0.35**	**0.61**	**0.22**	**0.19**	**0.11**

Appendix (continued). The raw measurements and indices of type specimens of new species of *Temnothorax* Mayr, 1861. H = holotype; P = paratype.

Species and types	TL	HL	HW	CI	SL	SI	ED	PW	WL	PL	PH	DPW
T. hanlu H	2.4	0.59	0.47	79	0.52	111	0.12	0.37	0.74	0.28	0.21	0.16
T. hanlu P	2.3	0.55	0.45	82	0.50	111	0.11	0.30	0.60	0.25	0.20	0.10
T. jingzhe H	3.1	0.72	0.63	87	0.60	95	0.15	0.42	0.85	0.32	0.20	0.15
T. lichun H	3.5	0.78	0.70	91	0.62	88	0.17	0.46	0.96	0.37	0.22	0.20
T. lidong H	2.3	0.57	0.45	79	0.50	111	0.13	0.33	0.66	0.26	0.17	0.13
T. lidong P	2.5	0.60	0.48	79	0.50	105	0.15	0.35	0.65	0.25	0.20	0.11
T. lidong P	2.3	0.55	0.45	82	0.40	89	0.10	0.30	0.60	0.20	0.15	0.10
Mean of P	**2.4**	**0.58**	**0.46**	**80**	**0.45**	**97**	**0.13**	**0.33**	**0.63**	**0.23**	**0.18**	**0.11**
T. liqiu H	3.0	0.66	0.55	83	0.62	113	0.15	0.41	0.83	0.29	0.20	0.16
T. liqiu P	3.2	0.70	0.60	86	0.55	92	0.10	0.35	0.80	0.25	0.15	0.13
T. liqiu P	2.7	0.65	0.55	85	0.53	96	0.10	0.35	0.68	0.25	0.16	0.12
T. liqiu P	3.1	0.65	0.55	85	0.55	100	0.12	0.35	0.70	0.25	0.18	0.12
T. liqiu P	3.0	0.65	0.53	82	0.54	102	0.11	0.35	0.70	0.25	0.18	0.12
T. liqiu P	2.9	0.65	0.52	80	0.53	102	0.10	0.35	0.65	0.25	0.18	0.12
T. liqiu P	2.6	0.65	0.50	77	0.54	108	0.10	0.35	0.60	0.25	0.16	0.12
T. liqiu P	2.5	0.60	0.45	75	0.50	111	0.10	0.33	0.60	0.24	0.15	0.10
T. liqiu P	2.8	0.64	0.55	86	0.53	96	0.10	0.33	0.65	0.25	0.16	0.12
T. liqiu P	2.7	0.63	0.50	79	0.55	110	0.10	0.35	0.60	0.25	0.16	0.12
T. liqiu P	2.9	0.65	0.50	77	0.55	110	0.10	0.35	0.65	0.25	0.16	0.12
T. liqiu P	2.3	0.60	0.45	75	0.50	111	0.10	0.33	0.60	0.24	0.18	0.10
T. liqiu P	2.3	0.60	0.45	75	0.50	111	0.10	0.33	0.60	0.24	0.15	0.10
T. liqiu P	2.9	0.65	0.55	85	0.51	93	0.10	0.33	0.65	0.25	0.18	0.12
Mean of P	**2.7**	**0.64**	**0.52**	**80**	**0.53**	**103**	**0.10**	**0.34**	**0.65**	**0.25**	**0.17**	**0.12**
T. lixia H	2.4	0.62	0.52	84	0.52	100	0.12	0.38	0.76	0.25	0.20	0.15
T. lixia P	2.4	0.60	0.50	84	0.50	100	0.09	0.36	0.73	0.25	0.19	0.12
T. lixia P	2.3	0.60	0.50	83	0.50	100	0.08	0.35	0.70	0.25	0.18	0.10
T. lixia P	2.5	0.63	0.55	88	0.48	86	0.10	0.35	0.75	0.30	0.20	0.13
Mean of P	**2.4**	**0.61**	**0.52**	**85**	**0.49**	**96**	**0.09**	**0.35**	**0.73**	**0.27**	**0.19**	**0.12**
T. mangzhong H	3.7	0.79	0.64	82	0.72	113	0.16	0.49	1.15	0.42	0.25	0.21
T. qingming H	2.1	0.52	0.40	76	0.44	110	0.10	0.30	0.59	0.22	0.16	0.12
T. qiu H	2.4	0.56	0.44	78	0.51	116	0.12	0.33	0.63	0.25	0.20	0.13
T. qiu P	2.3	0.58	0.48	82	0.50	104	0.12	0.36	0.66	0.22	0.21	0.13
T. qiu P	2.5	0.57	0.47	82	0.47	100	0.12	0.35	0.63	0.22	0.20	0.13
T. qiu P	2.4	0.62	0.53	86	0.54	101	0.13	0.41	0.72	0.23	0.21	0.14
T. qiu P	2.5	0.57	0.47	83	0.47	100	0.12	0.36	0.66	0.23	0.20	0.14
T. qiu P	2.5	0.61	0.50	82	0.50	100	0.13	0.35	0.70	0.22	0.20	0.15
T. qiu P	2.4	0.59	0.50	85	0.50	101	0.13	0.41	0.74	0.24	0.22	0.16

Appendix (continued). The raw measurements and indices of type specimens of new species of *Temnothorax* Mayr, 1861. H = holotype; P = paratype.

Species and types	TL	HL	HW	CI	SL	SI	ED	PW	WL	PL	PH	DPW
T. qiu P	2.5	0.61	0.50	82	0.50	100	0.12	0.36	0.66	0.23	0.21	0.14
T. qiu P	2.4	0.60	0.50	83	0.50	100	0.12	0.35	0.63	0.22	0.20	0.13
T. qiu P	2.5	0.61	0.50	82	0.50	100	0.13	0.41	0.72	0.23	0.21	0.14
T. qiu P	2.5	0.62	0.50	81	0.50	100	0.12	0.34	0.71	0.23	0.21	0.14
T. qiu P	2.5	0.63	0.52	83	0.53	101	0.13	0.35	0.65	0.23	0.20	0.14
T. qiu P	2.4	0.62	0.54	87	0.55	102	0.13	0.41	0.74	0.24	0.22	0.16
T. qiu P	2.4	0.55	0.48	87	0.48	100	0.11	0.36	0.67	0.24	0.20	0.13
Mean of P	**2.4**	**0.60**	**0.50**	**83**	**0.50**	**101**	**0.12**	**0.37**	**0.68**	**0.23**	**0.21**	**0.14**
T. qiufen H	2.7	0.63	0.51	81	0.60	118	0.13	0.36	0.80	0.29	0.22	0.16
T. qiufen P	2.6	0.63	0.50	80	0.50	100	0.13	0.35	0.65	0.25	0.20	0.13
T. shuangjiang H	3.5	0.80	0.72	91	0.59	82	0.18	0.49	1.05	0.38	0.28	0.20
T. xia H	2.9	0.66	0.55	83	0.58	106	0.12	0.41	0.79	0.37	0.19	0.17
T. xia P	2.7	0.70	0.55	79	0.51	93	0.15	0.33	0.70	0.25	0.18	0.15
T. xia P	2.6	0.66	0.53	80	0.50	94	0.15	0.33	0.70	0.25	0.20	0.15
T. xia P	2.8	0.70	0.55	79	0.50	91	0.15	0.35	0.70	0.26	0.20	0.15
T. xia P	2.7	0.63	0.50	80	0.50	100	0.13	0.35	0.65	0.25	0.20	0.15
T. xia P	2.4	0.63	0.50	80	0.50	100	0.10	0.33	0.65	0.25	0.15	0.10
Mean of P	**2.6**	**0.66**	**0.53**	**79**	**0.50**	**96**	**0.14**	**0.34**	**0.68**	**0.25**	**0.19**	**0.14**
T. xiaohan H	3.0	0.68	0.58	85	0.66	114	0.15	0.38	0.86	0.33	0.20	0.15
T. xiaohan P	3.3	0.65	0.56	86	0.57	101	0.15	0.35	0.87	0.30	0.20	0.14
T. xiaohan P	2.9	0.60	0.50	83	0.55	110	0.15	0.30	0.76	0.25	0.15	0.10
T. xiaohan P	2.6	0.60	0.50	83	0.55	110	0.10	0.30	0.70	0.25	0.15	0.10
T. xiaohan P	2.6	0.65	0.55	85	0.55	100	0.11	0.30	0.75	0.25	0.15	0.10
T. xiaohan P	2.7	0.65	0.56	86	0.62	111	0.11	0.33	0.65	0.28	0.18	0.13
T. xiaohan P	2.6	0.61	0.50	82	0.55	110	0.10	0.30	0.70	0.25	0.15	0.10
T. xiaohan P	2.6	0.62	0.55	89	0.55	100	0.11	0.30	0.75	0.25	0.15	0.10
T. xiaohan P	2.6	0.55	0.45	82	0.50	111	0.10	0.30	0.65	0.25	0.15	0.10
T. xiaohan P	3.3	0.64	0.62	97	0.64	103	0.15	0.43	0.93	0.34	0.21	0.14
Mean of P	**2.8**	**0.62**	**0.53**	**86**	**0.56**	**106**	**0.12**	**0.32**	**0.75**	**0.27**	**0.17**	**0.11**
T. xiaoman H	2.9	0.66	0.56	85	0.54	96	0.14	0.42	0.87	0.32	0.24	0.17
T. xiaoshu H	3.3	0.77	0.64	84	0.73	114	0.16	0.46	0.93	0.34	0.22	0.18
T. xiaoshu P	3.3	0.75	0.60	80	0.60	100	0.10	0.40	0.85	0.25	0.20	0.13
T. xiaoxue H	2.5	0.58	0.48	82	0.59	123	0.14	0.37	0.74	0.28	0.25	0.16
T. xiaoxue P	3.0	0.65	0.55	85	0.55	100	0.15	0.40	0.75	0.30	0.20	0.15
T. xiazhi H	2.9	0.69	0.58	84	0.60	104	0.13	0.40	0.83	0.33	0.22	0.15
T. xiazhi P	2.7	0.64	0.46	72	0.50	108	0.10	0.35	0.75	0.25	0.20	0.10
T. xiazhi P	2.7	0.65	0.50	77	0.50	100	0.10	0.35	0.80	0.24	0.15	0.15

Appendix (continued). The raw measurements and indices of type specimens of new species of *Temnothorax* Mayr, 1861. H = holotype; P = paratype.

Species and types	TL	HL	HW	CI	SL	SI	ED	PW	WL	PL	PH	DPW
T. xiazhi P	2.8	0.65	0.50	77	0.50	100	0.11	0.35	0.80	0.25	0.15	0.15
T. xiazhi P	2.8	0.65	0.50	77	0.51	102	0.10	0.35	0.80	0.25	0.15	0.10
T. xiazhi P	2.7	0.63	0.45	71	0.50	111	0.10	0.34	0.75	0.25	0.20	0.15
Mean of P	**2.7**	**0.64**	**0.48**	**75**	**0.50**	**104**	**0.10**	**0.35**	**0.78**	**0.25**	**0.17**	**0.13**
T. yushui H	2.8	0.58	0.50	86	0.50	100	0.13	0.36	0.71	0.29	0.16	0.13
T. yushui P	2.6	0.60	0.50	83	0.53	106	0.12	0.40	0.75	0.23	0.20	0.11
T. yushui P	2.6	0.60	0.50	83	0.50	100	0.12	0.40	0.71	0.25	0.20	0.11
T. yushui P	2.6	0.70	0.55	79	0.53	96	0.12	0.40	0.75	0.29	0.20	0.10
T. yushui P	2.6	0.60	0.48	80	0.50	104	0.11	0.34	0.70	0.23	0.18	0.12
T. yushui P	2.6	0.62	0.50	81	0.50	100	0.12	0.33	0.73	0.27	0.17	0.12
T. yushui P	2.6	0.70	0.55	79	0.50	91	0.10	0.40	0.75	0.23	0.20	0.10
T. yushui P	2.6	0.70	0.55	78	0.55	100	0.12	0.36	0.75	0.23	0.20	0.13
T. yushui P	2.6	0.70	0.55	78	0.55	100	0.12	0.33	0.75	0.29	0.20	0.13
T. yushui P	2.5	0.60	0.50	83	0.50	100	0.10	0.35	0.73	0.23	0.17	0.11
T. yushui P	2.5	0.55	0.48	87	0.53	110	0.10	0.35	0.75	0.29	0.17	0.10
T. yushui P	2.6	0.60	0.51	85	0.55	108	0.11	0.36	0.75	0.31	0.18	0.12
T. yushui P	2.6	0.60	0.50	83	0.50	100	0.11	0.40	0.72	0.24	0.17	0.13
T. yushui P	2.6	0.62	0.51	82	0.53	104	0.12	0.38	0.71	0.24	0.18	0.13
T. yushui P	2.6	0.60	0.49	82	0.50	102	0.11	0.35	0.73	0.28	0.17	0.13
T. yushui P	2.5	0.57	0.48	84	0.56	117	0.12	0.33	0.70	0.29	0.17	0.14
Mean of P	**2.6**	**0.62**	**0.51**	**82**	**0.52**	**103**	**0.11**	**0.37**	**0.73**	**0.26**	**0.18**	**0.12**