

## A new species of the ant genus *Strongylognathus* (Hymenoptera, Formicidae) from Inner Mongolia, with notes on the species reported from China

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**ABSTRACT.** A new species, *Strongylognathus dao* sp. n. is described based on all three castes from Inner Mongolia, China. It belongs to the *S. huberi* species-group and differs from the related species *S. koreanus* Pisarski by the presence of standing hairs on the temples and genae, by the distinctly darker color of the body, and also by the relatively shorter, higher and wider postpetiole. Its workers differ from *S. christophi* Emery by the longer head and by the much less developed longitudinal rugosity on the sides of mesosoma. Besides this, queens (gynes) of *S. dao* are much smaller than those of *S. christophi*. In this study, we describe what appears to have been an incomplete raid of *S. dao* on a neighboring *Tetramorium tsushimae* Emery colony. A brief review of Chinese *Strongylognathus* species is provided. We believe that previous records of *S. karawajewi* Pisarski and *S. cheliferus* Radchenko from China were based on misidentifications and propose to remove these two species from the list of Chinese ants.

**Keywords:** *Strongylognathus dao*, *Tetramorium*, dulotic ants, Key, taxonomy

### INTRODUCTION

More than 15000 described ant species are known presently, but only a few hundred of them are social parasites, which temporarily or permanently depend on workers of other species to found and maintain their colonies (Buschinger 2009). With approximately 25 described, and at least three additional, not yet formally described species (Paknia *et al.* 2010; our unpublished data), *Strongylognathus* Mayr, 1853 is the most species-rich and most widely distributed genus of social parasites in the subfamily Myrmicinae. It parasit-

izes colonies of various species of *Tetramorium* Mayr, 1855, and is distributed in North-West Africa, Central, Southern and Eastern Europe, Anatolia, Middle East, Caucasus, Iran, Afghanistan, Pakistan, Central Asia, Kazakhstan, West Siberia, Eastern China, Korea, and Japan. Despite a remarkable number of reports on its presence in *Tetramorium* nests (e.g., Pisarski 1965; Acosta & Martínez 1982; Radchenko 1991; Sanetra *et al.* 1999; Radchenko & Dubovikoff 2011; Vesnič 2013), little is known about its life history. This is explained by the patchiness of its occurrence and the huge size of the host nests.

*Strongylognathus* differs from all other Palearctic myrmicine ants by their peculiar falcate, i.e. saber-shaped, toothless mandibles without a defined masticatory margin. Young *Strongylognathus* queens usurp *Tetramorium* colonies, where they either replace or live alongside the resident queen, apparently suppressing the production of host sexuals. *Strongylognathus* workers rarely or never engage in hunting prey or handling the brood. Instead, workers of several species of the *S. huberi* group are thought to engage in active slave raids, i.e., they attack neighboring host colonies and retrieve their brood to replenish the stock of host workers in their own colony (Forel 1900; Kutter 1920, 1923; Sanetra & Güsten 2011). Active raiding has been observed in staged confrontations in experimental arenas in *S. alpinus* Wheeler, 1909 and *S. afer* Emery, 1884 (Kutter 1920, 1923; Sanetra & Güsten 2001), and Forel (1904) reported on a column of *S. rehbinderi* Forel, 1904 carrying pupae in the field. In contrast, *S. testaceus* Schenck, 1852 and *S. karawajewi* Pisarski, 1966 appear to be queen-tolerantinquilines and do not engage in slave raids (Wheeler 1907; Sanetra *et al.* 1999; Sanetra & Buschinger 2000).

Based on the placement of *S. testaceus* within *Tetramorium* in the phylogeny of the Myrmicinae, Ward *et al.* (2015) considered *Strongylognathus* as a senior synonym of *Tetramorium*, though refrained from formal synonymization of these names (see also Sanetra & Buschinger 2000). Nevertheless, we chose a name for the new species that would not need to be changed if general agreement about the naming of *Tetramorium* and *Strongylognathus* were reached.

In general, the taxonomy of *Strongylognathus* is comparatively well studied. The most recent regional taxonomical reviews and/or descriptions of new species have been carried out by Pisarski (1966), Baroni Urbani (1969), Bolton (1976), Radchenko (1985, 1991, 1995), Sanetra *et al.* (1999), Sanetra & Güsten (2001), Wei *et al.* (2001), Radchenko & Dubovikoff (2011) and Borowiec & Salata (2013), but a comprehensive revision of the whole genus has not yet been undertaken. Bolton (1976) divided the genus in two species-groups: the *testaceus*- and *huberi*-groups. The species of the first group have a

strongly concave occipital margin and prominent postero-lateral corners of the head. In contrast, the species of the *huberi*-group have a straight or at most very shallowly concave occipital margin and rounded, not prominent postero-lateral corners of the head.

Here we describe a new species from the *huberi* species group, *S. dao*, from Xilin Gol, Inner Mongolia, China, and present a key for identification of the species that are presently known to occur in China.

## MATERIALS AND METHODS

The new species is described based on ca. 50 workers, 3 gynes and 17 males, collected at the Research Station of Animal Ecology on Grassland, Maodeng, Xilinhaote, Inner Mongolia, China. The holotype specimen is stored in the collection of the Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine, Kiev (SIZK). The paratypes are stored in SIZK, the National Zoological Museum of China, Institute of Zoology, Chinese Academy of Sciences, Beijing, and in the University of Regensburg, Germany.

Original photos were taken using an Olympus SZX10 stereomicroscope, connected to an Olympus C-4040ZOOM digital camera, using LAS 3.0 and then stacked using the Helicon Focus Pro software package.

Measurements of specimens (accurate to 0.01 mm) were taken for each caste and these were used to calculate various indices:

- HL – maximum length of head in dorsal view, measured in a straight line from the most anterior point of clypeus to the posteriormost point of occipital margin;
- HW – maximum width of head in dorsal view behind (above) the eyes;
- FW – minimum width of frons between the frontal carinae;
- FLW – maximum distance between the outer borders of the frontal lobes;

- SL – maximum straight-line length of scape from its articulation with condylar bulb to the proximal edge of scape;
- OL – maximum diameter of the eye;
- GnL – length of the gena, measured from the anterior edge of eye to the anterior edge of the gena (malar distance);
- TpL – length of the temple, measured from the posterior edge of eye to the posteriormost point of temple;
- ML – diagonal length of the mesosoma seen in profile, from anterior end of the neck shield to the posterior margin of propodeal lobes (workers) and from the most anterodorsal point of mesosoma to posterior margin of propodeal lobes (queens and males);
- MH – height of the mesosoma, measured from the upper level of mesonotum perpendicularly to the level of lower margin of mesopleuron;
- PNW – maximum width of the pronotum in dorsal view (workers);
- SCW – maximum width of the scutum in dorsal view (queens and males);
- SCL – length of the scutum+scutellum in dorsal view (queens and males);
- HTL – maximum length of hind tibia, measured from the junction with femur to the junction with the first tarsal joint.
- PL – maximum length of petiole from above, measured from the posterodorsal margin of petiole to its anterior edge at the articulation with propodeum; petiole should be positioned so that measured points lay on the same plane;
- PW – maximum width of the petiole from above;
- PH – maximum height of the petiole in profile, measured from the uppermost point of the petiolar node perpendicularly to the lowermost point of the ventral face of petiole (excluding subpetiolar lobe);
- PPL – maximum length of the postpetiole from above;
- PPW – maximum width of the postpetiole from above;
- PPH – maximum height of the postpetiole in profile from its uppermost to lowermost points, measured perpendicularly to the linear component of the lateral postpetiolar suture.

For simplicity, we give ratios of various measurements (e.g. HL/HW instead CI) rather than name and abbreviate various indices (e.g. CI) as we have done elsewhere.

## DESCRIPTION OF THE NEW SPECIES

***Strongylognathus dao* Radchenko, Zhang et Heinze, sp. nov.**  
(Figs. 1-3)

**Material examined.** Holotype: worker, China, Inner Mongolia, Research Station of Animal Ecology on Grassland of Chinese Academy of Sciences on 307 Provincial Road, Maodeng, Xilinhaote, N 44° 11' 04", E 116° 27' 38", 1085 m a.s.l., July 30, 2016, in nest of *Tetramorium tsushimae* under a tile provided as experimental shelter for small rodents, leg. J. Heinze and Yinchen Zhang (SIZK). Paratypes: ca. 40 workers, 3 gynes and 17 males from the nest of holotype; 8 workers, collected on July 31, 2016 from a second nest in soil during a raid approximately 300 m away from the other nest (SIZK, National Zoological Museum of China, University of Regensburg, Germany). Unique specimen identifiers are: holotype worker – CASENT0916954, paratype gyne – CASENT0916955, paratype male – CASENT0916956 (all these are preserved in SIZK).

**Etymology.** The species name refers to the Chinese saber *dào* (刀), which in shape resembles the falcate, saber-shaped mandibles of *Strongylognathus* in general.

**Worker description** (Fig. 1).

Head moderately elongate, with very slightly convex to subparallel (in smaller specimens) sides, occipital margin very shallowly concave, occipital corners rounded, postero-lateral corners of the head not prominent (seen in profile). Anterior clypeal margin slightly convex and gradually rounded, not-notched medially. Eyes of moderate size, much shorter than length of genae, situated approximately at midlength of sides of head. Frontal carinae short, not curved, merge with the rugae that surround antennal sockets. Frontal lobes not extended, distance between their outer margins subequal to or only very slightly larger than width of frons. Scapes quite short, gradually curved at base, by far not reaching occipital margin. Shape of mandibles is typical for genus, their outer surfaces without any teeth or protuberances.

Mesosoma long and low, ca. 2.6-2.9 times longer than height, with distinct while not deep metanotal groove, promesonotum very feebly convex, promesonotal suture at least partly developed (seen from above). Propodeum with short sharp triangular denticles. Petiole with distinct but relatively short peduncle, only slightly longer than high, anterior surface of node strongly concave, posterior one convex, dorsum of node rounded, without dorsal plate, so that petiole does not appear cuneiform. Postpetiole with gradually rounded dorsum, does not appear cuneiform, distinctly higher than length, ca. 1.3-1.4 times wider than petiole. Middle and hind tibiae with simple spur.

Central part of head dorsum smooth and shiny, but with scattered shallow piligerous foveae; frons in most specimens additionally with fine longitudinal striation, but occasionally striation might be reduced in various extent to complete absence; surface of head dorsum on either sides of frons and lateral part of head densely punctate and with longitudinal rugulosity. Central part of clypeus smooth and shiny.

Mesosoma and waist densely and quite coarsely punctate, short sinuous rugulae present only on mesopleura; central band on promesonotal dorsum often with partly reduced sculpture, seems quite shiny. Gaster smooth and shiny.

Whole body (including occipital margin of head, temples and genae) with numerous straight, not long and blunt standing hairs, legs with subdecumbent to suberect hairs, scape with abundant short subdecumbent hairs. Mesosoma reddish-brown, head darker, dark brown to blackish-brown, appendages and mandibles somewhat lighter, reddish- to yellowish-brown. First gastral tergite completely brownish, without lighter spot at the base.

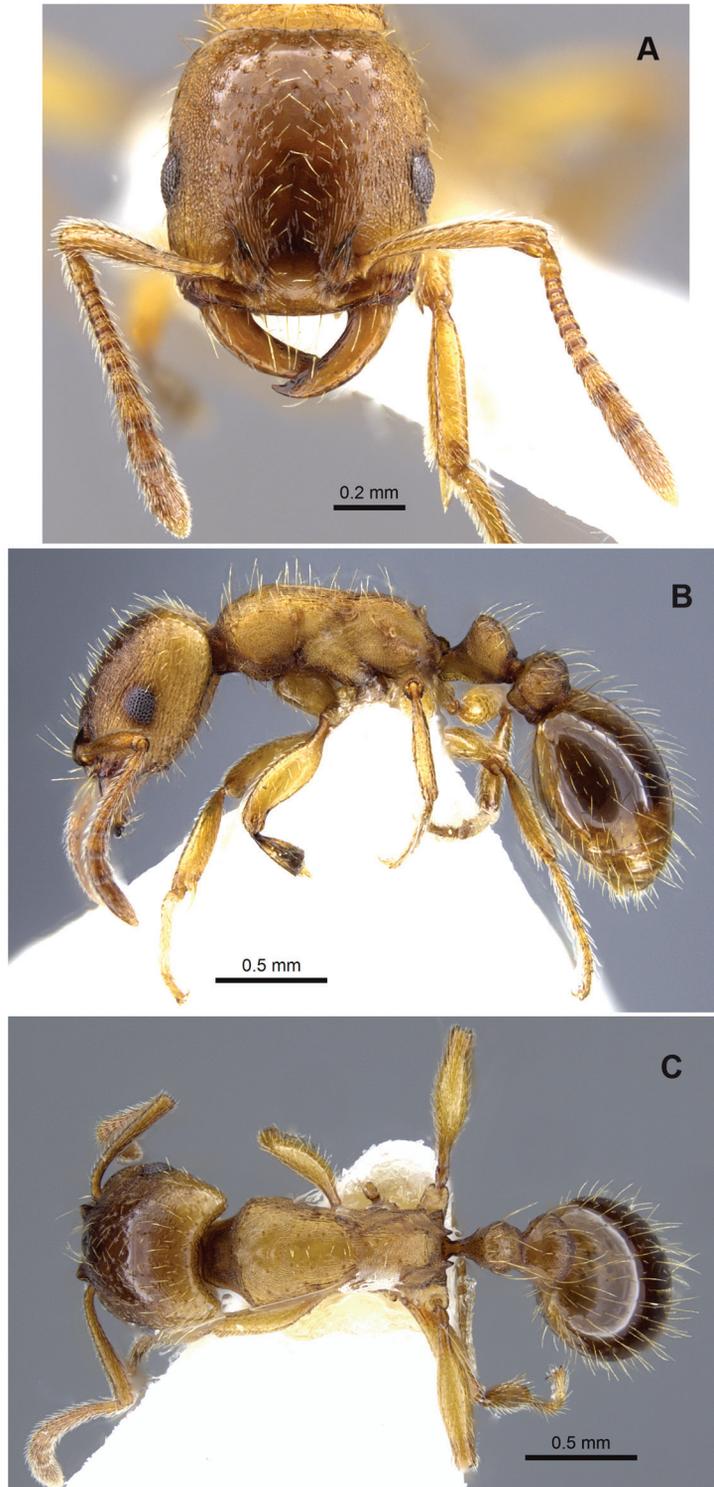
**Morphometrics**

**Measurements** (in mm) (n=18), arranged as: holotype (min-max) [mean±SD]:

HL 0.83 (0.81-0.90) [0.86±0.031], HW 0.71 (0.69-0.77) [0.74±0.027], FW 0.34 (0.29-0.35) [0.34±0.014], FLW 0.34 (0.31-0.35) [0.34±0.011], SL 0.55 (0.53-0.60) [0.56±0.020], OL 0.15 (0.14-0.16) [0.15±0.006], GnL 0.24 (0.22-0.25) [0.24±0.007], TpL 0.34 (0.34-0.38) [0.35±0.012], ML 1.19 (1.09-1.20) [1.16±0.028], MH 0.45 (0.39-0.46) [0.43±0.019], PL 0.34 (0.34-0.36) [0.35±0.008], PW 0.22 (0.21-0.25) [0.24±0.011], PH 0.30 (0.28-0.33) [0.31±0.012], PPL 0.20 (0.18-0.21) [0.19±0.014], PPW 0.32 (0.29-0.34) [0.31±0.014], PPH 0.30 (0.27-0.31) [0.29±0.008], PnW 0.50 (0.49-0.55) [0.52±0.016], HTL 0.57 (0.56-0.62) [0.58±0.015].

**Ratios:** HL/HW 1.16 (1.11-1.18) [1.15±0.017], FW/HW 0.49 (0.43-0.49) [0.45±0.015], FLW/FW 1.00 (0.98-1.05) [1.02±0.021], SL/HL 0.66 (0.64-0.69) [0.66±0.012],

SL/HW 0.76 (0.74-0.78) [0.76±0.011], PL/HL 0.41 (0.39-0.42) [0.40±0.011], PL/PH 1.12 (1.04-1.21) [1.12±0.047], PPL/HL 0.24 (0.21-0.25) [0.22±0.014], PPL/PPH 0.65 (0.60-0.75) [0.67±0.041], PPL/PPW 0.61 (0.54-0.68) [0.62±0.044], PPW/PW 1.44 (1.28-1.44) [1.33±0.055], OL/HL 0.19 (0.17-0.19) [0.18±0.007], TpL/HL 0.41 (0.39-0.43) [0.41±0.010], GnL/OL 1.55 (1.55-1.62) [1.57±0.021], AL/AH 2.66 (2.59-2.86) [2.71±0.079]



**Fig. 1.** Photographs of holotype worker of *Strongylognathus dao* sp. nov. (ANTWEB CASENT0916954). A) Head in dorsal view; B) Body in lateral view; C) Body in dorsal view.

**Gyne description** (Fig. 2).

Very small, sizes of head and mesosoma comparable to those of workers. Head rather elongate, relatively somewhat longer than in workers, with subparallel sides, occipital margin almost straight, occipital corners rounded, postero-lateral corners of the head not prominent (seen in profile). Eyes rather big, a little shorter than length of genae, situated approximately at midlength of sides of head. Shape of scapes, clypeus, mandibles, frontal carinae and frontal lobes as in workers.

Mesosoma quite long and low, 2.15 times longer than height, scutum and scutellum flat, scutum does not overlap pronotum. Propodeum with short triangular denticles. Shape of petiole similar to workers, but postpetiole much higher, ca. twice higher than its length and higher than petiole; more than 1.5 times wider than petiole. Legs shorter than in workers. Middle and hind tibiae with simple spur.

Head dorsum with longitudinal rugosity. Rugae of frons from the level of ocelli curving laterally and then back, confluent with rugae on ventral part of head, so that in lateral view rugosity seems concentric. Surface between rugae on frons with scattered rather big foveae and with fine punctures, space between frons and eyes, as well as genae, with much coarser and denser punctation. Clypeus smooth and shiny.

Scutum and scutellum with longitudinal rugosity. Propodeum, mesopleura, pronotum and waist densely and coarsely punctate, pronotum additionally with longitudinal rugosity. Gaster smooth and shiny.

Whole body (including occipital margin of head, temples and genae) with numerous straight, not long standing hairs, legs and scape with subdecumbent hairs. Whole body dark reddish-brown, appendages and mandibles lighter, reddish- to yellowish-brown. First gastral tergite completely brownish, without lighter spot at the base.

**Morphometrics**

**Measurements** (in mm) (n=2), arranged as min-max: HL 0.80-0.81, HW 0.67-0.69, FW 0.33-0.35, FLW 0.34-0.35, SL 0.52-0.53, OL 0.18-0.19, GnL 0.20, TpL 0.32-0.34, ML 1.20, MH

0.56, PL 0.39, PW 0.27, PH 0.36, PPL 0.20, PPW 0.42-0.43, PPH 0.38-0.39, SCW 0.66-0.67, SCL 0.90, HTL 0.53-0.54;

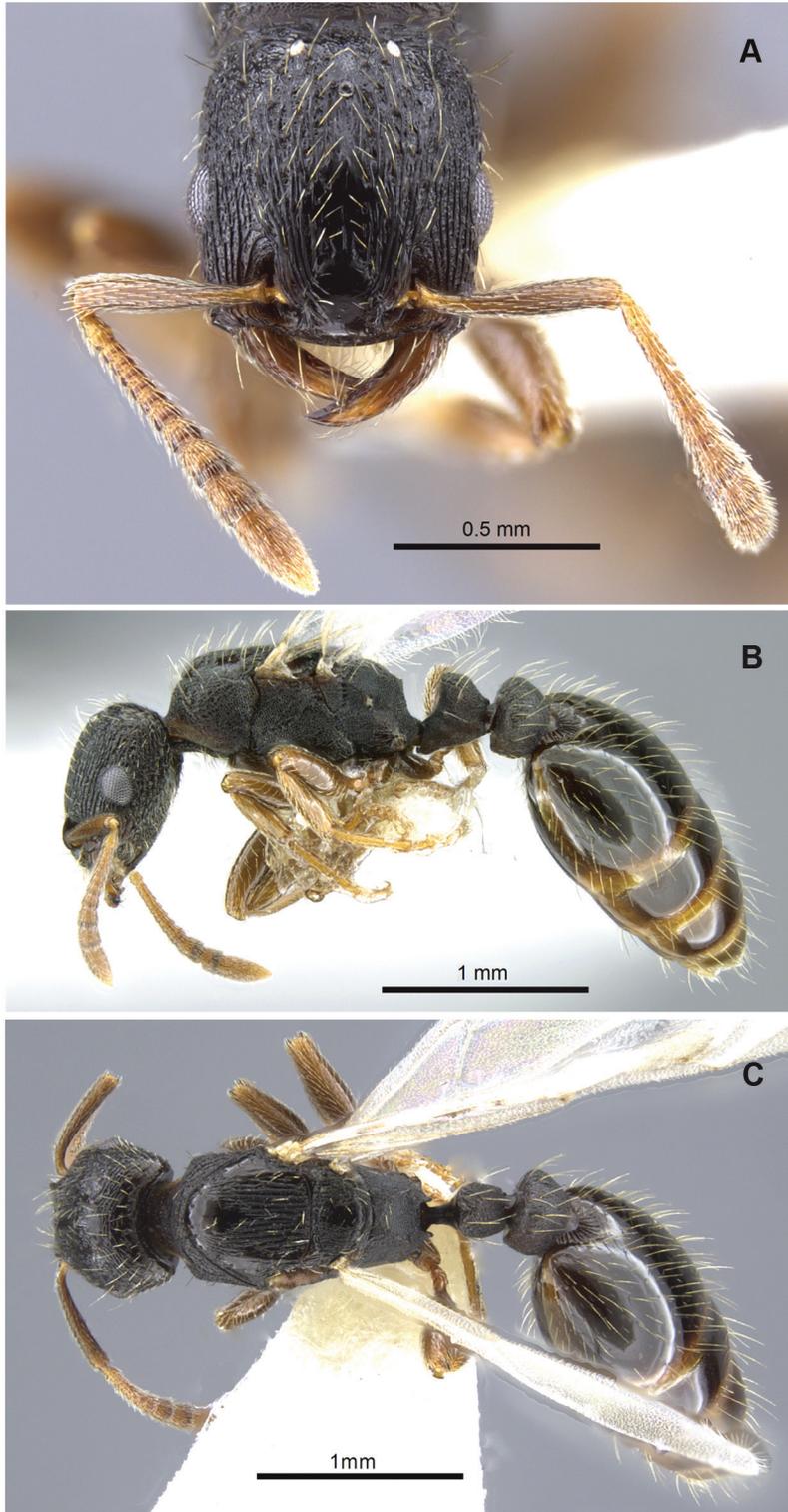
**Ratios:** HL/HW 1.18-1.19, FW/HW 0.48-0.52, FLW/FW 1.00-1.04, SL/HL 0.65-0.66, SL/HW 0.77-0.78, PL/HL 0.48-0.49, PL/PH 1.08, PPL/HL 0.24-0.25, PPL/PPH 0.52-0.52, PPL/PPW 0.45-0.48), PPW/PW 1.56-1.58, OL/HL 0.23, TpL/HL 0.40-0.41, GnL/OL 1.04-1.08, AL/AH 2.15, SCL/SCW 1.33-1.36.

**Male description** (Figs 3, 4).

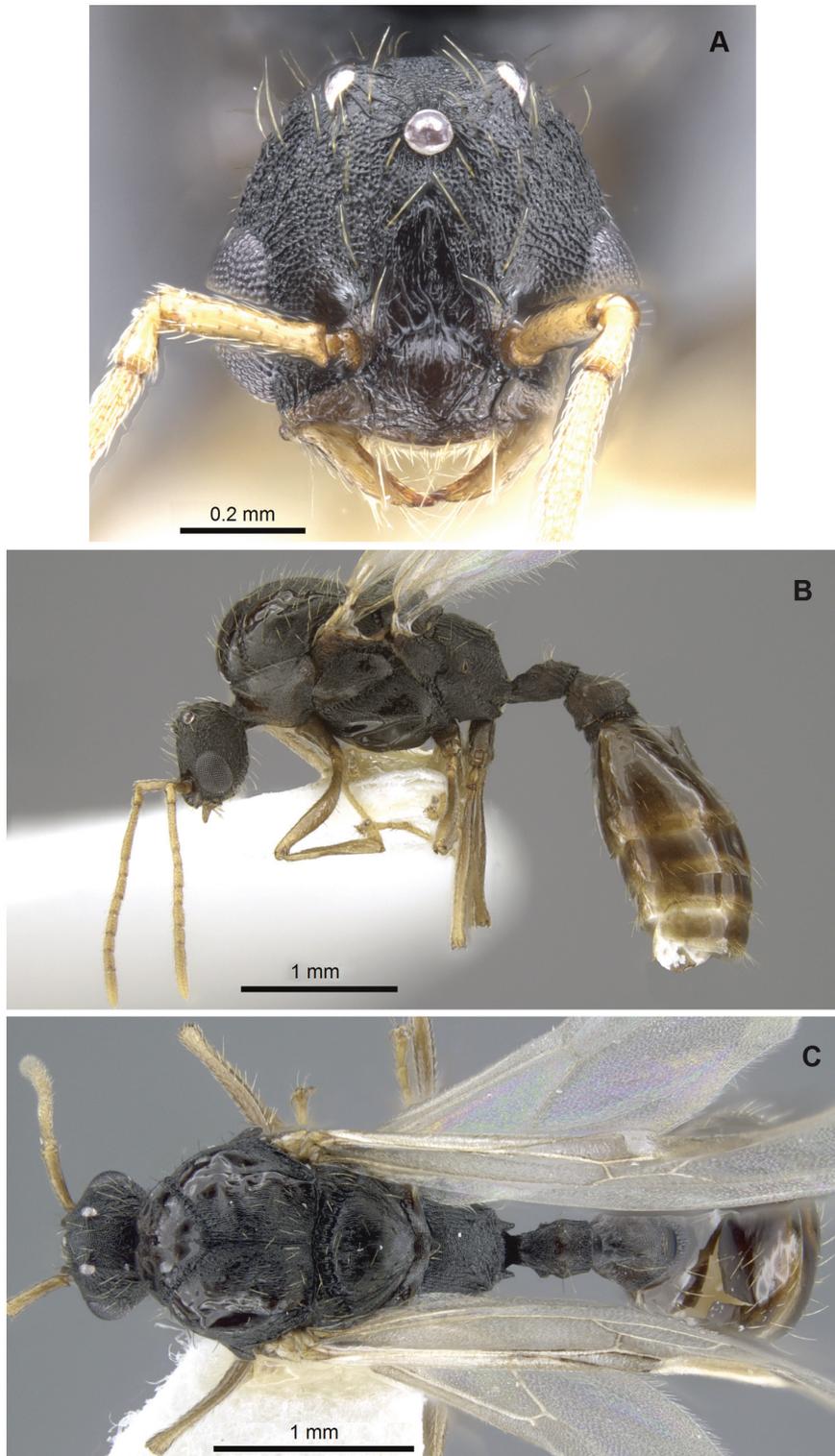
Head longer than width, while ratio of HL/HW is quite variable (1.02-1.14), narrowing behind eyes, occipital corners widely rounded but well-marked, occipital margin straight or very feebly convex, postero-lateral corners of head not prominent (seen in profile). Anterior clypeal margin slightly convex and rounded, not-notched medially. Eyes rather big, ca. 5 times longer than genae, situated distinctly in front of sides of head. Frontal carinae short, not curved, merge with the rugae that surround antennal sockets, frontal lobes somewhat extended. Scapes short, gradually curved at base, shorter than second funicular segment. Shape of mandibles is typical for genus, their outer surfaces without any teeth or protuberances.

Mesosoma quite high, scutum somewhat convex, overlapped pronotum, Mayrian furrows well developed, propodeum with short blunt tubercles. Shape of petiole quite variable, its node could be higher or lower, but in general 1.6-2.1 times longer than height, postpetiole ca. 1.5 times higher than petiole. Legs long and slender, middle and hind tibiae with simple spur.

Head dorsum coarsely and densely punctate, frons additionally with longitudinal rugosity, clypeus with coarser rugae. Anterior and dorso-lateral surfaces of scutum smooth and shiny, its dorsal surface and scutellum finely and densely longitudinally ruguloso-punctate. Mesopleura, latero-ventral surface of scutum, propodeum and waist densely and coarsely punctated (sculpture on mesopleura occasionally somewhat reduced); dorsal surface of propodeum additionally with longitudinal rugosity, its posterior and lateral surfaces transversally rugose.



**Fig. 2.** Photographs of paratype gyne of *Strongylognathus dao* sp. nov. (ANTWEB CASENT0916955). A) Head in dorsal view; B) Body in lateral view; C) Body in dorsal view.



**Fig. 3.** Photographs of paratype male of *Strongylognathus dao* sp. nov. (ANTWEB CASENT0916956). A) Head in dorsal view; B) Body in lateral view; C) Body in dorsal view.



**Fig. 4.** Photographs of genitalia of paratype male of *Strongylognathus dao* sp. nov. (ANTWEBCASENT 0916956). A) Stipites in dorsal view; B) Stipites and subgenital plate in ventral view; C) Stipites and subgenital plate in lateral view; D) Stipites in caudal view.

Body (including head margins) with numerous long, thin standing hairs, legs and scapes with subdecumbent pilosity. Head, mesosoma and waist from dark reddish-brown to brownish-black, gaster somewhat lighter, appendages and antennae ochreous.

Stipites of genitalia very feebly curved, with fine constriction in basal third, their apices rounded, not excavated.

#### **Morphometrics**

**Measurements** (in mm) (n=7), arranged as min-max [mean±SD]: HL 0.63-0.71 [0.68±0.028], HW 0.60-0.64 [0.62±0.016], SL 0.29-0.32 [0.30±0.013], OL 0.27-0.29 [0.28±0.008], GnL 0.05-0.06 [0.06±0.005], TpL 0.25-0.31 [0.27±0.024], ML 1.82-1.95 [1.90±0.047], MH 1.02-1.08 [1.06±0.020], PL 0.45-0.49 [0.47±0.016], PW 0.29-0.32 [0.30±0.013],

PH 0.24-0.28 [0.27±0.015], PPL 0.32-0.35 [0.34±0.015], PPW 0.42-0.45 [0.43±0.012], PPH 0.38-0.41 [0.39±0.012], SCW 0.95-1.12 [1.01±0.062], SCL 1.33-1.53 [1.41±0.069], HTL 0.94-0.98 [0.97±0.016].

**Ratios:** HL/HW 1.02-1.14 [1.09±0.039], SL/HL 0.42-0.47 [0.45±0.017], SL/HW 0.47-0.51 [0.49±0.015], PL/HL 0.65-0.74 [0.69±0.043], PL/PH 1.60-2.06 [1.75±0.160], PPL/HL 0.47-0.56 [0.51±0.039], PPL/PPH 0.85-0.89 [0.86±0.016], PPL/PPW 0.72-0.83 [0.78±0.051], PPW/PW 1.30-1.59 [1.47±0.106], OL/HL 0.39-0.45 [0.41±0.021], TpL/HL 0.37-0.43 [0.40±0.022], GnL/OL 0.17-0.21 [0.19±0.015], AL/AH 1.75-1.83 [1.80±0.030], SCL/SCW 1.40-1.62 [1.50±0.082].

#### Taxonomic notes

*Strongylognathus dao* belongs to the *huberi* species-group and therefore differs notably from the other species described from China, *S. potanini* Radchenko and *S. tylonus* Wei, Xu et He, which are members of the *testaceus*-group.

Workers of *S. dao* resemble *S. koreanus* Pisarski, but differ from the latter by the presence of standing hairs on the temples and genae, while such hairs are restricted to the occipital margin and occipital corners in *S. koreanus*. Additionally, the latter species is much lighter, orange-yellow or ochreous, and its postpetiole is relatively somewhat longer, lower and narrower (means PPL/PPH 0.81 and PPL/PPW 0.73 vs. 0.67 and 0.62 in *S. dao*). Workers of *S. dao* differ from those of *S. christophi* Emery by the longer head (mean HL/HW 1.15 vs. 1.10), and by the much more developed longitudinal rugosity on the sides of mesosoma. Queens (gynes) of *S. dao* are much smaller than those of *S. christophi*: HL < 0.85, HW < 0.70, ML < 1.25 vs. HL > 1.2, HW > 0.90, ML > 1.60 mm. *S. christophi* is distributed from southern Ukraine to Kyrgyzstan (Ruzsky, 1905; Pisarski, 1966; Radchenko, 1985, 1991, 2016) and we cannot exclude the possibility of finding this species in north-western China.

#### Ecology and behavior

The two colonies of *S. dao* were collected in a typical Inner Mongolian steppe ecosystem dominated by various bunch of grasses (e.g., Wu &

Loucks 1992). Other ants occurring in the area were *Temnothorax nassonovi* Ruzsky, *Proformica mongolica* Emery, *Lasius cf. alienus*, and several undetermined species of *Formica* and *Myrmica*.

The first colony was found during a general study on ant biodiversity. The second colony was noticed because of a large number of *Tetramorium* and *Strongylognathus* fighting close to two adjacent nest entrances A and B on July 31, 2017 around 10:00 in the morning in full sun after a rainy afternoon and evening. The area was full of dead or dying ants and it appeared that *Tetramorium* workers tried to block the nest entrances. At 11:05, a raiding column of dozens of *S. dao* workers left entrance A and rapidly entered a third nest entrance C about 50cm away. Within minutes, the entrances A and C were connected by ants travelling in both directions, and at 11:20, a *S. dao* worker was seen leaving entrance C and carrying a prepupa towards entrance A. Two more brood items were transported by *S. dao* in the same way, but presumably because of increasing soil temperatures the activity ceased rapidly and only a few fighting and dying ants were still observed between 12 and 14:00.

#### Notes on Chinese *Strongylognathus*

Two *Strongylognathus* species have been described from China until now: *S. potanini* and *S. tylonus* (see Wei *et al.*, 2001; Huang & Zhou, 2007). Both species belong to the *testaceus* species-group and by the reduced body sculpture resemble *S. karawajewi* Pisarski. Besides these, three other species were also recorded from China: *S. koreanus* from Shaanxi (Tie & Xu 2004), *S. chelififerus* Radchenko from Henan (Li *et al.* 2005), and *S. karawajewi* from Beijing (Wu & Wang 1995) and Ningxia (Wang 2009; Xin *et al.* 2011). These records were simply repeated by Guénard and Dunn (2012); *S. potanini* was recorded based on the paper of Radchenko (1994) by Huang and Zhou (2007) though it is missed in the most recent Catalogue of Chinese ants (Guénard & Dunn 2012).

*S. karawajewi* is distributed in Crimea, Transcaucasia, Kazakhstan and Central Asia, and its presence in China is unlikely. Because it is very similar to *S. potanini* and *S. tylonus* its records from China might belong to one of the above-mentioned species. Similarly, the record

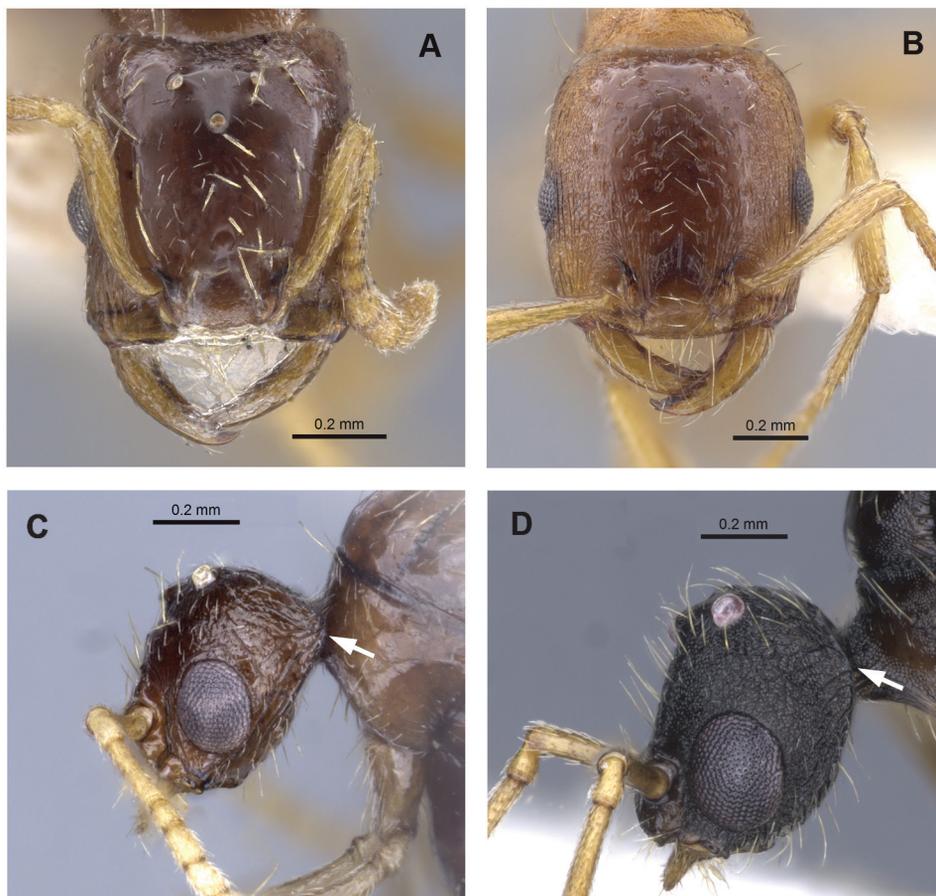
of *S. cheliferus* from China is also very improbable. This species is known only from southern Ukraine and belongs to the *huberi* species-group. We suppose that its record from China might belong to *S. koreanus* or to *S. dao*. Hence, we propose to remove *S. karawajewi* and *S. cheliferus* from the list of Chinese ants.

#### Key for identification of Chinese *Strongylognathus* species

**1. Workers and queens:** occipital margin strongly concave (seen from above) (Fig. 5, A), postero-lateral corners of head strongly prominent. **Males:** occipital margin straight or feebly concave, postero-lateral corners of the head dis-

tinctly prominent (seen in profile) (Fig. 5, C)... **2 -- Workers and queens:** occipital margin straight or at most very shallowly concave (seen from above), postero-lateral corners of the head rounded and not prominent (Figs 1, A, B; 2, A, B; 5, B). **Males:** occipital margin straight or feebly convex, postero-lateral corners of the head not prominent (seen in profile) (Fig. 5, D)..... **3**

**2(1). Workers** (queens and males unknown): outer margin of mandibles with four minute tubercles ..... *S. tylonus* Wei, Xu et He  
**-- Queens** (workers unknown): outer margin of mandibles without any additional structures.....  
 ..... *S. potanini* Radchenko



**Fig. 5.** Photographs of details of structure of *Strongylognathus potanini* (A – paratype gyne, ANTWEB CASENT0916957; C – paratype male, ANTWEB CASENT0916958), *S. koreanus* (B – paratype worker, ANTWEB CASENT 0916959) and *S. dao* (D – paratype male, ANTWEB CASENT0916956). A, B) – head in dorsal view. C, D) – head in lateral view.

**3(1). Workers** occipital margin, temples and genae with standing hairs (Fig. 1, A). Darker species, mesosoma reddish-brown, head dark brown to blackish-brown..... *S. dao* sp. nov.  
 -- **Workers** (queens and males unknown): standing hairs on head restricted to the occipital margin and occipital corners (Fig. 5, B). Lighter species, mesosoma orange-yellow or ochreous, head yellowish-brown ..... *S. koreanus* Pisarski

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