

Simopone yunnanensis sp. nov. – the first record of *Simopone* Forel, 1891 from China (Hymenoptera, Formicidae, Cerapachyinae)

ZHILIN CHEN^{1,2,3}, SHANYI ZHOU^{1,2,3*}, LIWEI LIANG¹

¹ Guangxi Key Laboratory of Rare and Endangered Animal Ecology, Guangxi Normal University, Guilin, 541004, China

² Key Laboratory of Ecology of Rare and Endangered Species and Environmental Protection (Guangxi Normal University), Ministry of Education, Guilin, 541004, China

³ College of Life Sciences, Guangxi Normal University, Guilin 541004, China

*Corresponding author's e-mail: syzhou@mailbox.gxnu.edu.cn

ABSTRACT. The genus *Simopone* in the subfamily Cerapachyinae is recorded in China for the first time with description of a new species, *S. yunnanensis* sp. nov.. The new species is closely related to *S. oculata* Radchenko 1993, but differs distinctly from the latter. An identification key based on worker caste is provided to the *grandidieri*-group species.

Keywords: Formicidae, *Simopone*, *grandidieri*-group, new species

INTRODUCTION

The genus *Simopone* was established based on the type species *S. grandidieri* by Forel (1891). It is a moderate-size genus of the subfamily Cerapachyinae, with 38 valid species in the world (Bolton & Fisher 2012; Bolton 2014). Brown (1975) revised the genus and recognized 13 species, and provided a key to the seven species of the Afrotropical region, but did not provide detailed descriptions of species. Bolton and Fisher (2012) made a great contribution to our understanding of the genus. They revised all the species of the world, described 22 new species, and divided the genus into three species groups. *Simopone* is uncommon in ant collections because most species of the genus are arboreal. Specimens are seldom found and samples are limited in number of individuals. Despite this rarity, this genus is widely distributed throughout the Old World tropics; the majority of species are known from Madagascar (16 species) and sub-Saharan Africa (18 species) (Bolton & Fisher 2012; Bolton 2014). In South-east Asia, four species were described before this study. Menozzi (1926) described the first species,

S. bakeri, from Singapore. Taylor (1965, 1966) recorded *S. gressitti* and *S. chapmani* in New Guinea and Philippines respectively. Radchenko (1993) reported *S. oculata* from Vietnam. Finally, Terayama (2009) described *S. huode* from Taiwan, China, which was recently combined in *Cerapachys* by Bolton and Fisher (2012). When we studied the ant specimens deposited in the Insect Collection of Guangxi Normal University, a new species of *Simopone* was discovered from Yunnan Province. The genus is therefore recorded in China for the first time. In this paper, the new species *S. yunnanensis* sp. nov. is described and an identification key to the *grandidieri*-group is provided. The type specimen is deposited in the Insect Collection, College of Life Science, Guangxi Normal University, Guilin, Guangxi Region, China.

MATERIALS AND METHODS

The material examined is a single worker collected from Yunnan Province of China. Digital images of the specimen were taken using a Nikon

AZ100 microscope. Standard measurements and indices are as giving in Bolton (1975) and Bolton and Fisher (2012). All measurements are expressed in millimeters.		PL	Petiole Length: The length of the petiole measured in lateral view from the anterior process to the posteriormost point of the tergite, where it surrounds the gastral articulation.
TL	Total Length: The total outstretched length of the individual, from the mandibular apex to the gastral apex.	PH	Petiole Height: The height of the 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.
HL	Head Length: The length of the head capsule excluding the mandibles; measured in full-face view in a straight line from the mid-point of the anterior clypeal margin or from a line that spans the anterior most points of the frontal lobes (depending on which projects farthest forward) to the level of a line that spans the posterior corners of the head capsule. In species with a strongly reflexed true anterior clypeal margin (i.e. the clypeo-labral junction) the measurement is taken from the midpoint of the apparent margin as seen in full-face view.	DPW	Dorsal Petiole Width: The maximum width of the petiole in dorsal view.
		PW	Pronotal Width: The maximum width of the pronotum in dorsal view.
		WL	Mesosoma Length (=AL-Alitrunk Length): The diagonal length of the mesosoma in profile, from the angle at which the pronotum meets the cervix to the posterior basal angle of the metapleuron.
HW	Head Width: The maximum width of the head immediately behind the eyes, measured in full-face view.	AIIW	Abdominal Segment II (petiole) Width: The maximum width of abdominal segment II (petiole), measured in dorsal view but omitting laterally projecting teeth when such occur at the posterolateral corners.
SL	Scape Length: The maximum straight-line length of the scape, excluding the basal constriction or neck that occurs just distal of the condylar bulb.	AIIL	Abdominal Segment II (petiole) Length: The maximum length of abdominal segment II (petiole), measured in dorsal view and including longitudinal projections of the posterolateral corners where such occur.
SW	Scape Width: The maximum width of the scape, usually at its apex.	AIIIW	Abdominal Segment III Width: The maximum width of abdominal segment III (postpetiole), measured in dorsal view.
FCW	Frontal Carina Width: The distance across the maximum separation of the frontal lobes or frontal carinae (whichever is greatest), measured in full-face view.	AIIIL	Abdominal Segment III Length: The maximum length of abdominal segment III (postpetiole), measured in dorsal view.
EL	Eye Length: In profile, the maximum measurable length of the compound eye.	AIVW	Abdominal Segment IV Width: The maximum width of abdominal segment IV (first gastral), measured in dorsal view.
EW	Eye Width: In profile, the maximum measurable width of the compound eye, perpendicular to EL.		
ES	Eye Size: In the <i>schoutedeni</i> -group, $EL+EW$, divided by 2.		



Figs 1 – 4. *Simopone yunnanensis* sp. nov. worker. 1. head in full-face view; 2. antennal segments 4-11; 3. body in dorsal view; 4. body in profile view.

AIVL	Abdominal Segment IV Length: The maximum length of the posttergite of abdominal segment IV (first gastral), measured in dorsal view, omitting the pretergite.
MFL	Metafemur Length: The maximum straight-line length of the meta femur.
CI	Cephalic Index: HW divided by HL, $\times 100$.
SI	Scape Index: SL divided by HW, $\times 100$.
EP	Eye Position Ratio: In full-face view, the distance from a horizontal line that intersects the mid-point of the anterior clypeal margin, or from a line that spans the anterior most points of the frontal lobes (depending on which projects farthest forward), to the level of a line that spans the anterior margins of the eyes, divided by the horizontal distance from a line that spans the posterior margins of the eyes to one that spans the posterior corners of the head.

Other ratios that are routinely used in the species rank taxonomy include: EL/HW, AIIW/AIIL, AIIIW/AIIIL.

DESCRIPTION OF NEW SPECIES

Simopone yunnanensis sp. nov. (Figs. 1-4)

Measurements & indices of holotype worker.

TL 5.27, HL 0.93, HW 0.65, SL 0.20, EW 0.21, ES 0.23, SW 0.12, FCW 0.34, EL 0.26, PW 0.50, AIIW 0.52, AIIL 0.63, AIIIW 0.57, AIIIL 0.58, WL 1.27, PL 0.65, PH 0.41, DPW 0.50, MFL 0.50, CI 70, SI 31, EL/HW 0.40, EP 1.17, AIIW/AIIL 0.83, AIIIW/AIIIL 0.98.

In full-face view head nearly rectangular, longer than broad, sides weakly convex behind eyes, and shallowly concave in front of eyes; posterior margin distinctly concave, posterior corners angular. Mandibles subtriangular, masticatory margin finely dentate. Anterior margin of clypeus bluntly angled, dorsum without median carina. Frontal carinae not elevated, widely separated and weakly divergent posteriorly, extend-

ing beyond anterior margins of eyes, frontal area broad. Antennae 11-segmented, scapes short, but quite broad apically, not beyond anterior margin of eye. Head with short, narrow and deep scrobes extending from the antennal socket to the anterior margin of the eye. Eyes large, occupying about 1/3 length of head side, located about at mid-length of head side, outer margin of eye almost reaching to head sides. Ocelli present, minute and closely approximated.

Dorsum of mesosoma weakly convex, weakly and narrowly depressed at promesonotal suture. Posterodorsal corner of propodeum bluntly angled, lateral borders of declivity lowly carinate. Dorsum of petiole moderately convex, anteroventral process a distinct recurved hook or spur. Postpetiole longer and higher than petiole, dorsum moderately convex. Constriction behind postpetiole distinct.

In dorsal view lateral margins of mesosoma weakly marginate, narrowest across mesonotum (maximum width 0.46), and broadest across propodeum (maximum width 0.50). Pronotum with sharp anterior carina and acute humeral corners, sides weakly convergent posteriorly. Promesonotal suture slightly anteriorly curved, represented by short longitudinal rugae. Metanotal groove absent. Petiole (AII) longer than broad (AIIW/AIIL 0.83), with a strong anterior carina, sides almost straight, distinctly marginate and weakly widening posteriorly. Postpetiole (AIII) almost square, as broad as long, sides almost straight and parallel.

Body surface smooth and shining. Mandibles, head and mesosoma with scattered minute piligerous punctures. Body dorsum with very sparse suberect short hairs. Scapes and tibiae with very sparse suberect hairs, flagella with abundant suberect hairs and decumbent pubescence. Gastral apex with abundant long hairs. Body color black. Mandibles and clypeus reddish brown. Antennae and legs yellowish brown.

Holotype worker. China: Yunnan Province, Yingjiang County, Jiema, July 31, 2005, Zhao Tan leg., No. 7005.

Etymology. The new species is named after its type-locality, Yunnan.

Comparison Notes. *S. yunnanensis* sp. nov. belongs to the *grandidieri* species group. So far this group covers seven species, four of them

from the Oriental and Malesian region. The new species is most allied to *S. oculata* Radchenko, but distinctly differs from the latter. In *Simopone yunnanensis* sp. nov., anterior margin of clypeus bluntly angled; metanotal groove absent; in dorsal view petiole weakly widening posteriorly, posterior margin almost straight; in lateral view petiole distinctly marginate laterally; sides of petiole and postpetiole with very sparse hairs. But in *S. oculata*, anterior margin of clypeus weakly convex; metanotal groove weakly impressed and visible; in dorsal view petiole distinctly widening posteriorly, posterior margin obviously concave; in lateral view petiole not marginate laterally; sides of petiole and postpetiole with rich hairs.

The new species is also allied to *S. chapmani* Taylor, 1966, but differs from the latter by posterior margin of head distinctly and widely concave in full-face view, head nearly rectangle, dorsolateral borders of pronotum and mesonotum approximately right-angled, marginated laterally.

KEY TO SPECIES OF *GRANDIDIERI*-*GROUP* BASED ON WORKER CASTE

1. Anterior clypeal margin strongly biconcave in full-face view 2
- Anterior clypeal margin never biconcave in full-face view 3
2. Anterior clypeal margin with a median prominence, not evenly shallowly convex or flat across its width..... *S. bakeri* Menozzi
- Anterior clypeal margin evenly shallowly convex to more or less straight across its width, without a median prominence..... *S. elegans* Bolton & Fisher
3. Promesonotal suture feebly present, may be almost effaced, never with ribbed trace on dorsum *S. grandidieri* Forel
- Promesonotal suture represented by transversely ribbed trace or aligned punctures on dorsum. 4
4. Anteroventral process of petiole merely a small, insignificant tooth. Tergite of petiole relatively broad with respect to the pronotum, AIIW/PW 1.14..... *S. laevissima* Arnold
- Anteroventral process of petiole a distinctly recurved hook or spur. Tergite of petiole relatively narrow with respect to the pronotum, AIIW/PW \leq 1.07..... 5

5. Dorsal surface of petiole meets lateral surface in a rounded angle, marginate not obvious; side of petiole with a curved longitudinal carina between the dorsolateral margin and the level of spiracle..... *S. gressitti* Taylor
- Dorsal surface of petiole meets lateral surface in a sharp corner, marginate obvious; side of petiole without a curved longitudinal carina between the dorsolateral margin and the level of spiracle 6
6. Head distinctly top triangle. Dorsolateral borders of pronotum and mesonotum round-angled, not marginated laterally *S. chapmani* Taylor
- Head nearly rectangle. Dorsolateral borders of pronotum and mesonotum approximately right-angled, marginated laterally 7
7. Anterior margin of clypeus weakly convex. Metanotal groove weakly impressed and visible. In dorsal view petiole distinctly widening posteriorly, posterior margin obviously concave. In lateral view petiole not marginated laterally. Sides of petiole and postpetiole with rich hairs.....
- *S. oculata* Radchenko
- Anterior margin of clypeus bluntly angled. Metanotal groove absent. In dorsal view petiole weakly widening posteriorly, posterior margin almost straight. In lateral view petiole distinctly marginated laterally. Sides of petiole and postpetiole with very sparse hairs.
- *S. yunnanensis* sp. nov.

ACKNOWLEDGEMENTS

We thank Prof. ZhengHui Xu (Southwest Forestry University, China), Prof. Alexander G. Radchenko (Museum and Institute of Zoology Polish Academy of Sciences, Poland) and one anonymous reviewer for their valuable suggestions and modifications to the manuscript. We are grateful to the editors Dr. Martin Pfeiffer for his useful advises and Adam L. Cronin for correction of the English. We thank Zhao Tan (Guangxi Normal University, China) for collecting the type specimen. This study is supported by the National Natural Science Foundation of China (Project No. 31372248), Guangxi Key Laboratory of Rare and Endangered Animal Ecology, Guangxi Normal University (GKN. 14-B-03 & GKN. 1301z011) and Key Laboratory of Ecology of Rare and Endangered Species

and Environmental Protection (Guangxi Normal University), Ministry of Education.

REFERENCES

- Bolton B, 1975. A revision of the ant genus *Leptogenys* Roger in the Ethiopian region, with a review of the Malagasy species. *Bulletin of the British Museum (Natural History) (Entomology)* 31: 235-305.
- Bolton B, 2014. Catalogue of Ants of the World. 1 JULY 2014. Downloaded from http://www.antwiki.org/wiki/Species_Accounts. on 27 February 2015.
- Bolton B and Fisher BL, 2012. Taxonomy of the cerapachyine ant genera *Simopone* Forel, *Vicinopone* gen. n. and *Tanipone* gen. n. (Hymenoptera: Formicidae). *Zootaxa* 3283: 1-101.
- Brown WL, Jr. 1975. Contributions toward a reclassification of the Formicidae. 5. Ponerinae, tribes Platythyreini, Cerapachyini, Cyldromyrmecini, Acanthostichini, and Aenictogitini. *Search Agriculture* 5, *Entomology* (Ithaca) 15: 1-115.
- Forel A, 1891. In Grandidier, A. Histoire Physique, Naturelle et Politique de Madagascar 20. Histoire naturelle des Hyménoptères. 2 (fascicule 28). *Les Formicides* 1-231. Paris.
- Menozi C, 1926. Nuove formiche delle isole Filippine e di Singapore. *Atti della Società dei Naturalisti e Matematici di Modena* (6) 4 [56] (1925): 92-103.
- Radchenko AG, 1993. New ants of the subfamily Cerapachyinae (Hymenoptera, Formicidae) from Vietnam. *Zhurnal Ukrains'koho Entomolohichnoho Tovarystva* 1(1): 43-47.
- Taylor RW, 1965. New Melanesian ants of the genera *Simopone* and *Amblyopone* of zoogeographical significance. *Breviora* 221: 1-11.
- Taylor RW, 1966. Notes on the Indo-Australian ants of the genus *Simopone* Forel. *Psyche* 72: 287-290.
- Terayama M, 2009. A synopsis of the family Formicidae of Taiwan (Insecta: Hymenoptera). *Research Bulletin of Kanto Gakuen University. Liberal Arts* 17: 81-266.

ASIAN MYRMECOLOGY

A Journal of the International Network for the Study of Asian Ants

Communicating Editors: Martin Pfeiffer, Adam L. Cronin & Himender Bharti