

FIRST VERIFIED RECORD OF GENUS *PONERA*
(HYMENOPTERA: FORMICIDAE) FROM INDIA,
WITH DESCRIPTION OF TWO NEW SPECIES

BHARTI, H. and WACHKOO, A. A.

*Department of Zoology and Environmental Sciences, Punjabi University
Patiala – 147002 India; E-mails: himenderbharti@gmail.com; aijaz_shoorida@yahoo.co.in*

Ponera indica sp. n. and *Ponera taylori* sp. n. collected in lower Shivalik range of Northwest Himalaya are described. This finding represents the first verified record of the genus *Ponera* for India. *Ponera affinis* JERDON and *Ponera pumila* JERDON were described inadequately from Malabar India are unidentifiable to genus and are considered *incertae sedis*. *Ponera indica* most resembles Philippine *P. oreas* and distinctly differs from all already described species of this genus. *Ponera taylori* resembles *P. nangongshana* from China and *P. yuhuang* from Taiwan, sharing with them the absence of posteroventral teeth of subpetiolar process in worker caste. An identification key to the workers of Indian *Ponera* species is provided.

Key words: Ponerinae, ants, new record, new species, Shivalik

INTRODUCTION

Currently 52 extant and 5 fossil species are listed in the ant genus *Ponera* from the Holarctic, Oriental, Indo-Australian and Australasian regions (BOLTON *et al.* 2006, BOLTON 2012). *Ponera* was revised worldwide by TAYLOR (1967) and since then a good number of species have been described by TERAYAMA (1986, 1996, 2009); PERRAULT (1993); XU (2001*a, b*); ZHOU (2001); CSÓSZ and SEIFERT (2003) and DLUSSKY (2009). Though two species, *Ponera affinis* JERDON, 1851 and *Ponera pumila* JERDON, 1851 were described earlier from Malabar India, their generic status is uncertain. Original descriptions of these taxa are inadequate and very little is known about the collection of JERDON, hence these are considered *incertae sedis* (BOLTON 1995, 2012, BOLTON *et al.* 2006). BINGHAM (1903) and TAYLOR (1967) left them out for the same reason.

Below we describe two new species, *Ponera indica* sp. n. based on worker and gyne; and *Ponera Taylori* sp. n. based on worker and male, representing the first record of this genus from India. *Ponera taylori*, resembles the Oriental *P. nangongshana* XU, 2001 and *P. yuhuang* TERAYAMA, 2009 both characterised by the absence of posteroventral teeth on the subpetiolar process, but possessing a fenestra anteriorly. In view of the morphoclinal development of a fenestra in Afrotropical *Hypoponera* and the otherwise universal presence of posteroventral subpetiolar teeth in *Ponera*, the generic combination of these two Oriental species

should be re-assessed (BOLTON & FISHER 2011). *Ponera taylori*, represents the 3rd species which lacks posteroventral teeth on the subpetiolar process and is therefore, very important from phylogeographic and phylogenetic point; and may play a critical role in taxonomic decision regarding the generic status of the species in question. Presence of epimeral lobe in male of *Ponera taylori* also does not conform to generic plan of *Ponera* (TAYLOR 1967, YOSHIMURA & FISHER 2007) and therefore substantiates the earlier proposal, for their separate generic status.

MATERIAL AND METHODS

The specimens were collected through Winkler's extractor, soil core and hand-searching methods. The taxonomic analysis was conducted on Nikon SMZ 1500 stereo zoom microscope. For digital images, MP evolution digital camera was used on same microscope with Auto-Montage (Syncoscopy, Division of Synoptics, Ltd.) software. Later, images were cleaned with Adobe Photoshop CS5. Holotype and paratypes of both the species have been deposited in PUPAC, Punjabi University Patiala Ant Collection, Patiala. One paratype of both species will be deposited in BMNH, Natural History Museum, London, U.K. and California Academy of Sciences, San Francisco, United States of America. Measurements were recorded in micrometers between 120 × and 225 × with measuring accuracies of ±1 µm for small measures like petiole length, such of ±2 µm for medium sized measures like head width, such of ±6 µm for larger measures like Weber's length. The basic statistics of the morphometric data is presented in a side-by-side comparison of the species' data in Table 1. Morphological terminology for measurements and indices are as follows: HL – maximum length of head in dorsal view, measured in straight line from the anterior most point of the median clypeal margin to the midpoint of the occipital margin; HW – maximum width of head in dorsal view; HS – head size, arithmetic mean of HL and HW; SL – maximum length of the scape excluding the basal neck and condyle; PrW – maximum width of pronotum from above; WL – Weber's length of mesosoma, measured in lateral view from the anterior surface of the pronotum (excluding the collar) to the posterior margin of the propodeal lobes; PH – maximum height of the petiole in profile from the apex of subpetiolar process to dorsal most point; PW – maximum width of the petiole from above; PL – in profile, the distance from the midpoints of the curves where the anterior and posterior faces of the node meet its anterior and posterior peduncles; CI – cephalic index: HW/HL; SI – scape index: SL/HW; PNI – petiolar node index: PW/PrW; LPI – lateral petiolar index: PL/PH; DPI – dorsal petiole index: PW/PL; OI – ocular index (sexuals only): maximum diameter of eye divided by head width.

RESULTS

Ponera LATREILLE, 1804

***Ponera indica* sp. n.**

(Figs 1–6)

Holotype worker. – India, Himachal Pradesh, Terrace, 31.9234°N 75.9294°E, 430 m, 12 October, 2008, Winkler. Paratypes: 5 workers, same data; 1 worker and 1 gyne, India, Himachal Pradesh, Andretta, 32.0744°N 76.5856°E, 940 m, 11 June, 2010, hand picking; 5 workers, India, Himachal Pradesh, Mandi, 31.7080°N 76.9318°E?, 800 m, 27 June, 2010, soil core (coll. Aijaz A. Wachkoo).

Workers

Morphometric data of the holotype: HL 440; HW 410; HS 425; SL 330; PrW 290; WL 590; PL 100; PW 230; PH 290. Indices: CI 0.932; SI 0.805; PNI 0.793; LPI 0.345; DPI 2.300.

Head: Head slightly longer than broad, sides convex, frontovertexal margin concave. Mandible with 3 developed teeth occupying approximately apical 3/5th of masticatory margin, remainder without any fairly discernible denticle. One of the paratypes possesses only a single blunt tooth at the middle of the masticatory margin. Eyes small, composed of 3–4 indistinct facets. Median portion of anterior clypeal margin shallowly convex. Apex of scape, when laid straight back from its insertion in full-face view just touches the midpoint of the posterior margin; funiculus incrassate towards apex; antennal club not differentiated.

Mesosoma and petiole: In lateral view mesosoma with dorsal margin gently convex; in dorsal view pro-mesonotal suture distinct with concentric horizontal striations; meso-metanotal suture feeble. Propodeal dorsum, diverging basally; in lateral view sloping gently behind, passes into an oblique declivity. Seen from above petiole twice broad as long; its anterior margin convex while posterior margin is concave. Subpetiolar process cuneiform; fenestra oval; posteroventral teeth of subpetiolar process acute and divergent.

Gaster: base of cinctus of second gastral tergite with cross ribs; sting exerted.

Sculpture: Cephalic dorsum opaque and sharply reticulate punctate, mesosoma and most of gaster with same, but slighter sculpture. Petiole dorsum superficially sculptured; propodeal declivity, posterior face of petiole and apical gastral tergites smooth and shining. Mandible shining with scattered punctures.

Pilosity: Moderate; reclinate, suberect.

Colour: Head blackish; rest of the body medium reddish brown. Mandible, antenna, legs and apical gastral tergites yellow.

Gyne

Morphometric data: HL 440; HW 400; HS 420; PrW 310; WL 590; PL 130; PW 240; PH 300; SL 300. Indices: CI 0.909; SI 0.75; PNI 0.774; LPI 0.433; DPI 1.846; OI 0.23 ($n = 1$).

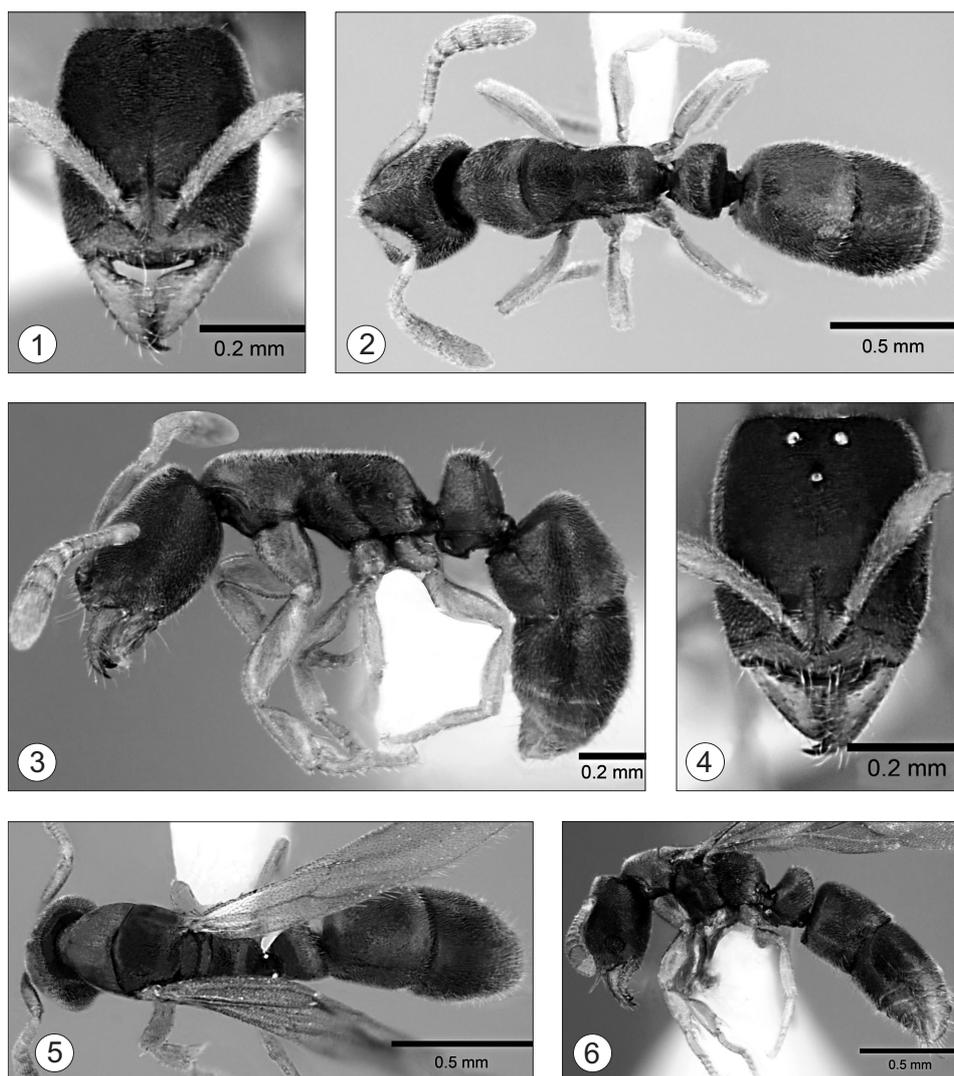
As in worker, with modifications expected for caste and the following differences: overall sculpture and colour lighter; frontovertexal margin shallowly concave and antenna more slender than in workers. Mandible with 6 teeth. Posteroventral teeth of subpetiolar process reduced and parallel.

Distribution and habitat – This species seems to be widespread in Shivalik range of Northwest Himalaya although infrequent in collections. In non-forested habitats the species was found under small stones and soil core samples; although in forested habitat this species was found in leaf litter samples.

Etymology – The species epithet is Latin for India.

Remarks – *Ponera indica* somewhat resembles to the Phillipine *P. oreas* (WHEELER, 1933) but can be easily distinguished from the latter. In *P. indica* 3 apical mandibular teeth occupy 3/5th of masticatory border and no posterior denticles are delimited; head blackish; fenestra oval; posteroventral teeth emerge at closing end of subpetiolar process and are directed backward whereas in *P. oreas* 3 apical mandibular teeth occupy 1/2 of masticatory border followed by an irregular series of 7–8 denticles; colour medium dark brown all over; fenestra round; postero-

ventral teeth emerge in the middle of subpetiolar process and are directed downward. This new species differs also morphometrically from *P. oreas* being relatively small with dimensions: HL 430–460; HW 410–430; PW: 210–240; PH: 270–300; SL: 280–330 while the dimensions of *P. oreas* are: HL 500–540; HW 470–510; PW: 290–330; PH: 350–370; SL: 380–410.



Figs 1–6. *Ponera indica* sp. n. 1–3 = worker: 1 = head, dorsal view; 2 = body, dorsal view; 3 = body, lateral view. 4–6 = gyne: 4 = head, dorsal view; 5 = body, dorsal view; 6 = body, lateral view

Table 1. Morphometric data of Indian *Ponera* workers showing arithmetic mean \pm standard deviation; minimum and maximum values are in brackets. Twelve specimens measured for each species.

	<i>P. indica</i>	<i>P. taylori</i>
HL	445.83 \pm 9.0 [430, 460]	650.83 \pm 21.93 [600, 670]
HW	418.33 \pm 5.8 [410, 430]	585.45 \pm 19.68 [550, 610]
HS	432.08 \pm 6.6 [420, 440]	620.45 \pm 15.08 [595, 640]
SL	315.83 \pm 15.64 [280, 330]	440.83 \pm 9.96 [430, 460]
PrW	302.50 \pm 9.6 [280, 310]	390.00 \pm 8.16 [380, 400]
WL	585.45 \pm 18.1 [560, 610]	843.33 \pm 42.28 [740, 890]
PL	104.17 \pm 9.0 [90, 120]	183.64 \pm 15.02 [160, 200]
PW	229.17 \pm 11.6 [210, 240]	241.82 \pm 11.68 [200, 260]
PH	289.00 \pm 8.76 [270, 300]	372.86 \pm 16.04 [350, 390]
CI	0.944 \pm 0.0224 [0.913, 0.978]	0.893 \pm 0.0281 [0.833, 0.938]
SI	0.741 \pm 0.0526 [0.651, 0.805]	0.755 \pm 0.0256 [0.717, 0.818]
PNI	0.745 \pm 0.0512 [0.677, 0.793]	0.628 \pm 0.0211 [0.605, 0.650]
LPI	0.367 \pm 0.2137 [0.345, 0.400]	0.478 \pm 0.0299 [0.447, 0.526]
DPI	2.214 \pm 0.2144 [2.000, 2.667]	1.132 \pm 0.0902 [1.200, 1.444]

***Ponera taylori* sp. n.**
(Figs 7–12)

Holotype worker – India, Himachal Pradesh, Andretta, 32.0744°N 76.5856°E, 940 m, 11 June, 2010, hand picking. Paratypes: 4 workers same data; 2 workers, India, Uttarakhand, Assan Barrage 30.4417°N 77.6754°E, 740 m, 10 May, 2009, soil core; 5 workers and 1 male, India, Himachal Pradesh, Rewalsar, 31.6345°N 76.8343°E, 1360 m, 30 June, 2010, hand picking (coll. Aijaz A. Wachkoo).

Workers

Morphometric data of the holotype: HL 670; HW 610; HS 640; SL 450; PrW 390; WL 850; PL 170; PW 240; PH 380. Indices: CI 0.910; SI 0.738; PNI 0.615; LPI 0.447; DPI 1.412.

Head: Head longer than broad, sides convex, frontovertexal margin concave. Mandible with 7 teeth, occupying the entire masticatory margin. Eyes absent. Median portion of anterior clypeal margin concave. Apex of scape, when laid straight back from its insertion in full-face view touches the midpoint of the posterior margin; funiculus incrassate towards apex but slender than in *P. indica*, antennal club not differentiated.

Mesosoma and petiole: in lateral view mesosoma with convex dorsal margin; in dorsal view sutures distinct; pro-mesonotal suture with concentric horizontal striations; metanotal groove prominent. Propodeal dorsum, with subparallel sides, passes into a convex declivity. Seen from above petiole subrectangular, distinctly broader than long, with sides diverging backward; in lateral view sloping behind. Subpetiolar process triangular; fenestra round; posteroventral teeth of subpetiolar process absent.

Gaster: base of cinctus of second gastral tergite with cross ribs; sting exerted.

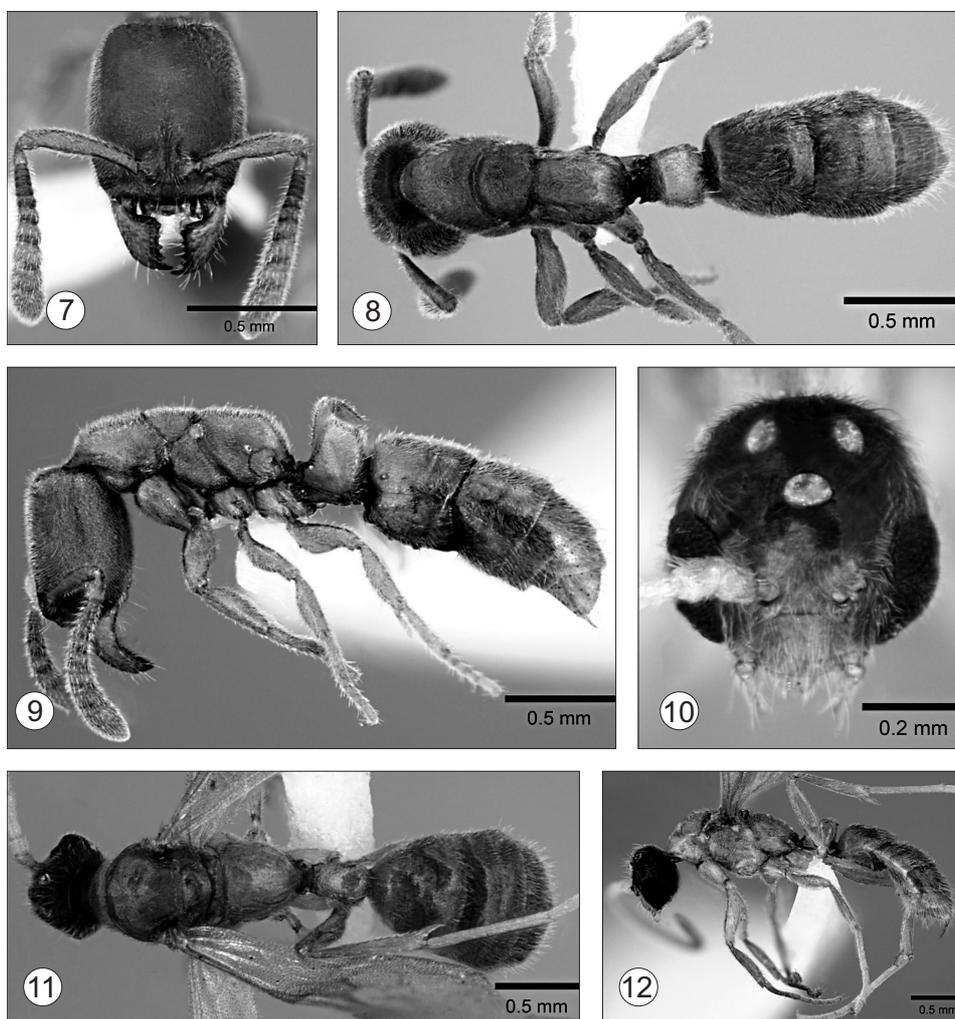
Sculpture: Head capsule sharply reticulate punctate; dorsal mesosomal sculpturing consists of punctures restricted mainly to sides. Petiole and gaster with superficial punctures, obviously much less strongly and densely sculptured than rest of the body. Mandible microreticulate at base with scattered punctures.

Pilosity: Dense; reclinate, suberect.

Colour: Reddish yellow; anterior margin of head and mandibular margins brown.

Male

Morphometric data: HL 580; HW 480; HS 530; WL 1070; PL 190; PW 260; PH 300; SL 90. Indices: CI 0.828; SI 0.188; LPI 0.633; DPI 1.263; OI 0.56 ($n = 1$).



Figs 7–12. *Ponera taylori* sp. n. 7–9 = worker: 7 = head, dorsal view; 8 = body, dorsal view; 9 = body, lateral view. 10–12 = male: 10 = head, dorsal view; 11 = body, dorsal view; 12 = body, lateral view

Head almost as broad as long, including the large compound eyes. Mandible reduced, triangular, without any dentition, apex simple and acute; basal cavity visible in full-face view. Antenna filiform, 13 segmented, antennal scrobe absent. Clypeus convex, its median portion entire without any emargination.

Notauli absent. Mesepimeron bearing distinct epimeral lobe. Jugal lobe of hind wing absent. Petiolar node in general shape as in worker, but more slender. Apical margin of abdominal tergum VIII projecting into sharp spine. Claws simple. Terminal abdominal sclerites and genitalia conforming to general plan for genus.

Sculpture much reduced, than that of workers. Head brown, eyes black; gaster reddish yellow, rest of body yellow.

Distribution and habitat – This species seems to be rare in the Shivalik range of Northwest Himalaya and was collected from three non-forested areas of the region each with a water body. The species was found along the edges of water body, twice under the large stones and once in soil sample.

Etymology. –The species is dedicated to Robert W. TAYLOR.

Remarks – *Ponera taylori* lacks posteroventral teeth of subpetiolar process, a character shared only by 2 Oriental species of *Ponera*: *P. nangongshana* from China and *P. yuhuang* from Taiwan. However, it is a blind species with reddish yellow colour, what well differentiates it from the latter which possess eyes and are brown in colour. *P. taylori*, further differentiates from *P. nangongshana* by the following combination of characters: apex of scape reaches occipital margin; antennal club 5 segmented; mandible possess 7 teeth with anterior margin of clypeus concave while in latter apex of scape fails to reach occipital margin; mandible with 3 enlarged apical teeth followed by a series of minute denticles and convex anterior margin of clypeus. *P. taylori* additionally separates from *P. yuhuang* by undifferentiated antennal club while in latter antennal club is 4 segmented; scapes in *P. yuhuang* also fail to reach the posterior margin of head. Morphometrically, *P. taylori* is a relatively larger species than *P. yuhuang* with HL 600–670; HW 560–610 and SL 430–460 whilst latter has HL 490; HW 400 and SL 330.

KEY TO SPECIES OF *PONERA* OF INDIA BASED ON WORKER CASTE

- Smaller species (HL 445.83±9.0, HW 418.33±5.8); eyes present; metanotal groove indistinct; posteroventral teeth of subpetiolar process present; colour reddish brown. ***P. indica* sp. n.**
- Larger species (HL 650.83±21.93, HW 585.45±19.68); eyes absent; metanotal groove distinct; posteroventral teeth of subpetiolar process absent; colour reddish yellow. ***P. taylori* sp. n.**

*

Acknowledgements – Financial assistance rendered by Ministry of Environment and Forests (Grant No. 14/10/2007-ERS/RE), Government of India, New Delhi is gratefully acknowledged.

REFERENCES

- BINGHAM, C. T. (1903) *The fauna of British India, including Ceylon and Burma. Hymenoptera. Vol. 2. Ants and Cuckoo-Wasps*. Taylor and Francis, London, 506 pp.
- BOLTON, B. (1995) *A new general catalogue of the ants of the World*. Harvard University Press, Cambridge, Massachusetts, 504 pp.
- BOLTON, B. (2012) Bolton's catalogue and synopsis. <http://gap.entclub.org/> [Accessed: 1 January 2012]
- BOLTON, B. & FISHER, B. L. (2011) Taxonomy of Afrotropical and West Palaearctic ants of the ponerine genus *Hypoponera* Santschi (Hymenoptera: Formicidae). *Zootaxa* **2843**: 1–118.
- BOLTON, B., ALPERT, G., WARD, P. S. & NASKRECKI, P. (2006) Bolton's catalogue of ants of the World: 1758–2005 [CD-ROM]. Harvard University Press, Cambridge, Massachusetts.
- CSÓSZ, S. & SEIFERT, B. (2003) *Ponera testacea* Emery, 1895 stat. nov. – A sister species of *P. coarctata* (Latreille, 1802) (Hymenoptera: Formicidae). *Acta Zoologica Academiae Scientiarum Hungaricae* **49**: 211–223.
- DLUSSKY, G. M. (2009) The ant subfamilies Ponerinae, Cerapachyinae and Pseudomyrmecinae in the Late Eocene ambers of Europe. *Paleontological Journal* **43**: 1043–1086.
- JERDON, T. C. (1851) A catalogue of the species of ants found in southern India. *Madras Journal of Literature and Science* **17**: 103–127.
- LATREILLE, P. A. (1804) Tableau méthodique des insectes. Classe huitième. Insectes, Insecta. *Nouveau Dictionnaire d'Histoire Naturelle* **24**: 129–200.
- PERRAULT, G. H. (1993) Peuplement en fourmis de l'atoll de Fangataufa. *Bulletin de la Société Entomologique de France* **98**: 323–338.
- TAYLOR, R. W. (1967) A monographic revision of the ant genus *Ponera* Latreille (Hymenoptera: Formicidae). *Pacific Insects Monographs* **13**: 1–112.
- TERAYAMA, M. (1986) Two new ants of the genus *Ponera* (Hymenoptera: Formicidae) from Taiwan. *Kontyû* **54**: 591–595.
- TERAYAMA, M. (1996) Taxonomic studies on the Japanese Formicidae, Part 2. Seven genera of Ponerinae, Cerapachyinae and Myrmicinae. *Nature and Human Activities* **1**: 9–32.
- TERAYAMA, M. (2009) A synopsis of the Family Formicidae of Taiwan (Insecta, Hymenoptera). *Liberal Arts, Research Bulletin of Kanto Gakuen University* **17**: 81–266.
- WHEELER, W. M. (1933) Three obscure genera of Ponerine ants. *American Museum Novitates* **672**: 1–23.
- XU, Z. (2001a) Four new species of the ant genus *Ponera* Latreille (Hymenoptera: Formicidae) from Yunnan, China. *Entomotaxonomia* **23**: 217–226.
- XU, Z. (2001b) A systematic study on the ant genus *Ponera* Latreille (Hymenoptera: Formicidae) of China. *Entomotaxonomia* **23**: 51–60.
- YOSHIMURA, M. & FISHER, B. L. (2007) A revision of male ants of the Malagasy region (Hymenoptera: Formicidae): Key to subfamilies and treatment of the genera of Ponerinae. *Zootaxa* **1654**: 21–40.
- ZHOU, S. Y. (2001) *Ants of Guangxi*. Guangxi Normal University Press, Guilin, China, 255 pp.

Revised version received January 12, 2012, accepted March 27, 2012, published August 10, 2012