

Four New Species of the Amblyoponine Ant Genus *Amblyopone* (Hymenoptera: Formicidae) from Southwestern China with a Key to the Known Asian Species

by

Zheng-Hui Xu¹ & Jiao-Jiao Chu¹

ABSTRACT

Four new species of the amblyoponine ant genus *Amblyopone* Erichson, 1842 collected from southwestern China are described, i.e. *A. kangba* sp. nov., *A. zoma* sp. nov., *A. meiliana* sp. nov., and *A. awa* sp. nov. The queen caste of *A. awa* sp. nov. is reported. Measurements are supplemented to *A. octodentata* Xu based on the newly collected specimens. A key to the 29 known Asian species of the genus is provided based on the worker caste. Illustrations are provided for each species except for *A. quadrata* (Karavaiev).

Key words: Hymenoptera: Formicidae, Amblyoponinae, *Amblyopone*, New species, Asian species.

INTRODUCTION

The amblyoponine ant genus *Amblyopone* Erichson, 1842 is widely distributed in the world tropics and temperate zones (Bolton 1995). Before this study, 72 living species were recorded in the world (Bolton 2012).

The Asian species of the genus were reported respectively by Mayr (1879), Emery (1895), Forel (1900, 1912, 1913), Bingham (1903), Wheeler & Chapman (1925), Wheeler (1928), Karavaiev (1935), Arnol'di (1968), Baroni Urbani (1978), Taylor (1965, 1979), Terayama (1987, 1989, 2009), Morisita et al. (1989), Wu & Wang (1992), Onoyama (1999), Xu (2001, 2006), Zhou (2001), Imai et al. (2003), and Bharti & Wachkoo (2011). Before this study, 25 species of the genus were recorded in Asia.

In the Ant Diversity Investigations of Southwestern China, 4 new species of *Amblyopone* were collected. The new species are described. The queen caste of *A. awa* sp. nov. is reported. Measurements are supplemented to *A. octodentata* Xu based on the newly collected specimens.

¹ Key Laboratory of Forest Disaster Warning and Control in Yunnan Province, College of Forestry, Southwest Forestry University, Kunming, Yunnan Province 650224, China, E-mail: xuzhenghui1962@163.com

In order to facilitate the identification of the species of *Amblyopone*, a key to the 29 known Asian species is provided based on the worker caste. Illustrations are provided for each species except for *A. quadrata* (Karavaiev).

MATERIALS AND METHODS

The worker and queen castes of the new species and *A. octodentata* Xu were collected by the sample-plot method. Descriptions and measurements were made under a XTB-1 stereo microscope with a micrometer. Illustrations of the new species were made under a Motic-700Z stereo microscope with illustrative equipment. Figures of most species were drawn from the Antweb images except for those cited from original descriptions.

Standard measurements and indices are as defined in Bolton (1975), in addition, ML, ED, and AL are supplemented:

TL-Total Length: The total outstretched length of the individual, from the mandibular apex to the gastral apex.

HL-Head Length: The straight-line length of the head in perfect full-face view, measured from the mid-point of the anterior clypeal margin to the mid-point of the occipital margin. In species where one or both of these margins is concave, the measurement is taken from the mid-point of a transverse line that spans the apices of the projecting portions.

HW-Head Width: The maximum width of the head in full face view, excluding the eyes.

CI-Cephalic Index = $HW \times 100 / HL$.

SL-Scape Length: The straight-line length of the antennal scape, excluding the basal constriction or neck.

SI-Scape Index = $SL \times 100 / HW$.

ML-Mandible Length: The straight-line length of the mandible measured from apex to the lateral base.

ED-Eye Diameter: The maximum diameter of the eye.

PW-Pronotal Width: The maximum width of the pronotum measured in dorsal view.

AL-Alitrunk Length: The diagonal length of the alitrunk in profile view, measured from the point at which the pronotum meets the cervical shield to the posterior basal angle of the metapleuron.

PL-Petiole Length: The length of the petiole measured in profile from the anterior process to the posteriormost point of the tergite, where it surrounds the gastral articulation.

PH-Petiole Height: The height of the petiole measured in profile from the apex of the ventral (subpetiolar) process vertically to a line intersecting the dorsalmost point of the node.

DPW-Dorsal Petiole Width: The maximum width of the petiole in dorsal view.

LPI-Lateral Petiole Index = $PH \times 100 / PL$.

DPI-Dorsal Petiole Index = $DPW \times 100 / PL$.

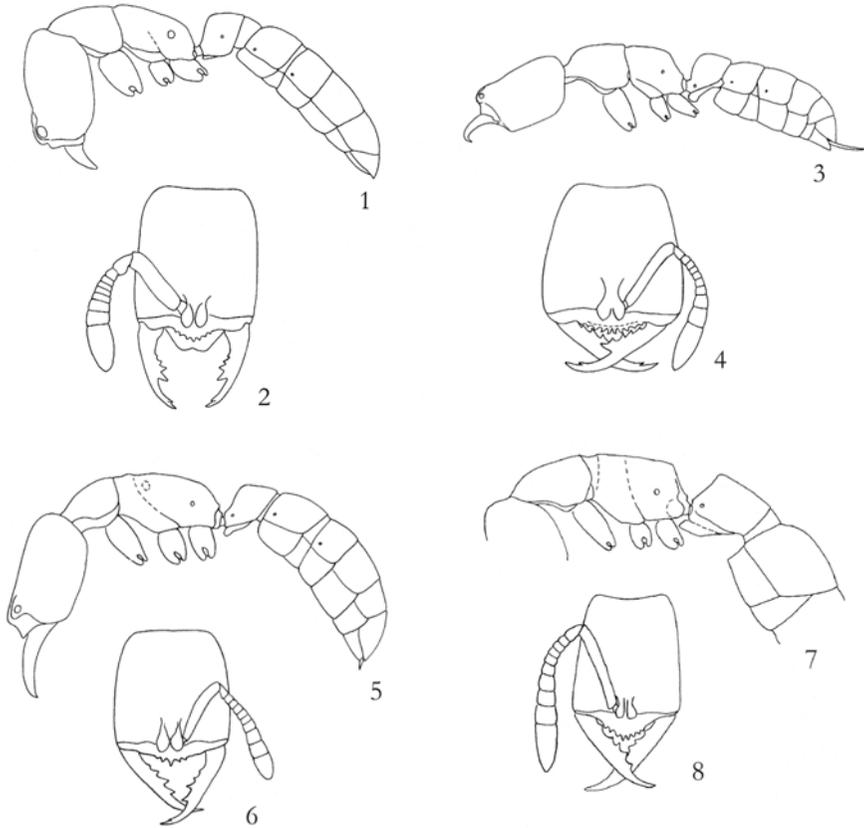
All measurements are expressed in millimeters.

The type specimens are deposited in the Insect Collection, Southwest Forestry University (SWFU), Kunming, Yunnan Province, China.

KEY TO KNOWN ASIAN SPECIES OF *AMBLYOPONE* BASED ON THE WORKER CASTE

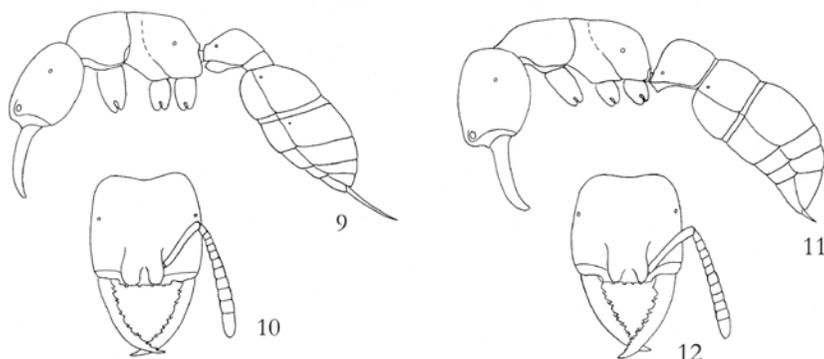
- 1 Antennae 10- or 11-segmented2
- Antennae 12-segmented5
- 2 Antennae 10-segmented (Japan) (Figs. 1-2).....*A. fulvida* Terayama
- Antennae 11-segmented3
- 3 In full-face view, head about as broad as long. Mandibles deeply split at third tooth counting from apex. In profile view, subpetiolar process short and broad, roughly square (India) (Figs. 3-4)*A. pertinax* Baroni Urbani
- In full-face view, head distinctly longer than broad. Mandibles not deeply split at third tooth counting from apex. In profile view, subpetiolar process long and narrow, slender4
- 4 In full-face view, anterior clypeal margin with 5 teeth. In profile view, posterodorsal corner of propodeum and anterodorsal corner of petiolar node rounded. Subpetiolar process oblique (Japan) (Figs. 5-6).....
- *A. caliginosa* Onoyama
- In full-face view, anterior clypeal margin with 8 teeth. In profile view, posterodorsal corner of propodeum and anterodorsal corner of petiolar node bluntly angled. Subpetiolar process horizontal (China: Taiwan) (Figs. 7-8).....*A. sakaii* Terayama
- 5 In full-face view, head nearly square, about as broad as long6

- In full-face view, head elongate trapezoidal, distinctly longer than broad... 12
- 6 In full-face view, anterior clypeal margin with 4-6 minute rectangular denticles7
- In full-face view, anterior clypeal margin with 10-16 triangular or rectangular denticles.....9



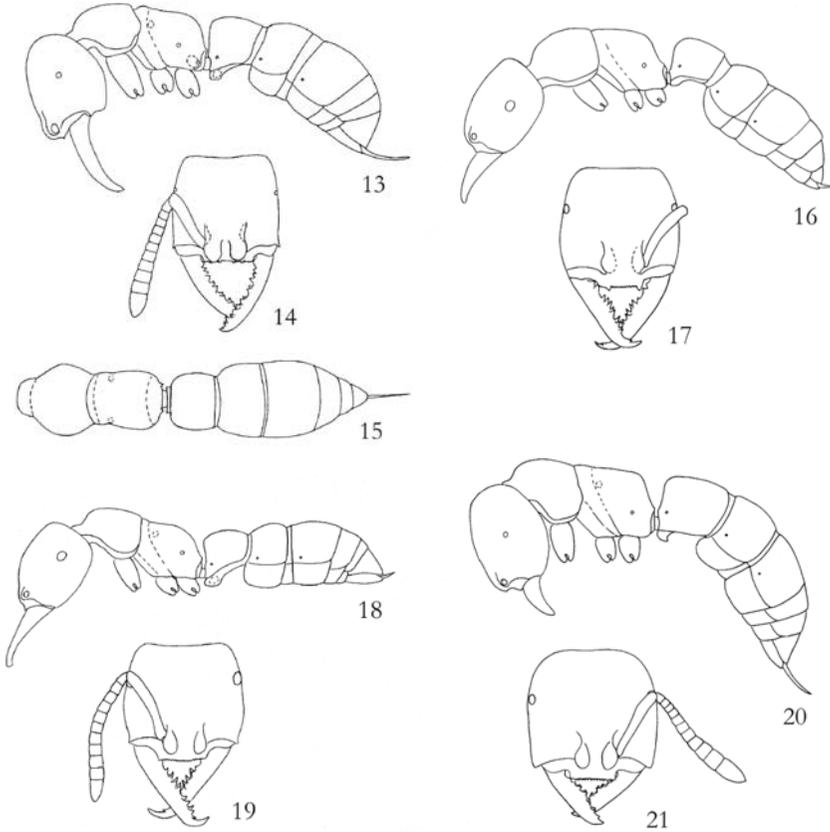
Figs. 1-8. 1-2: Worker of *Amblyopone fulvida* Terayama. 1. Head and body in profile view; 2. Head in full-face view. (Cited from Terayama 1987, slightly modified) 3-4: Worker of *Amblyopone pertinax* Baroni Urbani; 3. Head and body in profile view; 4. Head in full-face view. (Cited from Baroni Urbani 1978, slightly modified) 5-6: Worker of *Amblyopone caliginosa* Onoyama. 5. Head and body in profile view; 6. Head in full-face view. (Cited from Imai *et al.* 2003, slightly modified) 7-8: Worker of *Amblyopone sakaii* Terayama; 7. Head and body in profile view; 8. Head in full-face view. (Cited from Terayama 1989, slightly modified)

- 7 In profile view, anterodorsal corner of petiolar node bluntly angled; subpetiolar process roughly rectangular, anteroventral corner acutely angled (China: Guangxi) (Figs. 9-10) *A. eminia* Zhou
- In profile view, anterodorsal corner of petiolar node rounded, anterior face vertical to dorsal face; subpetiolar process triangular or square 8
- 8 In full-face view, occipital margin narrowly deeply concave in the middle. In profile view, subpetiolar process triangular (China: Hunan) (Figs. 11-12) *A. rubiginosa* Wu et Wang
- In full-face view, occipital margin widely weakly concave. In profile view, subpetiolar process roughly square (China: Tibet and Yunnan) (Figs. 13-15) *A. kangba* sp. nov.
- 9 In full-face view, anterior clypeal margin with about 10 denticles, and a large protruding tooth on each side (India) (Figs. 16-17).... *A. bellii* Forel
- In full-face view, anterior clypeal margin with 12-17 denticles, lateral sides without protruding large teeth..... 10
- 10 In full-face view, anterior clypeal margin with about 17 denticles. Eyes larger, with its diameter about as broad as the width of antennal scape (Indonesia) (Figs. 18-19)..... *A. reclinata* Mayr
- In full-face view, anterior clypeal margin with about 12 denticles. Eyes



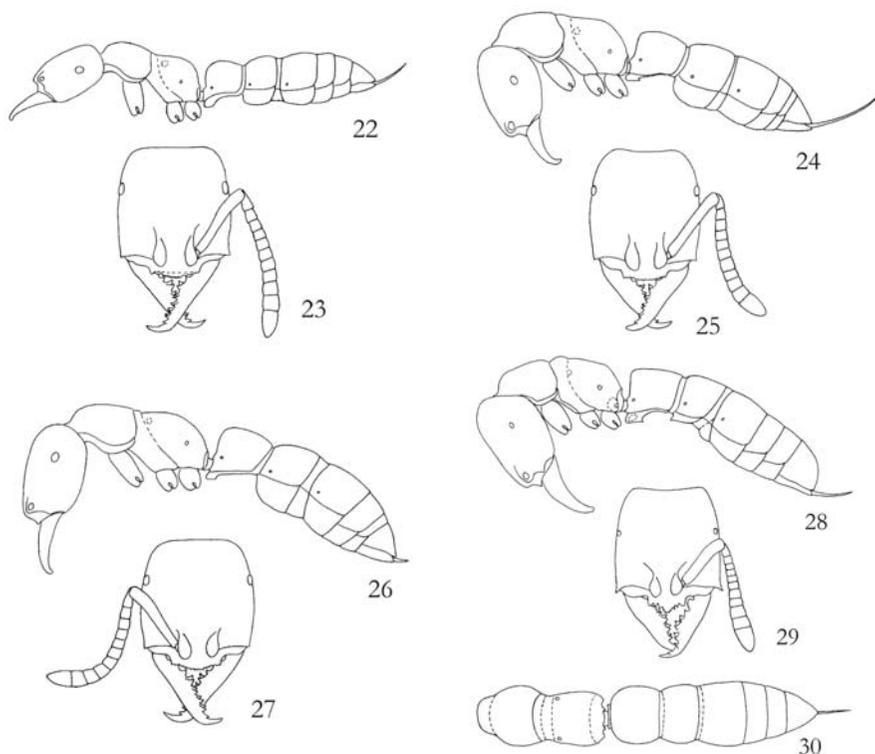
Figs. 9-12. 9-10: Worker of *Amblyopone eminia* Zhou; 9. Head and body in profile view; 10. Head in full-face view. (Cited from Zhou 2001, slightly modified). 11-12: Worker of *Amblyopone rubiginosa* Wu et Wang; 11. Head and body in profile view; 12. Head in full-face view. (Cited from Wu & Wang 1992, slightly modified)

- smaller, with its diameter narrower than the width of antennal scape.. 11
 11 In full-face view, anterior clypeal margin with about 12 rectangular den-
 ticles. Occipital corners rounded (China: Taiwan) (Figs. 20-21)
*A. bruni* (Forel)
 -- In full-face view, anterior clypeal margin with about 12 triangular denticles.



Figs. 13-21. 13-15: Worker of *Amblyopone kangba* sp. nov.; 13. Head and body in profile view; 14. Head in full-face view; 15. Body in dorsal view. 16-17: Worker of *Amblyopone bellii* Forel; 16. Head and body in profile view; 17. Head in full-face view. (Drawn from Antweb images). 18-19: Worker of *Amblyopone reclinata* Mayr; 18. Head and body in profile view; 19. Head in full-face view. (Drawn from Antweb images). 20-21: Worker of *Amblyopone bruni* (Forel); 20. Head and body in profile view; 21. Head in full-face view. (Drawn from Antweb images).

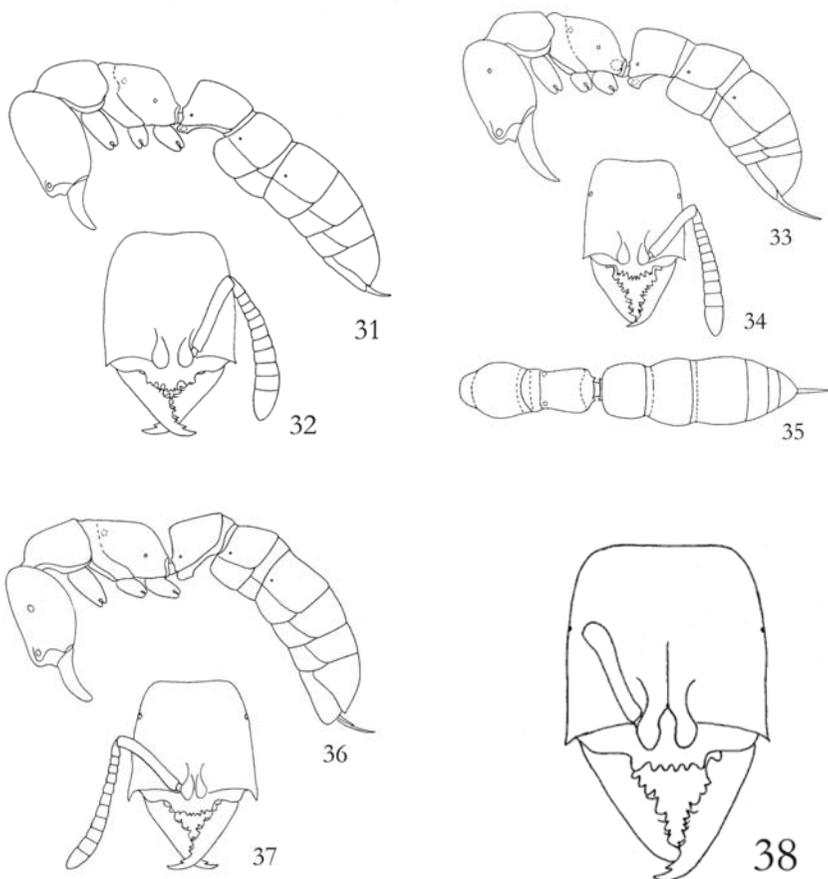
- Occipital corners blunt (Vietnam) *A. quadrata* (Karavaiev)
 12 Anterior clypeal margin with more than 10 denticles, the denticles not divided into lobes..... 13
 -- Anterior clypeal margin with less than 10 teeth or lobes, some teeth maybe divided into lobes..... 15
 13 Anterior clypeal margin with 10 denticles, and a large triangular tooth on each side (Myanmar) (Figs. 22-23)..... *A. feae* (Emery)
 -- Anterior clypeal margin with 12-15 denticles, lateral sides without large triangular teeth 14
 14 In full-face view, occipital margin weakly concave. Anterior clypeal margin



Figs. 22-30. 22-23: Worker of *Amblyopone feae* (Emery); 22. Head and body in profile view; 23. Head in full-face view. (Drawn from Antweb images) 24-25: Worker of *Amblyopone crenata* Xu; 24. Head and body in profile view; 25. Head in full-face view. (Drawn from Antweb images). 26-27: Worker of *Amblyopone rothneyi* Forel; 26. Head and body in profile view; 27. Head in full-face view. (Drawn from Antweb images). 28-30: Worker of *Amblyopone zoma* sp. nov.; 28. Head and body in profile view; 29. Head in full-face view; 30. Body in dorsal view.

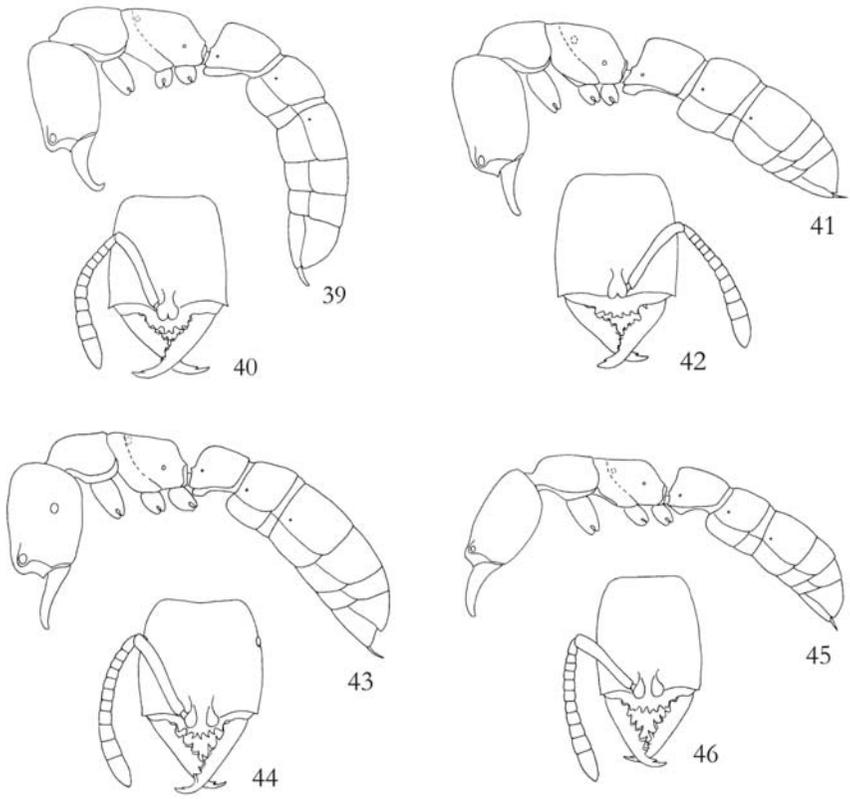
- with about 12 denticles. In profile view, anterodorsal corner of petiolar node bluntly angled. Posteroventral corner of subpetiolar process acutely toothed (China: Yunnan) (Figs. 24-25)..... *A. crenata* Xu
- In full-face view, occipital margin nearly straight. Anterior clypeal margin with about 15 denticles. In profile view, anterodorsal corner of petiolar node rounded. Posteroventral corner of subpetiolar process rightly angled (India) (Figs. 26-27) *A. rothneyi* Forel
- 15 Anterior clypeal margin with a broad large middle lobe, each side with 1 or 2 simple teeth and a narrow small lateral lobe 16
- Anterior clypeal margin without a broad large middle lobe, teeth simple or pairly combined at base 19
- 16 Anterior clypeal margin with 2 simple teeth between the middle and lateral lobes. The middle lobe truncated at apex, and with a small denticle on each side (China: Tibet) (Figs. 28-30)..... *A. zoma* sp. nov.
- Anterior clypeal margin with 1 simple tooth between the middle and lateral lobes. The middle lobe with 4 denticles..... 17
- 17 In full-face view, occipital margin narrowly weakly concave in the middle. Occipital corners rounded. Eyes absent (China: Yunnan) (Figs. 31-32) ..
..... *A. triloba* Xu
- In full-face view, occipital margin widely weakly concave. Occipital corners prominent. Eyes present 18
- 18 In full-face view, lateral sides of head nearly straight, anterolateral corner with a short tooth. Lateral lobes of anterior clypeal margin bifid at apex. Eyes each with 5 facets. In profile view, subpetiolar process roughly triangular (China: Yunnan) (Figs. 33-35)..... *A. meiliana* sp. nov.
- In full-face view, lateral sides of head weakly convex, anterolateral corner with a long tooth. Lateral lobes of anterior clypeal margin simple. Eyes each with about 18 facets. In profile view, subpetiolar process roughly rectangular (New Guinea) (Figs. 36-37)..... *A. noonadan* Taylor
- 19 Anterior clypeal margin with 6 teeth 20
- Anterior clypeal margin with 7-8 teeth 22
- 20 Anterior clypeal margin straight, with 6 isolated teeth, the lateral ones larger than the others (Vietnam) (Fig. 38) *A. amblyops* (Karavaiev)
- Anterior clypeal margin roundly convex, the median 2 teeth combined at

- base, the lateral ones not larger than the others..... 21
 21 The lateral 2 teeth of the anterior clypeal margin combined at base. Mandibles relatively narrow (New Guinea) (Figs. 39-40) ...*A. papuana* Taylor
 -- The lateral 2 teeth of the anterior clypeal margin isolated. Mandibles relatively broad (Indonesia) (Figs. 41-42)*A. minuta* (Forel)
 22 Anterior clypeal margin with 7 teeth. Anterolateral curve of clypeus with



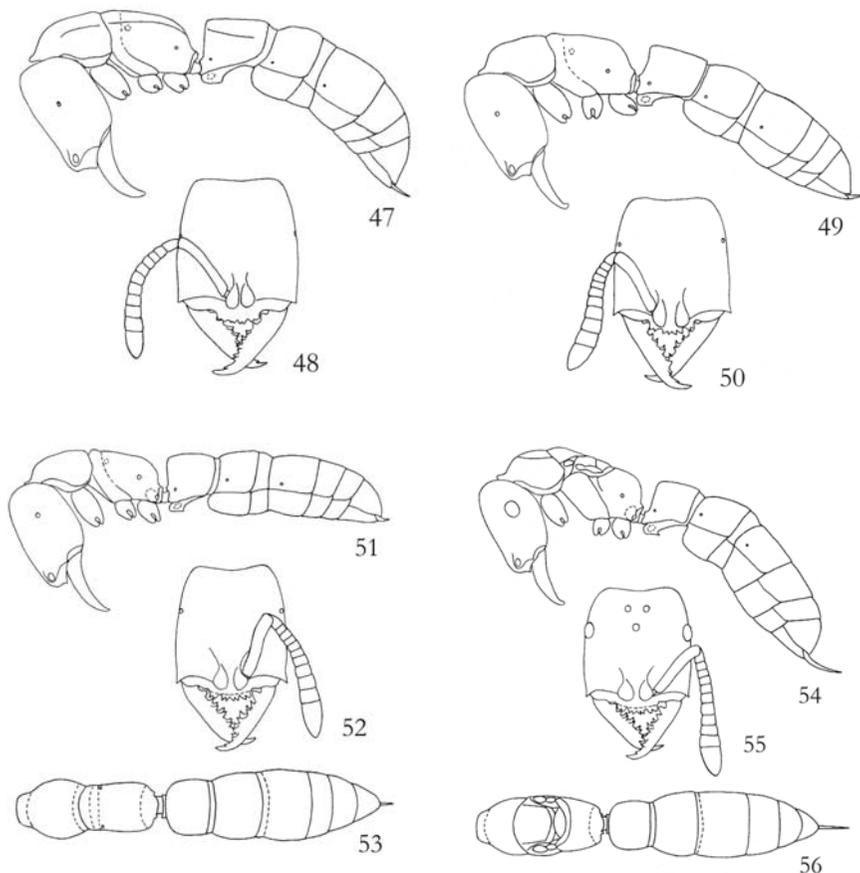
Figs.31-38. 31-32: Worker of *Amblyopone triloba* Xu; 31. Head and body in profile view; 32. Head in full-face view. (Drawn from Antweb images). 33-35: Worker of *Amblyopone meiliana* sp. nov.; 33. Head and body in profile view; 34. Head in full-face view; 35. Body in dorsal view. 36-37: Worker of *Amblyopone noonadan* Taylor; 36. Head and body in profile view; 37. Head in full-face view. (Drawn from Antweb images). 38: Worker of *Amblyopone amblyops* (Karavaiev), head in full-face view. (Cited from Karavaiev, 1935, slightly modified)

- a tooth 23
- Anterior clypeal margin with 8 teeth. Anterolateral curve of clypeus without a tooth 24
- 23 In full-face view, head weakly longer than broad. Eyes present. Anterior clypeal teeth isolated, not pairly combined. In profile view, anterodorsal corner of petiolar node rounded, subpetiolar process roughly rectangular (Israel) (Figs. 43-44)..... *A. ophthalmica* Baroni Urbani
- In full-face view, head strongly longer than broad. Eyes absent. Anterior



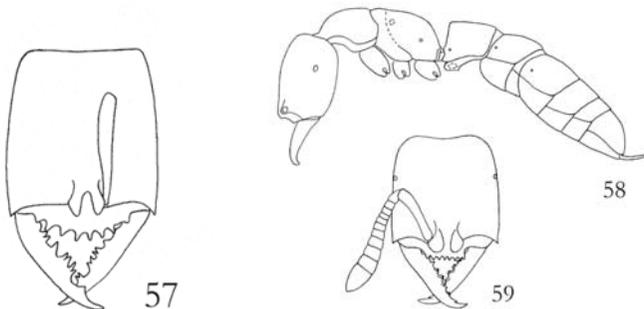
Figs. 39-46. 39-40: Worker of *Amblyopone papuana* Taylor; 39. Head and body in profile view; 40. Head in full-face view. (Drawn from Antweb images). Figs. 41-42: Worker of *Amblyopone minuta* (Forel); 41. Head and body in profile view; 42. Head in full-face view. (Drawn from Antweb images). 43-44: Worker of *Amblyopone ophthalmica* Baroni Urbani; 43. Head and body in profile view; 44. Head in full-face view. (Drawn from Antweb images). 45-46: Worker of *Amblyopone boltoni* Bharti et Wachkoo; 45. Head and body in profile view; 46. Head in full-face view. (Drawn from Antweb images)

- clypeal teeth pairly combined at base. In profile view, anterodorsal corner of petiolar node bluntly angled, subpetiolar process triangular (India) (Figs. 45-46) *A. boltoni* Bharti et Wachkoo 25
 24 Anterior clypeal teeth pairly combined at base..... 25
 -- Anterior clypeal teeth isolated, not pairly combined at base..... 27
 25 Dorsolateral sides of alitrunk and petiole strongly marginated (Philip-



Figs. 47-56. 47-48: Worker of *Amblyopone luzonica* (Wheeler et Chapman); 47. Head and body in profile view; 48. Head in full-face view. (Drawn from Antweb images). 49-50: Worker of *Amblyopone silvestrii* (Wheeler); 49. Head and body in profile view; 50. Head in full-face view. (Drawn from Antweb images). 51-53: Worker of *Amblyopone awa* sp. nov.; 51. Head and body in profile view; 52. Head in full-face view; 53. Body in dorsal view. 54-56: Queen of *Amblyopone awa* sp. nov.; 54. Head and body in profile view; 55. Head in full-face view; 56. Body in dorsal view.

- pines) (Figs. 47-48).....*A. luzonica* (Wheeler et Chapman)
 -- Dorsolateral sides of alitrunk and petiole rounded, not marginated..... 26
 26 In profile view, anterodorsal corner of petiolar node acutely angled, anterior
 face weakly concave, dorsal face straight (China: Zhejiang and Taiwan;
 Korea Peninsula, Japan) (Figs. 49-50)*A. silvestrii* (Wheeler)
 -- In profile view, anterodorsal corner of petiolar node rightly angled, anterior
 face straight, dorsal face weakly convex (China: Yunnan and Tibet) (Figs.
 51-56)*A. awa* sp. nov.
 27 Anterior clypeal margin roundly convex, the clypeal teeth decreased in
 length from middle to lateral sides (Turkmenia) (Fig. 57)
*A. annae* Arnol'di
 -- Anterior clypeal margin straight, the clypeal teeth with the similar
 length..... 28
 28 In full-face view, occipital corners rounded, lateral sides of head nearly
 straight. In profile view, posterodorsal corner of propodeum rounded.
 Anterior face of petiolar node straight (China: Yunnan) (Figs. 58-59)
*A. octodentata* Xu
 -- In full-face view, occipital corners prominent, lateral sides of head evenly
 convex. In profile view, posterodorsal corner of propodeum bluntly angled.
 Anterior face of petiolar node weakly concave (China: Taiwan) (Figs. 60-
 61)*A. zaojun* Terayama



Figs. 57-59. 57: Worker of *Amblyopone annae* Arnol'di, head in full-face view. (Cited from Arnol'di, 1968, slightly modified). 58-59: Worker of *Amblyopone octodentata* Xu; 58. Head and body in profile view; 59. Head in full-face view. (Drawn from Antweb images).

**DESCRIPTIONS OF NEW SPECIES AND
SUPPLEMENTARY MEASUREMENTS FOR
*A. OCTODENTATA***

Amblyopone kangba sp. nov.

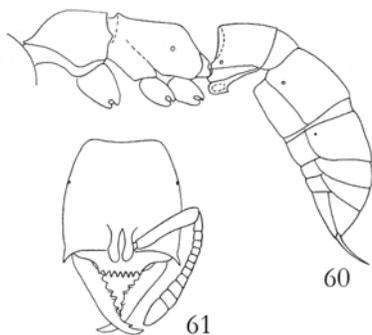
(Figs. 13-15)

Holotype worker: TL 6.7, HL 1.40, HW 1.40, CI 100, SL 0.80, SI 57, ED 0.10, ML 1.17, PW 0.93, AL 2.07, PL 0.70, PH 0.87, DPW 0.80, LPI 124, DPI 114.

In full-face view, head square, as broad as long, slightly widened forward. Occipital margin weakly widely concave, occipital corners bluntly angled. Lateral sides nearly straight. Anterolateral corners each with a reduced tiny tooth. Mandibles elongate and linear, masticatory margin very short, about 1/4 length of the inner margin, with 3 simple teeth; inner margin with 2 rows of curved teeth, each row with 6 teeth, the basal tooth large and triangular. Middle portion of anterior clypeal margin weakly protruding forward, slightly concave, with 4 tiny short rectangular denticles; anterolateral corners rightly angled. Frontal lobes slightly surpassed anterior clypeal margin. Antennae short, 12-segmented; apices of scapes reached to 2/3 of the distance from antennal sockets to occipital corners; funiculi incrassate toward apices. Eyes

small, located behind the midpoints of the lateral sides of head, each with about 9 facets.

In profile view, dorsum of alitrunk weakly convex, pronotum weakly convex, pronotum notched. Mesonotum short and convex. Metanotal groove absent. Dorsum of propodeum nearly straight, about 1.5 times as long as declivity, posterodorsal corner rounded, declivity weakly convex. Dorsal face of petiole weakly convex, anterior face straight, anterodorsal corner bluntly



Figs. 60-61: Worker of *Amblyopone zaojun* Terayama; 60. Head and body in profile view; 61. Head in full-face view. (Cited from Terayama, 2009, slightly modified)

angled; ventral face oblique and weakly concave, subpetiolar process roughly square, with a circular sub-transparent fenestra. Constriction between the two basal gastral segments distinct, sting strong and extruding.

In dorsal view, mesothorax constricted, mesonotum very short. Propodeal declivity weakly concave. Petiole broader than long, width : length = 1.2:1.

Mandibles longitudinally striate. Head with fine elongate reticulations. Dorsal faces of alitrunk, petiole, and gaster sparsely punctured, the punctures decreased in diameter from alitrunk to gaster, interfaces smooth and shining. The longitudinal middle strip of pronotum without punctures. Lateral sides of alitrunk, petiole, and gaster densely punctured; lateral sides of mesothorax and metathorax longitudinally striate. Dorsal surfaces of head and body with abundant suberect short hairs and dense decumbent pubescence. Scapes and hind tibiae with sparse suberect hairs and dense decumbent pubescence. Color reddish brown. Occiput blackish brown. Antennae and legs yellowish brown.

Paratype workers: TL 6.5-7.0, HL 1.33-1.40, HW 1.33-1.40, CI 100-102, SL 0.77-0.83, SI 57-60, ED 0.07-0.08, ML 1.17-1.23, PW 0.87-0.97, AL 1.93-2.07, PL 0.67-0.77, PH 0.87-0.90, DPW 0.78-0.83, LPI 117-130, DPI 109-118 (4 individual measured). As holotype, but middle portion of anterior clypeal margin with 4-6 tiny rectangular denticles; Color yellowish brown to reddish brown.

Holotype: worker, China: Tibet, Zayu County, Zhuwagen Town, Cibaqiao, 1750m, 2010.VIII. 30, collected from a soil sample in the forest of *Pinus yunnanensis* (Pinaceae), Xia Liu leg., No.A10-3405.

Paratypes: 2 workers, with the same data as holotype; 2 workers, China: Yunnan Province, Xichou County, Xisa Town, Jiaokui Village, 1480m, 2010. III.31, collected from a soil sample in the forest of *Cyclobalanopsis glaucooides* (Fagaceae), Zheng-Hui Xu leg., No.A10-1763.

Comparison notes: This new species is close to *A. rubiginosa* Wu et Wang, but in full-face view, occipital margin widely weakly concave, occipital corners bluntly angled; in profile view, subpetiolar process roughly square.

Etymology: The new species is named after a race of the Tibetan people “Kangba” who live in the southwestern Tibet.

Amblyopone zoma sp. nov.
(Figs. 28-30)

Holotype worker: TL 4.5, HL 1.00, HW 0.85, CI 85, SL 0.48, SI 56, ED 0.05, ML 0.68, PW 0.58, AL 1.25, PL 0.48, PH 0.55, DPW 0.55, LPI 116, DPI 100.

In full-face view, head roughly trapezoidal, widened forward and longer than broad. Occipital margin widely weakly concave, occipital corners bluntly angled. Lateral sides weakly convex. Anterolateral corners acutely toothed. Mandibles elongate triangular, masticatory margin with a long apical tooth, a short subapical tooth, and 3 pairs of curved teeth; inner margin about as long as masticatory margin, with a pair of curved teeth, a short subbasal tooth, and a large basal tooth. Anterior clypeal margin roughly triangularly protruding, with a large middle lobe, and 3 teeth on each side, the most lateral tooth large and lobe-like; the large middle lobe truncated at apex, with a small denticle on each side. Antennae short, 12-segmented; apices of scapes reached to 4/7 of the distance from antennal sockets to occipital corners; funiculi incrassate toward apex. Eyes small, each with about 6 facets, and located behind the midpoints of the lateral sides of head.

In profile view, pronotum weakly convex. Promesonotal suture deeply notched. Mesonotum short and convex. Metanotal groove absent. Propodeal dorsum straight, about 1.5 times as long as declivity; posterodorsal corner very bluntly angled; declivity nearly straight. Dorsal and anterior faces of petiole nearly straight, anterodorsal corner nearly rightly angled; ventral face oblique and weakly concave; Subpetiolar process roughly rectangular, with a large elliptical sub-transparent fenestra, anteroventral corner prominent, ventral face straight, posteroventral corner toothed. Sternite of the first gastral segment ill developed, anteroventral corner toothed, and the segment looks narrower.

In dorsal view, mesothorax constricted. Propodeum widened backward. Petiole broader than long, width : length = 1.2:1, anterior and lateral sides weakly convex.

Mandibles longitudinally striate. Head densely punctured, interfaces appear as micro-reticulations. Pronotum densely punctured. Mesonotum, propodeum, petiole, and first gastral segment abundantly punctured. The

middle longitudinal narrow strip on alitrunk without punctures. Lateral sides of mesothorax, metathorax, and propodeum longitudinally striate. Gastral segments 2-5 finely sparsely punctured. Dorsal surfaces of head and body with dense subdecumbent pubescence, gaster with sparse suberect hairs and dense subdecumbent pubescence. Scapes with sparse suberect hairs and dense decumbent pubescence. Tibiae with dense decumbent pubescence. Head brown, eyes grey. Body yellowish brown, legs yellow.

Holotype: worker, China: Tibet, Medog County, Beibeng Town, Gangouhe, 740m, 2011.VII.19, collected from a soil sample in the valley tropical rainforest, Zheng-Hui Xu leg., No. A11-3676.

Comparison notes: This new species is close to *A. triloba* Xu, but in full-face view, occipital corners bluntly angled; eyes present, each with about 6 facets; anterior clypeal margin with 2 simple teeth between the middle and lateral lobes; the middle lobe truncated at apex, and with a small denticle on each side; the lateral lobes simple, not bifid at apex.

Etymology: The new species is named after a common female name "Zoma" widely used in Tibet.

Amblyopone meiliana sp. nov.

(Figs. 33-35)

Holotype worker: TL 4.9, HL 1.10, HW 0.95, CI 86, SL 0.63, SI 66, ED 0.05, ML 0.78, PW 0.63, AL 1.50, PL 0.53, PH 0.60, DPW 0.60, LPI 114, DPI 100.

In full-face view, head roughly trapezoidal, widened forward and longer than broad. Occipital margin widely weakly concave, occipital corners rounded. Lateral sides nearly straight, anterolateral corners acutely toothed. Mandibles elongate, masticatory margin about as long as inner margin, with a long apical tooth, a short subapical tooth, and 3 pairs of curved teeth; inner margin with a pair of curved teeth, a short subbasal tooth, and a large basal tooth. Anterior clypeal margin roundly convex, with a broad middle lobe, a narrow lobe on each side, and a simple tooth between the middle and lateral lobes; the broad middle lobe with 4 denticles at apex, the lateral lobes slightly bifid at apices. Antennae short, 12-segmented; apices of scapes reached to 2/3 of

the distance from antennal sockets to occipital corners; funiculi incrassate toward apex. Eyes small, each with 5 facets, and located well behind the midpoints of the lateral sides of head.

In profile view, posterior 2/3 of pronotum nearly straight, mesonotum short and convex. Promesonotal suture distinctly notched, metanotal groove weakly depressed. Propodeal dorsum straight, about 1.5 times as long as declivity, posterodorsal corner rounded, declivity nearly straight. Petiole roughly trapezoidal, dorsal and anterior faces nearly straight, anterodorsal corner rounded; ventral face oblique and weakly concave. Subpetiolar process nearly triangular, with a large circular sub-transparent fenestra, anterior face rounded, ventral face straight, posteroventral corner rightly angled.

In dorsal view, mesothorax constricted. Propodeum widened backward. Petiole slightly broader than long, width : length = 1.1:1, anterior and lateral sides weakly convex.

Mandibles and clypeus longitudinally striate. Head densely punctured, interfaces appear as micro-reticulations. Dorsal face of alitrunk densely punctured, the longitudinal middle strip on pronotum and propodeum smooth and shining. Lateral sides of pronotum transversely striate. Lateral sides of mesothorax, metathorax, and propodeum longitudinally striate. Declivity nearly smooth. Dorsal faces of petiole and gaster smooth, lateral sides of petiole finely reticulate, lateral sides of gaster finely punctured. Dorsal surfaces of head and body with sparse suberect short hairs and dense decumbent pubescence. Scapes and tibiae with sparse suberect hairs and dense decumbent pubescence. Color reddish brown. Eyes blackish. Legs yellowish brown.

Holotype: worker, China: Yunnan Province, Deqin County, Yunling Town, Mingyong Village, 3250m, 2004.X.10, collected from a ground sample in the conifer-broad leaf mixed forest on the east slope of the Snow Mt. Meili, Sheng-Li Shi leg., No. A04-536.

Comparison notes: This new species is close to *A. triloba* Xu, but in full-face view, occipital margin widely weakly concave, occipital corners more prominent; lateral sides of head nearly straight; eyes present, each with 5 facets; in profile view, subpetiolar process roughly triangular.

Etymology: The new species is named after the type locality “Snow Mt. Meili”, the highest mountain in Yunnan Province.

Amblyopone awa sp. nov.
(Figs. 51-56)

Holotype worker (Figs. 51-53): TL 3.8, HL 0.80, HW 0.68, CI 84, SL 0.40, SI 59, ED 0.03, ML 0.55, PW 0.45, AL 1.05, PL 0.38, PH 0.43, DPW 0.43, LPI 113, DPI 113.

In full-face view, head roughly trapezoidal, widened forward and longer than broad. Occipital margin widely weakly concave, occipital corners bluntly angled. Lateral sides weakly convex, anterolateral corners acutely toothed. Mandibles elongate, masticatory margin with a long apical tooth, a short subapical tooth, and 3 pairs of curved teeth; inner margin about as long as masticatory margin, with a pair of curved teeth, a short subbasal tooth, and a large basal tooth. Anterior clypeal margin with 8 teeth, which combined into 4 pairs. Antennae short, 12-segmented; apices of scapes reached to about 2/3 of the distance from antennal sockets to occipital corners; funiculi incrassate toward apex. Eyes very small, each with 3 facets, and located well behind the midpoints of the lateral sides of head.

In profile view, pronotum weakly convex. Promesonotal suture distinctly notched. Mesonotum short and convex. Metanotal groove absent. Propodeal dorsum straight, about 2 times as long as declivity, posterodorsal corner rounded, declivity weakly convex. Petiole trapezoidal, dorsal and anterior faces nearly straight, anterodorsal corner close to a right angle; ventral face oblique, nearly straight; subpetiolar process roughly rectangular, with a large elliptical sub-transparent fenestra, ventral face straight, posteroventral corner rightly angled.

In dorsal view, mesothorax constricted. Propodeum slightly widened backward. Propodeal declivity longitudinally concave. Petiole broader than long, width : length = 1.25:1, anterior and lateral sides weakly convex.

Mandibles longitudinally striate. Head densely punctured, interfaces appear as micro-reticulations. Pronotum densely punctured, the narrow longitudinal middle strip without punctures. Dorsa of mesonotum and propodeum abundantly punctured. Lateral sides of mesothorax and metathorax finely longitudinally striate. Petiole and gaster finely sparsely punctured. Dorsal surfaces of head and body with sparse suberect short hairs and dense decumbent pubescence. Scapes with sparse suberect hairs and dense decumbent pubes-

cence. Tibiae with dense decumbent pubescence, but without suberect hairs. Color reddish brown. Eyes black. Antennae and legs yellowish brown.

Paratype workers: TL 3.6-4.2, HL 0.78-0.90, HW 0.65-0.75, CI 81-90, SL 0.40-0.48, SI 57-63, ED 0.03-0.04, ML 0.53-0.60, PW 0.43-0.50, AL 1.03-1.20, PL 0.38-0.45, PH 0.43-0.48, DPW 0.41-0.48, LPI 106-113, DPI 103-113 (5 individuals measured). As holotype, but eyes with 3-6 facets; posteroventral corner of subpetiolar process toothed or bluntly angled; head and alitrunk reddish brown to blakish brown.

Paratype queens (Figs. 54-56): TL 4.0-4.1, HL 0.80-0.85, HW 0.70-0.75, CI 88, SL 0.40-0.43, SI 57, ED 0.13, ML 0.55-0.68, PW 0.53-0.55, AL 1.18-1.25, PL 0.40-0.45, PH 0.45-0.48, DPW 0.45-0.48, LPI 106-113, DPI 106-113 (2 individuals measured). Similar to holotype worker, but body feebly larger, vertex with 3 ocelli. Eyes large, each with about 45 facets. Mesonotum large in volume, tegulae present. In dorsal view, anterior margin of mesonotum roundly convex, scutum with a pair of posteriorly convergent longitudinal furrows, posterior margin roundly convex. Scutellum rhombus, both anterior and posterior margins roundly convex. Metascutum narrow and posteriorly arched. In profile view, posteroventral corner of subpetiolar process acutely toothed.

Holotype: worker, China: Yunnan Province, Cangyuan County, Banlao Town, Huguang Village, 1720m, 2011.III.17, collected from a soil sample in the monsoon evergreen broad-leaf forest, Yong-Qiang Hao leg., No. A11-855.

Paratypes: 1 worker, 1 queen, with the same data as holotype; 1 worker, China: Yunnan Province, Cangyuan County, Banhong Town, Nanban Village, 1250m, 2011.III.17, collected from a ground sample in the monsoon evergreen broad-leaf forest, Yong-Qiang Hao leg., No. A11-927; 1 worker, China: Yunnan Province, Ximeng County, Lisuo Town, Nankang Village, 740m, 2011.III.22, collected from a soil sample in the valley tropical rainforest, Li Zhang leg., No. A11-1671; 2 workers, 1 queen, China: Tibet, Linzhi County, Lulang Town, Zhaqu Village, 2380m, 2007.IX.25, collected inside decayed wood in the broad-leaf forest, Zheng-Hui Xu leg., No. A07-432.

Comparison notes: This new species is close to *A. silvestrii* (Wheeler), but in profile view, anterodorsal corner of petiolar node rightly angled, anterior face straight, dorsal face weakly convex; body smaller with TL 3.6-4.2 mm.

Etymology: The new species is named after an intimate call “Awa” of the minority nationality “Wa” people who commonly live in the area of the holotype locality.

***Amblyopone octodentata* Xu**
(Figs. 58-59)

Workers: TL 4.8-5.8, HL 1.03-1.38, HW 0.90-1.13, CI 82-91, SL 0.55-0.75, SI 58-67, ED 0.04-0.08, ML 0.75-1.10, PW 0.60-0.75, AL 1.38-1.70, PL 0.55-0.68, PH 0.58-0.68, DPW 0.53-0.68, LPI 100-114, DPI 95-109 (10 individuals measured). Well conform to the original description.

Specimens observed: 9 workers, China: Yunnan Province, Zhenxiong County, Wufeng Town, Shangjie Village, 1750m, 2009.IV.01, collected from a ground sample in the forest of *Cunninghamia lanceolata* (Taxodiaceae), Zhi-Feng Chen leg., No. A09-1322; 1 worker, China: Yunnan Province, Yongshan County, Xisha Town, Yangpu Village, 1000m, 2009.III.26, collected from a soil sample in the deciduous broad-leaf forest, Li-Mei Li leg., No. A09-735.

ACKNOWLEDGMENTS

This study is supported by the National Natural Science Foundation of China (Nos. 30260016, 30870333), Rapid Assessment Program of Biodiversity organized by Peking University, and the Key Subject of Forest Protection of Yunnan Province.

We thank the following persons or Institutions for their special help in this study: Miss Xia Liu (PhD Candidate of Forest Protection, Beijing Forestry University, Beijing), Mr. Sheng-Li Shi (Postgraduate of Forest Protection, Southwest Forestry University, Kunming), Miss Li-Mei Li & Mr. Zhi-Feng Chen (Students of Forest Protection Class 2005, Southwest Forestry University, Kunming), Miss Li Zhang & Mr. Yong-Qiang Hao (Students of Forest Protection Class 2007, Southwest Forestry University, Kunming) who collected the type specimens with us; Mr. Himender Bharti (Punjabi University, Patiala) who supplied a valuable paper; Mr. Konstantin Vladamirovitch Arnol'di (Anim. Acad. Sci. USSR, Moscow), Mr. Cesare Baroni Urbani (Naturhistorisches Museum, Basel), Mr. Vladimir Aphanasjevich Karavaiev (Conservator of the Zoological Museum of the Ukranian Academy of Science in Kiew), Mr. Hirotami T. Imai *et al.* (Myrmecological Society of Japan,

Tokyo), Mr. Mamoru Terayama (2-12-29-3, Naka-Cho, Iwatsuki, 339-0054, Japan), Mrs. Jiang Wu & Chang-Lu Wang (Chinese Academy of Forestry, Beijing), and Mr. Shan-Yi Zhou (Guangxi Normal University, Guilin) who granted permission to cite figures in their papers; California Academy of Sciences (San Francisco) who permitted the use of the images on the Antweb (<http://www.antweb.org/>).

REFERENCES

- Arnol'di, K. V. 1968. Vazhnye dopolneniya k mirmekofaune SSSR i opisaniye novykh form. *Zoologicheskii Zhurnal* 47: 1800-1822.
- Baroni Urbani, C. 1978. Contributo alla conoscenza del genere *Amblyopone* Erichson. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 51: 39-51.
- Bharti, H. & A. A. Wachkoo 2011. *Amblyopone boltoni*, a new ant species (Hymenoptera: Formicidae) from India. *Sociobiology* 58(3): 585-591.
- Bingham, C. T. 1903. The fauna of British India, including Ceylon and Burma. Hymenoptera 2. Ants and Cuckoo-Wasps: 506 pp. Taylor & Francis, London.
- 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. 1995. A New General Catalogue of the Ants of the World: 504 pp. Harvard University Press, Cambridge, Mass.
- Bolton, B. 2012. An Online Catalog of the Ants of the World. <http://www.antcat.org/>.
- Emery, C. 1895. Viaggio di Leonardo Fea in Birmania e regioni vicine. 63. Formiche di Birmania, del Tenasserim e dei Monti Carin, raccolte da L. Fea. *Annali del Museo Civico di Storia Naturale di Genova* (2) 14 [34] (1894): 450-483.
- Erichson, W. F. 1842. Beitrag zur Insecten-Fauna von Vandiemensland, mit besonderer Berücksichtigung der geographischen Verbreitung der Insecten. *Archiv für Naturgeschichte* 8: 83-287.
- Forel, A. 1900. Les formicides de l'Empire des Indes et de Ceylan. Part 6. 3me sous famille Ponerinae. *Journal of the Bombay Natural History Society* 13: 52-65.
- Forel, A. 1912. H. Sauter's Formosa-Ausbeute: Formicidae. *Entomologische Mitteilungen* 1: 45-81.
- Forel, A. 1913. Wissenschaftliche Ergebnisse einer Forschungsreise nach Ostindien, ausgeführt im Auftrage der Kgl. Preuss. Akademie der Wissenschaften zu Berlin von H. v. Buttel-Reepen. 2. Ameisen aus Sumatra, Java, Malacca und Ceylon. Gesammelt von Herrn Prof. Dr. v. Buttel-Reepen in den Jahren 1911-1912. *Zoologische Jahrbücher. Abteilung für Systematik, Geographie und Biologie der Tiere* 36: 1-148.
- Imai, H. T., A. Kihara, M. Kondoh, M. Kubota, S. Kuribayashi, K. Ogata, K. Onoyama, R. W. Taylor, M. Terayama, M. Yoshimura & Y. Ugawa 2003. *Ants of Japan*: 224 pp. Gakken, Japan.

- Karavaiev, V. 1935. Neue Ameisen aus dem Indo-Australischen Gebiet, nebst Revision einiger Formen. *Treubia* 15: 57-118.
- Mayr, G. 1879. Beiträge zur Ameisen-Fauna Asiens. Verhandlungen der k. k. Zoologisch-Botanischen Gesellschaft in Wien 28 (1878): 645-686.
- Morisita, M., M. Kubota, K. Onoyama, K. Ogata, M. Terayama, M. Kondoh & H. T. Imai 1989. A guide for the identification of Japanese ants. 1. Ponerinae, Cerapachyinae, Pseudomyrmecinae, Dorylinae and Leptanillinae: 42 pp. Myrmecological Society of Japan, Tokyo.
- Onoyama, K. 1999. A new and a newly recorded species of the ant genus *Amblyopone* from Japan. *Entomological Science* 2: 157-161.
- Taylor, R. W. 1965. New Melanesian ants of the genera *Simopone* and *Amblyopone* of zoogeographical significance. *Breviora* 221: 1-11.
- Taylor, R. W. 1979. Melanesian ants of the genus *Amblyopone*. *Australian Journal of Zoology* 26 (1978): 823-839.
- Terayama, M. 1987. A new species of *Amblyopone* from Japan. *Edaphologia* 36: 31-33.
- Terayama, M. 1989. The ant tribe Amblyoponini of Taiwan, with description of a new species. *Japanese Journal of Entomology* 57: 343-346.
- Terayama, M. 2009. A synopsis of the family Formicidae of Taiwan. *Research Bulletin of Kanto Gakuen University* 17: 81-266.
- Wheeler, W. M. 1928. Ants collected by Professor F. Silvestri in Japan and Korea. *Bollettino del Laboratorio di Zoologia generale e agraria del R. Istituto Superiore agrario di Portici* 22: 96-125.
- Wheeler, W. M. & J. W. Chapman 1925. The ants of the Philippine Islands. Part 1. Dorylinae and Ponerinae. *Philippine Journal of Science* 28: 49-73.
- Wu, J. & C. Wang 1992. Formicidae. *In*: Peng, J. et al. (eds.). *Iconography of Forest Insects in Hunan, China*. Forest Bureau of Hunan Province. Hunan Scientific and Technical Publishing House, Changsha: 1301-1320.
- Xu, Z. 2001. A systematic study on the ant genus *Amblyopone* Erichson from China. *Acta Zootaxonomica Sinica* 26: 551-556.
- Xu, Z. 2006. Three new species of the ant genera *Amblyopone* Erichson, 1842 and *Proceratium* Roger, 1863 from Yunnan, China. *Myrmecologische Nachrichten* 8: 151-155.
- Zhou, S. 2001. *Ants of Guangxi*. Guangxi Normal University Press, Guilin, China: 255 pp.

