

***Vombisidris tibeta*, a New Myrmicine Ant Species from Tibet, China with a Key to the Known Species of *Vombisidris* Bolton of the World (Hymenoptera: Formicidae)**

by

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ABSTRACT

Seventeen species of the myrmicine ant genus *Vombisidris* Bolton are recognized in the world. A new species collected from the south slope of Himalaya Mountain, *V. tibeta* sp. nov., is described. A key to the 17 known species of the genus is provided based on the worker caste. Illustrations are provided for each species.

Key words: Hymenoptera, Formicidae, *Vombisidris*, new species, key.

INTRODUCTION

Since the establishment of the myrmicine ant genus *Vombisidris* Bolton (1991), 16 species of the genus were recorded in the world (Bolton, 1995, 2012). Firstly, 9 species of the genus were described by Bolton (1991) with the erection of the genus. Secondly, 3 species described in other genus before 1991 were transferred to *Vombisidris* by Bolton (1991), i.e. *Leptothorax australis* Wheeler, 1934, *L. bilongrudi* Taylor, 1989, and *L. renateae* Taylor, 1989. Thirdly, 1 species described in other genus, *Atopula jacobsoni* Forel, 1915, was transferred to *Vombisidris* by Bolton (1995, 2003) and Sorger (2011). Fourthly, 3 species of the genus were described after 1991, i.e. *Vombisidris humboldticola* Zacharias et Rajan, 2004, *V. umbrabdomina* Huang et Zhou, 2006, and *V. philippina* Zettel et Sorger, 2010.

It is difficult to have a complete grasp of the total 16 species of the genus due to the following shortcomings. Firstly, the detailed information of *Atopula jacobsoni* Forel, 1915, was excluded from the papers of Taylor (1989) and Bolton (1991). Fortunately, Sorger (2011) had sufficiently improved the description and illustrations of the species. Secondly, Bolton (1991)

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provided good illustrations and descriptions for the profile characters of the 9 species described, but without illustrations and good descriptions of the full face characters of the head, which are very useful for the identification of the species. Thirdly, the other 3 species described after 1991 were published separately and without a key relating them to the formerly known ones, and the profile figure of *V. humboldticola* Zacharias et Rajan is not clear.

So, it is necessary to produce a good key with sufficient illustrations for the known species of the genus, in order to facilitate identification of the species. Recently, the high quality images of 9 species of the genus are presented on the AntWeb and Antbase, which provides as good references for the preparation of the key.

In the Ant Diversity Investigation of Southeastern Tibet, a new species of *Vombisidris* was found in the valley tropical rainforest of Medog County, the south slope of the Himalaya Mountain. The new species is described. A key to the 17 known species of the genus of the world is provided based on the worker caste. However, illustrations of the worker caste of *V. australis* (Wheeler), and illustrations of the full face head of *V. harpeza* Bolton, *V. lochme* Bolton, *V. occidua* Bolton, and *V. humboldticola* Zacharias et Rajan are still absent from this paper.

MATERIALS AND METHODS

The worker caste of *V. tibeta* sp. nov. was collected by the sample-plot method. Descriptions and measurements were made under a XTB-1 stereo microscope with a micrometer. Illustrations were made under a Motic-700Z stereo microscope with illustrative equipment.

Standard measurements and indices are as defined in Bolton (1987), in addition, ED is supplemented:

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

HL-Head Length: The length of the head proper, excluding the mandibles, measured in a straight line from the mid-point of the anterior clypeal margin to the mid-point of the occipital margin, in full-face view. In species where the occipital margin or the clypeal margin is concave, the measurement is

taken from the mid-point of a transverse line spanning the anteriormost or posteriormost projecting points, respectively.

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 maximum straight-line length of the antennal scape excluding the basal constriction or neck close to the condylar bulb.

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

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

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

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

All measurements are expressed in millimeters.

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

Illustrations of the worker caste of *V. acherdos* Bolton, *V. bilongrudi* (Taylor), *V. nabet* Bolton, and *V. philax* Bolton, and illustrations of the queen caste of *V. australis* (Wheeler), were drawn from the AntWeb images. Illustrations of the worker caste of *V. dryas* Bolton, *V. philippina* Zettel et Sorger, *V. regina* Bolton, and *V. xylochos* Bolton were drawn from the AntBase images. And illustration of the worker caste of *V. humboldticola* Zacharias et Rajan was drawn from the figure of Zacharias & Rajan (2004).

KEY TO KNOWN SPECIES OF *VOMBISIDRIS* OF THE WORLD BASED ON THE WORKER CASTE

(All figures cited are in the Appendix)

- 1 - Subocular groove entirely absent (Papua New Guinea) (Figs. 1-3).....
.....*V. bilongrudi* (Taylor)
- Subocular groove at least present from mandibular insertion to the eye...
.....2

- 2 - Subocular groove incomplete, running from mandibular insertion to the anteroventral margin of the eye, never beyond the eye (Papua New Guinea) (Figs. 4-6).....*V. acherdos* Bolton
 - Subocular groove complete, running from mandibular insertion to the anteroventral margin of the eye, then passing through a shallow angle and continuing along the side to the lateroccipital margin.....3
- 3 - In profile view, dorsum of mesonotum with a pair of short vertical sharp teeth at each side. Anterior 2/3 of the first gastral tergite longitudinally rugulose (Indonesia) (Figs. 7-9) *V. philax* Bolton
 - In profile view, dorsum of mesonotum without a pair of vertical sharp teeth, at most with a pair of blunt prominence. First gastral tergite smooth...
4
- 4 - In profile view, petiolar node dome-like or roughly triangular, dorsum roundly convex, without distinctly differentiated dorsal face.....5
 - In profile view, petiolar node roughly trapezoidal, with distinctly differentiated dorsal face, anterodorsal and posterodorsal corners more or less distinct.....10
- 5 - In profile view, metanotal groove shallow but obviously depressed.....6
 - In profile view, metanotal groove entirely absent 7
- 6 - In full face view, occipital margin weakly concave. Anterior clypeal margin strongly convex. In profile view, propodeal spines weakly curved down, longer than propodeal dorsum. Postpetiolar node evenly convex (China: Tibet) (Figs. 10-13).....*V. tibeta* sp. nov.
 - In full face view, occipital margin weakly convex. Anterior clypeal margin weakly convex. In profile view, propodeal spines straight, as long as propodeal dorsum. Postpetiolar node strongly convex (China: Hunan Province) (Figs. 14-15).....*V. umbrabdomina* Huang et Zhou
- 7 - In profile view, petiolar node roughly triangular, dorsal corner distinct.....8
 - In profile view, petiolar node dome-like, dorsal corner indistinct.....9
- 8 - In profile view, propodeal spines about as long as propodeal declivity. Postpetiolar node evenly convex. In dorsal view, lateral sides of petiolar node

- convex. Head and alitrunk blackish brown, gaster lighter brown (India) (Fig. 16).....*V. occidua* Bolton
 - In profile view, propodeal spines distinctly longer than propodeal declivity. Postpetiolar node strongly convex. In dorsal view, lateral sides of petiolar node almost straight. Head and alitrunk yellowish brown, gaster blackish brown (India) (Fig. 17).....*V. humboldticola* Zacharias et Rajan
- 9 - In full face view, occipital corners roundly prominent. Eyes evenly convex. Anterior clypeal margin without a middle notch (Indonesia) (Figs. 18-20).....*V. nahet* Bolton
 - In full face view, occipital corners rounded. Eyes strongly extruding. Anterior clypeal margin with a middle notch (Malaysia) (Figs. 21-23).....
*V. regina* Bolton
- 10 - In profile view, metanotal groove strongly depressed and trench-like.....11
 -- In profile view, metanotal groove vestigial to absent, without a trench-like notch.....13
- 11 - In profile view, promesonotum nearly straight, anterodorsal corner angled. Propodeal spines about two times as long as propodeal dorsum (Brunei) (Figs. 24-26).....*V. xylochos* Bolton
 -- In profile view, promesonotum weakly convex, anterodorsal corner rounded. Propodeal spines about as long as propodeal dorsum.....12
- 12 - In full face view, lateral sides of head divergent behind eyes. In profile view, anterior peduncle shorter than the dorsal face of petiolar node. First gastral tergite finely superficially reticulate (Indonesia) (Fig. 27).....
*V. lochme* Bolton
 -- In full face view, lateral sides of head nearly parallel behind eyes. In profile view, anterior peduncle about as long as the dorsal face of petiolar node. First gastral tergite almost completely smooth (Malaysia) (Fig. 28-30).....*V. dryas* Bolton
- 13 - In profile view, anterior peduncle of petiole relatively short, shorter than the dorsal face of petiolar node, the dorsal face nearly straight (Malaysia) (Fig.31).....*V. harpeza* Bolton
 -- In profile view, anterior peduncle of petiole relatively long, about

- as long as the dorsal face of petiolar node, the dorsal face weakly convex.....14
- 14 - In profile view, anterodorsal corner of petiolar node bluntly angled, higher than posterodorsal corner, the latter rounded.....15
- In profile view, both anterodorsal and posterodorsal corners of petiolar node bluntly prominent, at the same level.....16
- 15 - In full face view, occipital margin straight. In profile view, propodeal spines relatively short, shorter than or about as long as propodeal declivity. Ventral face of petiole nearly straight. Dorsal surface of alitrunk with short blunt hairs (Australia) (Figs. 32-34).....*V. australis* (Wheeler)
- In full face view, occipital margin evenly convex. In profile view, propodeal spines relatively long, longer than propodeal declivity. Ventral face of petiole concave. Dorsal surface of alitrunk with moderate long tapered hairs (Australia) (Figs. 35-37).....*V. renateae* (Taylor)
- 16 - In full face view, occipital margin nearly straight. Anterior clypeal margin weakly convex. Dorsal surface of alitrunk with short blunt hairs. Color yellow to lighter brown (Indonesia) (Figs. 38-40)..... *V. jacobsoni* (Forel)
- In full face view, occipital margin weakly convex. Anterior clypeal margin strongly convex. Dorsal surface of alitrunk with moderate long tapered hairs. Color blackish brown (Philippines) (Figs. 41-43).....
-*V. philippina* Zettel et Sorger

DESCRIPTION OF NEW SPECIES

Vombisidris tibeta sp. nov.

Figs. 10-13

Holotype worker: TL 3.9, HL 0.83, HW 0.68, CI 82, SL 0.65, SI 96, ED 0.23, PW 0.53, AL 1.13.

In full face view, head roughly rectangular, longer than broad. Occipital margin weakly concave in the middle, occipital corners rounded. Lateral sides weakly convex. Mandibles triangular, masticatory margin with 3 apical teeth, a long deastema, and 2 blunt basal teeth. Anterior clypeal margin strongly

convex, posteriorly extended portion very broad, about 2.5 times as broad as frontal lobes. Antennae 12-segmented, apices of scapes just reached to occipital corners, antennal clubs 3-segmented. Frontal carinae fine and long, extended backward and close to the occipital corners. Eyes large, situated slightly before the midpoints of the lateral sides.

In profile view, subocular groove complete, running from mandibular insertion to the lateroccipital margin. Promesonotum weakly convex, promesonotal suture vestigial on the dorsum. Metanotal groove shallowly notched. Propodeal dorsum straight and weakly slope down backward. Propodeal spines strong and long, slightly curved down backward, about 1.8 times as long as propodeal dorsum. Declivity weakly concave, about as long as propodeal dorsum. Propodeal spiracle small and circular, high up on the side. Propodeal lobes moderately developed, rounded at apices. Petiolar node elongate and dome-like, both anterior and posterior faces gently slope down, without distinct dorsal face; anterior peduncle very short, spiracle situated at about the mid-length of the peduncle; ventral face weakly convex about in the middle, and weakly concave afterwards; anteroventral corner acutely toothed. Postpetiolar node evenly convex, ventral face nearly straight.

In dorsal view, lateral sides of pronotum roundly convex. Lateral sides of mesonotum without prominence. Propodeal spines weakly curved inward. Lateral sides of petiole nearly straight, slightly widened backward; petiolar node longer than broad, length : width = 2:1. Postpetiole wider than petiole, lateral sides weakly convex; postpetiolar node wider than long, width : length = 1.2:1.

Mandibles smooth and shining, sparsely punctured. Head and alitrunk coarsely reticulate. Clypeus and lateral sides of metanotum longitudinally striate. Propodeal declivity longitudinally striate and densely finely punctured. Petiole and postpetiole finely reticulate and densely finely punctured. Gaster smooth and shining, basal costulae distinct, about 1/2 length of the postpetiole. Dorsal surfaces of head and body with sparse suberect to subdecumbent tapered hairs and abundant decumbent pubescence. Scapes with abundant suberect to subdecumbent tapered hairs and dense decumbent pubescence. Tibiae with sparse subdecumbent tapered hairs and abundant decumbent pubescence. Color brownish yellow, middle portion of gaster black, legs yellow.

Paratype workers: TL 4.0-4.1, HL 0.85-0.88, HW 0.70-0.73, CI 82-83, SL 0.63-0.65, SI 89-90, ED 0.24, PW 0.53-0.58, AL 1.15-1.25 (2 individuals measured). As holotype worker, but metanotal groove even more shallow, sting extruding in one worker.

Holotype worker: China: Tibet, Medog County, Damu Town, Damu Village, 1200m, collected from a canopy sample in the valley tropical rainforest, 2011.VII.20, Xia Liu leg., No.A11-3928.

Paratypes: 2 workers, with the same data as holotype worker, and both collected from canopy samples respectively, but Nos. A11-3876, A11-3943.

Comparative notes: This new species is close to *V. umbrabdomina* Huang et Zhou, but in full face view, occipital margin weakly concave in the middle; anterior clypeal margin strongly convex; in profile view, propodeal spines weakly curved down backward, and distinctly longer than propodeal dorsum; postpetiolar node evenly convex.

Etymology: The new species is named after the type locality "Tibet".

Biological notes: According to the collection data, all the 3 workers of the species were collected from canopy samples separately. It seems this species lives in the valley tropical rainforest and forages on the plants.

ACKNOWLEDGMENTS

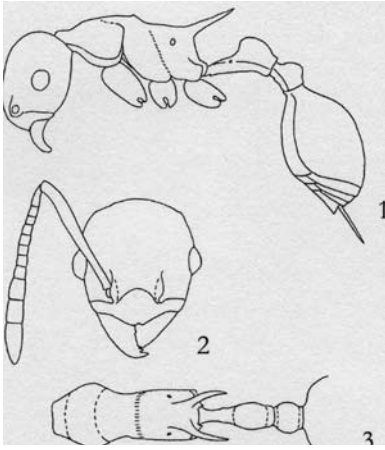
This study is supported by the National Natural Science Foundation of China (Nos. 31260521, 30870333) and the Key Subject of Forest Protection of Yunnan Province. We thank the following persons or Institution for their special helps in this study: Xia Liu (PhD Candidate of Forest Protection, Beijing Forestry University, Beijing) who collected the type specimens with us; Daniela Magdalena Sorger (Natural History Museum, Vienna) who supplied a valuable paper and permitted to use the figures in her paper; Robert W. Taylor (Australian National Insect Collection, Canberra), Barry Bolton (The Natural History Museum, London), Merry Zacharias & Priyadarsanan Dharma Rajan (Ashoka Trust for Research in Ecology and the Environment, Bangalore), and Jian-Hua Huang & 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 of *V. acherdos* Bolton, *V. bilongrudi* (Taylor), *V. nahet* Bolton, *V. philax* Bolton, and *V. australis* (Wheeler) on the Antweb.org (<http://www.antweb.org/>); Martin Pfeiffer (National University of Mongolia, Ulaanbaatar) who permitted the use of the images of *V. dryas* Bolton, *V. philippina* Zettel et Sorger, *V. regina* Bolton, and *V. xylochos* Bolton on the Antbase.net (<http://www.antbase.net/>).

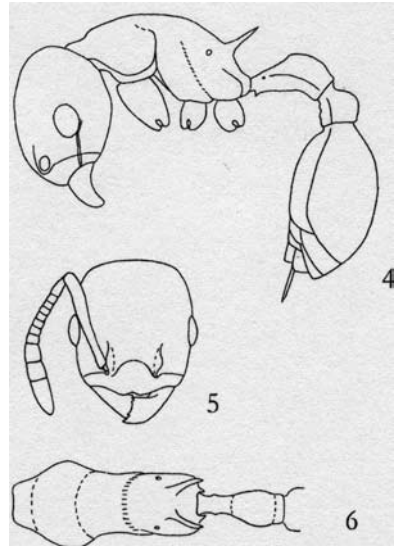
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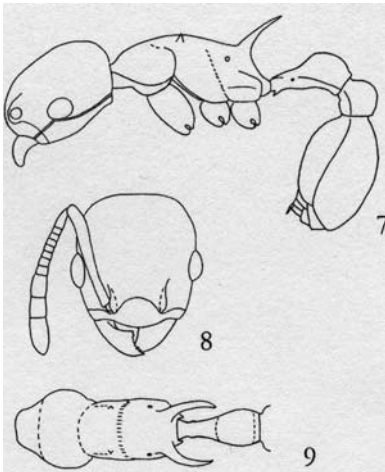
Appendix starts on page 1504



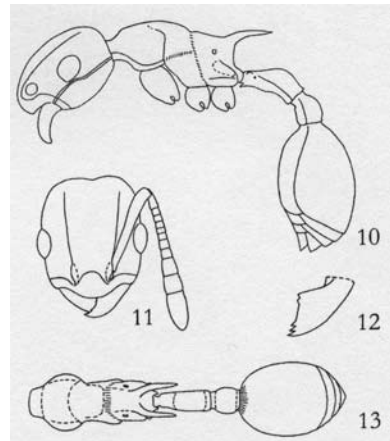
Figs. 1-3: Worker of *Vombisidris bilongrudi* (Taylor); 1. Head and body in profile view; 2. Head in full face view; 3. Alitrunk, petiole, and postpetiole in dorsal view. (Drawn from Antweb images, pilosity and sculpture omitted)



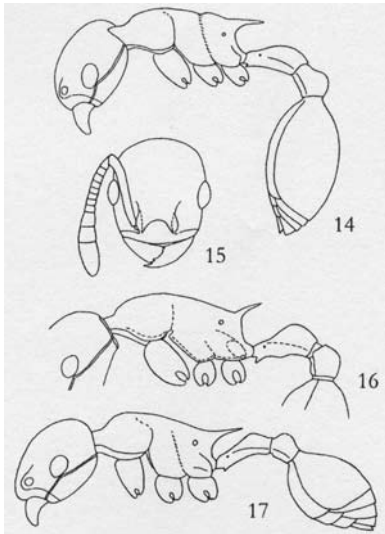
Figs. 4-6: Worker of *Vombisidris acherdos* Bolton; 4. Head and body in profile view; 5. Head in full face view; 6. Alitrunk and petiole in dorsal view. (Drawn from Antweb images, pilosity and sculpture omitted)



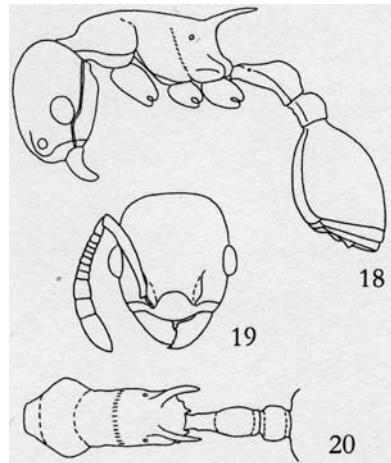
Figs. 7-9: Worker of *Vombisidris philax* Bolton; 7. Head and body in profile view; 8. Head in full face view; 9. Alitrunk and petiole in dorsal view. (Drawn from Antweb images, pilosity and sculpture omitted)



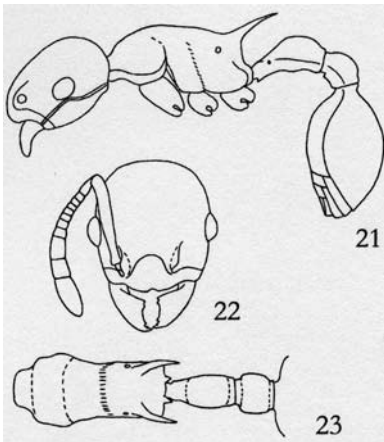
Figs. 10-13: Worker of *Vombisidris tibeta* sp. nov.; 10. Head and body in profile view; 11. Head in full face view; 12. Mandible in dorsal view; 13. Body in dorsal view. (Pilosity and sculpture omitted)



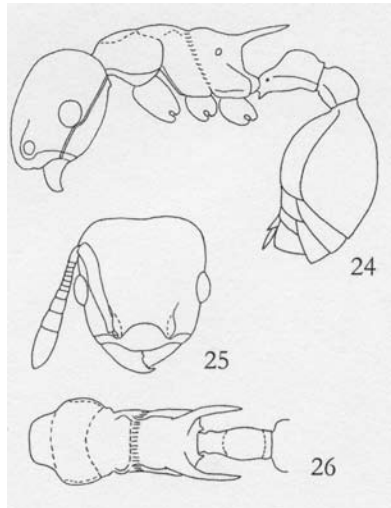
Figs. 14-17: Workers of *Vombisidris* Bolton; 14-15: Worker of *V. umbrabdomina* Huang et Zhou; 16: Worker of *V. occidua* Bolton; 17: Worker of *V. humboldticola* Zacharias et Rajan; 14, 16, 17. Head and body in profile view; 15. Head in full face view.



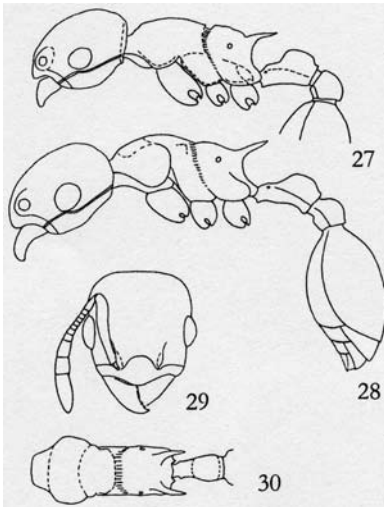
Figs. 18-20: Worker of *Vombisidris nabet* Bolton; 18. Head and body in profile view; 19. Head in full face view; 20. Alitrunk, petiole, and postpetiole in dorsal view. (Drawn from Antweb images, pilosity and sculpture



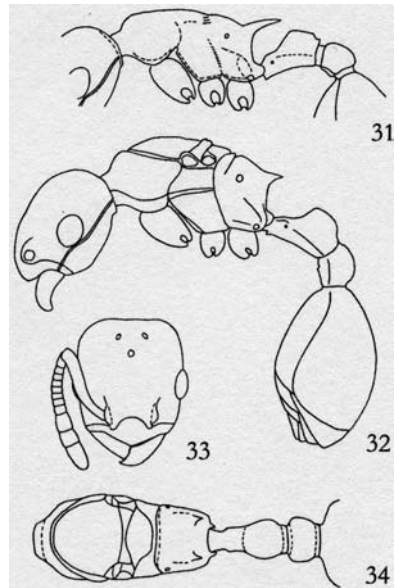
Figs. 21-23: Worker of *Vombisidris regina* Bolton; 21. Head and body in profile view; 22. Head in full face view; 23. Alitrunk, petiole, and postpetiole in dorsal view. (Drawn from Antbase images, pilosity and sculpture omitted)



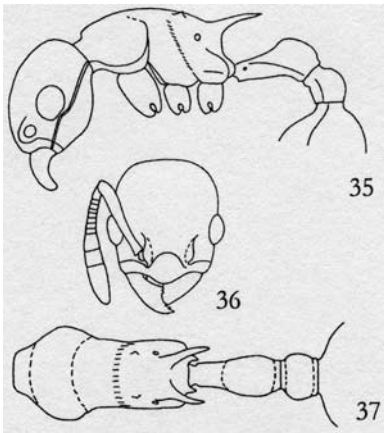
Figs. 24-26: Worker of *Vombisidris xylochos* Bolton; 24. Head and body in profile view; 25. Head in full face view; 26. Alitrunk and petiole in dorsal view. (Drawn from Antbase images, pilosity and sculpture omitted)



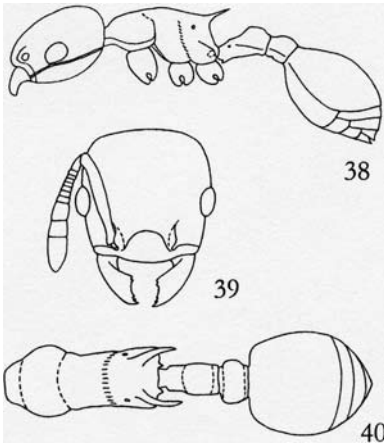
Figs. 27-30: Workers of *Vombisidris* Bolton; 27: Worker of *V. lochme* Bolton; 28-30: Worker of *V. dryas* Bolton; 27, 28. Head and body in profile view; 29. Head in full face view; 30. Alitrunk and petiole in dorsal view. (27. Cited from Bolton, 1991; 28-30. Drawn from Antbase images; Pilosity and sculpture omitted)



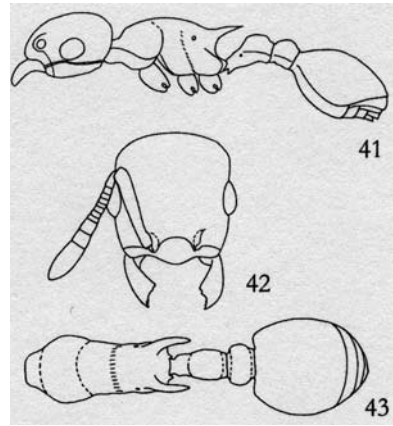
Figs. 31-34: Worker and Queen of *Vombisidris* Bolton; 31: Worker of *V. harpeza* Bolton; 32-34: Queen of *V. australis* (Wheeler); 31, 32. Head and body in profile view; 33. Head in full face view; 34. Alitrunk, petiole, and postpetiole in dorsal view. (31. Cited from Bolton, 1991; 32-34. Drawn from Antweb images; Pilosity and sculpture omitted)



Figs. 35-37: Worker of *Vombisidris renatae* (Taylor); 35. Head and body in profile view; 36. Head in full face view; 37. Alitrunk, petiole and postpetiole in dorsal view. (Drawn from figures of Taylor, 1989, pilosity and sculpture omitted)



Figs. 38-40: Worker of *Vombisidris jacobsoni* (Forel); 38. Head and body in profile view; 39. Head in full face view; 40. Body in dorsal view. (Drawn from figures of Sorger, 2011, pilosity and sculpture omitted)



Figs. 41-43: Worker of *Vombisidris philippina* Zettel et Sorger; 41. Head and body in profile view; 42. Head in full face view; 43. Body in dorsal view. (Drawn from Antbase images, pilosity and sculpture omitted)

