

Taxonomic studies on ant genus *Hypoponera* (Hymenoptera: Formicidae: Ponerinae) from India

HIMENDER BHARTI*, SHAHID ALI AKBAR, AIJAZ AHMAD WACHKOO
AND JOGINDER SINGH

Department of Zoology and Environmental Sciences, Punjabi University,
Patiala – 147002, India

*Corresponding author's e-mail: himenderbharti@gmail.com

ABSTRACT. The Indian species of the ant genus *Hypoponera* Santschi, 1938 are treated herewith. Eight species are recognized of which three are described as new and two infraspecific taxa are raised to species level. The eight Indian species are: *H. aitkenii* (Forel, 1900) stat. nov., *H. assmuthi* (Forel, 1905), *H. confinis* (Roger, 1860), *H. kashmirensis* sp. nov., *H. shattucki* sp. nov., *H. ragusai* (Emery, 1894), *H. schmidti* sp. nov. and *H. wroughtonii* (Forel, 1900) stat. nov. An identification key based on the worker caste of Indian species is provided.

Keywords: New species, ants, Formicidae, Ponerinae, *Hypoponera*, India.

INTRODUCTION

The taxonomy of *Hypoponera* has been in a state of confusion and uncertainty for some time. The small size of the ants, coupled with the morphological monotony has led to the neglect of this genus. The only noteworthy revisionary work is that of Bolton and Fisher (2011) for the Afrotropical and West Palearctic regions. Important contributions from Southeast Asia include Morisita *et al.* (1989); Wu & Wang (1995) and Terayama (2009). A review of the subfamily Ponerinae by Schmidt & Shattuck (2014) is also pertinent to this study. *Hypoponera* is cosmopolitan in distribution, currently represented by 148 extant species, 29 subspecies and 1 fossil species (Bolton 2013).

Until the recent revision by Bolton and Fisher (2011), *Hypoponera* was given a shabby taxonomic treatment because of the uniformity of the component species and the use of characters with hardly any taxonomic value (Bolton and Fisher, 2011). Bolton and Fisher (2011) provided a new verve to the study of this

genus with use of new taxonomic characters facilitating prompt identification.

From India, three species and two infraspecific taxa of *Hypoponera* have been reported to date (Bharti, 2011): *Hypoponera assmuthi* (Forel, 1905), *Hypoponera confinis* (Roger, 1860), *Hypoponera confinis aitkenii* (Forel, 1900), *Hypoponera confinis wroughtonii* (Forel, 1900) and *Hypoponera ragusai* (Emery, 1894).

The present study reports three further new species from India. *H. schmidti* sp. nov. is the largest known Indian species, *H. kashmirensis* sp. nov. represents the first record of the genus from the Kashmir valley, while *H. shattucki* sp. nov. is the smallest Indian species so far known. *Hypoponera aitkenii* and *H. wroughtonii*, hitherto infraspecific taxa, are raised to species level, based on their consistent morphological differences and distinct reproductive castes. *Hypoponera* in India is thus represented by eight species, a revised key to which is provided here.

MATERIALS AND METHODS

The specimens were collected using Winkler's extractor, soil core and hand picking methods. The taxonomic analysis was conducted using a Nikon SMZ 1500 stereo zoom microscope. For digital images, a MP evolution digital camera was used on the above microscope with Auto-Montage (Syncroscopy, Division of Synoptics, Ltd.) software. Later, images were cleaned as per requirement with Adobe Photoshop CS6. Holotype and paratypes of all new species have been deposited in PUAC, Punjabi University Patiala Ant Collection at Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India. One paratype of each species will be deposited at BMNH, Natural History Museum, London, U.K. Description pattern, morphological terminology for measurements and indices (given in millimeters) found below follow Bolton and Fisher (2011).

Head Length (HL). 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 to the mid-point of the posterior margin. Where the posterior margin is concave the measurement is taken from the midpoint of a transverse line that spans the apices of the projecting posterior corners.

Head Width (HW). The maximum width of the head, measured in full-face view.

- **Head Size (HS).** $HL + HW$, divided by 2.

Scape Length (SL). The maximum straight-line length of the scape, excluding the basal constriction or neck that occurs just distal of the condylar bulb.

Pronotal Width (PrW). The maximum width of the pronotum in dorsal view.

Weber's Length of Mesosoma (WL). 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.

Petiole Height (PeH). The vertical height of the petiole measured in profile from the lowest point of the subpetiolar process to a line that intersects the highest point of the dorsal outline.

Petiole Node Length (PeNL). In profile, the maximum length of the petiole node, measured

in a straight horizontal line from immediately above the dorsal base of the anterior petiolar tubercle to the posterior margin.

Petiole Node Width (PeNW). The maximum width of the petiole node in dorsal view.

- **Petiole Size (PeS).** $PeH + PeNL + PeNW$, divided by 3.
- **Cephalic Index (CI).** HW divided by HL , $\times 100$.
- **Scape Index (SI).** SL divided by HW , $\times 100$.
- **Petiole Node Index (PeNI).** $PeNW$ divided by PrW , $\times 100$.
- **Lateral Petiole Index (LPeI).** $PeNL$ divided by PeH , $\times 100$.
- **Dorsal Petiole Index (DPeI).** $PeNW$ divided by $PeNL$, $\times 100$.

ACRONYMS OF DEPOSITORY

BMNH Natural History Museum, London, U.K.
 PUAC Punjabi University Patiala, Ant Collection at Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India.

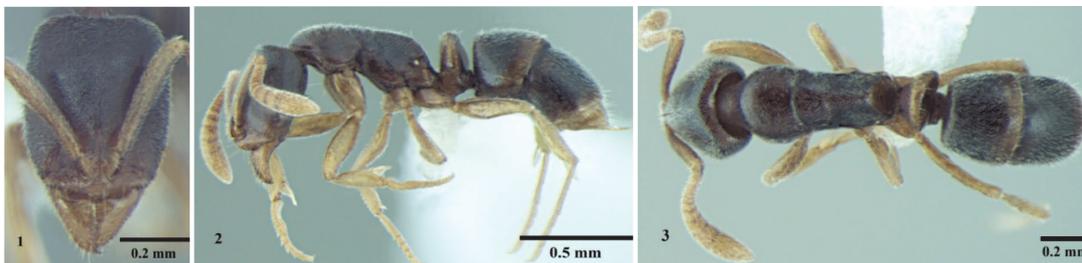
RESULTS

***Hypoponera aitkenii* (Forel, 1900) stat. nov. (Figures 1-6)**

Ponera confinis var. *aitkenii* Forel, 1900: 325 (diagnosis in key) (w.) INDIA. Forel, 1900: 327 (q.). Combination in *Hypoponera*: Bolton, 1995: 213.

Worker measurements: HL 0.52-0.55, HW 0.41-0.43, HS 0.46-0.49, SL 0.37-0.41, PrW 0.31-0.33, WL 0.62-0.68, HFL 0.37-0.40, PeNL 0.09-0.11, PeH 0.31-0.35, PeNW 0.23-0.26, PeS 0.21-0.24, CI 76-81, SI 90-96, PeNI 73-81, LPeI 27-30, DPeI 259-275 (21 measured).

Eyes present, small but distinct with 2-4 small ommatidia. The individual ommatidia are sometimes poorly defined or even partially fused. Impression that extends back along midline of head from the frontal lobes fails to reach the midlength of the vertex. Apex of scape, when laid straight back from its insertion in full-face



Figs 1 – 3. *Hypoponera aitkenii*; worker.
1. head in full-face view; 2. body in Profile view; 3. body in dorsal view.



Figs 4 – 6. *Hypoponera aitkenii*; queen.
4. head in full-face view; 5. body in profile view; 6. body in dorsal view.



Figs 7 – 9. *Hypoponera assmuthi*; worker.
7. head in full-face view; 8. body in profile view; 9. body in dorsal view.



Figs 10 – 12. *Hypoponera assmuthi*; queen.
10. head in full-face view; 11. body in profile view; 12. body in dorsal view.

view, fails to reach the midpoint of the posterior margin; SI 90-96. Reticulate-punctate sculpture on cephalic dorsum very fine and denser than on the dorsal pronotum, which is almost smooth with only very widely spaced minute superficial punctulae present. Mesonotal-mesopleural suture distinct on side of mesosoma. Metanotal groove distinctly incised across dorsum of mesosoma; mesonotum with a defined posterior margin. Mesopleuron mostly to entirely smooth and shining, unsculptured except for a few scattered minute pits. Propodeum weakly marginate between declivity and side. Petiole squamiform; node in profile tall and narrow, with the anterior and posterior faces converging dorsally to a short and narrowly rounded dorsum. Subpetiolar process in profile a rounded lobe, without angles anteriorly or posteriorly. In dorsal view the petiole node much broader than long, the dorsal surface very short from front to back. Maximum width of first gastral tergite in dorsal view equal or slightly greater than width of the second tergite at its midlength. Base of cinctus of second gastral tergite smooth and shining in dorsal view, without cross-ribs. Post-tergite of second gastral segment, from posterior margin of cinctus to apex, slightly broader than long. Full adult colour varies from dull yellow to dark brown.

Queen measurements: HL 0.57-0.60, HW 0.47-0.48, HS 0.52-0.54, SL 0.42-0.44, PrW 0.38-0.43, WL 0.78-0.83, HFL 0.45-0.46, PeNL 0.10-0.11, PeH 0.37-0.42, PeNW 0.28-0.31, PeS 0.26-0.28, CI 78-82, SI 89-93, PeNI 71-75, LPeI 26-27, DPeI 259-304 (7 measured).

Characters as in worker, with modifications expected for caste and the following differences: Sculpture feebler and antennae slender than in workers. Eyes with short setae present between the ommatidia.

Distribution and habitat. This is a widespread and dominant species of *Hypoponera* restricted to South India. This species is allopatric to the related, more northerly *H. wroughtonii*.

Remarks. *H. aitkenii* was described by Forel (1900) as an infraspecific form, *confinis* var. *aitkenii*. However, it is an independent species and is removed from its association with *H. confinis* and treated as a full species. It can be

easily distinguished from *confinis* by the absence of cross-ribs at the base of the cinctus of the second gastral tergite.

Material examined. **Karnataka:** Gundlupet, 800m, 5♂, 1♀, 12.x.2010. **Kerala:** Anakutty, 900m, 17♂, 3♀, 27.ix.2010; Periyar Tiger Reserve, 1500m, 31♂, 2♀, 12.x.2012; Mangalar, 1650m, 14♂, 6♀, 16.x.2012; Trivandrum, 36m, 7♂, 1♀, 20.ix.2010; Salim Ali Bird Sanctuary, 50m, 9♂, 4♀, 12.xi.2012. **Tamil nadu:** Cumbum, 1000m, 9♂, 4♀, 20.x.2012; Theni, 780m, 29♂, 8♀, 6.x.2012 (coll. Shahid A. Akbar).

Hypoponera assmuthi (Forel, 1905) (Figures 7-12)

Ponera abeillei r. *assmuthi* Forel, 1905: 182 (w.) INDIA. Combination in *Hypoponera*: Bolton, 1995: 213. Raised to species: Bolton & Fisher, 2011: 24 (in text).

Worker measurements: HL 0.55-0.58, HW 0.43-0.46, HS 0.49-0.52, SL 0.37-0.41, PrW 0.30-0.33, WL 0.68-0.72, HFL 0.36-0.40, PeNL 0.17-0.19, PeH 0.32-0.33, PeNW 0.23-0.24, PeS 0.24-0.25, CI 77-79, SI 86-90, PeNI 71-78, LPeI 52-55, DPeI 129-140 (19 measured).

Eyes absent. In full-face view apex of scape, when laid straight back from its insertion, fails to reach the midpoint of the posterior margin; SI 86-90. Impression that extends back along midline of head from the frontal lobes fails to reach the midlength of the vertex. Cephalic dorsum minutely reticulate-punctate. Mesonotal-mesopleural suture absent; pronotal dorsum with minute punctulae, almost smooth. Lateroventral surfaces of head almost smooth, only with widely separated minute punctulae. With mesosoma in dorsal view the metanotal groove absent. Propodeal declivity rounds into the sides through a blunt angle, without a carina or sharp margin separating them. Mesosoma laterally unsculptured. Petiole in profile with a weakly convex dorsum; the anterior and posterior faces vertical, straight and parallel, not converging dorsally; dorsal surface almost flat. Subpetiolar process with a small, shallow ventral



Figs 13 – 15. *Hypoponera confinis*; worker.
13. head in full-face view; 14. body in profile view; 15. body in dorsal view.



Figs 16 – 18. *Hypoponera confinis*; queen.
16. head in full-face view 17. body in profile view 18. body in dorsal view.



Figs 19 – 21. *Hypoponera confinis*; male.
19. head in full-face view; 20. body in profile view; 21. body in dorsal view.



Figs 22 – 24. *Hypoponera kashmirensis* sp.nov.; worker.
22. head in full-face view; 23. body in profile view; 24. body in dorsal view.

angle. Posterior surface of petiole node smooth and shiny. Maximum width of first gastral tergite in dorsal view distinctly less than the width of the second tergite at its midlength. First gastral tergite in dorsal view as long as or slightly broader than long, much narrower across the anterior margin than across the posterior margin and with the sides distinctly divergent posteriorly. Base of cinctus of second gastral tergite smooth without any cross-ribs. Sides of second gastral segment straight and parallel for most of their length in dorsal view; narrowing extremely feebly only at the cinctus anteriorly and the apex posteriorly. Post-tergite of second gastral segment, from posterior margin of cinctus to apex, as long as broad to slightly broader than long. Disc of second gastral tergite shallowly punctate. Full adult colour light brownish yellow.

Queen measurements: HL 0.61-0.62, HW 0.49-0.50, HS 0.55-0.56, SL 0.39-0.40, PrW 0.37-0.38, WL 0.76-0.77, HFL 0.39-0.40, PeNL 0.17-0.19, PeH 0.33-0.34, PeNW 0.25-0.26, PeS 0.25-0.26, CI 80-81, SI 79-80, PeNI 67-68, LPeI 53-56, DPeI 137-147 (4 measured).

Characters as in worker, with modifications expected for caste and the following differences: colour brownish, darker than her workers. Punctulae more pronounced and petiole node more slender than in workers. Eyes relatively small, short setae project between the ommatidia. Ocelli prominent however, lateral ocelli reduced and barely visible in one of the queens.

Distribution and habitat. This species seems to be widespread in India although infrequent in collections. It was encountered in leaf litter and soil samples.

Remarks. Forel (1905) described *H. assmuthi* as an infraspecific form, *abeillei* r. *assmuthi*. Bolton and Fisher (2011) provisionally raised it to species rank; their assessment is correct as *H. abeillei* (Andre, 1881) is characterized by presence of distinct cross-ribs at base of cinctus of second gastral tergite, which are absent in *H. assmuthi*.

Material examined. Arunachal Pradesh: Lumla, 2800m, 2♀, 8.x.2013 (coll. Shahid A. Akbar & Joginder Singh). **Jammu & Kashmir:** Jasrota, 400m, 1♀, 28.vii.2010 (coll. Aijaz A.

Wachkoo). **Karnataka:** Gundlupet, 800m, 3♂, 2♀, 12.x.2010 (coll. Shahid A. Akbar). **Sikkim:** Rorathang, 587m, 3♂, 12.vi.2012 (coll. Shahid A. Akbar & Joginder Singh).

***Hypoconera confinis* (Roger, 1860) (Figures 13-21)**

Ponera confinis Roger, 1860: 284 (w.) SRI LANKA. Forel, 1900: 327 (q.); Imai, Kubota, *et al.* 1985: 47 (k.). Combination in *Hypoconera*: Wilson & Taylor, 1967: 26. Senior synonym of *nautarum*: Wilson & Taylor, 1967: 26. Current subspecies: nominal plus *aitkenii*, *epinotalis*, *javana*, *singaporensis*, *wroughtonii*. See also: Bingham, 1903: 91.

Worker measurements: HL 0.51-0.56, HW 0.40-0.44, HS 0.45-0.50, SL 0.36-0.40, PrW 0.29-0.33, WL 0.61-0.70, HFL 0.36-0.41, PeNL 0.12-0.14, PeH 0.30-0.33, PeNW 0.22-0.24, PeS 0.21-0.23, CI 78-82, SI 89-93, PeNI 68-75, LPeI 38-43, DPeI 160-191.

Eyes vestigial, usually represented by a small, black spot; sometimes depigmented, which appears to be the remnant of a single ommatidium. In full-face view apex of scape, when laid straight back from its insertion, just fails to reach, or just touches, the midpoint of the posterior margin; SI 89-93. Mid-dorsal longitudinal impression on head terminates immediately behind the frontal lobes and does not extend to the midlength of the vertex or beyond. Punctulate sculpture of cephalic dorsum extremely fine and superficial, but head more densely sculptured than pronotal dorsum. Lateroventral surfaces of head with extremely feeble punctate sculpture, merely of separated small superficial punctures on an otherwise smooth surface. Metanotal groove conspicuously incised across dorsum of mesosoma; mesonotum with a well-defined posterior margin. Mesonotal-mesopleural suture present. Propodeal declivity bluntly rounded into the sides, without sharp marginations or carinae. Mesopleuron smooth and shining. Petiole in profile with anterior and posterior faces somewhat convergent dorsally; dorsal surface broadly convex. Subpetiolar process with a roughly rounded lobe, without angles anteriorly or posteriorly. Maximum width of first gastral tergite in dorsal view slightly



Figs 25 – 27. *Hypoponera shattucki* sp.nov.; worker.
25. head in full-face view; 26. body in profile view; 27. body in dorsal view.



Figs 28 – 30. *Hypoponera ragusai*; worker.
28. head in full-face view; 29. body in profile view; 30. body in dorsal view.



Figs 31 – 33. *Hypoponera ragusai*; queen.
31. head in full-face view; 32. body in profile view; 33. body in dorsal view.



Figs 34 – 36. *Hypoponera schmidti* sp.nov.; worker.
34. head in full-face view; 35. body in profile view; 36. body in dorsal view.

less than the width of the second tergite at its midlength. Base of cinctus of second gastral tergite with strong, dense cross-ribs. Post-tergite of second gastral segment, from posterior margin of cinctus to apex, slightly broader than long. Disc of second gastral tergite shallowly punctate. With first gastral segment in profile the dorsum with sparse short standing setae. Full adult colour light yellowish brown.

Queen measurements: HL 0.57-0.60, HW 0.48-0.50, HS 0.52-0.55, SL 0.42-0.45, PrW 0.40-0.43, WL 0.80-0.86, HFL 0.42-0.47, PeNL 0.13-0.14, PeH 0.36-0.37, PeNW 0.26-0.27, PeS 0.24-0.25, CI 83-84, SI 74-90, PeNI 63-66, LPeI 37-38, DPeI 196-200 (3 measured).

Characters as in worker, with modifications expected for caste and the following differences: Eyes with short setae projecting between the ommatidia. Punctulate sculpture more pronounced, in profile petiole relatively shorter than her workers.

Male measurements: HL 0.45-0.48, HW 0.44-0.48, HS 0.45-0.48, SL 0.11-0.12, WL 0.78-0.84, HFL 0.54-0.62, PeNL 0.13-0.14, PeH 0.36-0.37, PeNW 0.26-0.27, PeS 0.25-0.26, CI 98-100, SI 24-25, LPeI 36-38, DPeI 193-200 (4 measured).

Head almost as broad as long, including the large compound eyes. Short setae project between the ommatidia. Ocelli placed closely, shortest distance in between not longer than their diameter. Mandibles reduced, narrow, with parallel sides, apex simple and acute; basal cavity visible in full-face view. Antenna filiform. Clypeus entire and convex. Subpetiolar process an elongate low lobe. Base of cinctus of second gastral tergite without cross-ribs. Sculpture feebler than in corresponding workers. Colour light yellow.

Distribution and habitat. Sri Lanka, Samoa and India. This species seems to be widespread but restricted to Northern India. In non-forested habitats the species was found under small stones and in soil core samples; although in forested habitat this species was found in leaf litter samples.

Remarks. The infraspecific taxa *confinis* var. *aitkenii* and *confinis* var. *wroughtonii* are removed from their association with *confinis* as

both are characterized by smooth and shiny cinctus of the second gastral tergite while *H. confinis* is characterized by cinctus of second gastral tergite crowded with cross ribs. In addition *H. confinis* is always yellow to light brown yellow and funiculus is not incrassate towards apex whilst *H. aitkenii* and *H. wroughtonii* are brown and funiculus is incrassate towards apex.

Material examined. Arunachal Pradesh:

Lumla, 2800m, 3♀, 8.x.2013, 13.x.2013, Dirang, 2118m, 5♀, 27.ix.2013, 3♀, 28.ix.2013 (coll. Shahid A. Akbar & Joginder Singh). **Himachal Pradesh:** Andretta, 940m, 2♀, 12.vi.2010, 6♀, 5♀, 13.vi.2010; Dakpathar, 750m, 1♀, 20.viii.2009, Ghatti, 425m, 1♀, 12.x.2008, 2♀, 28.ix.2009; Kotla, 500m, 2♀, 30.ix.2009; Nahan, 760m, 1♀, 20.viii.2009, Rewalsar, 1360m, 1♀, 20.vi.2010, Siholi, 560m, 1♀, 2.x.2009; Terrace, 420m, 37♀, 6♀, 11.x.2008, 12♀, 3♀, 24.ix.2009, 2♀, 25.ix.2009, 2♀, 19.vii.2010.

Jammu & Kashmir: Manda, 500m, 1♀, 1♀, 15.vii.2009, 2♀, 4.viii.2010, Surinsar, 700m, 15♀, 4♀, 1.viii.2010; Udhampur, 690m, 1♀, 4.vii.2009 (coll. Aijaz A. Wachkoo). **Sikkim:** Rorathang, 587m, 1♀, 12.vi.2012 (coll. Shahid A. Akbar & Joginder Singh). **Uttarakhand:** FRI, 640m, 2♀, 1♀, 30.ix.2008; Rajaji Forest Area, 660m, 48♀, 1♀, 2♂, 5.viii.2009, 3♀, 6.viii.2009, 7♀, 6♀, 11.viii.2009, 7♀, 9♀, 12.viii.2009, 1♀, 13.viii.2009, 1♀, 6.ix.2010, 2♀, 7.ix.2010; Selaqui, 670m, 10♀, 8.viii.2009, 2♀, 2♀, 9.viii.2009, 9♀, 9♀, 5.ix.2010 (coll. Aijaz A. Wachkoo).

***Hypoponera kashmirensis* sp. nov.**
(Figures 22-24)

Type material. Holotype. Worker. India: Jammu and Kashmir, Natipora Srinagar, 34.04°N, 74.81°E, 1585m a.s.l., 28.vi.2010, soil core (coll. Shahid A. Akbar). Paratypes: 1 worker, with same data as holotype; 4 workers, 21.v.2011 with same data as holotype. Holotype in PUAC and paratype in BMNH.



Figs 37 – 39. *Hypoponera schmidti* sp.nov.; queen.
37. head in full-face view; 38. body in profile view; 39. body in dorsal view.



Figs 40 – 42. *Hypoponera wroughtonii*; worker.
40. head in full-face view; 41. body in profile view; 42. body in dorsal view.



Figs 43 – 45. *Hypoponera wroughtonii*; queen.
43. head in full-face view; 44. body in profile view; 45. body in dorsal view.



Figs 46 – 48. *Hypoponera wroughtonii*; male.
46. head in full-face view; 47. body in profile view; 48. body in dorsal view.

Worker measurements (holotype in brackets): HL 0.56-(0.62), HW 0.45-(0.51), HS 0.51-(0.54), SL 0.37-(0.42), PrW 0.31-(0.35), WL 0.70-(0.82), HFL 0.34-(0.40), PeNL 0.17-(0.21), PeH 0.24-(0.28), PeNW 0.20-(0.25), PeS 0.20-(0.24), CI 80-(82), SI 77-(82), PeNI 64-(71), LPeI 70-(75), DPeI 117-(119) (5 measured).

Eyes absent. Apex of scape, when laid straight back from its insertion, distinctly fails to reach the midpoint of the posterior margin in full-face view; SI 77-82. Cephalic dorsum finely but distinctly reticulate-punctate. Mid-dorsal longitudinal impression on head terminates immediately behind the frontal lobes and does not extend to the midlength of the vertex or beyond. Pronotal dorsum almost smooth, with spaced minute, superficial punctures; obviously much less strongly and densely sculptured than cephalic dorsum. Latroventral surfaces of head with spaced minute punctures. Metanotal groove present on dorsum of mesosoma. Mesonotal-mesopleural suture present. Propodeal declivity rounds into the sides, without sharp marginations or carinae. Node of petiole in profile with the anterior and posterior faces distinctly convergent dorsally so that the node is broader just above the tubercle than at its apex. Subpetiolar process absent or a reduced elongate low lobe that terminates in a short ascending angle at about the midlength of the sternite with an acute ventral angle. Maximum width of first gastral tergite in dorsal view distinctly greater than the width of the second gastral tergite at its midlength. Base of cinctus of second gastral tergite glossy and polished, without trace of cross-ribs. Midline width of second gastral post-tergite, from posterior margin of cinctus to apex, is roughly 2x greater than the length of the segment at its midlength. Disc of second gastral tergite with superficial small punctures. First and second gastral tergites dorsally pubescent and with a number of short standing setae that project above the level of the pubescence in profile. Full adult colour light brownish yellow.

Remarks. *H. kashmirensis* resembles *H. assmuthi*, but differs noticeably because the latter lacks the metanotal groove and mesonotal-mesopleural suture, characters present in *H. kashmirensis*.

Etymology. The species is named after Kashmir valley.

Ecology. This species is more hypogaecic, having been collected underneath a 6 cm deep soil cover. It marks the first record of *Hypoponera* from the Kashmir valley.

***Hypoponera shattucki* sp. nov.**
(Figures 25-27)

Type material. Holotype. Worker. **India Arunachal Pradesh:** Lumla, 2800m, 1♀, 8.x.2013 (Coll. Shahid A. Akbar & Joginder Singh). **India:** Kerala, Periyar tiger reserve, Thanikkudy, 9.30°N, 77.16°E, 1003m a.s.l., 15.x.2011, Winkler method (coll. Shahid A. Akbar). Paratypes: 3 workers with same data as holotype. Holotype in PUAC and paratype in BMNH.

Worker measurements (holotype in brackets): HL 0.59-(0.61), HW 0.51-(0.53), HS 0.55-(0.57), SL 0.45-(0.46), PrW 0.35-(0.37), WL 0.75-(0.78), HFL 0.46-(0.48), PeNL 0.14-(0.16), PeH 0.33-(0.34), PeNW 0.26-(0.28), PeS 0.24-(0.26), CI 86-(87), SI (87)-88, PeNI 74-(75), LPeI 42-(47), DPeI (175)-185 (4 measured).

Eyes distinct, with 3-4 ommatidia. In full-face view apex of scape, when laid straight back from its insertion, reaches or very slightly exceeds the midpoint of the posterior margin; SI 87-88. Punctulate sculpture of cephalic dorsum fine and superficial, but dorsal head distinctly more densely sculptured than pronotal dorsum. Mid-dorsal longitudinal impression on head barely extends to the midlength of the vertex. Lateroventral areas of head weakly and superficially punctate. Propodeal dorsum almost smooth, with only faint, widely spaced, minute punctulae. In profile pro-mesonotum strongly convex, discontinuous at the deep metanotal groove; dorsum of propodeum oblique and lower than pro-mesonotum. Mesonotal-mesopleural suture present. Metanotal groove distinctly incised across dorsum of mesosoma; mesonotum with a defined posterior margin. Propodeal declivity separated from side by a blunt angle. Mesopleuron smooth and shining. Petiole squamiform; profile with the anterior and

posterior faces of the node convergent dorsally; node distinctly longer just above the anterior tubercle than at the dorsum. Sternite of petiole in profile with a differentiated elongate lobe with sharp angles anteriorly and posteriorly. Maximum width of first gastral tergite in dorsal view about equal to the width of the second tergite at its midlength. Base of cinctus of second gastral tergite smooth, without cross-ribs. Post-tergite of second gastral segment, from posterior margin of cinctus to apex, broader than long. Punctures on disc of second gastral tergite superficial, minute and sparse. With first gastral segment in profile its dorsum with scattered standing setae. Body uniformly dull brown coloured.

Remarks. *H. shattucki* sp. nov. shares most affinities with Sri Lankan endemic species *H. ceylonensis* (Mayr, 1897) from which it can be easily separated. *H. shattucki* is a dull coloured species with prominent eyes consisting of 3-4 ommatidia, mesonotal-mesopleural suture well marked and petiole squamiform; with the anterior and posterior faces convergent dorsally, whilst *H. ceylonensis* is mostly a smooth and shining species with eyes absent, mesonotal-mesopleural suture absent and petiole trapezoidal, with anterior and posterior faces not converging dorsally, and the dorsum of the node flat.

Etymology. The species is named after Dr. Steven Shattuck for his contributions to ant systematics.

Ecology. This species appears to be adapted to a tropical climate and gives the impression of being uncommon in collections. Three of the workers collected were found under a stone below a shady tree.

***Hypoponera ragusai* (Emery, 1894) (Figures 28-33)**

Ponera ragusai Emery, 1894: 28 (w.) ITALY (Sicily). [Also described as new by Emery, 1895: 65. Unjustified emendation of spelling to *ragusae*: Emery, 1911: 91.] Santschi, 1907: 313 (w.q., ergatoid q., ergatoid m.); Santschi, 1908: 519 (m.); Emery, 1916: 109 (q.). Combination in *Hypoponera*: Baroni Urbani, 1971: 18. Senior synonym of *gyptis*, *lesnei*, *massiliensis*, *parva*:

Bernard, 1967: 88; of *aethiopica*, *deciens*, *formosae*, *gleadowi*, *oblongiceps*, *santschii*: Bolton & Fisher, 2011: 94. See also: Wheeler, W. M. 1937: 59.

Worker measurements: HL 0.57-0.63, HW 0.45-0.49, HS 0.52-0.57, SL 0.36-0.41, PrW 0.34-0.37, WL 0.70-0.78, HFL 0.37-0.40, PeNL 0.15-0.17, PeH 0.25-0.28, PeNW 0.21-0.25, PeS 0.20-0.22, CI 75-79, SI 79-87, PeNI 61-68, LPeI 56-60, DPeI 138-146 (20 measured).

Eyes small but conspicuous, of 1-6 often poorly defined or partially fused ommatidia, located far forward on the side of the head. Impression that extends back along midline of head from the frontal lobes reaches at least the midlength of the vertex and usually further. Apex of scape, when laid straight back from its insertion, fails to reach the midpoint of the posterior margin in full-face view; SI 79-87. Minute punctulate sculpture of cephalic dorsum extremely fine and superficial. Mesonotal-mesopleural suture absent. Metanotal groove deeply incised across dorsum of mesosoma; mesonotum with a well-defined posterior margin. Propodeal declivity rounds into the sides, without sharp marginations or carinae. In profile the anterior margination of the mesopleuron rounded to very bluntly angular behind base of anterior coxa; without a prominent sharp angle or tooth. Mesopleuron smooth and shining, at most with a few scattered punctures; usually with a small reticulate patch in the extreme posteroventral corner above the mesocoxa. Petiole in profile with the anterior and posterior faces of the node weakly convergent dorsally; node longer just above the anterior tubercle than at the dorsum. Sternite of petiole in profile a rounded lobe, without angles anteriorly or posteriorly. Maximum width of first gastral tergite in dorsal view less than the width of the second tergite at its midlength. Base of cinctus of second gastral tergite smooth and shining in dorsal view, without cross-ribs. Post-tergite of second gastral segment, from posterior margin of cinctus to apex, much broader than long. Disc of second gastral tergite minutely punctulate, appearing weakly microreticulate in places. Full adult colour varies from yellow to brown.

Queen measurements: HL 0.63-0.67, HW 0.51-0.54, HS 0.59-0.61, SL 0.40-0.43, PrW 0.39-0.41, WL 0.87-0.93, HFL 0.42-0.44, PeNL 0.15-0.17, PeH 0.33-0.35, PeNW 0.25-0.27, PeS, 0.24-0.26, CI 78-82, SI 76-81, PeNI 62-67, LPeI 46-50, DPeI 159-170 (3 measured).

Characters as in worker, with modifications expected for caste and the following differences: colour blackish, considerably darker than her workers; punctulae more pronounced and antenna more slender than in workers. Eyes with short setae projecting between the ommatidia.

Distribution and habitat. This species is widespread in most parts of the world (see Bolton and Fisher, 2011). In India it seems to be general in distribution and has been collected in non-forest as well as forest habitats.

Remarks. The possibility that *H. gleadowi* (Forel, 1895) and *H. ragusai* are two separate species remains, as two types of queens were collected. However, one type of queen was not collected with workers. Moreover workers could not be delimited morphologically, leaving doubts that more than a single species is present.

Material examined. Arunachal Pradesh: Bomdila, 2080, 2♀, 22.ix.2013, Dirang, 2118m, 3♀, 27.ix.2013 (coll. Shahid A. Akbar & Joginder Singh). **Himachal Pradesh:** Bilaspur, 520m, 21♀, 1.vii.2010; Dunera, 520m, 5♀, 24.vii.2010; Kandwal, 13♀, 480m, 25.vi.2009; Terrace, 420m, 1♀ 24.ix.2009, 2♀, 15.vii.2010. **Jammu & Kashmir:** Jasrota, 400m, 2♀, 28.vii.2010, Mansar, 690m, 3♀, 12.vii.2009, 3♀, 1♀, 13.vii.2009; Surinsar, 700m, 2♀, 14.vii.2009 (coll. Aijaz A. Wachkoo). **Karnataka:** Gundlupet, 800m, 4♀, 1♀, 12.x.2010. **Kerala:** Periyar Tiger Reserve, 1500m, 7♀, 2♀, 12.x.2012; Trivandrum, 36m, 7♀, 20.ix.2010 (coll. Shahid A. Akbar). **Sikkim:** Rorathang, 587m, 4♀, 13.vi.2012 (coll. Shahid A. Akbar & Joginder Singh).

***Hypoponera schmidti* sp. nov.**
(Figures 34-39)

Type material. Holotype. Worker. India: Karnataka, Gundlupet 11.8°N, 76.68°E, 800m a.s.l., 27.ix.2010, hand picking method (coll.

Shahid A. Akbar). Paratypes: 2 workers and 1 gyne, same data as holotype; 3 workers, India, Arunachal Pradesh, Lumla, 2800m, 27.31°N, 91.43°E, 12.vi. 2012 (coll. Shahid A. Akbar). Holotype in PUAC and paratype in BMNH.

Measurements (holotype in brackets): HL 0.69-(0.72), HW 0.57-(0.59), HS 0.97-(1.01), SL 0.49-(0.51), PrW 0.41-(0.43), WL 0.83-(0.86), HFL 0.55-0.56, PeNL 0.16-(0.17), PeH 0.40-(0.41), PeNW 0.29-(0.31), PeS 0.28-(0.29), CI (81)-82, SI 85-(86), PeNI 70-(72), LPeI 0.40-(0.41), DPeI 181-182 (3 measured).

Eyes prominent, of 4-7 ommatidia that are irregular in size and may be partially fused. Dorsal impression extends back along midline of head from the frontal lobes, reaching at least the midlength of the vertex or further. Apex of scape, when laid straight back from its insertion in full-face view, touches or slightly exceeds the midpoint of the posterior margin; SI 85-(86). Reticulate-punctulate sculpture of cephalic dorsum fine and dense. Mesonotal-mesopleural conspicuous. In profile pro-mesonotum strongly convex, discontinuous at the deep metanotal groove; dorsum of propodeum oblique and lower than pro-mesonotum. Mesopleuron unsculptured. Metanotal groove conspicuous on dorsum of mesosoma; mesonotum with a well-defined posterior margin. Sides of propodeal declivity weakly marginate. Petiole in profile with the anterior and posterior faces of the node convergent dorsally. Subpetiolar process in profile bluntly rounded without sharp angles anteriorly or posteriorly. In dorsal view the petiole node distinctly broader than long. Maximum width of first gastral tergite in dorsal view equal to the width of the second tergite at its midlength. Base of cinctus of second gastral tergite crowded with cross-ribs. Post-tergite of second gastral segment, from posterior margin of cinctus to apex, slightly broader than long. Disc of second gastral tergite finely and densely superficially punctulate. Full adult colour brown.

Queen measurements: HL 0.72, HW 0.57, HS 0.65, SL 0.51, PrW 0.45, WL 1.03, HFL 0.58, PeNL 0.16, PeH 0.37, PeNW 0.31, PeS 0.28, CI 79, SI 89, PeNI 68, LPeI 43, DPeI 193 (1 measured).

Characters as in worker, with modifications expected for caste and the following differences: Eyes with short setae projecting between the ommatidia. Impression on dorsum of head reaches the median ocellus. Punctulate sculpture more pronounced than her workers.

Remarks. *H. schmidti* sp. nov. is the largest known Indian species and is similar to the endemic Sri Lankan species *H. taprobanae* (Forel, 1913). The two species however can be easily separated. *H. taprobanae* is a smaller, bright yellow coloured species, predominately smooth and shining without much pilosity and sculpture, the occipital margin is straight, the clypeus has a blunt triangular protruding front edge, and the ventral side of the petiolar node has two small denticles. In contrast *H. schmidti* is a larger, brown coloured species with prominent sculpture and pilosity, the occipital margin concave in middle, the clypeus is rounded and without a protruding front edge and the ventral side of the petiolar node is angulated and without two small denticles.

Etymology. The species is named after Dr. Chris A. Schmidt for his contributions to the subfamily Ponerinae.

Ecology. This tropical species is rare in collections. It was encountered in leaf litter.

***Hypoponera wroughtonii* (Forel, 1900) stat. nov. (Figures 40-48)**

Ponera confinis var. *wroughtonii* Forel, 1900: 325 (diagnosis in key) (w.) INDIA. Combination in *Hypoponera*: Bolton, 1995: 217.

Worker measurements: HL 0.55-0.59, HW 0.44-0.48, HS 0.50-0.53, SL 0.39-0.44, PrW 0.32-0.39, WL 0.68-0.76, HFL 0.39-0.44, PeNL 0.12-0.15, PeH 0.33-0.37, PeNW 0.24-0.28, PeS 0.23-0.27, CI 78-83, SI 88-95, PeNI 72-80, LPeI 36-40, DPeI 196-221 (25 measured).

Eyes small but conspicuous, of 2-6 ommatidia that are irregular in size and may be partially fused. Dorsum of head with a fine impressed line that barely reaches the midlength of the vertex. Apex of scape, when laid straight back from its insertion in full-face view, fails to

touch the midpoint of the posterior margin; SI 88-95. Reticulate-punctulate sculpture of cephalic dorsum fine and dense. Mesonotal-mesopleural suture present. Mesopleuron unsculptured. Metanotal groove conspicuous on dorsum of mesosoma; mesonotum with a well-defined posterior margin. Propodeum bluntly marginate between declivity and sides. Petiole squamiform; in profile with the anterior and posterior faces of the node distinctly convergent dorsally so that the node is broader just above the tubercle than at its apex. Subpetiolar process in profile without sharp angles anteriorly or posteriorly. In dorsal view the petiole node distinctly broader than long. Maximum width of first gastral tergite in dorsal view equal to or slightly more than the width of the second tergite at its midlength. Base of cinctus of second gastral tergite smooth in dorsal view, without cross-ribs dorsally. Post-tergite of second gastral segment, from posterior margin of cinctus to apex, broader than long. Disc of second gastral tergite finely superficially punctulate. Full adult colour dark brown.

Queen measurements: HL 0.60-0.63, HW 0.49-0.51, HS 0.55-0.57, SL 0.45-0.47, PrW 0.39-0.44, WL 0.85-0.90, HFL 0.46-0.49, PeNL 0.14-0.16, PeH 0.42-0.44, PeNW 0.29-0.32, PeS 0.28-0.31, CI 79-82, SI 90-94, PeNI 73-74, LPeI 33-36, DPeI 204-209 (5 measured).

Characters as in worker, with modifications expected for caste and the following differences: Eyes with short setae projecting between the ommatidia. Impression on dorsum of head reaches the median ocellus. Punctulate sculpture more pronounced, subpetiolar process low and elongate than her workers.

Male measurements: HL 0.46, HW 0.45, HS 0.46, SL 0.11, WL 0.82, HFL 0.53, PeNL 0.14, PeH 0.25, PeNW 0.18, PeS 0.19, CI 98, SI 24, LPeI 56, DPeI 128 (1 measured).

Head almost as broad as long, including the large compound eyes. Eyes with short setae present between the ommatidia. Mid-dorsal longitudinal impression on head reaches the median ocellus. Ocelli spaced about 2x their diameter. Mandibles reduced, narrow, converging apically, apex simple and acute; basal cavity visible in full-face view. Antenna filiform.

Clypeus entire and convex. Sculpture feebler than in corresponding workers. Colour light brown.

Distribution and habitat. *H. wroughtonii* is restricted Northern India. This species is allopatric to the related, southerly *H. aitkenii* and was collected chiefly from forested habitats with good leaf litter.

Remarks. *H. wroughtonii* is raised here to species rank. It was described by Forel (1900) as an infraspecific form, *confinis* var. *wroughtonii*. It is an independent species and removed from its association with *H. confinis* from which it can be easily distinguished by absence of cross-ribs at base of cinctus of second gastral tergite. However, it most closely resembles *H. aitkenii* from which it can be distinguished by relatively large size, HW 0.44-0.48, and longer petiole node in profile, PeNL 0.12-0.15, compared to *aitkenii*, HW 0.41-0.43, PeNL 0.09-0.11.

Material examined. Arunachal Pradesh: Lumla, 2800m, 6♀, 8.x.2013, Bomdila, 2080, 3♀, 22.ix.2013, Dirang, 2118m, 3♀, 27.ix.2013 (coll. Shahid A. Akbar & Joginder Singh). **Himachal Pradesh:** Andretta, 940m, 29♀, 12.vi.2010, 36♀, 13.vi.2010; Khatiar, 450m, 13♀, 2♀, 1♂, 18.x.2008; Kotla, 500m, 1♀, 13.x.2008, Rewalsar, 1360m, 30♀, 20.vi.2010; Siholi, 560m, 21♀, 1♀, 19.x.2008; Terrace, 420m, 37♀, 3♀, 11.x.2008, 2♀, 23.v.2009, 5♀, 25.v.2009, 1♀, 23.ix.2009, 10♀, 25.ix.2009 (coll. Aijaz A. Wachkoo). **Sikkim:** Rorathang, 587m, 3♀, 12.vi.2012 (coll. Shahid A. Akbar & Joginder Singh). **Uttarakhand:** FRI, 640m, 9♀, 2♀, 2.viii.2009, Rajaji Forest Area, 660m, 1♀, 6.viii.2009, 3♀, 1♀, 11.viii.2009, 1♀, 12.viii.2009, 1♀, 13.viii.2009 (coll. Aijaz A. Wachkoo).

Key to the Indian species of genus *Hypoponera* based on worker caste

1. Eyes absent 2
- Eyes present 3
2. Metanotal groove absent; in dorsal view the mesosoma surface is not clearly interrupted by a depressed transverse groove between mesonotum and propodeum
..... *H. assmuthi* (Forel)

- Metanotal groove present; in dorsal view the mesosoma surface is sharply and conspicuously interrupted by a depressed transverse groove between mesonotum and propodeum
..... *H. kashmirensis* sp. nov.
3. Base of cinctus of second gastral tergite (Abd. IV) strongly cross-ribbed 4
- Base of cinctus of second gastral tergite (Abd. IV) smooth, without cross-ribs 5
4. Mesosomal profile discontinuous, interrupted at the deep metanotal groove; eyes well developed with 4-7 distinct facets, brown colored *H. schmidtii* sp. nov.
- Mesosomal profile continuous, metanotal groove very shallow; eyes reduced without any distinct facets, yellow colored
H. confinis (Roger)
5. Petiole short, nodiform; mesonotal-mesopleural suture absent
..... *H. ragusai* (Emery)
- Petiole squamiform; mesonotal-mesopleural suture present 6
6. In profile pro-mesonotum strongly convex, discontinuous at the deep metanotal groove; dorsum of propodeum oblique and lower than pro-mesonotum; emargination of vertex deep *H. shattuckii* sp. nov.
- In profile mesosoma nearly flat, continuous, metanotal groove very shallow; dorsum of propodeum nearly straight and level with promesonotum; emargination of vertex shallow 7
7. Smaller species, HL 0.52-0.55, HW 0.41-0.43, HS 0.46-0.49; petiole node shorter in profile LPeI 27-31
..... *H. aitkenii* (Forel, 1900) stat. nov.
- Larger species, HL 0.55-0.59, HW 0.44-0.48, HS 0.50-0.53; petiole node longer in profile LPeI 34-40
..... *H. wroughtonii* (Forel, 1900) stat. nov.

Note: *H. truncate* is known only from Sulawesi (Indonesia) (Bolton pers. comm.). The reported occurrence of this species in India (Forel, 1900 and Bingham, 1903) is highly dubious.

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