

Research article

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(Hymenoptera: Formicidae: Formicinae) from India**Aijaz Ahmad Wachkoo¹, Himender Bharti² & Shahid Ali Akbar^{3,*}¹Department of Zoology, Government Degree College, Shopian, Jammu and Kashmir, 192303 India²Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, 147002 India³Division of Plant Protection; Department of Entomology, Central Institute of Temperate Horticulture, Srinagar, Jammu and Kashmir, 191132 India*Corresponding author: Email: kingakbarali@gmail.com¹[urn:lsid:zoobank.org:author:6F19EB1F-5DDC-4722-BBD3-F75C29F901D9](https://zoobank.org/author:6F19EB1F-5DDC-4722-BBD3-F75C29F901D9)²[urn:lsid:zoobank.org:author:5CFEBC9B-3CA9-4459-83A6-6D7B61B984B7](https://zoobank.org/author:5CFEBC9B-3CA9-4459-83A6-6D7B61B984B7)³[urn:lsid:zoobank.org:author:5A0AC4C2-B427-43AD-840E-7BB4F2565A8B](https://zoobank.org/author:5A0AC4C2-B427-43AD-840E-7BB4F2565A8B)

Abstract. The species-rank taxonomy of the genus *Lepisiota* Santschi, 1926 in India is revised. Thirteen species are recognized, with two described as new: *L. layla* sp. n. and *L. mayri* sp. n. The three previously infraspecific taxa *L. integra* stat. nov., *L. pulchella* stat. rev. and *L. wroughtonii* stat. rev. are elevated to species rank. Four species or subspecies are excluded from the Indian *Lepisiota* fauna: *L. capensis* (Mayr, 1862), *L. frauenfeldi* (Mayr, 1855), *L. rothneyi watsonii* (Forel, 1894), and *L. simplex* (Forel, 1892) for issues related to previous doubtful distribution or species misidentification. An identification key to the worker caste of Indian *Lepisiota* species is provided.

Keywords. Ants, Formicinae, key, *Lepisiota*, new species, new status, revived status, India.

INTRODUCTION

The formicine ant genus *Lepisiota* Santschi, 1926 contains 138 species and subspecies, including two that are newly described here (Sharaf et al. 2020; Bolton 2021), and is widespread in the grasslands, savannahs or woodlands of the Afrotropical, Indomalayan, and Palearctic regions (Brown 2000; Hita Garcia et al. 2013). The taxonomy of the genus is in a dreadful condition with the lack of any revisionary studies for most of the zoogeographical regions of the World (Sharaf et al. 2020). However, a number of authors have published isolated species descriptions and updated, taxonomic revisions for several regional faunas (Sharaf et al. 2020; Bolton 2021).

The *Lepisiota* fauna of India is poorly known. Most of the species and infraspecific taxa are poorly defined and have been treated under different genera. Apart from the major contributions in the late nineteenth and the early twentieth century (Forel 1892, 1894, 1895, 1902a; Bingham 1903), and subsequent isolated treatments (Mukerjee 1930; Bharti 2002), the fauna has been neglected taxonomically.

In this study, we revise the species-rank taxonomy of the ant genus *Lepisiota* for India. We describe the two new species *L. layla* and *L. mayri* and recognize the three poorly defined sympatrically distributed infraspecific

taxa *integra*, *pulchella* and *wroughtonii*, at species rank. The data reported herein represent the first deep insight of the Indian *Lepisiota* with the hope of correcting some of the taxonomic neglect that has plagued the Indian Formicinae (Bharti & Wachkoo 2012, 2014a, b; Wachkoo & Bharti 2015a, b).

MATERIAL AND METHODS

The taxonomic study was conducted on a Nikon SMZ 1500 stereoscope. For digital images, MP Evolution digital camera was used on the same microscope with Auto-Montage (Syncroscopy, Division of Synoptics, Ltd.) software. Later, images were cleaned with Adobe Photoshop CS5.

Institutional abbreviations

MHNG = Museum of Natural History, Geneva, Switzerland
MSNG = Natural History Museum, Genoa, Italy
NHMUK = Natural History Museum, London, UK
PUAC = Punjabi University Patiala Ant Collection, Punjab, India

ZSI = Zoological Survey of India, Kolkata, India

Holotype and paratypes of both new species, and other newly collected material have been deposited in PUAC. One paratype of both new species will be deposited at NHMUK. Morphological terminology for measurements (given in millimeters) and indices found below follow Wachkoo & Bharti (2014a, b) and Akbar et al. (2017).

Abbreviations for morphological terms and indices used in the text

CI = Cephalic index: $HW/HL \times 100$
 EL = Maximum length of eye as measured normally in oblique view of the head to show full surface of eye
 HL = Maximum length of head in full-face view, measured in straight line from the anterior most point of the median clypeal margin to a line drawn across the posterior margin
 HW = Maximum width of head in full-face view (excluding the portion of eyes that extends past the lateral margins of the head)
 ML = Mesosomal length measured from the anterior surface of the pronotum proper (excluding the collar) to the posteriormost point of the propodeal lobes
 PFL = Maximum length of the profemur from its margin with the trochanter to its margin with the tibia
 PFW = Maximum width of the profemur
 PnW = Maximum width of the pronotum in dorsal view
 SI = Scape index: $SL/HW \times 100$
 SL = Maximum length of the antennal scape excluding the basal neck and condyle
 REL = Relative eye length index: $EL/HL \times 100$

SYSTEMATIC ACCOUNTS

Genus *Lepisiota* Santschi, 1926

Type species: *Plagiolepis rothneyi* Forel, 1894

Worker diagnosis. Antenna 11-segmented; eyes well-developed, ocelli frequently present; propodeum armed with a pair of spines, teeth, or tubercles; petiole a scale-like with the dorsal margin bispinose, bidentate or emarginated; acidopore well-developed (Bolton 1994).

Synoptic list of Indian species of *Lepisiota*

Lepisiota annandalei (Mukerjee, 1930)
Lepisiota bipartita (Smith, 1861)
Lepisiota fergusonii (Forel, 1895)
Lepisiota integra (Forel, 1894) stat. nov.

Lepisiota layla sp. n.
Lepisiota lunaris (Emery, 1893)
Lepisiota mayri sp. n.
Lepisiota modesta (Forel, 1894)
Lepisiota opaca (Forel, 1892)
Lepisiota pulchella (Forel, 1892) stat. rev.
Lepisiota rothneyi (Forel, 1894)
Lepisiota sericea (Forel, 1892)
Lepisiota wroughtonii (Forel, 1902) stat. rev.

Lepisiota annandalei (Mukerjee, 1930) (Figs 1–3)
Acantholepis annandalei Mukerjee, 1930: 156, fig. 4.
 Syntype workers, Shimla [Simla], Himachal Pradesh, India [ZSI].
Lepisiota annandalei (Mukerjee); Bolton 1995: 226; first combination in *Lepisiota*.

Worker measurements. HL 0.50–0.54; HW 0.46–0.52; EL 0.16–0.18; SL 0.48–0.56; PnW 0.31–0.35; ML 0.60–0.68; PFL 0.38–0.43; PFW 0.11–0.13 mm. Indices: CI 91–95; SI 102–108; REL 29–33 (n = 14).

Description. Head subquadrate; longer than wide, distinctly wider posteriorly than in front; lateral margins convex, posterior margin transverse, posterolateral corners rounded; clypeus subcarinate in the middle; anterior clypeal margin complete and convex; eyes broadly oval, weakly convex, placed at the middle-line of head, covering one-third of lateral cephalic margin; three small ocelli present; antennal scape surpassing posterior head margin by about one-third its length.

In lateral view promesonotum dome like, convex; metanotum distinctly lower than promesonotum but almost as high as propodeum; mesometanotum demarcated, constricted; metanotal area distinct; propodeal spines reduced to tubercles; propodeal declivity steep.

Petiole upright with angular sides, dorsally without distinct teeth or spines, shallowly emarginate; apical corners with acute angles pointing upward.

Overall body smooth and shiny.

Gaster covered with short, abundant, erect setae; head and pronotum with only a few setae; pubescence on body uniformly very fine and sparse; antennal funiculus with appressed to subdecumbent pubescence.

Color black; antenna, mandible and tarsi light brown.

Distribution and habitat. India (Himachal Pradesh, Jammu and Kashmir, Punjab, Sikkim, Uttarakhand, West Bengal) (Bharti et al. 2016; present study). Although, infrequent in collections this species seems widespread across India; workers were mostly hand collected from tree trunks and honey baits.

Remarks. This species has largely been misidentified as Afrotropical *L. simplex* (Forel, 1892) due to its superficial resemblance with the latter. The small to medium-sized workers can be distinguished from the somewhat similar *L. lunaris* by their smooth and shiny body, a dorsally emarginate petiole and few setae on the pronotum.



Figs 1–3. Worker; *Lepisiota annandalei* (Mukerjee, 1930). **1.** Head, frontal view. **2.** Body, lateral view. **3.** Body, dorsal view.

tum; *L. lunaris* has a relatively dull and microreticulate body, a bispinose petiole and several pairs of setae scattered on the mesosoma including the propodeum.

Material examined. India: Himachal Pradesh, Andretta, 32.0744° N, 76.5856° E, 940 m, 6 ♀♀, 12.vi.2010; Renuka, 30.6083° N, 77.4615° E, 600 m, 3 ♀♀, 8.v.2009; Terrace, 31.9234° N, 75.9294° E, 420 m, 2 ♀♀, 11.x.2008. Jammu and Kashmir, Mansar, 32.6979° N, 75.1489° E, 690 m, 3 ♀♀, 13.vii.2009. Punjab, Dharampur, 31.8420° N, 75.9132° E, 450 m, 5 ♀♀, 14.x.2008. Uttarakhand, Dakpathar, 30.4966° N, 77.8004° E, 750 m, 5 ♀♀, 20.viii.2009; Forest Research Institute, 30.3416° N, 77.9903° E, 640 m, 6 ♀♀, 1.x.2008; Mussoorie, 30.4606° N, 78.0521° E, 1820 m, 4 ♀♀, 9.viii.2009; Selaqui, 30.3720° N, 77.8605° E, 670 m, 3 ♀♀, 7.viii.2009, Aijaz A. Wachkoo leg.

***Lepisiota bipartita* (Smith, 1861) (Figs 4–6)**

Formica bipartita Smith, 1861: 33. Syntype workers, Lebanon; Israel, Holy Land [NHMUK]. [Images of CASENT0903167 Syntype worker examined].

Acantholepis bipartita (Smith); Roger 1863: 11; first combination in *Acantholepis*.

Acantholepis bipartita (Smith); Mayr 1863: 394 as junior synonym of *Acantholepis frauenfeldi*.

Acantholepis frauenfeldi var. *bipartita* (Smith); André 1882: 211 queen described and revived from synonymy as variety of *frauenfeldi*.

Acantholepis frauenfeldi bipartita (Smith); Emery 1891: 16; Emery 1898: 126; Forel 1902b: 155; Ruzsky 1905: 463; Santschi 1917: 47; variety/subspecies of *frauenfeldi*.

Acantholepis frauenfeldi var. *bipartita* (Smith); Karavaiev 1911: 44; male described.

Lepisiota frauenfeldi subsp. *bipartita* (Smith); Baroni Urbani et al. 1992: 303; first combination in *Lepisiota*.

Lepisiota bipartita (Smith); Collingwood & Agosti 1996: 365; status as species.

Worker measurements. HL 0.66–0.80; HW 0.57–0.71; EL 0.19–0.25; SL 0.98–1.09; PnW 0.36–0.53; ML 0.97–1.06; PFL 0.75–0.98; PFW 0.14–0.20 mm. Indices: CI 84–88; SI 148–171; REL 28–31 (n = 15).

Description. Head subrectangular; longer than wide, equally wide anteroposteriorly; lateral and posterior margins convex, posterolateral corners rounded; clypeus medially subcarinate to carinate; anterior clypeal margin complete and convex; eyes subglobose, convex, projecting beyond cephalic lateral margins, covering one-third of lateral cephalic margin, placed at posterior half of head; three ocelli present; antenna long, scape surpassing posterior head margin by about half its length.

In lateral view pronotum convex, mesometanotum strongly constricted, lower than pronotum and propodeum, giving mesosoma a dumbbell shape; mesomet-



Figs 4–6. Worker; *Lepisiota bipartita* (Smith, 1861). 4. Head, frontal view. 5. Body, lateral view. 6. Body, dorsal view.

notum demarcated; metanotal area distinct; propodeum armed with a pair of teeth diverging posteriorly; propodeal declivity steep.

Petiole upright with distinctly angular sides, dorsally emarginate, apical corners teeth like pointing upward.

Head and mesosoma feebly shining; gaster relatively more shiny; overall body weakly microreticulate, however, sculpturing is effaced in some specimens.

Body covered with erect setae on head, pronotum and gaster; setae on gaster usually restricted to venter and segmental margins; pubescence very fine and sparse, most visible on head; almost absent on mesosoma and gaster; antennal funiculus with appressed to decumbent pubescence.

Head and gaster dark brown; mesosoma reddish brown; antenna and tarsi brown.

Distribution and habitat. Greece, India (Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Maharashtra, Meghalaya, Punjab, Rajasthan, Uttarakhand, West Bengal), Iran, Israel, Lebanon (Bharti et al. 2016; Dad et al. 2019; Sharaf et al. 2020). This species is widespread across India. The specimens were collected by hand, from honey baits and by beating vegetation.

Remarks. *Lepisiota bipartita* is a medium to large-sized ant. The main feature that will enable it to be distinguished from *L. integra*, the species with which it is most likely to be confused, is the shiny bicolored body, whereas the latter species has a dull and uniformly reddish-brown body.

Material examined. India: Himachal Pradesh: Andretta, 32.0744° N, 76.5856° E, 940 m, 1 ♀, 11.vi.2010, 1 ♀, 27.viii.2009. Jammu and Kashmir: Manda, 32.7496° N, 74.8673° E, 500 m, 1 ♀, 15.vii.2009, Aijaz A. Wachkoo leg.

Lepisiota fergusoni (Forel, 1895) (Figs 7–9)

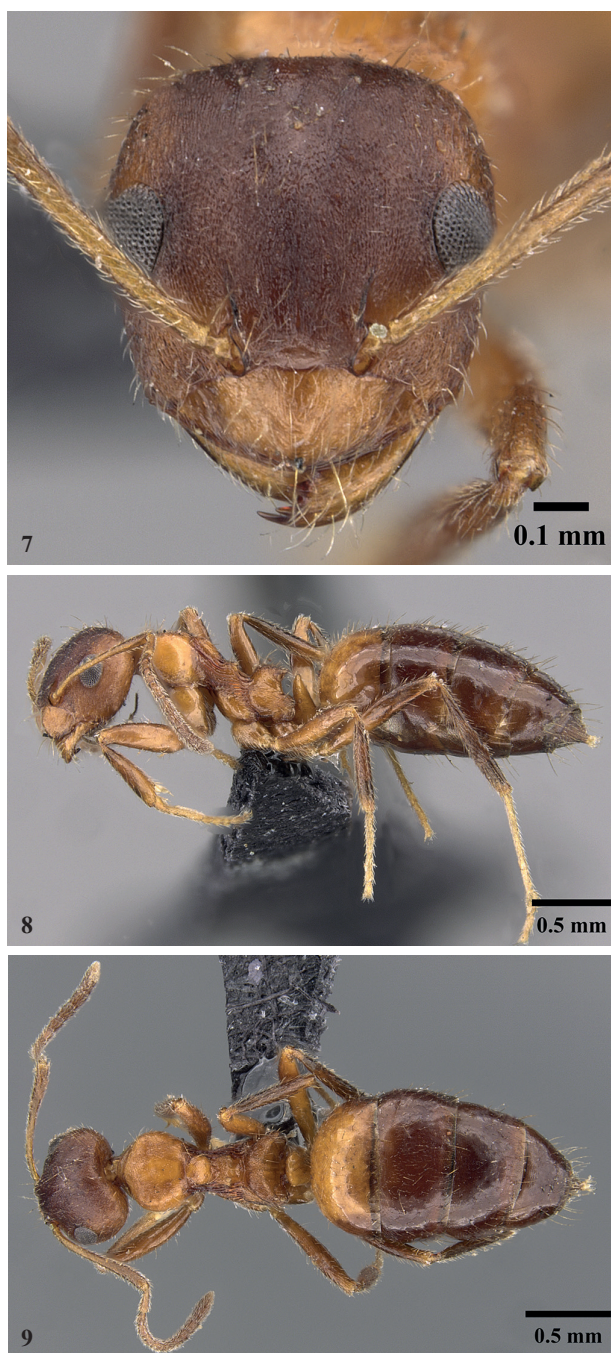
Acantholepis fergusoni Forel, 1895: 459. Syntype workers, Thiruvananthapuram [Travancore], Kerala, India [MHNG]. [Images of CASENT0909883 Syntype worker examined].

Acantholepis fergusoni Forel; Bingham 1903: 319.

Lepisiota fergusoni (Forel); Bolton 1995: 227; first combination in *Lepisiota*.

Worker measurements. HL 0.69–0.72; HW 0.65–0.66; EL 0.17–0.19; SL 0.69–0.70; PnW 0.42–0.45; ML 0.95–1.05; PFL 0.59–0.61; PFW 0.16–0.17 mm. Indices: CI 91–94; SI 105–107; REL 24–26 (n = 5).

Description. Head subquadrate; slightly longer than wide, wider posteriorly than in front; lateral margins convex, posterior margin convex, with rounded posterolateral corners; clypeus carinate in the middle; anterior clypeal margin complete and convex; eyes oval, weakly convex, placed at the middle-line of head, covering about one-third of lateral cephalic margin; three small ocelli



Figs 7–9. Syntype worker (AntWeb: CASENT0909883); *Lepisiota fergusonii* (Forel, 1895). **7.** Head, frontal view. **8.** Body, lateral view. **9.** Body, dorsal view. (Photograph courtesy of Zach Lieberman).

present; antennal scape surpassing posterior head margin by about one-third its length.

In lateral view promesonotum convex, metanotum low, almost straight; pronotum flat above; mesometanotum demarcated; metanotal area distinct; mesometanotum constricted; propodeum armed with a pair of diverging

blunt spines directed backward; propodeal declivity steep.

Petiole upright with angular sides, dorsally without distinct teeth or spines, shallowly emarginate; apical corners with acute angles pointing upward.

Head distinctly reticulate-striate, opaque; mesosoma dorsally fine microreticulate, overall opaque, laterally relatively shiny; gaster polished smooth and shining; propleuron relatively smoother, remainder of lateral mesosoma longitudinally striate; mesometanotal suture cross-ribbed.

Body abundantly covered with erect setae; pubescence very fine and sparse; antennal funiculus with subdecumbent to suberect pubescence.

Head reddish-brown, mesosoma and petiole reddish-yellow, gaster reddish-brown with a light reddish-yellow patch anteriorly on first gastral tergite.

Distribution and habitat. India (Karnataka, Kerala, West Bengal), Sri Lanka (Bharti et al. 2016; Dias et al. 2020). This species is infrequent in collections and seems to be restricted to the coastal plains of India. The specimens were collected in a leaf litter sample.

Remarks. *Lepisiota fergusonii* is a medium-sized ant. The reticulate-striate head and blunt propodeal spines directed backward allow distinction from the somewhat similar *L. pulchella* which has a reticulate-punctate head and pointed propodeal spines directed upward.

Material examined. India: Kerala: Periyar Tiger Reserve, Thanikkudy, 9.4997° N, 77.2665° E, 1003 m, 5 ♀♀, 15.x.2011, Shahid A. Akbar leg.

Lepisiota integra (Forel, 1894) stat. nov. (Figs 10–12)
Acantholepis frauenfeldi var. *integra* Forel, 1894: 411.
Syntype workers, Dharamshala, Himachal Pradesh, India [MHNG]. [Images of CASENT0909888 Syntype worker examined].

Acantholepis frauenfeldi integra Forel; Forel 1906: 86; Santschi 1917: 44; race/stirps of *frauenfeldi*.

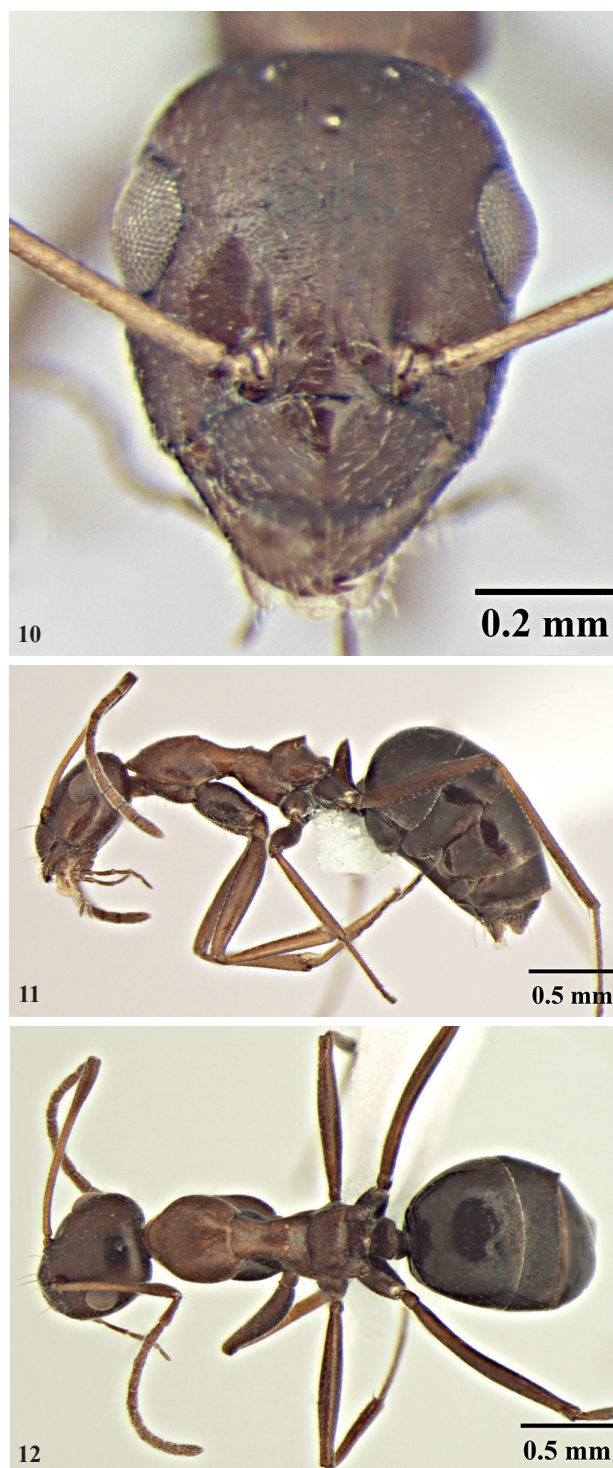
Lepisiota frauenfeldi var. *integra* (Forel); Bolton 1995: 227; first combination in *Lepisiota*.

Worker measurements. HL 0.66–0.75; HW 0.57–0.66; EL 0.20–0.22; SL 0.82–0.95; PnW 0.39–0.49; ML 1.00–1.12; PFL 0.66–0.77; PFW 0.13–0.16 mm. Indices: CI 84–88; SI 140–151; REL 27–30 (n = 10).

Description. Head subrectangular; longer than wide, almost equally wide anteroposteriorly; lateral and posterior margins convex, posterolateral corners rounded; clypeus medially subcarinate; anterior clypeal margin complete and convex; eyes subglobulose, convex, projecting beyond cephalic lateral margins, covering one-third of lateral cephalic margin, placed at posterior half of head; three ocelli present; antennal scape surpassing posterior head margin by about half its length.

In lateral view pronotum convex, mesometanotum strongly constricted, lower than pronotum and propo-

deum, giving mesosoma a dumbbell shape; mesometanotum demarcated; metanotal area distinct; propodeum armed with a pair of teeth diverging posteriorly; propodeal declivity steep.



Figs 10–12. Worker; *Lepisiota integra* (Forel, 1894) stat. nov. 10. Head, frontal view. 11. Body, lateral view. 12. Body, dorsal view.

Petiole upright, with distinctly angular sides, dorsum emarginate with teeth-like apical corners.

Overall body dull and opaque, relatively densely and evenly microreticulate.

Body covered with erect setae on head and pronotum; gastral setae restricted to apical segments; pubescence relatively more as in *Lepisiota bipartita* and *Lepisiota sericea*, fine and sparse, most visible on head and gaster; sparser on mesosoma; antennal funiculus with appressed to decumbent pubescence.

Color uniformly reddish-brown.

Distribution and habitat. India (Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Meghalaya, Punjab, Uttarakhand), Pakistan (Bharti et al. 2016; Rasheed et al. 2019). This species seems to be general in distribution in India; it was collected in non-forest as well as forest habitats. Workers were mostly collected by beating vegetation, Winkler's extractor, hand collecting, from honey baits and in pitfall traps.

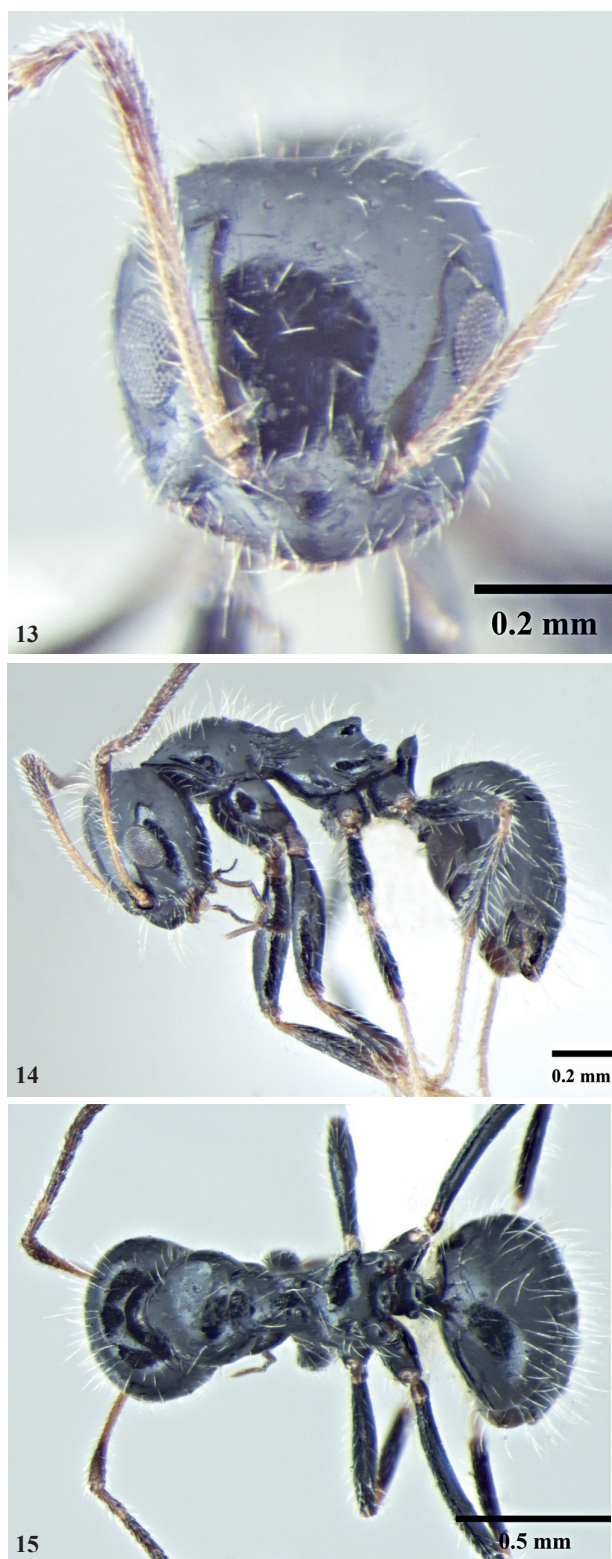
Remarks. *Lepisiota integra* is raised here to species rank, originally described by Forel (1894) as an infra species taxon *frauenfeldi* var. *integra*. This is a medium to large-sized ant with a dull and uniformly reddish-brown body and a dorsally emarginate petiole, whereas *L. frauenfeldi* (Mayr, 1855) is a relatively shiny, paler species with mesosoma, legs and antennae orange, distinctly contrasting the brown head and gaster, and a dorsally dentate petiole.

Material examined. India: Himachal Pradesh: Baijnath, 32.0527° N, 76.6500° E, 1125 m, 9 ♀♀, 17.vi.2010; Bakhra, 31.4087° N, 76.4327° E, 650 m, 21 ♀♀, 7.x.2008; Ghamrur, 31.6620° N, 76.0601° E, 460 m, 9 ♀♀, 1.vi.2009; Ghatti, 31.9300° N, 75.9302° E, 425 m, 1 ♀, 12.x.2008; Guraldhar, 31.6670° N, 76.4684° E, 660 m, 15 ♀♀, 2.vi.2009; Jogi Panga, 31.5408° N, 76.3161° E, 600 m, 13 ♀♀, 9.x.2008; Renuka, 30.6083° N, 77.4615° E, 600 m, 5 ♀♀, 8.v.2009; Terrace, 31.9234° N, 75.9294° E, 420 m, 10 ♀♀, 24.v.2009, 20 ♀♀, 25.v.2009, 2 ♀♀, 9.vii.2010. Jammu and Kashmir: Manda, 32.7496° N, 74.8673° E, 500 m, 8 ♀♀, 15.vii.2009; Mansar, 32.6979° N, 75.1489° E, 690 m, 4 ♀♀, 13.vii.2009. Punjab: Chohal, 31.6666° N, 76.0666° E, 450 m, 17 ♀♀, 11.x.2008. Uttarakhand: Forest Research Institute, 30.3416° N, 77.9903° E, 640 m, 3 ♀♀, 11.v.2009, 3 ♀♀, 12.v.2009; Ranger's College, 30.3225° N, 78.0445° E, 660 m, 20 ♀♀, 22.v.2010, 9 ♀♀, 25.v.2010, Aijaz A. Wachkoo leg.

Lepisiota layla sp. n. (Figs 13–15)

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Type material. *Holotype worker.* India, Himachal Pradesh, Kotla, 31.8821° N, 75.9963° E, 500 m, 22.x.2010. Paratype, 1 worker, same data as for holotype, Aijaz A. Wachkoo leg.



Figs 13–15. Holotype worker; *Lepisiota layla* sp. n. **13.** Head, frontal view. **14.** Body, lateral view. **15.** Body, dorsal view.

Worker measurements. HL 0.57–0.58; HW 0.57–0.58; EL 0.18–0.19; SL 0.64–0.65; PW 0.40–0.41; PFL 0.50–0.51; PFW 0.12–0.13; ML 0.86–0.87 mm. Indices: CI 100; SI 112; REL 33 (n = 2).

Description. Head subquadrate; as long as wide, as wide posteriorly as in front; lateral margins convex, posterior margin transverse with strongly rounded postero-lateral corners; clypeus subcarinate in the middle; anterior clypeal margin complete and convex; eyes broadly oval, weakly convex, placed at the middle-line of head, covering about one-third of lateral cephalic margin; three small ocelli present; antennal scape surpassing posterior head margin by about one-third its length.

In lateral view promesonotum convex, metanotum low, almost straight; mesometanotum demarcated; metanotal area distinct; mesometanotum constricted; propodeum armed with a pair of posteriorly diverging thick blunt spines; propodeal declivity steep.

Petiole upright with angular sides, dorsally without distinct teeth or spines, shallowly emarginate; apical corners with acute angles pointing upward.

Overall body polished, smooth and shining; mesometanotal suture cross-ribbed; mesometapleuron longitudinally striate.

Body abundantly covered with long, erect white setae; scape and legs with relatively shorter erect setae than on body; antennal funiculus with dense suberect pubescence.

Color black; scape and tarsi yellow brown.

Distribution and habitat. India (Himachal Pradesh). This species seems to be rare in India: the specimens were found in the Shivalik range of Western Himalaya. The specimens were collected by hand from the trunk of an *Acacia* tree.

Etymology. The species epithet is an Arabic noun meaning dark beauty, in reference to the shining black color of this species.

Remarks. *Lepisiota layla* is a medium-sized ant. It is superficially similar to *L. lunaris* and *L. modesta*, but its body is abundantly covered with long, erect white setae while *L. lunaris* and *L. modesta* have a body covered with usual short erect setae.

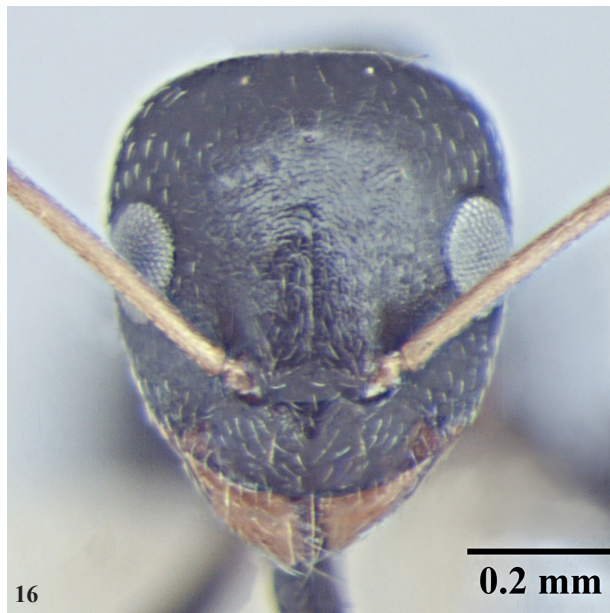
***Lepisiota lunaris* (Emery, 1893) (Figs 16–18)**

Acantholepis lunaris Emery, 1893a: 250, plate 6, fig. 12. Syntype workers, Colombo, Sri Lanka [Ceylon] [MSNG]. [Images of CASENT0905157 Syntype worker examined].

Acantholepis capensis lunaris Emery; Forel 1895: 458; Forel 1906: 86; Forel 1909: 395; Emery 1925: 24; Menozzi 1939: 312; Chapman & Capco 1951: 209; race/subspecies of *capensis*.

Acantholepis capensis subsp. *lunaria* Emery; Chapman & Capco 1951: 209; misspelled as *lunaria*.

Acantholepis lunaris Emery; Collingwood 1970: 379; status as species.



Figs 16–18. Worker; *Lepisiota lunaris* (Emery, 1893). **16.** Head, frontal view. **17.** Body, lateral view. **18.** Body, dorsal view.

Acantholepis lunaris Emery; Imai et al. 1984: 9; karyotype described.

Lepisiota capensis subsp. *lunaris* (Emery); Bolton 1995: 228; first combination in *Lepisiota*.

Lepisiota capensis subsp. *lunaris* (Emery); Bolton 1995: 228; Bharti et al. 2016: 28; Bharti et al. 2017: 42; erroneously treated as subspecies of *capensis*.

Worker measurements. HL 0.56–0.63; HW 0.51–0.57; EL 0.17–0.19; SL 0.62–0.66; PnW 0.34–0.42; ML 0.74–0.86; PFL 0.48–0.53; PFW 0.12–0.14 mm. Indices: CI 89–91; SI 111–123; REL 29–31 (n = 9).

Description. Head subquadrate; slightly longer than wide, wider posteriorly than in front; lateral and posterior margins convex, posterolateral corners rounded; clypeus subcarinate in the middle; anterior clypeal margin complete and convex; eyes broadly oval, weakly convex, placed at the middle-line of head, covering one-third of lateral cephalic margin; three small ocelli present; antennal scape surpassing posterior head margin by about one-third its length.

In lateral view promesonotum convex, metanotum low, almost straight; mesometanotum demarcated; metanotal area long and constricted; propodeum armed with a pair of posteriorly diverging thick blunt spines; propodeal declivity steep.

Petiole upright, with angular sides, dorsally emarginate, armed with a pair of almost straight spines pointing upward.

Head and mesosoma feebly shiny to subopaque; gaster polished, smooth and shiny; overall head and mesosomal dorsum weakly microreticulate; propleuron shiny; mesonotum and lateral mesosoma longitudinally striate; declivous face transversally striate.

Body covered with short, erect, abundant setae on head and gaster, sparser on mesosoma; pubescence very fine and sparse, most visible on head; almost absent on mesosoma and gaster; antennal funiculus with sparse appressed to decumbent pubescence.

Black; antenna, mandible and tarsi light brown.

Distribution and habitat. India (Himachal Pradesh, Jammu and Kashmir), Nepal, Pakistan, Sri Lanka (Thapa 2000; Bharti et al. 2016; Rasheed et al. 2019; Dias et al. 2020). This species seems to be widespread across India, although infrequent in the collections. The specimens were collected both in forest and non-forest habitats, mainly by hand collecting from the dry soil and honey baits.

Remarks. This small to medium-sized species is similar to many workers of the medium sized *L. mayri* but the erect setae on the body are distinctly sparse, whereas the latter species is covered with abundant erect setae and very hairy overall.

Material examined. India: Himachal Pradesh: Bari, 31.6591° N, 76.5000° E, 520 m, 3 ♀♀, 6.vi.2009; Ghatti, 31.9300° N, 75.9302° E, 425 m, 3 ♀♀, 12.x.2008; Guga,

31.6864° N, 76.1898° E, 600 m, 2 ♀♀, 22.x.2008; Jassur, 32.2824° N, 75.8496° E, 520 m, 6 ♀♀, 6.vi.2009; Kotla, 31.8821° N, 75.9963° E, 500 m, 5 ♀♀, 22.x.2008; Palampur, 32.1109° N, 76.5430° E, 1200 m, 4 ♀♀, 18.vi.2010; Nagabari, 32.3004° N, 75.8901° E, 420 m, 3 ♀♀, 18.vi.2009; Terrace, 31.9234° N, 75.9294° E, 420 m, 4 ♀♀, 12.x.2009. Punjab: Dunera, 32.4443° N, 75.8900° E, 520 m, 3 ♀♀, 24.vii.2010, Aijaz A. Wachkoo leg.

***Lepisiota mayri* sp. n.** (Figs 19–21)

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Type material. *Holotype worker.* India, Himachal Pradesh, Andretta, 32.0744° N, 76.5856° E, 940 m, 21.vi.2010. *Paratypes:* 12 workers, same data as for holotype; 7 workers, Himachal Pradesh, Baijnath, 32.0527° N, 76.6500° E, 1125 m, 17.vi.2010; 6 workers, Himachal Pradesh, Kotla, 31.8821° N, 75.9963° E, 500 m, 13.x.2008; 2 workers, Himachal Pradesh, Nahan, 760 m, 30.5596° N, 77.2960° E, 27.viii.2009; 1 worker, Himachal Pradesh, Renuka, 30.6083° N, 77.4615° E, 600 m, 8.v.2009; 5 workers, Himachal Pradesh, Terrace, 31.9234° N, 75.9294° E, 420 m, 24.v.2009; 3 workers, Uttarakhand, Forest Research Institute, 30.3416° N, 77.9903° E, 640 m, 2.ix.2009; 8 workers, Uttarakhand, Rajaji Forest Area, 30.2483° N, 77.9878° E, 660 m, 21.v.2010; 1 worker, Uttarakhand, Selaqui, 30.3720° N, 77.8605° E, 670 m, 24.v.2010, Aijaz A. Wachkoo leg.

Worker measurements. HL 0.65–0.73; HW 0.60–0.69; EL 0.20–0.23; SL 0.68–0.77; PnW 0.42–0.50; ML 0.92–1.04; PFL 0.57–0.64; PFW 0.14–0.17 mm. Indices: CI 91–95; SI 111–116; REL 29–31 (n = 15).

Description. Head subquadrate; slightly longer than wide, wider posteriorly than in front; lateral and posterior margins convex, with rounded posterolateral corners; clypeus carinate in the middle; anterior clypeal margin complete and convex; eyes broadly oval, weakly convex, placed at the middle-line of head, covering about one-third of lateral cephalic margin; three small ocelli present; antennal scape surpassing posterior head margin by about one-third its length.

In lateral view promesonotum convex, metanotum low, almost straight; mesometanotum demarcated; metanotal area distinct; mesometanotum constricted; propodeum armed with a pair of posteriorly diverging thick blunt spines; propodeal declivity steep.

Petiole upright, with angular sides, dorsally emarginate, armed with a pair of nearly straight spines pointing upward.

Overall body shiny; head weakly microreticulate to smooth without sculpture; pronotum, metanotum and propodeal dorsum coarsely microreticulate; mesonotum weakly microreticulate, mesometanotal suture cross-ribbed; propleuron sometimes weakly longitudinally striate; mesometapleuron coarsely longitudinally striate.

Body abundantly covered with short, erect setae; scape and legs with dense suberect pilosity; antennal funiculus with dense subdecumbent to suberect pubescence.



Figs 19–21. Holotype worker; *Lepisiota mayri* sp. n. 19. Head, frontal view. 20. Body, lateral view. 21. Body, dorsal view.

Black; scape and tarsi yellow brown.

Distribution and habitat. India (as *L. capensis*; Arunachal Pradesh, Assam, Bihar, Goa, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Sikkim, Uttarakhand, West Bengal) (Bharti et al. 2016; Dad et al. 2019). This species appears to be widespread on the Indian subcontinent typically reported as *L. capensis*; specimens were collected by hand, beating vegetation and honey baiting.

Etymology. The species is named in honor of Gustav Mayr, author of *L. capensis* to which it has been a homonym.

Remarks. The species is similar to *L. modesta* with which it shares its uniform black color and a medium-sized body. The distinguishing features include a combination of fine microreticulate sculpture on head and mesosoma, prominent propodeal spines and abundant erect setae on the body in *L. mayri*, versus a smooth and shiny body, reduced propodeal spines, and sparse erect setae in *L. modesta*.

Lepisiota modesta (Forel, 1894) (Figs 22–24)

Acantholepis modesta Forel, 1894: 412. Syntype workers, Mussoorie, Uttarakhand, India [MHNG]. [Images of CASENT0909892 Syntype worker examined].

Lepisiota modesta (Forel); Bolton 1995: 228; first combination in *Lepisiota*.

Worker measurements. HL 0.60–0.67; HW 0.52–0.63; EL 0.16–0.20; SL 0.62–0.70; PnW 0.35–0.44; ML 0.78–0.92; PFL 0.48–0.57; PFW 0.12–0.15 mm. Indices: CI 85–93; SI 110–125; REL 26–29 (n = 12).

Description. Head subquadrate; longer than wide, wider posteriorly than in front; lateral margins convex, posterior margin shallowly concave, with rounded posterolateral corners; clypeus carinate in the middle; anterior clypeal margin complete and convex; eyes oval, weakly convex, placed at the middle-line of head, covering about one-third of lateral cephalic margin; three small ocelli present; antennal scape surpassing posterior head margin by about one-third its length.

In lateral view promesonotum convex, metanotum low, almost straight; mesometanotum demarcated; metanotal area distinct; mesometanotum constricted; propodeal spines reduced to tubercles; propodeal declivity steep.

Petiole upright with angular sides, dorsally emarginate, armed with spines pointing upward.

Overall body shiny; mesometanotal suture cross-ribbed; mesometapleuron coarsely longitudinally striate weakly so, on lateropropodeum; propodeal declivity transversally striate.

Body abundantly covered with erect setae; pubescence on body uniformly very fine and sparse; antennal funiculus with subdecumbent to suberect pubescence.

Color black; scape, mandible and tarsi yellow brown.

Distribution and habitat. India (Himachal Pradesh, Jammu and Kashmir, Punjab, Uttarakhand) (Bharti et al. 2016; Wachkoo et al. 2020). Although this species is collected infrequently it seems widespread across India. It



Figs 22–24. Worker; *Lepisiota modesta* (Forel, 1894). 22. Head, frontal view. 23. Body, lateral view. 24. Body, dorsal view.

seems to have a preference for relatively higher altitudes above 1200 m. Most of the specimens were collected under stones and from honey baits.

Remarks. The medium-sized workers can be distinguished from the somewhat similar small to medium-sized *L. annandalei* by a combination of abundant erect setae on body, a transversally striate propodeal declivity and a bispinose petiolar dorsum; *L. annandalei* has sparse erect setae on the body, a smooth and shiny propodeal declivity and an emarginate petiolar dorsum.

Material examined. India: Himachal Pradesh: Lwasa, 30.7394° N, 77.1528° E, 1200 m, 17 ♀♀, 27.viii.2009. Jammu and Kashmir: Baderwah, 32.9832° N, 75.7097° E, 1700 m, 18 ♀♀, 30.vi.2009, 30 ♀♀, 1.vii.2009. Uttarakhand: Mussoorie, 30.4606° N, 78.0521° E, 1820 m, 37 ♀♀, 9.viii.2009, Aijaz A. Wachkoo leg.

Lepisiota opaca (Forel, 1892) (Figs 25–27)

Acantholepis opaca Forel, 1892: 43. Syntype workers, Kanara, Karnataka, India [MHNG, MSNG]. [Images of CASENT0909893, CASENT0905158 Syntype workers examined].

Acantholepis opaca Forel; Bingham 1903: 318.

Lepisiota opaca (Forel); Xu 1994: 235; first combination in *Lepisiota*.

Worker measurements. HL 0.63–0.70; HW 0.58–0.65; EL 0.19–0.22; SL 0.64–0.76; PnW 0.42–0.47; ML 0.79–1.00; PFL 0.53–0.61; PFW 0.14–0.16 mm. Indices: CI 91–93; SI 111–120; REL 29–32 (n = 8).

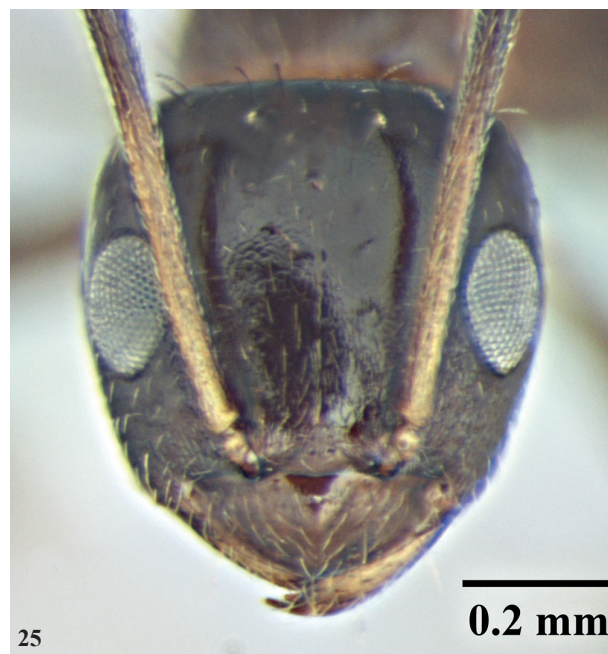
Description. Head subquadrate; slightly longer than wide, wider posteriorly than in front; lateral margins convex, posterior margin nearly transverse to convex, with rounded posterolateral corners; clypeus carinate in the middle; anterior clypeal margin complete and convex; eyes oval, weakly convex, placed at the middle-line of head, covering about one-third of lateral cephalic margin; three small ocelli present; antennal scape surpassing posterior head margin by about one-third its length.

In lateral view promesonotum convex, metanotum low, almost straight; pronotum flat above; mesometanotum demarcated; metanotal area distinct; mesometanotum constricted; propodeum armed with a pair of posteriorly diverging, upward directed sharp spines; propodeal declivity steep.

Petiole upright, with angular sides, dorsally emarginate, armed with a pair of almost straight spines pointing upward.

Overall body smooth and shiny; malar space usually coarsely microreticulate, remainder of head mostly shiny with effaced sculpture; pronotum smooth and shiny, remainder of mesosomal dorsal feebly microreticulate; propleuron smooth and shiny, rest of lateral mesosoma longitudinally striate; mesometanotal suture cross-

ribbed; propodeal declivity feebly transversally striate; sculpturing almost entirely absent in some specimens.



Figs 25–27. Worker; *Lepisiota opaca* (Forel, 1892). 25. Head, frontal view. 26. Body, lateral view. 27. Body, dorsal view.

Body abundantly covered with erect setae; pubescence very fine and sparse, least on mesosoma; antennal funiculus with subdecumbent to suberect pubescence.

Head reddish-brown, mesosoma and petiole reddish-yellow, gaster purplish-black, some specimens with a light reddish-yellow patch anteriorly on first gastral tergite; antenna, mandible and legs reddish-brown.

Distribution and habitat. China, India (Arunachal Pradesh, Assam, Himachal Pradesh, Goa, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Sikkim, West Bengal), Sri Lanka (Guénard & Dunn 2012; Bharti et al. 2016; Sheikh et al. 2019; Dias et al. 2020). This is one of the widespread species of its genus and relatively common in India. The specimens were mainly collected by beating vegetation.

Remarks. *Lepisiota opaca* is a medium-sized ant. It superficially resembles *L. fergusoni* and *L. pulchella* but can be separated from both by a smooth and shiny body, whereas *L. fergusoni* and *L. pulchella* have dull and coarsely sculptured bodies.

Material examined. India: Himachal Pradesh: Andretta, 32.0744° N, 76.5856° E, 940 m, 16 ♀♀, 11.vi.2010; Chanaur, 32.0545° N, 75.6503° E, 600 m, 5 ♀♀, 12.vi.2009, 5 ♀♀, 20.x.2008; Ghatti, 31.9300° N, 75.9302° E, 425 m, 7 ♀♀, 12.x.2008, 6 ♀♀, 27.ix.2009, 3 ♀♀, 28.ix.2009; Guraldhar, 31.6670° N, 76.4684° E, 660 m, 1 ♀, 2.vi.2009, 2 ♀♀, 10.vi.2009; Khatiar, 32.0057° N, 75.9388° E, 450 m, 7 ♀♀, 18.x.2008, 1 ♀, 3.vi.2009; Kotla, 31.8821° N, 75.9963° E, 500 m, 8 ♀♀, 13.x.2008, 4 ♀♀, 22.x.2008, 5 ♀♀, 28.v.2009; Lwasa, 30.7394° N, 77.1528° E, 1200 m, 12 ♀♀, 7.viii.2009; Nahan, 30.5596° N, 77.2960° E, 760 m, 13 ♀♀, 20.viii.2009, 9 ♀♀, 27.viii.2009; Siholi, 31.9456° N, 75.9949° E, 560 m, 1 ♀, 4.vi.2009; Terrace, 31.9234° N, 75.9294° E, 420 m, 36 ♀♀, 11.x.2008, 1 ♀, 21.x.2008, 4 ♀♀, 26.v.2009, 1 ♀, 13.vi.2009, 11 ♀♀, 24.ix.2009, 10 ♀♀, 25.ix.2009. Jammu and Kashmir: Manda, 32.7496° N, 74.8673° E, 500 m, 7 ♀♀, 15.vii.2009; Mansar, 32.6979° N, 75.1489° E, 690 m, 1 ♀, 12.vii.2009, 1 ♀, 13.vii.2009; Samba, 32.5537° N, 75.1317° E, 390 m, 2 ♀♀, 11.vii.2009; Surinsar, 32.7009° N, 75.1512° E, 700 m, 2 ♀♀, 14.vii.2009. Punjab: Dharampur, 31.8420° N, 75.9132° E, 450 m, 2 ♀♀, 14.x.2008; Dunera, 32.4443° N, 75.8900° E, 520 m, 1 ♀, 23.vi.2009; Thein Dam, 32.4426° N, 75.7305° E, 1 ♀, 24.vi.2009. Uttarakhand: Dakpathar, 30.4966° N, 77.8004° E, 750 m, 1 ♀, 20.viii.2009; Forest Research Institute, 30.3416° N, 77.9903° E, 640 m, 1 ♀, 17.viii.2009; Mussoorie, 30.4606° N, 78.0521° E, 1820 m, 2 ♀♀, 13.vii.2009; Rajaji Forest Area, 30.2483° N, 77.9878° E, 660 m, 39 ♀♀, 6.viii.2009, 4 ♀♀, 10.viii.2009, 1 ♀, 13.viii.2009; Selaqui, 30.3720° N, 77.8605° E, 670 m, 1 ♀, 7.viii.2009, 2 ♀♀, 24.v.2010, Aijaz A. Wachkoo leg.

Lepisiota pulchella (Forel, 1892) stat. rev. (Figs 28–30) *Acantholepis opaca* r. *pulchella* Forel, 1892: 43. Syntype workers, Pune [Poona], Maharashtra, India [MHNG]. [Images of CASENT0909894 Syntype worker examined].

Acantholepis pulchella Forel; Dalla Torre 1893: 172; Bingham 1903: 318; Wu & Wang 1995: 129; Zhou 2001: 168; status as species.

Acantholepis opaca subsp. *pulchella* Forel; Emery 1893b: 172; Forel 1894: 414; Forel 1895: 458; Emery 1925: 27; Chapman & Capco 1951: 210; Bolton 1995: 228; Guénard & Dunn 2012: 34; Bharti et al. 2016: 28; Bharti et al. 2017: 42; subspecies of *opaca*.

Lepisiota opaca subsp. *pulchella* (Forel); Bolton 1995: 228; first combination in *Lepisiota*.

Worker measurements. HL 0.56–0.64; HW 0.51–0.59; EL 0.17–0.20; SL 0.60–0.68; PnW 0.35–0.42; ML 0.77–0.87; PFL 0.45–0.53; PFW 0.12–0.14 mm. Indices: CI 90–94; SI 111–119; REL 30–31 (n = 15).

Description. Head subquadrate; slightly longer than wide, wider posteriorly than in front; lateral and posterior margins convex, posterolateral corners rounded; clypeus subcarinate in the middle; anterior clypeal margin complete and convex; eyes oval, weakly convex, placed at the middle-line of head, covering about one-third of lateral cephalic margin; three small ocelli present; antennal scape surpassing posterior head margin by about one-third its length.

In lateral view promesonotum convex, metanotum low, feebly concave; mesometanotum demarcated; metanotal area distinct; mesometanotum constricted; propodeum armed with a pair of posteriorly diverging, upward directed sharp spines; propodeal declivity steep.

Petiole upright, with angular sides, dorsally emarginate, armed with a pair of divergent spines pointing upward and outward.

Head and mesosomal dorsum opaque; gaster polished, smooth and shining; head and mesosomal dorsum distinctly reticulate-punctate; propleuron relatively smooth and shiny, remainder of lateral mesosoma longitudinally striate; mesometanotal suture cross-ribbed; propodeal declivity transversally striate.

Body abundantly covered with erect setae; pubescence very fine and sparse, least on mesosoma; antennal funiculus with subdecumbent to suberect pubescence.

Head brown, mesosoma reddish-brown to dark brown; antenna, petiole and legs light to dark brown; gaster black with a light reddish-yellow patch anteriorly on first gastral tergite.

Distribution and habitat. China, India (Karnataka, Kerala, Maharashtra) (Forel 1894; Guénard & Dunn 2012; Dad et al. 2019). This species seems to be distributed in the Western Ghats and other parts of central India. Records from Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Punjab, Sikkim, Uttara-

khand and West Bengal (Bharti et al. 2016) seem to be a misidentification of *L. opaca* and are excluded until further evaluation. The workers were mainly collected from honey baits and by beating vegetation.

Remarks. This medium-sized ant originally described by Forel (1892) as an infraspecific taxon *opaca* r. *pulchella* was raised to species rank by Bingham (1903). Emery (1925) without any justification reverted it back to subspecies. It is a valid species, resembling more closely *L. fergusoni* than *L. opaca* and is therefore revived here

to species level. The main characters that enable distinguishing it from *L. opaca* are a combination of a dull and opaque body with a distinctly reticulate-punctate head and mesosoma. *L. opaca* is smooth and shiny with superficial reticulate sculpture.

Material examined. India: Karnataka: Gundlupet, 11.8132° N, 76.6858° E, 800 m, 8 ♀♀, 27.ix.2010. Kerala: Salim Ali Bird Sanctuary, 10.0918° N, 76.7420° E, 118 m, 6 ♀♀, 10.x.2011, Shahid A. Akbar leg.

***Lepisiota rothneyi* (Forel, 1894) (Figs 31–33)**

Plagiolepis rothneyi Forel, 1894: 415. Syntype workers, Belgaum, Karnataka; Barrackpore [Barrakpore], West Bengal, India [MHNG]. [Images of CASENT0909865, CASENT0909866 Syntype workers examined].

Acantholepis rothneyi Forel; Santschi 1926: 15; first combination in *Acantholepis*.

Lepisiota rothneyi Forel; Bolton 1995: 228; first combination in *Lepisiota*.

Worker measurements. HL 0.74–1.04; HW 0.71–1.03; EL 0.20–0.28; SL 0.72–0.88; PnW 0.48–0.63; ML 0.88–1.09; PFL 0.61–0.81; PFW 0.18–0.25 mm. Indices: CI 95–98; SI 98–104; REL 26–27 (n = 13).

Description. Head subquadrate; about as long as wide, wider posteriorly than in front; lateral margins convex, posterior margin gently convex, posterolateral corners rounded; clypeus subcarinate in the middle; anterior clypeal margin complete and convex; eyes relatively small, broadly oval, weakly convex, placed at the middle-line of head, covering three-tenths of lateral cephalic margin; three small ocelli present; antennal scape surpassing posterior head margin by about one-fourth its length.

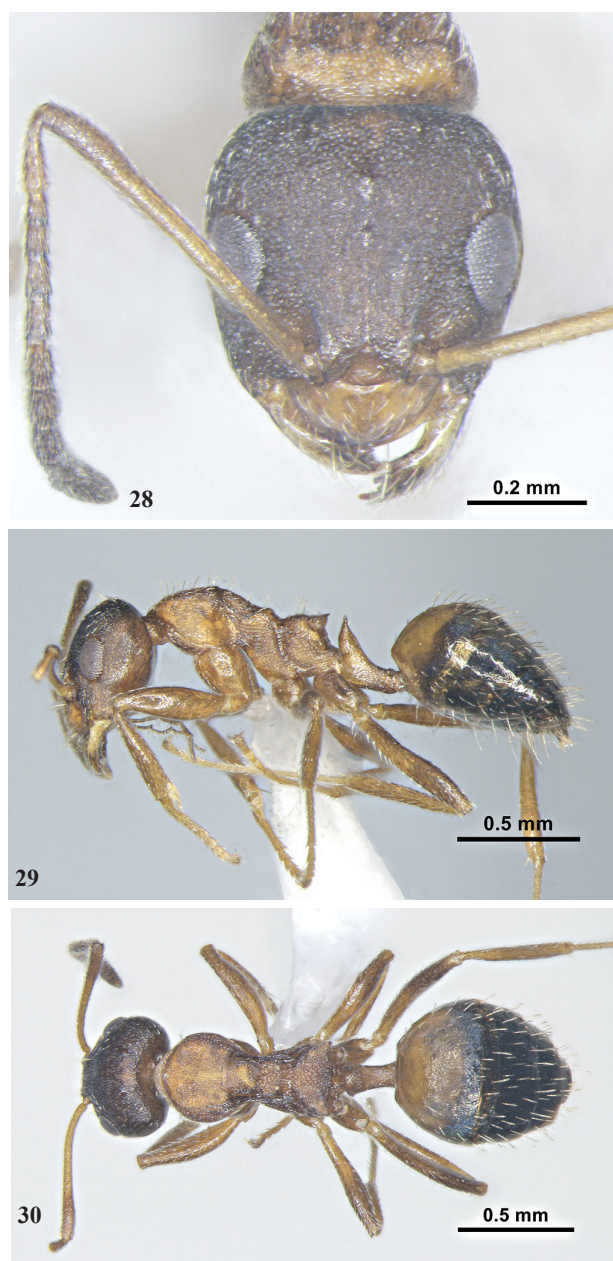
Mesosoma constricted in the middle, in lateral view promesonotum dome like, convex; metanotum distinctly lower than promesonotum but almost as high as propodeum; mesometanotum demarcated; metanotal area short but distinct; propodeum unarmed without a pair of teeth or spines; propodeal declivity steep.

Petiole upright, with smoothly curved sides, dorsally rounded, without a pair of teeth or spines.

Body overall smooth and shiny. Setae restricted to clypeus, gastral venter and segmental margins; a few setae near lateral ocelli usually present; body covered with sparse pubescence; antennal funiculus with appressed to decumbent pubescence.

Color brown to black; antenna, mandible and tarsi light brown.

Distribution and habitat. Bangladesh, China, India (Karnataka, Kerala, Orissa, Tamil Nadu, Uttarakhand, West Bengal), Myanmar, Vietnam (Wheeler 1927; Han-nan 2003; Zryanin 2011, Guénard & Dunn 2012; Bharti et al. 2016). This species is widespread in India however, it appears to be a forest ant, restricted to relatively un-



Figs 28–30. Worker; *Lepisiota pulchella* (Forel, 1892) stat. rev. 28. Head, frontal view. 29. Body, lateral view. 30. Body, dorsal view.

disturbed areas. The workers were mostly hand collected from tree trunks and by beating vegetation.



Figs 31–33. Worker; *Lepisiota rothneyi* (Forel, 1894). **31.** Head, frontal view. **32.** Body, lateral view. **33.** Body, dorsal view.

Remarks. The medium-sized ant closely resembles *L. wroughtonii*, but can be separated from it by having a sparsely pubescent and shiny body, lacking erect setae on the mesosomal dorsum. In contrast, *L. wroughtonii* is more pubescent with few short setae on the pronotum.

Material examined. India: Uttarakhand: Forest Research Institute, 30.3416° N, 77.9903° E, 640 m, 6 ♀♀, 11.v.2009, 1 ♀, 13.v.2009, 1 ♀, 30.vii.2009, 2 ♀♀, 26.v.2010; Rajaji Forest Area, 660 m, 30.2483° N, 77.9878° E, 1 ♀, 5.viii.2009, 2 ♀♀, 6.viii.2009, 4 ♀♀, 11.viii.2009, 1 ♀, 6.ix.2009; Selaqui, 30.3720° N, 77.8605° E, 670 m, 4 ♀♀, 7.viii.2009, Aijaz A. Wachkoo leg.

Lepisiota sericea (Forel, 1892) (Figs 34–36)

Acantholepis frauenfeldi var. *sericea* Forel, 1892: 41. Syntype workers, Mussoorie, Uttarakhand, India [MHNG]. [Images of CASENT0909885 Syntype worker examined].

Acantholepis sericea Forel; Pisarski 1967: 408; status as species.

Lepisiota sericea (Forel); Bolton 1995: 228; first combination in *Lepisiota*.

Worker measurements. HL 0.66–0.84; HW 0.59–0.74; EL 0.20–0.25; SL 0.99–1.08; PnW 0.36–0.52; ML 1.02–1.27; PFL 0.77–0.97; PFW 0.14–0.18 mm. Indices: CI 85–90; SI 146–152; REL 29–30 (n = 6).

Description. Head subrectangular; longer than wide, slightly narrowed anteriorly; lateral and posterior margins convex, posterolateral corners rounded; clypeus medially subcarinate; anterior clypeal margin complete and convex; eyes subglobulose, convex, projecting beyond cephalic lateral margins, covering one-third of lateral cephalic margin, placed at posterior half of head; three ocelli present; antennal scape surpassing posterior head margin by about half its length.

In lateral view pronotum convex, mesometanotum strongly constricted, lower than pronotum and propodeum, giving mesosoma a dumbbell shape; mesometanotum demarcated; metanotal area distinct; propodeum armed with a pair of teeth diverging posteriorly; propodeal declivity steep.

Petiole upright, with smoothly curved sides, dorsally rounded and narrow, without teeth or spines.

Body dull, overall feebly microreticulate, gastral sculpturing even feebler.

Body covered with sparse erect setae on head, pronotum and gaster; setae on gaster usually restricted to venter and segmental margins; pubescence very fine and sparse, most visible on head and gaster; almost absent on mesosoma; antennal funiculus with appressed to decumbent pubescence.

Color uniformly dark brown to black; antenna, mandible and tarsi brown.

Distribution and habitat. Afghanistan, India (Himachal Pradesh, Jammu and Kashmir, Maharashtra, Ut-

tar Pradesh, Uttarakhand), Iran, Pakistan, Turkmenistan (Kuznetsov-Ugamsky 1929; Pisarski 1967; Ghahari et al. 2011; Bharti et al. 2016; Rasheed et al. 2020). This species seems widespread in India. Specimens were hand collected, under stones, from tree trunks and the ground.

Remarks. *Lepisiota sericea* is a medium to large-sized ant which can be distinguished from the very similar species *L. integra* by a combination of a dark brown body, smoothly curved sides of the petiole and a narrow, rounded petiolar dorsum. *L. integra* has a reddish-brown body, angular sides of the petiole and an emarginate petiolar dorsum with teeth-like apical corners.

Material examined. Himachal Pradesh: Andretta, 32.0744° N, 76.5856° E, 940 m, 9 ♀♀, 21.vi.2010; Baijnath, 32.0527° N, 76.6500° E, 1125 m, 6 ♀♀, 17.vi.2010; Lwasa, 30.7394° N, 77.1528° E, 1200 m, 6 ♀♀, 27.viii.2009; Palampur, 32.1109° N, 76.5430° E, 1200 m, 7 ♀♀, 18.vi.2010. Jammu and Kashmir: Surinsar, 32.7009° N, 75.1512° E, 700 m, 10 ♀♀, 14.vii.2009. Uttarakhand: Mussoorie, 30.4606° N, 78.0521° E, 1820 m, 7 ♀♀, 9.viii.2009, Aijaz A. Wachkoo leg.



Figs 34–36. Worker; *Lepisiota sericea* (Forel, 1892). 34. Head, frontal view. 35. Body, lateral view. 36. Body, dorsal view.

Lepisiota wroughtonii (Forel, 1902) stat. rev. (Figs 37–39)

Plagiolepis rothneyi r. *wroughtonii* Forel, 1902a: 292. Syntype workers, Nilgiris, Tamil Nadu, India [MHNG]. [Images of CASENT0909869 Syntype worker examined].

Plagiolepis wroughtonii Forel; Bingham 1903: 321; status as species.

Plagiolepis rothneyi subsp. *wroughtonii* Forel; Emery 1925: 23; subspecies of *rothneyi*.

Lepisiota rothneyi subsp. *wroughtonii* (Forel); Bolton 1995: 229; first combination in *Lepisiota*.

Worker measurements. HL 0.60–0.75; HW 0.54–0.69; EL 0.16–0.21; SL 0.60–0.73; PnW 0.36–0.48; ML 0.76–0.96; PFL 0.49–0.62; PFW 0.16–0.20 mm. Indices: CI 82–93; SI 103–119; REL 26–28 (n = 13).

Description. Head subquadrate; longer than wide, wider posteriorly than in front; lateral margins convex, posterior margin gently convex, posterolateral corners rounded; clypeus subcarinate in the middle; anterior clypeal margin complete and convex; eyes relatively small, broadly oval, weakly convex, placed at the middle line of head, covering three-tenths of lateral cephalic margin; three small ocelli present; antennal scape surpassing posterior head margin by about one-fourth its length.

Mesosoma constricted in the middle, in lateral view promesonotum dome like, convex; metanotum distinctly lower than promesonotum but almost as high as propodeum; mesometanotum demarcated; metanotal area short but distinct; propodeum unarmed without pair of teeth or spines; propodeal declivity steep.

Petiole upright, with smoothly curved sides, dorsally rounded, without a pair of teeth or spines.

Body overall dull covered with relatively dense pubescence. Setae restricted to clypeus, gastral venter and

segmental margins; few short erect setae on pronotum and near lateral ocelli usually present; pubescence relatively dense, more so on gaster; antennal funiculus with appressed to decumbent pubescence.

Color black; antenna, mandible and tarsi light brown.

Distribution and habitat. China, India (Himachal Pradesh, Kerala, Tamil Nadu, Uttarakhand, West Bengal), Sri Lanka (Guénard & Dunn 2012; Bharti et al. 2016; Dias et al. 2020). This species appears widespread in India and was mainly hand collected from tree trunks, by beating vegetation, from honey baits and occasionally in pitfall traps.

Remarks. This medium-sized ant was originally described by Forel (1892) as an infraspecific taxon *rothneyi* r. *wroughtonii* and later elevated to species rank by Bingham (1903). Emery (1925) reverted it back to subspecies without any justification. Based on our examination, we consider it as a valid species and elevate it to species rank here. The main characters that will enable it to be distinguished from *L. rothneyi*, the species with which it is most likely to be confused, are a combination of a densely pubescent and dull body with few erect setae on the pronotum, whereas *L. rothneyi* has a sparsely pubescent and shiny body, lacking erect setae on the mesosomal dorsum.

Material examined. India: Himachal Pradesh: Khatiar, 32.0057° N, 75.9388° E, 450 m, 3 ♀♀, 18.x.2008; Poanta Sahib, 30.4384° N, 77.6239° E, 420 m, 4 ♀♀, 11.v.2009. Uttarakhand: Assan Barrage, 30.4417° N, 77.6754° E, 750 m, 3 ♀♀, 21.viii.2009; Forest Research Institute, 30.3416° N, 77.9903° E, 640 m, 3 ♀♀, 1.x.2008, 2 ♀♀, 12.v.2009, 2 ♀♀, 30.vii.2009, 2 ♀♀, 20.v.2010, 4 ♀♀, 26.v.2010; Rajaji Forest Area, 30.2483° N, 77.9878° E, 660 m, 4 ♀♀, 6.viii.2009, 4 ♀♀, 10.viii.2009, 3 ♀♀, 25.v.2010; Ranger's College, 660 m, 30.3225° N, 78.0445° E, 8 ♀♀, 25.v.2010, 1 ♀, 27.v.2010; Selaqui, 30.3720° N, 77.8605° E, 670 m, 6 ♀♀, 24.v.2010, 10 ♀♀, 7.viii.2009, 1 ♀, 5.ix.2010, Aijaz A. Wachkoo leg.

Species excluded from the Indian fauna

The following species are excluded from the Indian *Lepisiota* fauna and are considered as doubtful records and/or misidentifications.

Lepisiota capensis (Mayr, 1862)

The nominal form of *L. capensis* (Mayr, 1862) does not occur naturally in India, despite its implied presence by the use of the name *L. capensis* reported by Bingham (1903). The species referred to in the latter paper, with abundant yellowish erect setae is clearly not *L. capensis*, which has sparse dark (brown or black) erect setae (see Mayr 1862, 1865; Arnold 1920) and is distributed in southern Africa (not from the Himalayas through to Northeastern Africa).

Bingham's (1903) report was apparently based on an erroneous reporting of the presence of *L. capensis* with



Figs 37–39. Worker; *Lepisiota wroughtonii* (Forel, 1902) stat. rev. 37. Head, frontal view. 38. Body, lateral view. 39. Body, dorsal view.

whitish setae in India and Sri Lanka (then Ceylon) by Forel (1892, 1894), and the attribution of dense pilosity to *L. capensis* served only to perpetuate this error until today (Peter Hawkes & F. Hita Garcia, pers. comm.).

The Indian material currently and in the past attributed to *L. capensis* in fact represents a very different species, and is accordingly described as a new species under the name *L. mayri* to minimize confusion by eliminating future use of the name *L. capensis* associated with Indian species.

Lepisiota frauenfeldi (Mayr, 1855)

Forel (1885) first considered that *L. frauenfeldi* was Palearctic in distribution and attributed Indian specimens from Kolkata (then Calcutta), West Bengal to *L. bipartita*. But, in his subsequent publications (Forel 1886, 1894), he argued that he had confused *L. bipartita* with *L. frauenfeldi* and accordingly treated specimens from Kolkata and Barrackpore as *L. frauenfeldi*. However, he also mentioned its rare occurrence in India. Bingham (1903), Rothney (1903), and subsequent Indian authors until today continued with Forel's (1886, 1894) unverified reporting without further clarification (see Bharti et al. 2016).

Lepisiota rothneyi watsonii (Forel, 1894)

Bharti et al. (2016) include distribution of this species in India based on Wheeler (1921). However, Wheeler (1921) does not mention its distribution in India and it is therefore excluded from the known Indian fauna.

Lepisiota simplex (Forel, 1892)

This is an African species that seems unlikely to be found in India. Forel (1894) first reported this species from Orissa based on of its superficial resemblance to the type material from Somalia. Bingham (1903) and subsequent Indian authors followed this view without any further examination of Indian specimens (see Bharti et al. 2016). Based on our examination, Indian material attributed to *L. simplex* belong mostly to *L. annandalei* and can be distinguished by few setae restricted to pronotum, whereas former has several pairs of setae scattered on the mesosoma including the propodeum.

Key to Indian species of *Lepisiota* (workers)

1. Antennal scape long, surpassing posterior margin of head by half its length or more (Figs 5, 11, 35) 2
 - Antennal scape shorter, surpassing posterior margin of head by a third of its length or less (Figs 2, 14, 23) 4
2. Bicolored; head and gaster dark brown to black, mesosoma reddish brown (Fig. 5) *L. bipartita* (Smith)
 - Uniform reddish-brown or black-brown (Figs 11, 35) 3

3. Reddish-brown; petiolar scale with distinctly angular sides, dorsally emarginate with teeth-like apical corners (Figs 11–12) *L. integra* (Forel) stat. nov.
 - Black-brown; petiolar scale with smoothly curved sides, dorsally rounded and narrow, without teeth (Figs 35–36) *L. sericea* (Forel)
4. Bicolored; mesosoma paler than gaster, mainly or entirely reddish (Figs 8, 26, 29) 5
 - Whole body uniformly dark brown to black (Figs 2, 14, 38) 7
5. All parts of the body shining with superficial microreticulate sculpture at most (Figs 26–27) *L. opaca* (Forel)
 - Body sculpture coarse, general appearance opaque (Figs 9, 30) 6
6. Head reticulate-striate; propodeal spines blunt, directed backward; petiole dorsally emarginate (Figs 7–9) *L. fergusonii* (Forel)
 - Head reticulate-punctate; propodeal spines pointed, directed upward; petiole dorsally bispinose (Figs 28–30) *L. pulchella* (Forel) stat. rev.
7. Propodeal spines indistinct; gastral pilosity restricted to few pairs of black setae on the posterior margin of tergites (Figs 32, 38) 8
 - Propodeal spines well-developed in the form of two broadly-based blunt tubercles, teeth or spines; whole gastral dorsum covered with abundant pale setae (Figs 2, 14, 17) 9
8. Pronotum without any setae; body sparsely pubescent, shiny (Fig. 32) *L. rothneyi* (Forel)
 - Pronotum with few short setae; body fairly pubescent, opaque (Fig. 38) *L. wroughtonii* (Forel) stat. rev.
9. Body abundantly covered with long, erect white setae (Fig. 14) *L. layla* sp. n.
 - Body covered with usual short erect setae (Figs 17, 20, 23) 10
10. Petiole dorsally emarginate without distinct teeth or spines; mesosomal setae (if any) restricted to pronotum (Figs 2–3) *L. annandalei* (Mukerjee)
 - Petiole dorsally distinctly bispinose; setae present across entire mesosomal dorsum (Figs 17, 20, 23) 11
11. Head and mesosoma smooth and shining; propodeal spines in the form of two broadly-based blunt tubercles (Figs 22–23) *L. modesta* (Forel)
 - Head and mesosoma finely microreticulate and dull; propodeal spines pointed (Figs 16, 20) 12
12. Antennal scape with sparse appressed to decumbent pubescence; mesosomal setae sparse; smaller species (HW 0.51–0.57) (Figs 16–18) *L. lunaris* (Emery)
 - Antennal scape with dense subdecumbent to suberect pubescence; mesosomal setae abundant; larger species (HW 0.60–0.69) (Figs 19–21) *L. mayri* sp. n.

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