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Two new species of the solitary hunting wasp genus *Ectemnius* (Hymenoptera Crabronidae), with a key to the Indian species of the subgenus *Hypocrabro*

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Abstract

Two new species of *Ectemnius* Dahlbom (Hymenoptera: Crabronidae: Crabroninae: Crabronini) are described from India: *Ectemnius* (*Hypocrabro*) *harshae* and *Ectemnius* (*Hypocrabro*) *nandaniae*. The male of *Ectemnius* (*Metacrabro*) *insignis* (F. Smith) is first described. A key to the species of subgenus *Hypocrabro* and a checklist of genus *Ectemnius* from Indian subcontinent are provided.

Key words: Crabronini, taxonomy, *Ectemnius*, new species, India.

Introduction

Ectemnius Dahlbom 1845 (Hymenoptera Crabronidae) is one of the most diverse genera of Crabronini. It is distributed widely in almost all biogeographical regions. The genus was first described by Dahlbom (1845), with the type species *Crabro guttatus* Dahlbom 1845 designated by Ashmead (1899). Genus *Lestica* is most closely related to *Ectemnius*, but unlike the latter it has well-defined orbital foveae. Genus *Ectemnius* also shares characters with *Crossocerus*, differing from the latter by shape of ocellar triangle which is equilateral in *Crossocerus* whereas broad in *Ectemnius*, nearly equilateral in some species of *krusemani* group. Bohart and Menke (1976) have divided this genus into 16 species groups (or subgenera) based on their morphology and distribution. Most contributions to our knowledge of *Ectemnius* have come from the works of Leclercq and Tsuneki. Leclercq (1954; 1958; 1968) has presented partial keys to the subgenera along with the keys to the species of South East Asia and Latin America. The most recent key to the subgenera and species of Asia and Oceania has been provided by Leclercq (1999). The genus includes 188 species and 46 subspecies. Twenty species and seven subspecies are known from the Indian subcontinent (Pulawski, 2022). The Asian *Ectemnius* are represented by nineteen subgenera (Tsuneki, 1970; Leclercq, 1999). The *Ectemnius* of Indian subcontinent belong to eight subgenera: *Policrabro* Leclercq 1958, *Cameronitus* Leclercq 1950, *Yanonius* Tsuneki 1956, *Metacrabro* Ashmead 1899, *Hypocrabro* Ashmead 1899, *Thyreocerus* A. Costa 1871, *Metactemnius* Tsuneki 1984 (Tsuneki, 1984a) and *Clytochrysus* A. Morawitz 1864 (after Leclercq, 1999).

The subgenus *Hypocrabro* Ashmead is represented by more than 55 species and 13 subspecies worldwide of which four species namely, *E. confinis* (Walker), *E. corvidus* Leclercq, *E. lysias* (Cameron), *E. semirus* Leclercq, and two subspecies, *Ectemnius* (*Hypocrabro*) *schlettereri schlettereri* (Kohl 1888) *E. schlettereri nursei* (Kohl 1915) occur in the Indian subcontinent (Pulawski, 2022). Two new species namely, *Ectemnius harshae* and *Ectemnius nandaniae* and also the previously unknown male of *Ectemnius insignis* (F. Smith) belonging to this subgenus are described in the present paper.

Materials and methods

The specimens for this study were collected in Bhimtal (State of Uttarakhand), India during 2020-2021 using yellow pan traps with soap water. Specimens from National Pusa Collection-Indian Agricultural Research Institute (NPC-IARI), New Delhi-110012 were also used for study. Leica S8APO microscope was used for examining morphological characters. Photography was produced with Leica DFC 425 digital camera attached on Leica 205FA stereozoom automontage microscope. Photographic plates were finalized with Adobe Photoshop® 7.0. Identifications of specimens were performed with the keys and descriptions by Smith (1856), Bingham (1897) and Leclercq (1954; 1958; 1961; 1982; 1999). The key to the species of the subgenus *Hypocrabro* for the Indian subcontinent was compiled from the original descriptions and keys to the species (Walker, 1871; Cameron, 1905; Kohl, 1915; Leclercq, 1961; 1982; 1999). The terminology used follows that of Bohart and Menke (1976). Antennomeres I-XII represent scape, pedicel and flagellomeres I-X. The type specimens of the new species are deposited in NPC-IARI. A checklist of the Indian species of *Ectemnius* is also provided (table 1). Synonyms for the Indian species are only included in the checklist.

The abbreviations used in the text: BL, body length; FWL, fore wing length; POD, distance between lateral ocelli; OOD, distance between lateral ocellus and compound eye; PPL, pygidial plate length; MGL, male genitalia length; NPC-IARI, National Pusa Collection-Indian Agricultural Research Institute.

Table 1. Checklist of the species of *Ectemnius* Dahlbom from Indian subcontinent.

Ectemnius species Synonymies, references, years: page number	Localities
Ectemnius (*Policrabro*) *agycus agycus* (Cameron 1904) *Crabro agycus* Cameron, 1904: 261 *Ectemnius forestus* Leclercq, 1958: 110 *Ectemnius djurodzin* Tsuneki, 1984b: 38	India: Himalayas
Ectemnius (*Cameronitus*) *ammanitus* Leclercq 1958: 152	Nepal
Ectemnius (Yanonius) arreptus (Kohl 1915) *Crabro arreptus* Kohl, 1915: 69 *Ectemnius asiaticus* Leclercq, 1950: 3 *Ectemnius tibeticus* Leclercq, 1950: 2	India: Sikkim
Ectemnius (*Policrabro*) *belli* Leclercq 1999: 40	India: Bombay
Ectemnius (*Policrabro*) *bogorensis* Leclercq 1958: 151	India: Tamil Nadu, Nilgiri hills; Sri Lanka
Ectemnius (*Metacrabro*) *chrysites* (Kohl 1892) *Crabro chrysites* Kohl, 1892: 197 *Crabro auricomus* Bingham, 1897: 327 *Crabro khasianus* Cameron, 1902: 61 *Ectemnius butuani* Leclercq, 1963: 33	India: Sikkim; Meghalaya, East Khasi hills and Assam
Ectemnius (*Hypocrabro*) *confinis* (Walker 1871) *Crabro confinis* Walker, 1871: 27	India: Himachal Pradesh, Shimla
Ectemnius (*Hypocrabro*) *corvidus* Leclercq, 1961: 76	India: Assam
Ectemnius (*Thyreocerus*) *flagellarius* (F. Morawitz 1892) *Crabro flagellarius* Morawitz, 1892: 175	Pakistan: Quetta
Ectemnius (*Metactemnius*) *fulvopilosellus* (Cameron 1902) *Crabro fulvopilosellus* Cameron, 1902: 60 *Crabro ctenopus* Cameron, 1907: 88	India: Assam, Khasia hills (now Meghalaya) and Sikkim
Ectemnius (*Cameronitus*) *fuscipennis* (Lepeletier et Brulle 1835) *Crabro fuscipennis* Lepeletier and Brullé, 1835: 710	India: Bengal (now West Bengal)
Ectemnius (*Metacrabro*) *insignis* (F. Smith 1856) *Crabro insignis* Smith, 1856: 422	India: Meghalaya, Shillong(*)
Ectemnius (*Hypocrabro*) *lysias* (Cameron 1905) *Crabro lysias* Cameron, 1905: 15	India or Pakistan: Himalayas
Ectemnius (*Yanonius*) *martjanowi* (F. Morawitz, 1892) *Crabro martjanowi* Morawitz, 1892: 177	India: Kashmir, Gulmarg (now Jammu and Kashmir)
Ectemnius (*Cameronitus*) *melanotarsis melanotarsis* (Cameron 1902) *Crabro melanotarsis* Cameron, 1902: 60 *Crabro elvinus* Cameron, 1905: 14	India: Assam, Khasia hills (now Meghalaya) and Himalayas
Ectemnius (*Cameronitus*) *melanotarsis monozonus* (Cameron 1905) *Crabro monozonus* Cameron, 1905: 218 *Ectemnius monozonus* (Cameron, 1905)	India: Assam, Khasia hills (now Meghalaya)
Ectemnius (*Cameronitus*) *menyllus* (Cameron 1905) *Crabro menyllus* Cameron, 1905: 15	India or Pakistan: Himalayas
Ectemnius (*Cameronitus*) *nigritarsus palitans* (Bingham 1896) *Crabro palitans* Bingham, 1896: 446	Sri Lanka; India: Uttar Pradesh
Ectemnius (*Cameronitus*) *nigritarsus palitoides* Leclercq 1963: 29	India: Himachal Pradesh, Shimla
Ectemnius (*Cameronitus*) *psyllus* Leclercq 1982: 152	India: Sikkim
Ectemnius (*Hypocrabro*) *schlettereri schlettereri* (Kohl 1888) *Crabro schlettereri* Kohl, 1888: 135	India: Punjab, Kullu Manali (now Himachal Pradesh)
Ectemnius (*Hypocrabro*) *schlettereri nursei* (Kohl 1915) *Crabro nursei* Kohl, 1915: 89 *Ectemnius nursei* (Kohl, 1915)	India: Kashmir (now Jammu and Kashmir)
Ectemnius (*Hypocrabro*) *semirus* Leclercq 1982: 154	India: Sikkim
Ectemnius (*Clytochrysus*) *sexcinctus* (F. 1775) *Crabro sexcinctus* Fabricius, 1775: 374	India: Kashmir, Gulmarg (now Jammu and Kashmir); Pakistan: Hazara District, Chitral district
Ectemnius (*Cameronitus*) *trichiosomus* (Cameron 1904) *Crabro trichiosomus* Cameron, 1904: 260 *Crabro himalayensis* Cameron, 1905: 218	India: Himalayas; Meghalaya, East Khasia hills
Ectemnius (*Cameronitus*) *violaceipennis* (Cameron 1907) *Crabro violaceipennis* Cameron, 1907: 88	India: Sikkim
Ectemnius (*Metacrabro*) *wickwari* (R. Turner 1902) *Crabro wickwari* Turner, 1920: 270	Sri Lanka: Kandy

(*) new record

Results and discussion

Key to the species of subgenus *Hypocrabro* Ashmead from the Indian subcontinent

(Female of *E. schlettereri nursei* and males of *E. corvidus*, *E. lysias*, *E. semirus* and *E. nandaniae* sp. nov. are unknown)

1 - Female 2
-- - Male 6
2 - Pronotal collar rounded laterally, without denticle. Median lobe of clypeus wide, rounded-subtruncated. Spots on tergum II large, tergum III with narrow band, IV and V with broad bands . . . . . *E. semirus* Leclercq 1982
-- - Pronotal collar laterally with conspicuous denticle; other characters varying 3
3 - Clypeus: short median tooth, slightly rounded. Terga densely punctate, terga I-III not depressed basally. Tibiae of all legs yellow, rarely with black spots . . . . . *E. confinis* (Walker 1871)
-- - Clypeus: median lobe widely rounded or clearly emarginate apically; other characters varying 4
4 - Antennomere III about 2.0 × as long as wide, longer than antennomeres IV and VI. Terga II and IV each with yellow, large, transverse spot. Scape stout medially, not curved. Scutum largely punctate. Clypeus without bisinuate band dorsally, median carina distinct. Scutellum and metanotum punctate . . . . . *E. lysias* (Cameron 1905)
-- - Antennomere III about 1.5 × as long as wide, as long as antennomeres IV and VI (figure 4E). Terga II and IV and also tergum V each with a pair of large, transverse spots that are close to each other but not coalesced (figure 4J-K). Scape simple, cylindrical, curved. Scutum reticulate-punctuate dorsally (figure 4G). Clypeus with black bisinuate band dorsally, median carina indistinct (figure 4D). Scutellum and metanotum shiny, impunctate . . . . . *E. nandaniae* sp. nov.
-- - Scape subcylindrical, with or without carina 5
5 - No yellow marks on mandible, scape, antennomere III basally, pronotal lobe and fore- and midfemora. Scape ecarinate. Short narrow streak at the base of all tibiae on outer side, yellow. Clypeus with inconspicuous longitudinal carina. Yellow transverse band on basal half of terga II and IV, tergum V immaculate. Head dorsal surface densely punctate, without reticulation . . . . . *E. corvidus* Leclercq 1961
-- - Yellow are: mandible, scape, antennomere III basally, pronotal lobe and fore- and midfemora, fore tibia dorsally, mid tibia except ventral stripe and hind tibia completely (figure 1A). Scape carinate (figure 1B). Clypeus with distinct longitudinal carina (figure C). Yellow transverse spots on basal half of terga II and IV, tergum V with spots coalesced (figure 2L-M). Head dorsally reticulato-punctate, densely reticulate near and between ocelli (figure 1D) . . . . . *E. harshae* sp. nov.
6 - Pronotal collar with conspicuous denticle laterally. Antennomere III at least 1.5 × as long as wide, subequal to antennomere VI or shorter. Tergum I punctate 7
-- - Pronotal collar without denticle, rounded laterally. Antennomere IV at least 2.5 × as long as wide, as long as antennomere VI. Tergum I impunctate . . . . . *E. schlettereri nursei* (Kohl 1915)
7 - Antennomere III about 1.5 × as long as pedicel; antennomeres IV, VI and VII slightly excavated below; antennomere V not excavated. Terga II-IV with yellow lateral spots, spots of tergum III much smaller than those on II and IV, sometimes absent, tergum V immaculate . . . . . *E. confinis* (Walker 1871)
-- - Antennomere III about 1.3 × as long as pedicel; antennomere IV-VI deeply and VII shallowly excavated below (figure 3E). Lateral yellow spots on terga II-IV almost equal in size, spots on tergum V not coalesced (figure 3J-K) . . . . . *E. harshae* sp. nov.

TAXONOMY

Genus *Ectemnius* Dahlbom 1845

Subgenus *Hypocrabro* Ashmead 1899

Diagnosis. This subgenus is closely related to subgenera *Clytochrysus* A. Morawitz 1864 and *Apoctemnius* Leclercq 1950. It differs from both subgenera by precoxal carina not or little extended forward (precoxal carina extended forwards distinctly in both *Clytochrysus* and *Apoctemnius*), distance between compound eyes and antennal sockets very small (distance between compound eyes and antennal sockets large in both *Clytochrysus* and *Apoctemnius*), pronotal lobe without carina, mandible with conspicuous internal tooth, mesosoma coarsely punctuated, metasoma punctate or sometimes impunctate. The males of subgenus *Hypocrabro* are characterized by antennomeres IV-VI excavated below or sometimes antennomere VII (figure 3E), antennomere III generally longer than wide. The females of subgenus *Hypocrabro* are characterized by presence of fore tarsal spines, antennomere IV not exceeding twice its apical diameter (Leclercq, 1958; 1999).

Description of new species

Ectemnius (*Hypocrabro*) *harshae* Saini et Dey sp. nov. (figures 1, 2 and 3)

Diagnosis. The new species is close to female of *E. corvidus*, sharing with it the following: orbital fovea elongate, elliptical, close to inner eye margin; pronotal collar laterally with obtuse denticle; anterior and posterior borders of scutellum with distinct foveae; metanotum inconspicuously punctate, striate at posterior margin; apical margins of gastral sterna with white setae; sculpture of propodeum (median furrow, oblique longitudinal striae on dorsal surface and posterior surface alveolate with fine transverse striae); fore femur expanded basally forming an angle. The new species differs from *E. corvidus* and other species of subgenus *Hypocrabro* by the clypeus with distinct median carina and median lobe slightly truncate apically, scape carinate, lateral spots on metasoma, coloration and punctation on body and legs as described below.

Female (Holotype). Colour. Body black, with the following yellow: scape, pedicel except dorsal spot, flagel-

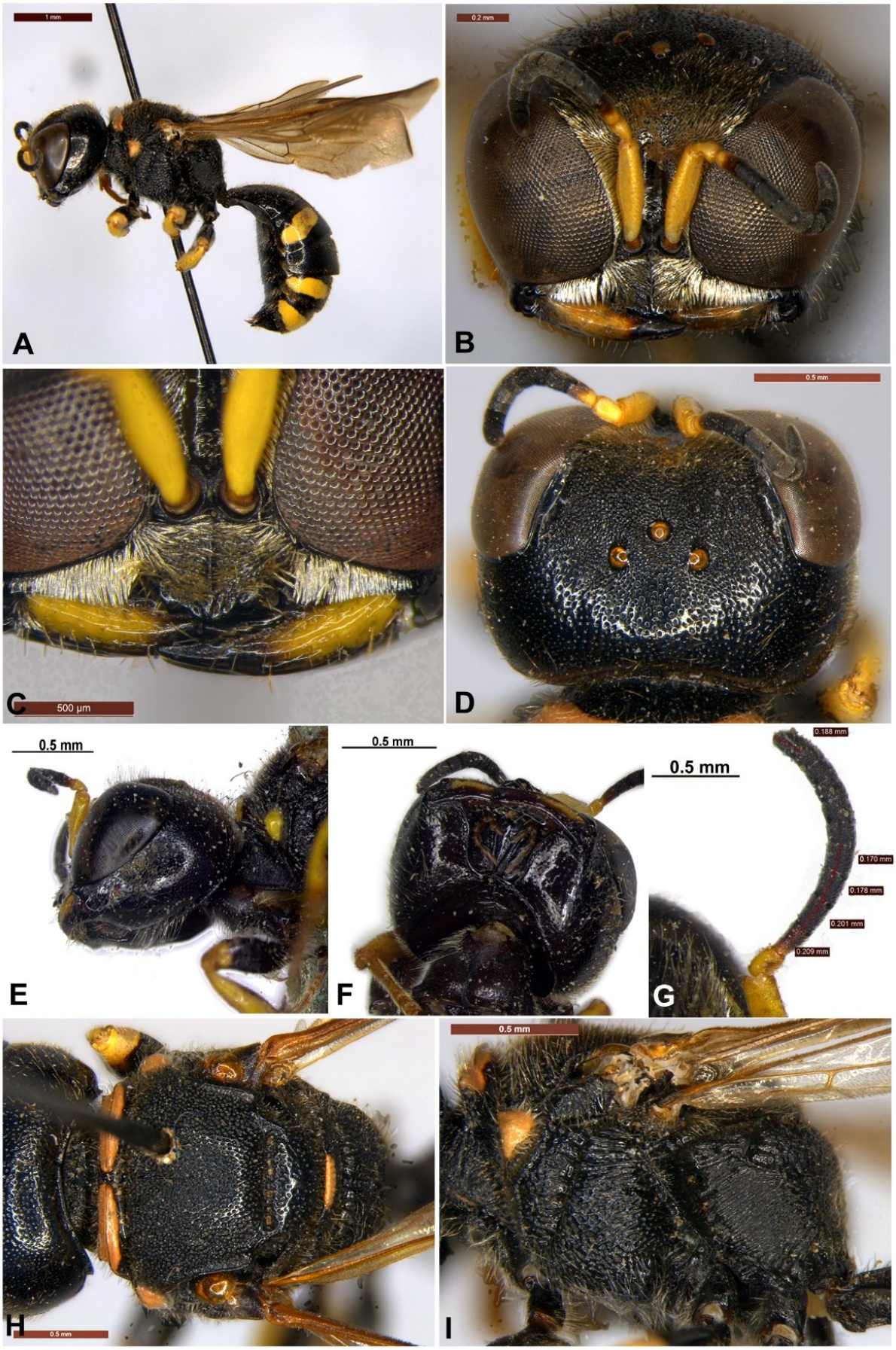

Figure 1. *Ectemnius* (*Hypocrabro*) *harshae* sp. nov., female: **A)** habitus in lateral view; **B)** head frontally; **C)** clypeus; **D)** head dorsally; **E)** head laterally; **F)** head ventrally; **G)** antennal flagellomeres; **H)** mesosoma dorsally; **I)** mesosoma laterally.

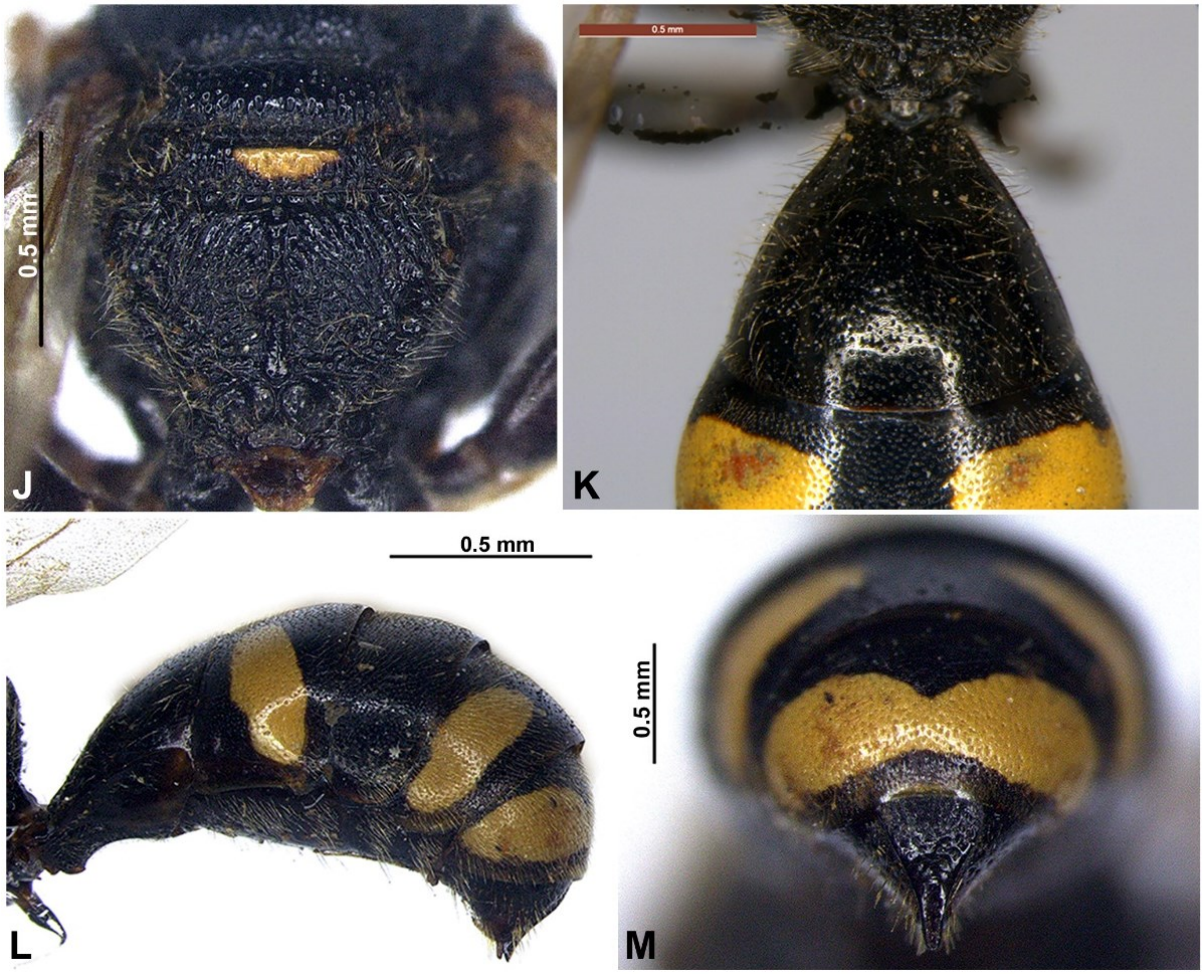

Figure 2. *Ectemnius* (*Hypocrabro*) *harshae* sp. nov., female: **J)** propodeum; **K)** tergum I; **L)** metasoma laterally; **M)** pygidial plate.

lomere I basally, mandible except basally and apically, pronotal collar, pronotal lobe, large apical spot on fore and mid femora, small apical spot on hind femur, fore tibia dorsally, mid tibia except ventral stripe, hind tibia completely, hind basitarsus dorsally, elongate spots on terga II and IV, coalesced spots on tergum V, metanotum anterior border (figure 1A); mandible apically ferruginous; fore and mid tarsi light brown except claws, tegula apically and basally, antenna, wing veins, pterostigma, tegula and claws of all legs dark brown.

Head. Subquadrilateral, shiny, densely reticulato-punctate dorsally, especially near ocelli and orbital fovea, length 0.6 × of width, dorsally covered with sparse creamish-white elongate setae; orbital fovea distinct, elliptical, close to compound eye (figure 1D); ocellar triangle broader than high, densely reticulato-punctate between ocelli, POD equal to 0.77 × of OOD; occipital carina not reaching hypostomal carina, foveolate (figure 1F); scapal basin concave, shiny; frons shiny, reticulato-punctate dorsally; median sulcus on vertex absent; gena shiny, sparsely punctate, covered with elongate, sparse setae (figure 1E); eyes glabrous, inner eye margins convergent below, distance between compound eyes and antennal sockets small; antennal sockets non-contiguous, scape unicarinate longitudinally, antennomere III shorter than antennomeres IV-VI, last flagellomere almost equal in length to antennomere V (figure 1G); clypeus subcubical, microsculptured dorsally, covered with dense silvery pubescence, median lobe slightly truncate apically, medial longitudinal carina distinct, not reaching apex; mandible tridentate, inner margin with large tooth (figure 1B-C).

Mesosoma. Pronotal collar shiny, notched medially, with denticle laterally and with transverse carina not reaching median notch, posterior carina rounded laterally, continuing to pronotal lobe, reaching median notch; antero-lateral side of pronotum coriaceous dorsally along with fine oblique longitudinal striae; scutum shiny, reticulato-punctate dorsally, posterior margin largely punctate, scutal flange slightly concave; admedian line, notaulus and parapsidal line indistinct; scutellum largely punctate dorsally, pre- and post scutellar sulcus with large foveae; metanotum reticulate, finely longitudinally striate (figure 1H); mesopleuron shiny, reticulato-alveolate and transversely striate, episternal sulcus distinct with deep large foveae; mesosternum shiny, coriaceous; mesopleural sulcus with distinct foveae; metapleuron dull, dorsally coriaceous and finely transversely striate; metapleural sulcus with largely foveae; postspiracular carina contiguous with omaulus and acetabular carina, foveolated (figure 1I); propodeum basally with transverse carina and

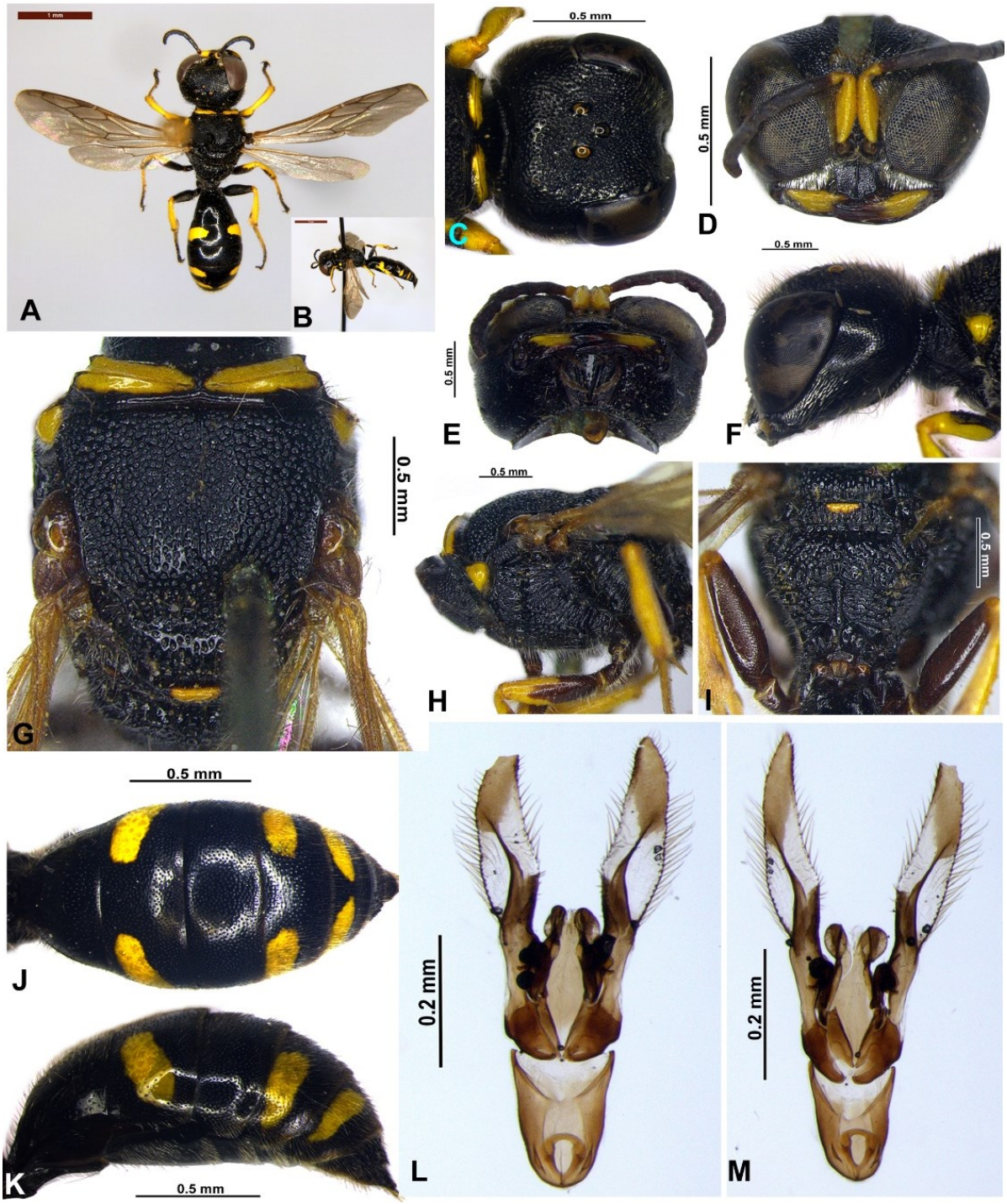

Figure 3. *Ectemnius* (*Hypocrabro*) *harshae* sp. nov., male: **A)** habitus in dorsal view; **B)** habitus in lateral view; **C)** head dorsally; **D)** head frontally; **E)** head ventrally; **F)** head laterally; **G)** mesosoma dorsally; **H)** mesosoma laterally; **I)** propodeum; **J)** metasoma dorsally; **K)** metasoma laterally; **L)** male genitalia dorsally; **M)** male genitalia ventrally.

9-10 basal foveae; dorsal and posterior surface not separated, dorsal surface alveolate with oblique longitudinal striae, posterior surface alveolate dorsally with fine and conspicuous transverse striae, median furrow distinct, broader apically, lateral propodeal carina absent, laterally with fine and conspicuous oblique transverse striae (figure 2J). Fore femur expanded basally forming an angle, narrow towards apex; fore and hind basitarsi closely spinose laterally; trochanters and femora of all legs covered with setae antero-laterally; mid and hind tibiae with dorsal row of spines; length of hind basitarsus 3/4 of hind tibia; tarsomeres of all legs depressed dorso-ventrally.

Metasoma. Gaster sessile, fusiform, shiny; terga I and III immaculate; tergum I dorsally covered with elongate setae, sparsely punctate, densely apically (figure 2K); other terga dorsally covered with short pubescence compared with tergum I, finely punctate dorsally; terga II and IV wider than long with elongate lateral spots, spots of tergum V coalesced; pygidial plate gutter-shape, narrow apically, largely punctate dorsally and antero-laterally (figure 2L-M).

Measurements. BL = 8.5-8.9 mm; FWL = 6.43 mm; PPL = 0.660 mm; relative length of antennomeres I: II: III: IV: V: VI: VII: VIII: IX: X: XI and XII = 4.7: 1.5: 1.6: 1.6: 1.5: 1.2: 0.9: 1.1: 0.9: 0.9: 0.9 and 1.4.

Male (figure 3A-B). Similar to female except: antennomeres IV-VI deeply excavated below, VII shallowly excavated below; mandible bifid at apex; (figure 3E); orbital fovea indistinct (figure 3C); median lobe of clypeus round apically (figure 3D); punctation on scutellum large (figure 3G); episternal sulcus indistinct (figure 3H); lateral side of pronotum with conspicuous oblique longitudinal striations; anterior and posterior surface of propodeum distinctly alveolate (figure 3I); large area of fore and mid femora yellow; terga strongly punctate; spots on tergum V close to each other, not coalesced (figure 3J-K).

Genitalia. Parameres elongate, basally broad, narrow apically, laterally covered with elongate setae; penis valve round, digitus claw-like; basal ring complete, shield-shaped (figure 3L-M).

Measurements. BL = 6.9-7.3 mm; FWL = 5.39 mm; MGL = 1.61 mm; relative length of antennomeres I: II: III: IV: V: VI: VII: VIII: IX: X: XI and XII = 4.2: 1.1: 1.3: 1.8: 1.7: 1.7: 0.9: 0.7: 0.5: 0.6: 0.6 and 0.9.

Etymology. The species is named after first author's mother, Mrs. Harsh Bala.

Distribution. India (Delhi, Jammu and Kashmir, Uttar Pradesh and Uttarakhand).

Material examined. Holotype: 1♀, Uttarakhand, Bhimtal, Horticulture Nursery (29.2136°N 79.3308°E) 23.iii.2021, on Pea/wild grass, yellow pan trap, coll. Jyoti Falswal (NPC-IARI); Paratypes: 2♂♂, Uttarakhand, Bhimtal, Horticulture Nursery (29.2136°N 79.3308°E), 23.iii.2021, on Pea/wild grass, yellow pan trap, coll. Jyoti Falswal (NPC-IARI); 1♂, Delhi: Pusa farm, New Delhi (28.080°N 77.120°E), 07.IX.2011, on cotton plant, coll. Baig (NPC-IARI); 1♀, Uttarakhand, Muktesar (now Mukteshwar), Kumaon, 23.v.1923 coll. Sen (NPC-IARI); 1♂, India: Jammu and Kashmir, Shalimar, Srinagar, 5000ft, 09.ix.1923, on fennel flowers, coll. T.B. Fletcher (NPC-IARI); 1♀, India: Uttar Pradesh, Bhowali (now in Uttarakhand), 5700ft, 26.vi.1939, coll. H.S. Pruthi (NPC-IARI); 1♂, Uttarakhand, Nainital, Bhimtal, 01.vi.1968, coll. SKG (NPC-IARI); 1♂, Uttar Pradesh, Uttarkashi, Jakhal road (now in Uttarakhand), 29.x.1996, coll. anonymous (NPC-IARI).

Ectemnius (*Hypocrabro*) *nandaniae* Saini et Dey sp. nov. (figure 4)

Diagnosis. The new species is close to *Ectemnius reginellus* (Leclercq 1954), sharing with it the following characters: mandible broad at apex; clypeus except black bisinued band and scape and flagellomere I basally yellow; shallow depression behind posterior ocelli; thorax narrower than head, pronotum antero-laterally with obtuse denticle, posterior transverse carina not continuous, interrupted medially; tergum I subsessile, pygidial plate narrow apically. It differs from *E. reginellus* and other species of subgenus *Hypocrabro* by shape of head, coloration and length of antennomeres, median lobe of clypeus and black bisinue band dorsally, fore- and mid-femora expanded basally, lateral spots on metasoma, coloration and punctation on body and legs as described below.

Female (Holotype). Colour. Body black, with the following yellow: scape, pedicel except dorsal spot, flagellomere I basally, mandible except apically, clypeus except bisinue band, pronotal collar, pronotal lobe, apical spot on femora, tibiae and basitarsus of all legs, dorsolaterally elongated spots on terga II and IV-V, medial transverse band on metanotum (figure 4A); mandible apically and pygidial plate ferruginous; wing veins yellowish-brown; pterostigma brown; tegula dark brown.

Head. Subrectangular, shiny, closely punctate dorsally, length 0.6 × of width, dorsally covered with sparse creamish-white elongate setae (figure 4B); orbital fovea distinct, shallow, close to compound eye; ocellar triangle broader than long, densely reticulato-punctate between ocelli, POD equal to 0.82 × of OOD; occipital carina not reaching hypostomal carina; scapal basin concave, shiny; frons shiny, dorsally covered with elongate golden pubescence; gena shiny, sparsely punctate, covered with silvery pubescence which is dense near outer orbit of compound eyes (figure 4F); eye glabrous, inner eye margins convergent below, distance between compound eyes and antennal sockets very small; distinct longitudinal sulcus extending between anterior ocellus and frontoclypeal suture; antennal sockets non-contiguous, scape unicarinate, antennomere III 1.5 × as long as IV and 2.0 × as long as antennomere VI, last flagellomere round apically; clypeus broad, covered with dense silvery pubescence, median lobe emarginate apically with side indentation, medial longitudinal carina obscure (figure 4C-E); mandible tridentate, inner margin with large tooth.

Mesosoma. Pronotal collar shiny, notched medially, spinose laterally and with transverse carina not reaching median notch, posterior carina rounded laterally, reaching median notch, continuous to pronotal lobe; antero-lateral side of pronotum with conspicuous oblique longitudinal and transverse striae; scutum shiny, reticulato-punctate, scutal flange slightly concave; admedian line distinct, reaching scutum medially; notaulus and parapsidal line present; pre- and postscutal sulcus with large foveae; scutellum and metanotum smooth and shiny, posterior border with short longitudinal striae (figure 4G); mesopleuron shiny, punctate with oblique transverse striae, episternal sulcus indistinct with deep foveae; mesosternum shiny, largely punctate with conspicuous oblique transverse striae; metapleuron shiny, with conspicuous oblique transverse striae, metapleural suture with large foveae; prepectus dull, lined by transverse striae; postspiracular carina contiguous with omaulus and acetabular carina, verticaulus L-shaped (figure 4H); propodeum basally with transverse carina along with longitudinal striae beneath, dorsal surface oblique reticulato-striate, posterior surface with fine transverse striae, median furrow distinct, narrow posteriorly, lateral propodeal carina absent, lateral surface of propodeum with fine oblique transverse striae (figure 4I); fore- and midfemora expanded basally, forming an angle, narrow towards apex; fore basitarsus closely spinose laterally, mid basitarsus with ventral row of spines; mid- and hind tibiae with dorsal row of spines.

Metasoma. Gaster subsessile, shiny, fusiform; terga I and III immaculate; tergum I sparsely punctate with elon-

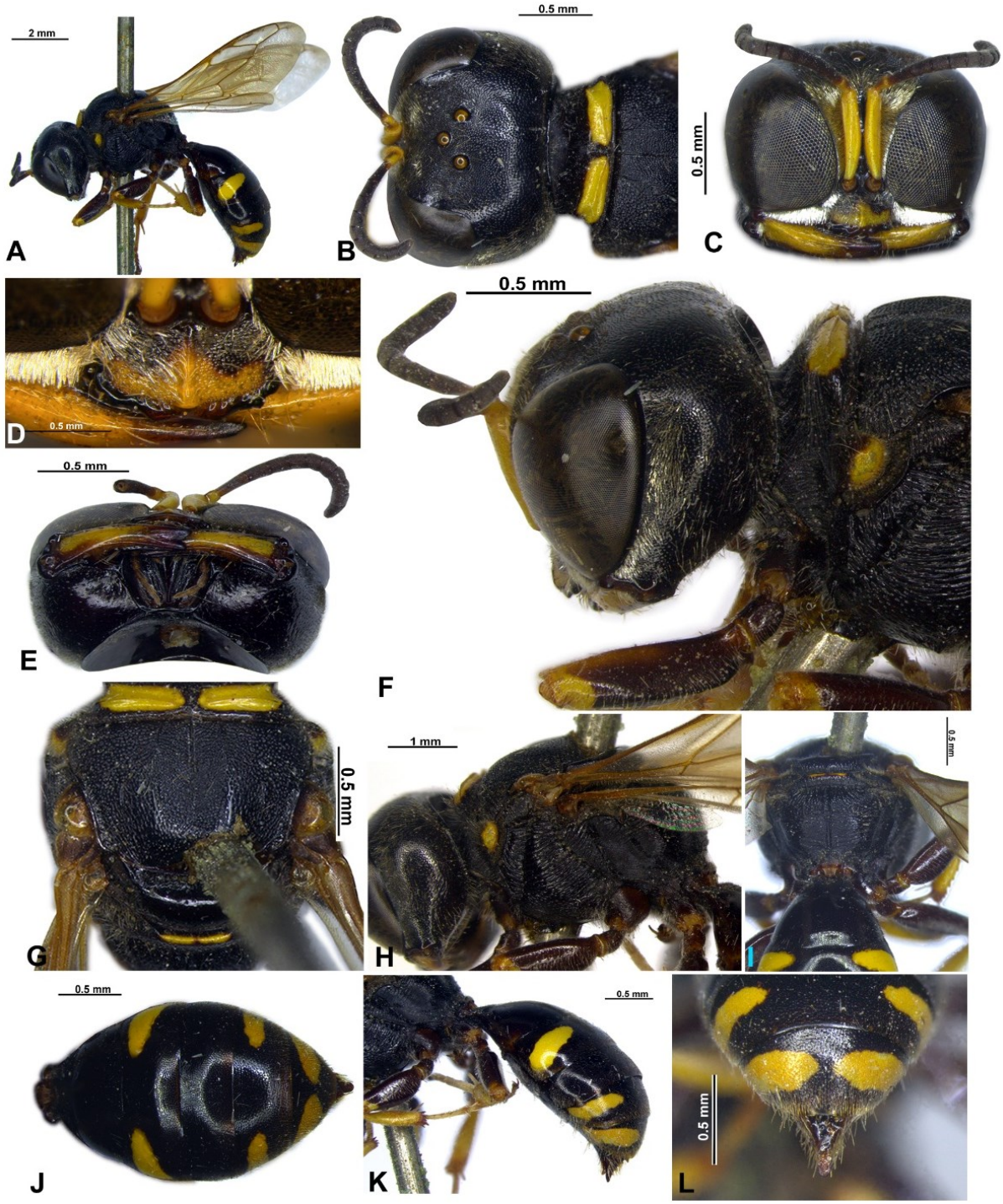

Figure 4. *Ectemnius* (*Hypocrabro*) *nandaniae* sp. nov. female: **A)** habitus in lateral view; **B)** head dorsally; **C)** head frontally; **D)** clypeus; **E)** head ventrally; **F)** head laterally; **G)** mesosoma dorsally; **H)** mesosoma laterally; **I)** propodeum; **J)** metasoma dorsally; **K)** metasoma laterally; **L)** pygidial plate.

gate setae, densely setose apically; terga II-IV covered with short setae and finely punctate dorsally, setae on tergum V elongate compared to other terga; terga II, IV-V wider than long with elongate lateral spots, spots on tergum V not coalesced (figure 4J-K); pygidial plate triangular, narrow apically, largely punctate dorsally, laterally covered with creamish-white elongate setae (figure 4L).

Measurements. BL = 11 mm; FWL = 6.92 mm; PPL = 0.717 mm; relative length of antennomeres I: II: III: IV: V: VI: VII: VIII: IX: X: XI and XII = 5.5: 1.1: 2: 1.5: 1.1: 1: 0.8: 0.8: 0.9: 0.8: 0.7 and 1.1.

Male. Unknown.

Etymology. The species is named after the first author's sister, Ms. Nandani Saini.

Distribution. India (Jammu and Kashmir).

Material examined. Holotype: 1♀, India: Jammu and Kashmir, Sumbal, 15.vi.1923, coll. T.B. Fletcher (NPC-IARI).

First description of male

Ectemnius (*Metacrabro*) *insignis* (F. Smith 1856)

Crabro insignis F. Smith, 1856: 422

(figure 5A-L)

Diagnosis. The characters shared with the female are the following: head dorsally with fine striae; tergum I without dorsal elongate setae; mandible black; tergum I finely punctate, terga I-V with yellow transverse bands; sternum II with yellow spots laterally; fore wing with yellowish tint; scutum with conspicuous transverse striae anteriorly, punctate between striae; metanotum finely reticulate with longitudinal striae; dorsal surface of propodeum alveolate, lateral surface of propodeum with widely separate conspicuous striae, and mesopleuron and metapleuron with conspicuous striae, widely separated, not punctate between striae (Smith, 1856; Leclercq, 1982). It differs from the female by scape completely black (scape black with narrow yellow line dorsally in

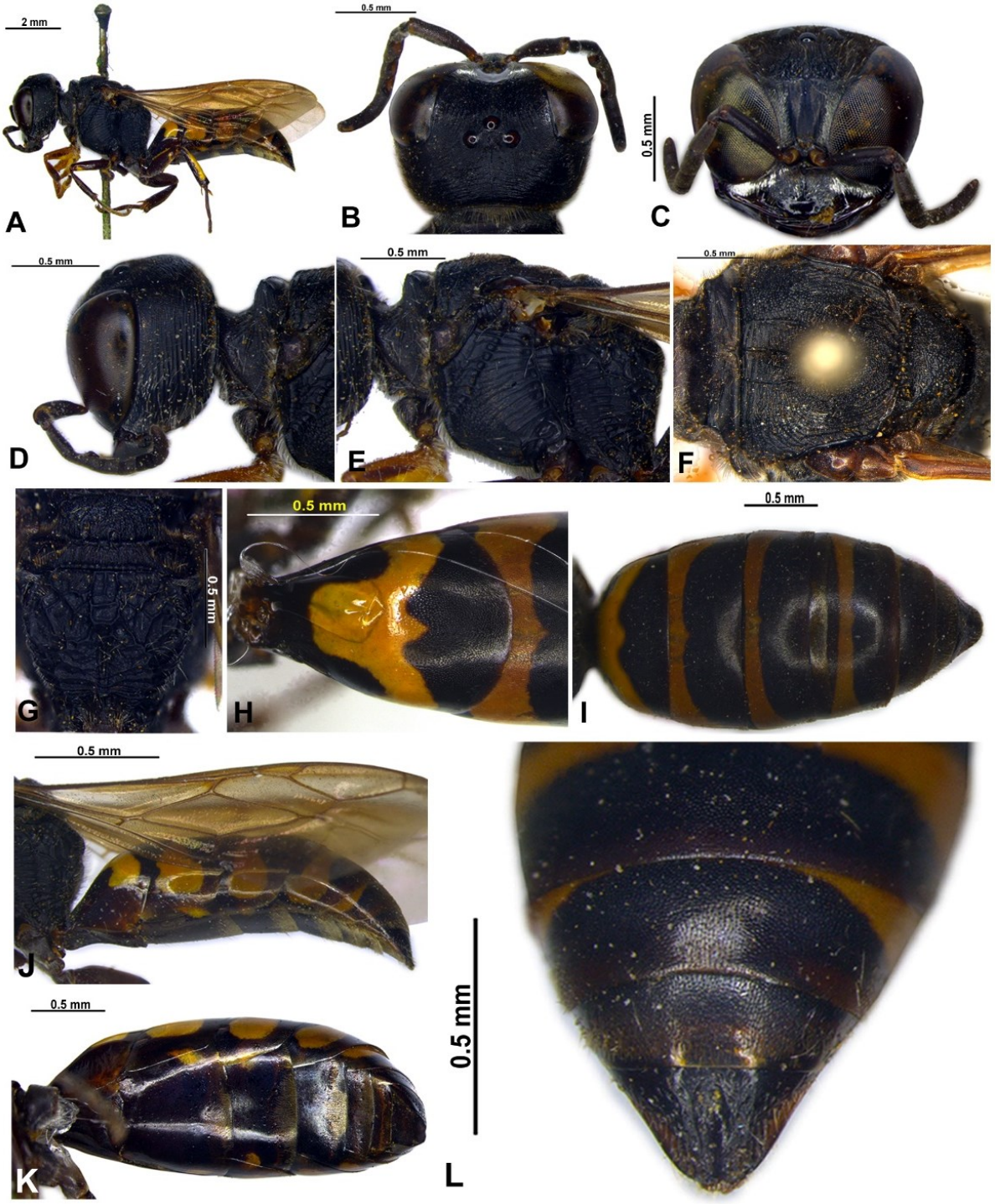

Figure 5. *Ectemnius* (*Metacrabro*) *insignis* male: **A)** habitus in lateral view; **B)** head dorsally; **C)** head frontally; **D)** head laterally; **E)** mesosoma laterally; **F)** mesosoma dorsally; **G)** propodeum; **H)** tergum I; **I)** metasoma dorsally; **J)** metasoma laterally; **K)** metasoma ventrally; **L)** last abdominal terga.

female), fore femur yellow except dorsal black stripe, fore tibia yellow dorsally (fore leg completely black in female), mid femur with yellow ventral stripe (mid femur completely black in female), hind femur with dorsal and ventral yellow stripe and broad yellow dorsal stripe on hind tibia (hind femur with ventral yellow spot and dorsal yellow stripe on hind tibia in female), broad yellow bisinuate band on tergum I (narrow yellow bisinuate band on tergum I in female), pronotal collar conspicuously dentate laterally (pronotal collar inconspicuously dentate in female), scutellum conspicuously reticulate with fine longitudinal striae (scutellum finely reticulate with conspicuous striae) and sternum III with yellow oval spots laterally, sternum IV with fine yellow spots laterally (sternum III with yellow triangular spots laterally, sternum IV without spots in female).

Male. Colour. Body black, with the following yellow: fore femur dorsally and ventrally, fore tibia ventrally, ventral stripe of mid- and hind femora and dorsal stripe on hind femur and hind tibia, transverse band on terga I-V, tergum I with broad bisinuate band, lateral spots on sterna II-IV; mandible, tegula ferruginous; antenna, pronotal lobe, mid femur dorsally and mid tibia completely, hind femur laterally, hind tibia ventrally, wing veins dark brown; pterostigma hyaline; wing veins light brown (figure 5A).

Head. Subquadrilateral, shiny, dorsally coriaceous with fine transverse and longitudinal striae, length 0.6 × of width (figure 5B); orbital fovea indistinct, elliptical, close to compound eye; ocellar triangle broader than long, POD equal to 0.75 × of OOD; occipital carina not reaching hypostomal carina, foveolate; scapal basin dull, smooth; gena dull, sparsely setose, with conspicuous longitudinal striae (figure 5D); frons coriaceous dorsally; longitudinal sulcus on vertex distinct, not reaching occipital carina; eye glabrous, inner margins convergent below, distance between eye and antennal sockets very small; scape unicarinate, dorsally covered with very short setae, antennal sockets contiguous, pedicel and flagellomere I ventrally covered with small silvery-whitish setae, flagellomeres I and II longer than other segments, flagellomeres II-IV excavated below (figure 5D); clypeus broad, shiny, covered with dense silvery pubescence, median lobe truncate apically, median longitudinal carina distinct, not reaching apex (figure 5C); mandible bifid at apex, sparsely setose dorsally, inner margin with large tooth.

Mesosoma. Pronotal collar dull, notched medially with transverse carina dorsally, conspicuously dentate laterally, continuous to pronotal lobe; antero-lateral side of pronotum with conspicuous oblique longitudinal striae; scutum reticulato-punctate with conspicuous longitudinal striae, dense near scutal flange and posteriorly; admedian line and notaulus distinct, reaching scutum medially, parapsidal line evanescent; scutellum immaculate, reticulato-punctate, posterior border with conspicuous longitudinal striae; axilla and metanotum immaculate with fine longitudinal striae; mesopleuron dull with conspicuous widely separated transverse striae, mesopleural suture with large foveae, episternal sulcus distinct with large foveae; mesosternum dull, with oblique transverse striae, median longitudinal mesosternal carina present; metapleuron dull, dorsally with transverse striae; postspiracular carina contiguous with omaulus and acetabular carina; sternaulus present as forward extension of verticaulus, L-shaped; long silvery setae present on between prepectus and omaulus (figure 5E-F); propodeum dorsal surface alveolate, posterior surface alveolate with conspicuous transverse striae, median sulcus indistinct, lateral propodeal carina absent, lateral surface of propodeum with conspicuous widely separated transverse striae (figure 5G); fore femur expanded basally forming an angle and narrow towards apex; foretrochanter and fore femur with large silvery setae antero-laterally; fore- and mid basitarsi with row of spines; mid- and hind basitarsi exactly half length of mid- and hind tibiae.

Metasoma. Gaster sessile, fusiform, shiny, tergum I finely punctate, asetose; tergum I with broad bisinue band medially with quadrate spot anteriorly (figure 5H-I), terga II-V with lateral spots basally, narrow medially; lateral spots on sterna II-IV (figure 5J-K); last terga depressed medially, apically emarginate (figure 5L).

Measurements. BL = 12 mm; FWL = 7.93 mm; relative length of antennomeres I: II: III: IV: V: VI: VII: VIII: IX: X: XI and XII = 4.8: 1.4: 2.4: 2.2: 1.5: 1.3: 0.9: 0.9: 0.8: 0.8: 0.8 and 1.4.

Distribution in India. No specific locality (Smith, 1856; Leclercq, 1999), Meghalaya (new record).

General Distribution. China (Leclercq, 1958; 1982; Hua, 2006) and India.

Material examined. 1♂, India, Meghalaya, Shillong, VI.1918, T. B. Fletcher (NPC-IARI).

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