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A taxonomic study of the genus *Ampulex* Jurine (Hymenoptera: Ampulicidae) from India with the description of one new species from Kerala

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Key words: *Ampulex,* India, species, new record, key.

Abstract

The genus *Ampulex* Jurine (Hymenoptera: Ampulicidae) is studied from India with the description of one new species, *Ampulex sadiyae* Anagha and Girish Kumar sp. nov., from Kerala. The reported distributions of *A. ceylonica* Krombein, *A. compressa* (Fabricius), and *A. dissector* (Thunberg) within various states of India are augmented here. A key and an updated checklist to the Indian species of *Ampulex* Jurine are provided.

1. Introduction

The genus *Ampulex* Jurine is the largest genus within the family Ampulicidae and the members are commonly known as cockroach wasps. It is a widespread tropical genus distributed in Australia, Ethiopian, Nearctic, Neotropical, Oriental and Palearctic Regions. One hundred and thirty two species are recorded in this genus worldwide, of which twenty five species are recorded from India (Pulawski, 2019). This paper deals with the species belonging to the genus *Ampulex* from India with the description of one new species, *Ampulex sadiyae* Anagha and Girish Kumar sp. nov., from Kerala. New distributional records from various Indian states for *A. ceylonica* Krombein, *A. compressa* (Fabricius), and *A. dissector* (Thunberg) are reported. A key and an updated checklist to the Indian species of *Ampulex* Jurine are also provided.

2. Materials and Methods

The present study is based on the specimens present in the Western Ghat Regional Centre, Zoological Survey of India, Kozhikode, and also the fresh specimens collected from various localities of India. The specimens were studied under a stereoscopic binocular microscope of model LEICA M205 and the images were captured with the camera model LEICA DFC 500 except few profile photos (Figs. 11–14) were captured with the camera Canon Power Shot SX 540 HS. Measurements were obtained using Leica LAS (Leica Application Suite V3.80) microsystems by Leica (Heerburg, Switzerland). Images at varying depth were stacked using Leica Automontage Software V3.80 and the final illustrations were post-processed for contrast and brightness using Adobe® Photoshop® CS5 (Version 6.1) software. All the specimens were properly preserved,

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duly labelled and added to the 'National Zoological Collections' of the Western Ghat Regional Centre, Zoological Survey of India, Kozhikode (ZSIK).

Abbreviations used for the Museums: EDZMU — Entomology Department, Zoological Museum, Uppsala University, P.O. Box 561, S-75122, Uppsala, Sweden; NHM — The Natural History Museum, London, England; MHNG — Musée d' Histoire Naturelle, Genève, Switzerland; NHMW — Naturhistorisches Museum, Wien, Austria; NRS — Naturhistoriska Riksmuseet, Stockholm, Sweden; OXUM — Hope Department of Zoology, Oxford, England; TMB — Természettudományi Múzeum, Budapest, Hungary; USNM — National Museum of Natural History, Washington, D.C., U.S.A.; ZSIK — Western Ghat Regional Centre, Zoological Survey of India, Kozhikode, India.

Abbreviations used for the terms: F = Flagellar segment; IOD = Inter Ocular Distance; LOL = Lateral Ocellar Length; OOL = Ocellocular Length; POL = Posterior Ocellar Length; T = Metasomal tergum.

3. Results & Discussion

Genus *Ampulex* Jurine, 1807

Ampulex Jurine, 1807: 132. Type species: *Chlorion compressum* of Latreille and of Fabricius [= *Chlorion compressum* (Fabricius, 1804) = *Sphex compressus* Fabricius, 1781, designated by Audouin, 1822: 301.

Diagnosis: Antennal sockets each with an overhanging frontal lobe; metasternum Y- shaped with arms directed posteriorly; petiole inserted between and on same level as hind coxae.

Distribution: Australia, Ethiopian, Nearctic, Neotropical, Oriental, and Palearctic regions.

Key to Indian species of *Ampulex* Jurine (except *Ampulex sodalicia* Kohl due to want of enough details)

1. Female. 2

— Male. ……..... 24

2. Integument of body brilliant metallic green, blue, bluish green, bluish or purple. ……..... 3

— Integument of body not metallic, either red and black or black. …….. 19

3. Mesoscutum with distinct punctures. ……..... 4

— Mesoscutum without punctures, almost smooth or aciculate. …….. 17

4. Pronotum with transverse rugulae, striations or few obscure transverse wrinkles. ……..... 5

— Pronotum without transverse rugulae, striations or obscure transverse wrinkles. ……..... 8

5. Temple behind eye with a prominent tubercle. ...……..…… ***sikkimensis*** **(Kriechbaumer**)

— Temple behind eye without prominent tubercle. ……..... 6

6. Mid and hind femora red...…….. 7

– Only hind femora red. ……..…… ***dissector*** **(Thunberg)**

7. Parapsidal furrows of mesoscutum distinct; most of disc of second metasomal segment with scattered small punctures, dense fine punctures only on narrow lateral strip. …..…… ***compressa*** **(Fabricius)**

– Parapsidal furrows of mesoscutum not clearly defined; second metasomal segment much more strongly punctured. ……..…..…… ***carinifrons*** **Cameron**

8. Wings fuscoviolaceous or smoky violaceous or smoky fuscous. ……. 9

– Wings fuscohyaline or hyaline with slight infumation. ……..... 15

9. Hind femora partly or completely red. ……..... 10

– Hind femora not red, either blue or black. ……..... ***difficilis*** **Strand**

10. Third and fourth joints of antennae equal in length. ……..... 11

– Third and fourth joints of antennae not equal in length. ……..... 12

11. Clypeal carina bifurcating close to apex. …… ***latifrons*** **Kohl**

– Clypeal carina not bifurcating close to apex. …….. ***interstitialis*** **Cameron**

12. Head partly or completely purple. ……..... 13

– Head not purple, either blue or green. ……..... 14

13. Legs black, apex of hind femora and tibiae purple. …..…… ***khasiana*** **Cameron**

– Legs blue, apex of hind femora and tibiae purple. …… ***longicollis*** **Cameron**

14. Only hind femora red..... ……..... ***major*** **Kohl**

– Mid and hind femora red. ……..... ***montana*** **Cameron**

15. Vertex and pronotum punctate. ……..... 16

– Vertex and pronotum almost impunctate. .....……. ***aborensis*** **Nurse**

16. Head bluish green. …..... ***hospes cognata*** **Kohl**

– Head purple mixed with dark green. .....…….. ***himalayensis*** **Cameron**

17. Pronotum and mesoscutum aciculated. .....…..…… ***pilosa*** **Cameron**

– Pronotum and mesoscutum not aciculated, bare. ……..... 18

18. Front with punctures. ……..…..... ***crudelis*** **Bingham**

– Front without punctures. ……..…..... ***ruficoxis*** **Cameron**

19. Integument entirely black. ……..... ***approximata*** **Turner**

– Integument not entirely black. ……..... 20

20. Mesosoma and legs entirely black. ……..…..... ***nigricans*** **Cameron**

— Mesosoma and legs not entirely black. ……..……..... 21

21. Greater part of mesosoma rufous or medium brown. ……..……..... 22

— Mesosoma black with some violet patches. ……..…..... ***rothneyi*** **Cameron**

22. First metasomal segment with sides diverging towards apex. ……..... 23

— First metasomal segment with sides not diverging towards apex, nodose. ……..... ***ruficornis*** **(Cameron)**

23. Mesoscutum microsculptured with irregularly interspersed macropunctures. …… ***ceylonica*** **Krombein**

— Mesoscutum microsculptured without irregularly interspersed macropunctures (Fig. 5). ……. ***sadiyae*** **Anagha and Girish Kumar sp. nov.**

24. Integument of body brilliant metallic green, blue, bluish green, bluish or purple. .....…… 25

— Integument of body not metallic, either red and black or black. ……... 30

25. Mesosoma thickly covered with long black hairs. …… ***pilosa*** **Cameron**

— Mesosoma sparsely or not covered with long black hairs. ……..... 26

26. Pronotum with transverse rugulae, striations or wrinkles. ……..... 27

— Pronotum without transverse rugulae, striations or wrinkles. ……..... 28

27. Mid and hind femora red. ……..... ***compressa*** **(Fabricius)**

— Only hind femora red. ……..... ***dissector*** **(Thunberg)**

28. Hind femora with more or less blue violet shimmering. ..…… ***difficilis*** **Strand**

— Hind femora not with blue violet shimmering, red. ……..... 29

29. Third and fourth joint of antennae equal in length. …… ***latifrons*** **Kohl**

— Third and fourth joint of antennae not equal in length, third joint slightly but distinctly longer than fourth. ……..... ***assamensis*** **Cameron**

30. Integument entirely black. ……..… ***approximata*** **Turner**

— Integument not entirely black. ……..……..... 31

31. Mesosoma and legs entirely black. ……..…… ***nigricans*** **Cameron**

— Mesosoma and legs not entirely black. ……..……..... 32

32. Greater part of mesosoma rufous or medium brown. ……..…..... 33

— Mesosoma black with some violet patches. ……..…..... ***rothneyi*** **Cameron**

33. First metasomal segment with sides diverging towards apex. ……..... 34

— First metasomal segment with sides not diverging towards apex, nodose. ……..... ***ruficornis*** **(Cameron)**

34. Mesoscutum closely punctured. ……..... ***ceylonica*** **Krombein**

— Mesoscutum microsculptured without irregularly interspersed macropunctures. ……..… ***constanceae*** **(Cameron)**

1. ***Ampulex sadiyae*** **Anagha and Girish Kumar sp. nov.**

(Figs. 1-8)

Diagnosis: The species is characterized by having frons with irregular longitudinal striations (Fig. 2); vertex and occiput with minute setigerous punctures; mesopleurae rough with small decumbent and erect large hairs (Fig. 6); pronotum and mesoscutum microsculptured (Fig. 5); anterior margin of scutellum with linear depression of coalesced punctures (Fig. 5); propodeal spine blunt (Fig. 5); mesoscutum anteromedially with V-shaped ridge.

Description: Holotype ♀. Head. Head rounded behind eyes; clypeus conical shaped with a median carina, apical end and lateral side toothed (Fig. 3); head 1.9 × as wide as IOD at anterior ocellus; ocelli forming low triangle; POL 1.16 × LOL and 0.32 × OOL; frons with irregular longitudinal striations; eyes surrounded by carina; F1 0.79 × combined length of F2 and F3.

Mesosoma: Pronotum longer than broad, base narrowed than apex, microsculptured with a sharp median furrow in the middle, pair of acute tubercles absent anterolaterally (Fig. 5); mesoscutum microsculptured, almost impunctate, mesoscutum anteromedially with V shaped ridge, parapsidal furrows and notauli distinct (Fig. 5); scutellum and metanotum microsculptured with very few scattered punctures (Fig. 5); anterior margin of scutellum with linear depression of coalesced punctures; propodeal dorsum coarsely areolate with a median and four lateral longitudinal ridges connected by several transverse carina with truncate median process at posterior margin, propodeal spines blunt (Fig. 5); mesopleuron with small decumbent and erect large hairs (Fig. 6); fore wing with submarginal cell bent away from wing margin for most of its length, pointed distally, first inter submarginal veinlet lacking, so that submarginal cells I and II fused to form markedly long cell (Fig. 7); legs long and slender.

Metasoma: Petiole almost evenly tubular; T1 small and shining (Fig. 8); T2 exceptionally large and broader than T1, 2 × longer than T1 and 2.25 × wider than T1; posterolateral corner of T2 and remaining metasomal tergites with finer setigerous punctures (Fig. 8).

Colour: The following Black: Head, tegulae, most of femora, coxa, and metasoma. The following light red: mandibles, most of clypeus, prothorax, most of mesoscutum, mesopleuron, and all tarsus. Propodeal spines brownish; petiole whitish; fore wing slightly yellowish with dark markings in marginal cells, hind wing hyaline.

Length: 11 mm.

Male: Unknown.

Materials examined: Holotype ♀, INDIA: Kerala, Kozhikode district, Kovoor (11°16' 14.16''N, 75°49'52.32''E, 19m), 26.iii.2019, Coll. Sadiya Thasneem, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13237.

FIGURES 1–8. *Ampulex sadiyae* Anagha and Girish Kumar sp. nov. Holotype Female. 1. Habitus, dorsal view; 2. Head, frontal view; 3. Clypeus, frontal view; 4. Antennae; 5. Mesosoma, dorsal view; 6. Mesosoma, lateral view; 7. Fore wing; 8. Metasoma, dorsal view.

Distribution: India: Kerala.

Etymology: The species epithet is derived from the name of the collector of holotype.

Discussion: This new species comes close to the other non-metallic and small-sized *Ampulex* species such as *A. ceylonica* and *A. ruficornis*, but distinctly differs from both. The female of this new species differs from female of *A. ceylonica* in having: (1) Frons with irregular longitudinal striations (in *A. ceylonica*, frons dull, granulate from fine close punctuation with larger moderately scattered punctures); (2) Absence of pair of acute tubercles on pronotum anterolaterally (in *A. ceylonica*, a pair of acute tubercles on pronotum present); (3) Mesoscutum microsculptured, almost impunctate, mesopleurae rough with small decumbent and erect large hairs (in *A. ceylonica*, mesoscutum with dense fine punctures and interspersed mostly subcontiguous larger punctures, mesopleuron similarly punctate); and (4) Propodeal spines being short, blunt and brownish (in *A. ceylonica*, propodeal spines long, curved and whitish at tip).

The female of this new species differs from female of *A. ruficornis* in having: (1) Frons with irregular longitudinal striations (in *A. ruficornis*, frons with dense fine punctures); (2) Absence of pair of acute tubercles on pronotum antereolaterally *(in A. ruficornis*, a pair of acute tubercles on pronotum present); (3) Mesoscutum microsculptured, almost impunctate, mesopleurae rough with small decumbent and erect large hairs (in *A. ruficornis*, mesoscutum and mesopleuron with delicate close punctuation and scattered small punctures); and (4) First metasomal segment with sides diverging towards apex (in *A. ruficornis*, first metasomal segment with sides not diverging towards apex).

Ampulex constanceae is the other non-metallic and small-sized *Ampulex* species from India which is known by male only. The holotype female of the present new species differs from male of *A. constanceae* in having frons with irregular longitudinal striations (in *A. constanceae* head finely rugosely punctured) (based on the male description of Cameron (1891)).

2. *Ampulex ceylonica* Krombein, 1979

(Figs. 9, 10, 15 & 16)

Ampulex ceylonica Krombein, 1979: 9, ♀, ♂. Holotype: ♀, Sri Lanka: Kandy District: Kandy, Udawattakele Sanctuary (USNM).

Diagnosis: Female. Front dull and granulate with fine close punctation and with evanescent carinae touching anterior ocellus along midline (Fig. 15); pronotal disk with delicate close punctation, scattered larger punctures on posterior half, a weak median furrow and pair of small acute tubercles anteriorly; mesoscutum with dense fine punctures and interspersed, mostly subcontiguous larger punctures; mesopleuron similarly punctate, sternaulus crenulate; propodeal dorsum with a slender, curved elongate tooth; petiole white in colour; apical third of T1 with sides diverging towards T2, not nodose. Length: 13 mm.

Male. Front and vertex with large close punctures (Fig. 16); occiput with deep median pit; pronotal disc with subcontiguous larger punctures; mesoscutum and mesopleuron with large close pits; propodeal dorsum with a slender, curved elongate tooth; petiole almost black; apical third of T1 with sides diverging towards T2, not nodose. Length: 9 mm.

Material examined: INDIA: **Kerala**, Kozhikode district, Kottooli wetland, 1 ♂, 20.vi.2019, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13151; Thiruvananthapuram district, Agasthyamalai Biosphere Reserve, Peppara Wildlife Sanctuary, Pattankulichapara, 1 ♂, 20.i.2019, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13153; Kozhikode district, Madappally, 5 ♂, 13.xi.2019, Coll. K. Anju, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13434; Thiruvananthapuram district, Neyyar Wildlife Sanctuary, Kottur, 1 ♀, Coll. M. Jafer Palot, ZSIK Regd. No. ZSI/WGRC/I.R–INV. 13161; Kozhikode district, Purameri, 1 ♀, Coll. K.P. Hanima Raveendran, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13162; Thiruvananthapuram district, Methottam, 1 ♀, Coll. S. Anagha, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13163. **Tamil Nadu**, Coimbatore district, Anaikatty, 1 ♂, 4.i.2019, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13152.

Distribution: India: Kerala (**new record**), Tamil Nadu (**new record**), Meghalaya. *Elsewhere*: Indonesia; Laos; Sri Lanka. (Pulawski, 2019).

3. *Ampulex compressa* (Fabricius, 1781)

(Figs. 11, 12, 17 & 18)

Ampulex compressa (Fabricius), 1781: 445, sex not indicated (as *compressa*, incorrect original termination). Holotype or syntypes: India: Kerala: Malabar (NHM, Banks coll.).

Ampulex sinensis de Saussure, 1867: 43, ♂. Holotype or syntypes: ♂, China: Hong Kong (NHMW). Synonymized with *Ampulex compressa* by Gerstaecker, 1871: 852, synonymy confirmed by Kohl, 1893: 492.

Chlorampulex striolata de Saussure, 1892: 446, ♀. Holotype or syntypes: ♀, Tanzania: Zanzibar: no specific locality (MHNG). Synonymized with *Ampulex compressa* by Schulz, 1911: 152.

Diagnosis: Female. Face with narrow median area delimited below by strong carina from antennal tubercle extending upward, becoming evanescent above where it passes behind fore ocellus (Fig. 17); frontal punctures moderately large, more separated on median area than laterally (Fig. 17); vertex with moderately large, subcontiguous punctures and a short median groove; occiput with fine close punctuation; pronotal disc with a median furrow, some delicate transvers rugulae on anterior two third; mesopleuron without sternaulus; forewing with three submarginal cells; mid and hind femora red. Length: 15-24 mm.

Male. Frons with enclosed area broader, delimiting carinae stronger; punctation of frons and vertex closer and coarser than in ♀ (Fig. 18); vertex

with evanescent median groove; occiput with fine close punctures; pronotal disc with a median furrow, some stronger transvers rugulae covering most of surface; mesopleuron without sternaulus; forewing with three submarginal cells; mid and hind femora red. Length: 13-16 mm.

Materials examined: INDIA: **Arunachal Pradesh**, Lower Dibang Valley district, Roing, 1 ♀, 13.ix.1997, Coll. A.R. Lahiri and party, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13092. **Himachal Pradesh**, Solan district, Solan, 1 ♂, 30.vi.1968, Coll. O.B. Chhotani, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13088. **Chhattisgarh**, Kabirdham district, Balasamund, 1 ♀, 1.ix.2011, Coll. Sunil K. Gupta, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13095. **Kerala**, Kozhikode district, Jaferkhan Colony, 1 ♀, 24.ix.2016, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 10205; Wayanad district, Thirunelli, 1 ♀, 16.ii.2016, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 10479; Kollam district, Karicode TKMCAS campus, 1 ♂, 1.i.2018–31.iii.2018, Coll. A.K. Aseeb, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 12324; Idukki district, Keerithodu, 20.xi.1999, 1 ♂, Coll. P. M. Sureshan and party, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13093; Kozhikode district, ZSI Campus Kozhikode, 2 ♀, 11.x.2018 & 19.xi.2018, Coll. C. Charesh, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13098 & 13150; Kasaragod district, Ranipuram, 1 ♀, 10.xii.2017, Coll. Rajan, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13099. **Lakshadweep**, Amini Island, 1 ♂, 26.iii.2018, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13100. **Maharashtra**, Ratnagiri district, Ratnagiri, 1 ♂, 7.vii.1981, Coll. P. Paruiand P.H. Roy, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13091. **Tripura**, South Tripura district, Abhoya, 3 ♂, 16.v.1978, Coll. J.K. Jonathan and Party, ZSIK Regd. No. ZSI/ WGRC/I.R.–INV. 13089. **Uttarakhand**, Dehradun district, Kalsi, 1 ♀, 18.vii.2019, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13101. **West Bengal**, Kolkata district, V.K. Road side, 1 ♀, 6.x.1979, Coll. S.C. Roy Chowdhary, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13090; Kolkata district, Southern Avenue, 1 ♀, 2.ix.2011, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13094; Kolkata district, Southern Avenue, 2 ♀ & 1 ♂, 21.v.2012, 16.xii.2012 & 1.xii.2012, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13096, 13097 & 13102.

Distribution: India: Andaman and Nicobar Islands, Arunachal Pradesh (**new record**), Assam, Chhattisgarh (**new record**), Himachal Pradesh (**new record**), Karnataka, Kerala, Lakshadweep (**new record**), Maharashtra, Meghalaya, Tripura (**new record**), Uttarakhand, West Bengal. *Elsewhere*: Africa; Australia; Bangladesh; Borneo; Brazil; China; France; Indonesia; Iran; Island of Bourbon; Island of Reunion; Island of St. Helena; New Caledonia; Hawaii island; Laos; Kenya; Madagascar; Mauritius; Nepal; Philippines; Seychelles; Saudi Arabia; Singapore; Sri Lanka; Tanzania; United Arab Emirates; Venezuela; Vietnam; Zanzibar. (Pulawski, 2019).

4. ***Ampulex dissector*** **(Thunberg, 1822**)

(Figs. 13 & 19)

Ampulex dissector (Thunberg), 1822: 272, sex not indicated. Holotype or syntypes (Thunberg, 1824: 341): Japan: no specific locality (EDZMU).

Ampulex amoena Stål, 1857: 63, sex not indicated. Holotype or syntypes: China: no specific locality (NRS). Synonymized with *Ampulex dissector* by ... – Kohl, 1893: 489 (original description copied).

Ampulex novarae de Saussure, 1867: 44, ♂. Holotype or syntypes: ♂, Hong Kong (NHMW). Synonymized with *Ampulex dissector* by Roman, 1912: 251.

Ampulex consimilis Kohl, 1893: 468, ♀. Holotype or syntypes: ♀, China: Hong Kong (NHMW). Synonymized with *Ampulex amoena* by Schulz, 1912: 96.

Ampulex japonica Kohl, 1893: 467, ♀. Holotype or syntypes: ♀, Japan: no specific locality (TMB). Synonymized with *Ampulex dissector* by Roman, 1912: 251.

Diagnosis: Female. Forewing with 2 submarginal cells; only hind femora red; front not keeled, surface with small subcontiguous punctures and more scattered larger ones (Fig. 19); vertex with closer larger punctures; pronotal disc with transverse rugulae interrupted by a shallow median groove; mesopleuron with sternaulus; hind femora red. Length: 13-15 mm.

Materials examined: INDIA: **Kerala**, Kannur district, Kannapuram, 1 ♀, 2.ii.2019, Coll. C. Charesh, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13103. **Uttarakhand**, Dehradun district, Kalsi, 1 ♀, 18.vii.2019, Coll. P. Girish Kumar, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13104, Haridwar district, Haridwar, 1 ♀, 13.x.1995, Coll. Arun Kumar and party, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 13154.

Distribution: India: Kerala (**new record**), Uttarakhand. *Elsewhere*: China; Japan; Korea; Laos; Sri Lanka; Ryukyu archipelago; Taiwan; Thailand. (Pulawski, 2019).

5. ***Ampulex major*** **Kohl 1893**

(Figs. 14 & 20)

Ampulex major Kohl, 1893: 467, ♀. Holotype or syntypes: ♀: Indonesia: Moluccas: no specific locality (TMB).

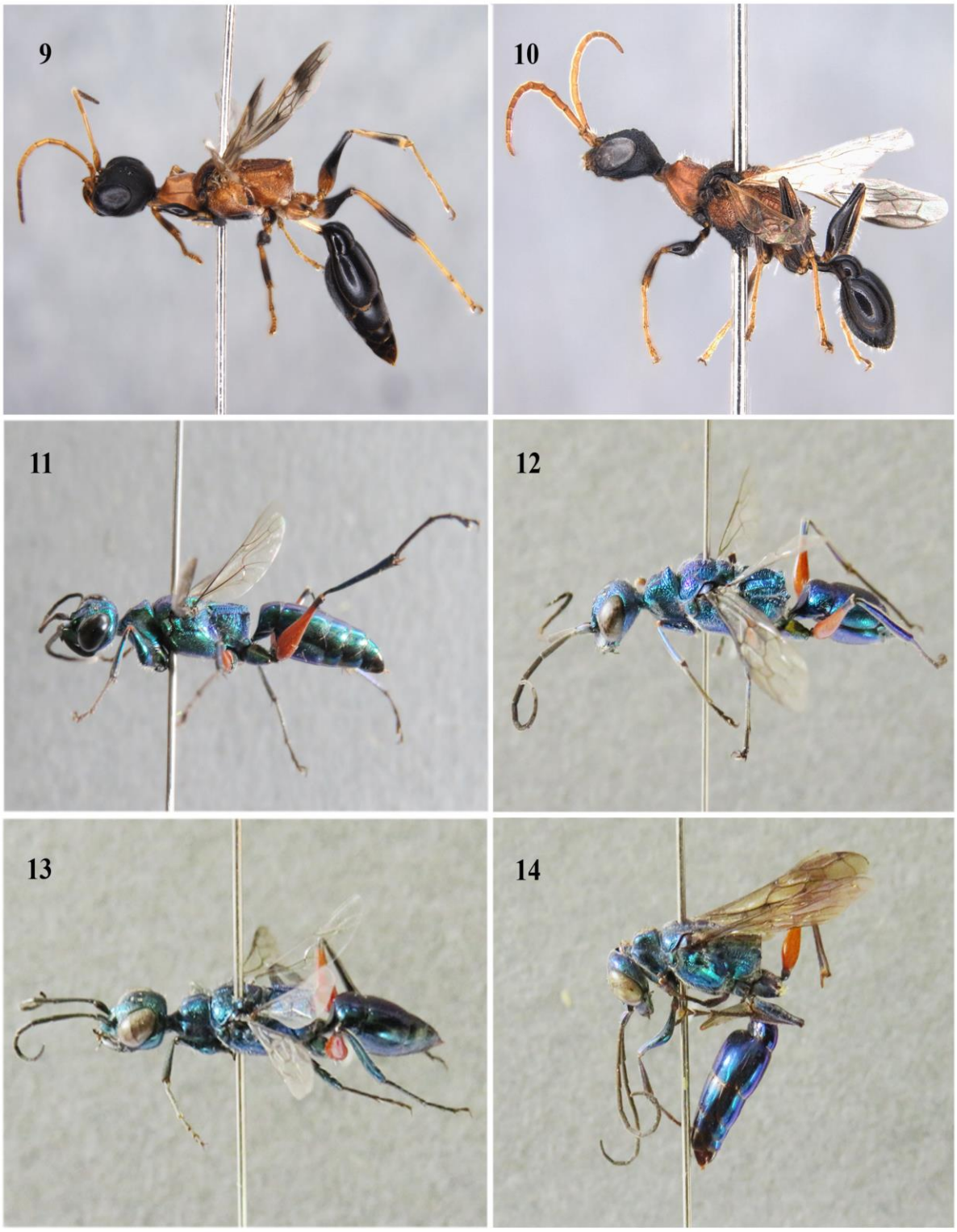
Diagnosis: Female. Forewing with three submarginal cells, one being incomplete; clypeus with a median carina and its apex with three teeth; dorsal surface of pronotum not flat, anteromedian area depressed, without a median longitudinal deeply impressed line, but only with a weak median line in the middle only; hind femora red. Length: 20 mm.

Materials examined: INDIA: Kerala, Kasaragod district, Kottanjeri forest, 1 ♀, 5.iii.2006, Coll. K. Rajmohana, ZSIK Regd. No. ZSI/WGRC/I.R.–INV. 12267.

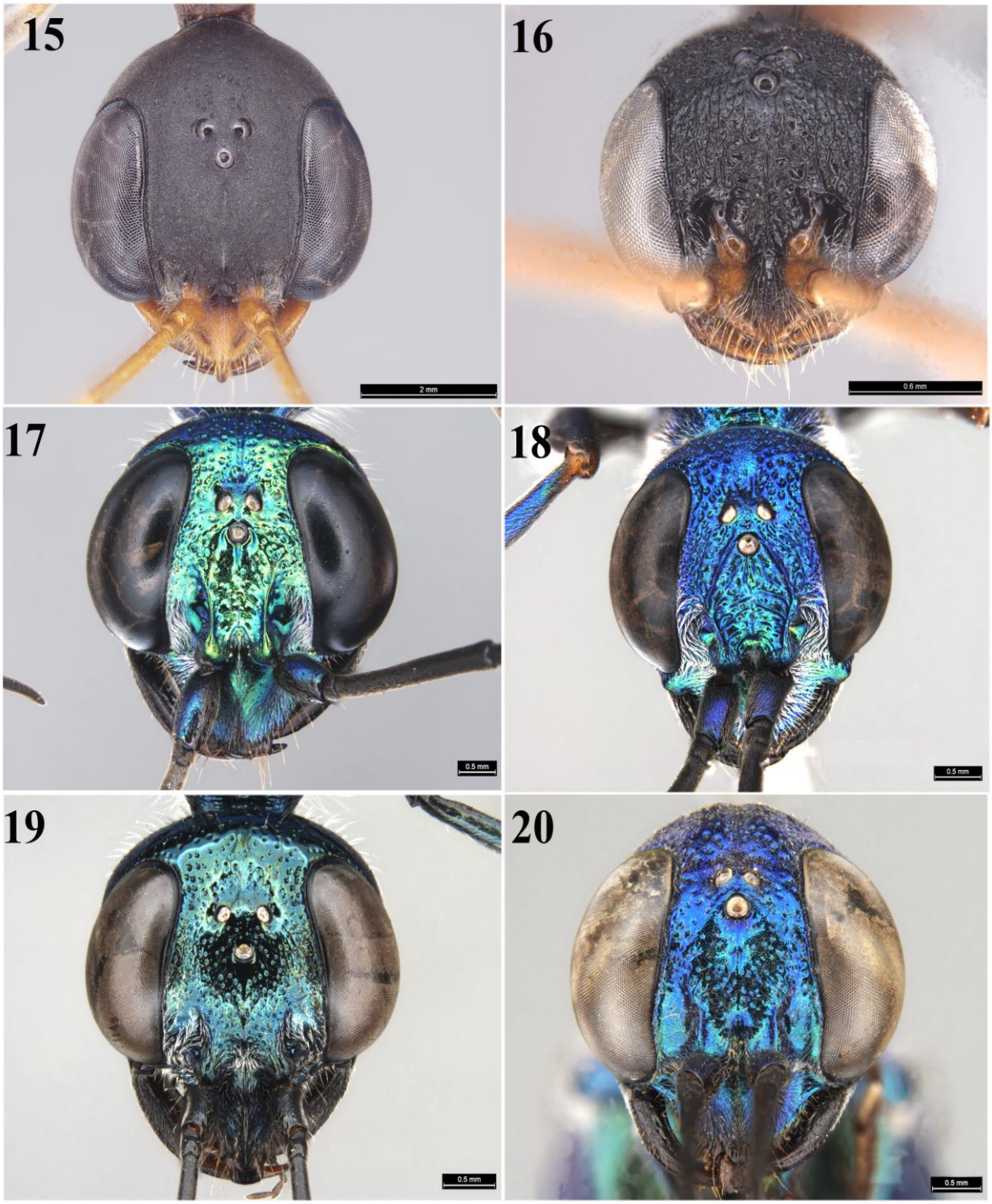
Distribution: India: Kerala. *Elsewhere*: Indonesia; Laos; Malaysia. (Pulawski, 2019).

6. ***Ampulex sodalicia*** **Kohl, 1893**

Ampulex sodalicia Kohl, 1893: 470, ♀. Holotype or syntypes: ♀, Indonesia: Moluccas: no specific locality (TMB).



FIGURES 9–14. Habitus. 9–10 *Ampulex ceylonica* Krombein, 9 Female; 10 Male. 11–12 *A. compressa* (Fabricius), 11 Female; 12 Male. 13 *A. dissector* (Thunberg), Female. 14 *A. major* Kohl, Female.



FIGURES 15–20. Head, frontal view. 15–16 *Ampulex ceylonica* Krombein, 15 Female; 16 Male. 17–18 *A. compressa* (Fabricius), 17 Female; 18 Male. 19 *A. dissector* (Thunberg), Female. 20 *A. major* Kohl, Female.

Ampulex striatifrons Cameron, 1902: 95, ♂. Holotype or syntypes: ♂, East Malaysia: Sarawak: Kuching (NHM). Synonymized with *Ampulex sodalicia* by Turner, 1912: 368.

Ampulex tricarinata Cameron, 1902: 245, ♀ (as tri-carinata, incorrect original hyphenation). Syntypes: ♀, Borneo: no specific locality (OXUM). Synonymized with *Ampulex sodalicia* by Turner, 1912: 368.

Since no specimen of this species was available for the present study, the following diagnostic characters were taken from the original description by the designating author. Also the sculpturing of mesosoma of the species was not clearly given in the original description (which is taken as a strong character in the present key to the Indian species of *Ampulex*), the species is thus excluded from the present key.

Diagnosis: Female. The female of this species is distinguished by its metallic green, largely mixed with blue colour; wings hyaline with slight infumation; head above antennae blue, smooth and shining, below them green thickly covered with silvery pubescence; prothorax smooth and shining; mesoscutum smooth and shining with two wide and deep furrows and with stout transverse keel throughout; mesopleurae distinctly punctured on the basal half above, below with curved furrow which reaching beyond middle; metasoma about twice longer than wide and not much narrowed at base.

Male. The male of this species is distinguished by its dark green largely tinged with blue colour; wings hyaline with slight infumation; head blue, ocellar region largely tinged with purple; the three stout keels in front reach to base of mandibles, the part between them, from near their top bears stout oblique striae, the part on their outerside at the top bears some large punctures; prothorax, elongate base distinctly narrowed, sparsely punctured; central part of mesonotum strongly and deeply punctured, sides are more sparsely punctured; abdomen, strongly punctured, apical half distinctly depressed and closely but not so strongly punctured.

Distribution: India: Sikkim. *Elsewhere*: Borneo; Indonesia; Malaysia. (Pulawski, 2019).

Checklist of Indian species of *Ampulex* (Adopted from Pulawski, 2019)

1. *A. aborensis* Nurse, 1914 – India: Assam, Meghalaya.
2. *A. approximata* Turner, 1912 – India: Gujarat, Maharashtra. *Elsewhere*: Sri Lanka; Thailand.
3. *A. assamensis* Cameron, 1903 – India: Meghalaya.
4. *A. carinifrons* Cameron, 1903 – India: Meghalaya.
5. *A. ceylonica* Krombein, 1979 – India: Kerala (**new record**), Tamil Nadu (**new record**), Meghalaya. *Elsewhere*: Indonesia; Laos; Sri Lanka.
6. *A. compressa* (Fabricius, 1781) – India: Andaman and Nicobar Islands, Arunachal Pradesh (**new record**), Assam, Chhattisgarh (**new record**), Himachal Pradesh (**new record**), Karnataka, Kerala,

Lakshadweep (**new record**), Maharashtra, Meghalaya, Tripura (**new record**), Uttarakhand, West Bengal. *Elsewhere*: Africa; Australia; Bangladesh; Borneo; Brazil; China; France; Indonesia; Iran; Island of Bourbon; Island of Reunion; Island of St. Helena; New Caledonia; Hawaii island; Laos; Kenya; Madagascar; Mauritius; Nepal; Philippines; Seychelles; Saudi Arabia; Singapore; Sri Lanka; Tanzania; United Arab Emirates; Venezuela; Vietnam; Zanzibar.

7. *A. constanceae* (Cameron, 1891) — India: Maharashtra.
8. *A. crudelis* Bingham, 1897 — India: Meghalaya, Sikkim.
9. *A. difficilis* Strand, 1913 — India: Meghalaya. *Elsewhere*: China; Laos; Taiwan; Vietnam.
10. *A. dissector* (Thunberg, 1822) — India: Kerala (**new record**), Uttarakhand. *Elsewhere*: China; Japan; Korea; Laos; Sri Lanka; Ryukyu archipelago; Taiwan; Thailand.
11. *A. himalayensis* Cameron, 1903 — India: Meghalaya.
12. *A. hospes cognata* Kohl, 1893 — India: Meghalaya. *Elsewhere*: Indonesia.
13. *A. interstitialis* Cameron, 1903 — India: Meghalaya.
14. *A. khasiana* Cameron, 1903 — India: Meghalaya.
15. *A. latifrons* Kohl, 1893 — India: Meghalaya, Sikkim. *Elsewhere*: China.
16. *A. longicollis* Cameron, 1902 — India: Meghalaya.
17. *A. major* Kohl, 1893 — India: Kerala. *Elsewhere*: Indonesia; Laos; Malaysia.
18. *A. montana* Cameron, 1903 — India: Meghalaya.
19. *A. nigricans* Cameron, 1899 — India: Meghalaya.
20. *A. pilosa* Cameron, 1900 — India: Meghalaya. *Elsewhere*: Malaysia.
21. *A. rothneyi* Cameron, 1902 — India: Meghalaya.
22. *A. ruficornis* Cameron, 1889 — India: West Bengal. *Elsewhere*: Sri Lanka; Thailand.
23. *A. ruficoxis* Cameron, 1902 — India: Meghalaya.
24. *A. sadiyae* Anagha and Girish Kumar **sp. nov.** — India: Kerala.
25. *A. sikkimensis* Kriechbaumer, 1874 — India: Sikkim. *Elsewhere*: China.
26. *A. sodalicia* Kohl, 1893 — India: Sikkim. *Elsewhere*: Borneo; Indonesia; Malaysia.

4. Conclusion

The genus *Ampulex* Jurine is studied from India with the description of one new species, *Ampulex sadiyae* Anagha and Girish Kumar sp. nov., from Kerala. The species *A. ceylonica* Krombein is newly recorded from Kerala and Tamil Nadu. The species *A. compressa* (Fabricius) is newly recorded from Arunachal Pradesh, Chhattisgarh, Himachal Pradesh, Lakshadweep, and Tripura. The species *A. dissector* (Thunberg) is newly recorded from Kerala. A key and an updated checklist to the Indian species of *Ampulex* Jurine are also provided.

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6. References

Audouin, I. (1822). Alyson, pp. 241; Ammophile, pp. 280–281; Ampulex, p. 301 in J. Bory de Saint Vincent (editor). Dictionnaire classique d' histoire naturelle. Tome premier [= volume 1]. Rey et Gravier and Boudouin Frères, Paris. pp. 604-710

Cameron, P. (1891). Hymenopterological notices. *Mem. Proc. –Manch. Lit. Philos. Soc.*, 4: 182–194.

Cameron, P. (1902). On the Hymenoptera collected by Mr. Robert Shelford at Sarawak, and on the Hymenoptera of the Sarawak Museum. *J. Straits Branch Asiat. Soc.*, 37: 29-131.

De Saussure, H (1867). *Reise der österreichschen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorf–Urbair. Zoologischer Theil. Zweiter Band. Hymenoptera. Familien der Vespiden, Sphegiden, Pompiliden, Crabroniden und Heterogynen*. C. Gerold's Sohn, Wien, 138 pp., pls. 1–4.

De Saussure, H (1892). *Histoire physique, naturelle et politique de Madagascar publiée par Alfred Grandidier. Volume XX.* Histoire naturelle des Hyménoptères. Imprimerie Nationale, Paris, 590 pp., pls. 1–27.

Fabricius, J.C. (1781). *Species Insectorum exhibentes eorum differentias specificas, synonyma auctorum, loca natalia, metamorphosin adiectis observationibus, descriptionibus. 1.* Carol. Ernest. Bohnii, Hamburgiet Kilonii [= Hamburg & Kiel]. I–VIII, 1–517 pp.

Gerstaecker, A. (1871). Beitrag zur Insektenfauna von Zanzibar. *Arch. Naturgesch.*, 37(1): 345-363.

Jurine, L. (1807). Nouvelle méthode de classer les Hyménoptères et les Diptères. Hyménoptères. Tome premier. J.J. Paschoud, Genève, (1)–(4), 1–319 + 1 unnumbered pp., 1–14 pls.

Kohl, F.F. (1893). Über Ampulex Jur. (s. l.) und die damit enger verwandten Hymenopteren–Gattungen. *Ann. des k. k. Naturhist. Hofmus.*, 8: 455–516.

Krombein, K.V. (1979). *Biosystematic studies of Ceylonese wasps, V: a monograph of the Ampulicidae (Hymenoptera: Sphecoidea)*. Smithsonian Contributions to Zoology, 298: 1–29.

Pulawski, W.J. (2019). Catalog of Sphecidae. Available on: http://research.calacademy.org/ent/catalog_sphecidae/ (accessed on 1st April 2019).

Roman, A. (1912). Die Ichneumonidentypen C.P. Thunbergs. *Zoologiska Bidragfrån Uppsala,* 1: 229–293.

Schuluz, W.A. (1911). Zweihundert alte Hymenopteren. *Zoologische Annalen*, 4: 1–220.

Schuluz, W.A. (1912). Aelteste und alte Hymenopteren skandinavischer Autoren. *Berliner Entomol. Zeitschrift*, 57: 52–102.

Stål. C. (1857). Entomologiska bidrag. Öpversigt af Kongl. *Vetenskaps-Akademiens Förhandlingar*, 14: 53-64.

Thunberg, C.P. (1822). Ichneumonidea. Insecta Hymenoptera illustrata. Pars I. *Mém.'Acad. Sci. St. Pétersb.*, 8: 249–281

Thunberg, C.P. (1824). Ichneumonidea. Insecta Hymenoptera, illustrata (continuatio). *Mém. 'Acad. Sci. St. Pétersb.,* 9: 285–368.

Turner, R. E. (1912). Notes on fossorial Hymenoptera. – X. On new species from the Oriental and Ethiopian Regions. *Ann. Mag. Nat. Hist.*, 10: 361–377.