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# Journal of Threatened Taxa

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

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Hassan Naveed, Kamran Sohail, Waqar Islam & Yalin Zhang

26 December 2019 | Vol. 11 | No. 15 | Pages: 15053–15060

DOI: 10.11609/jott.4957.11.15.15053-15060



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ISSN 0974-7893 (Print)

## A REVIEW OF THE LEAFHOPPER TRIBE AGALLIINI (HEMIPTERA: CICADELLIDAE: MEGOPHTHALMINAE) WITH A REVISED KEY TO THE KNOWN PAKISTANI GENERA AND SPECIES

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**Abstract:** The tribe Agalliini is reviewed from Pakistan with additional description and illustration of a new record *Anaceratagallia pararobusta* (Pruthi) 1936. An updated checklist and keys are given to distinguish all the genera and species of the tribe Agalliini from Pakistan.

**Keywords:** Cicadomorpha, new record, taxonomy.

The leafhopper tribe Agalliini of the subfamily Megophthalminae includes 37 genera and 650 species worldwide (Gonçalves & Dietrich 2009; Viraktamath 2011; Viraktamath et al. 2012). Most of the species are grass, herb or leguminous crop feeders (Viraktamath 2011) and 13 species are known to be vectors of plant diseases (Wilson & Turner 2010). Agalliine species can be distinguished from other Cicadellidae by combination of the following characters: head short and broad, usually wider than pronotum; ocelli on face close to

dorsal margin; forewing with appendix very narrow or absent; hind wing with four apical cells closed; hind tibial macrosetae on AV starting from midlength of tibia, metabasitarsomere with one or two platellae on distal transverse row of setae; male subgenital plates short, often fused at base and male style usually forked caudally. Viraktamath (2011) provided a detailed study of the tribe Agalliini from the Oriental and Australian regions and compiled all of the available literature from those regions. Soon thereafter, Viraktamath et al. (2012) studied the Chinese Agalliini fauna and added four new genera and 10 new species, bringing the Chinese Agalliini to a total of 14 genera and 41 species.

Pruthi (1930, 1936) described two species of Agalliini from Pakistan, namely *Agallia robusta* and *Durgades idiocera* from Murree Hills. Later, Mahmood (1979) reported the presence of the genera *Aceratagallia*

DOI: <https://doi.org/10.11609/jott.4957.11.15.15053-15060> | ZooBank: urn:lsid:zoobank.org:pub:A21F6937-694F-4EE3-954F-F2070DA7D75E

Editor: K.A. Subramanian, Zoological Survey of India, Chennai, India.

Date of publication: 26 December 2019 (online & print)

Manuscript details: #4957 | Received 19 March 2019 | Final received 24 October 2019 | Finally accepted 30 November 2019

Citation: Naveed, H., K. Sohail, W. Islam & Y. Zhang (2019). A review of the leafhopper tribe Agalliini (Hemiptera: Cicadellidae: Megophthalminae) with a revised key to the known Pakistani genera and species. *Journal of Threatened Taxa* 11(15): 15053–15060. <https://doi.org/10.11609/jott.3891.11.15.15053-15060>

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Funding: This study was supported by the Key scientific research project of university-level discipline construction of Leshan Normal University (LZD029), National Natural Science Foundation (31420103911, 31093430) and by the Ministry of Science and Technology of China (2015FY210300, 2005DKA21402).

Competing interests: The authors declare no competing interests.

Acknowledgements: We express our sincere thanks to John Richard Schrock, Emporia State University, USA and Prof. C.A. Viraktamath University of Agricultural Science, Bangalore, India, for reviewing this manuscript and providing valuable comments.



Kirkaldy, *Agallia* Curtis, *Agalliopsis* Kirkaldy, *Anaceratagallia* Zachvatkin, *Ceratagallia* Kirkaldy, *Nehela* White, *Peragallia* Ribaut and *Austroagallia* Evans, but no material has been found to confirm those identifications. Viraktamath (1973, 2004) described *Austroagallia nitobei* (Matsumura) and the new species *Durgades sympatrica* Viraktamath from Pakistan. Subsequently, Khatri et al. (2010) studied six species of Agalliini providing their re-descriptions and illustrations. Later, Viraktamath (2011) transferred all three Pakistani species of *Agallia* Curtis to *Anaceratagallia* Zachvatkin. In this paper, we report a new record of *Anaceratagallia pararobusta* (Pruthi, 1936) from Pakistan. The tribe Agalliini comprises three genera and 11 species from Pakistan. The specimens examined are deposited in the Entomological Museum, Northwest A&F University, Yangling, Shaanxi, China (NWAUFU).

#### Checklist of tribe Agalliini from Pakistan

*Anaceratagallia aciculate* (Horváth, 1894)  
*Anaceratagallia cuspidate* Dlabola, 1957  
*Anaceratagallia pararobusta* (Pruthi, 1936) **n. rec.**  
*Anaceratagallia robusta* Pruthi, 1930  
*Austroagallia fagonica* Sawai Singh & Gill, 1973  
*Austroagallia nitobei* (Matsumura, 1912)  
*Austroagallia sarobica* (Dlabola, 1964)  
*Austroagallia robusta* Sawai Singh & Gill, 1973  
*Austroagallia sinuate* (Mulsant & Rey, 1855)  
*Durgades idiocera* Pruthi, 1930  
*Durgades sympatrica* Viraktamath, 2004

*Note.* Detailed descriptions of known genera and species have been already provided by Viraktamath (2011) and hence are not repeated here except for the locality records and remarks.

#### Key to the genera of Agalliini from Pakistan

1. Hind margin of crown not curved or, if so, evenly curved behind eyes ..... 2
- Hind margin of crown sinuately curved behind eyes; base of aedeagus not sunken into dorsal apodeme, asymmetrical; anal collar well developed, with hooks or distally dentate; ocelli located in rather deep pits...*Austroagallia* Evans
2. Pronotum transversely rugose; aedeagus without subapical finger-like processes surrounding gonopore ..... *Anaceratagallia* Zachvatkin
- Pronotum not rugose; aedeagus with subapical finger-like processes surrounding gonopore ..... *Durgades* Distant

#### Genus *Anaceratagallia* Zachvatkin

*Anaceratagallia* Zachvatkin 1946: 159–161.

Type-species: *Cicada venosa* Fourcroy, 1785 by original designation.

**Distribution:** Palaearctic, Afrotropical and Oriental regions

#### Key to the species of *Anaceratagallia* from Pakistan (modified from Viraktamath 2011)

1. Anal collar process tridentate; aedeagal shaft with pair of subapical tooth-like processes ..... *A. cuspidata*
- Anal collar process with one or two subacute projections distally; aedeagus lacking processes ..... 2
2. Anal collar process with ventral subacute and dorsal acute projections, caudal margin between them either smooth or crenulated ..... *A. robusta*
- Anal collar process with single subacute projection ..... 3
3. Aedeagal shaft with one subapical tooth on dorsal margin ..... *A. aciculata*
- Aedeagal shaft devoid of subapical tooth on dorsal margin ..... *A. pararobusta*

#### *Anaceratagallia aciculata* (Horváth)

*Agallia venosa* var. *aciculate* Horváth 1894: 186

*Agallia aciculata* Vilbaste 1962: 134

*Anaceratagallia aciculata*; Metcalf 1966: 79;

Viraktamath 2011: 16.

**Material examined:** Not available.

**Remarks:** Khatri et al. (2010) reported this species from Pakistan and illustrated the male genitalia.

**Distribution:** Pakistan, Palaearctic region

#### *Anaceratagallia cuspidate* Dlabola

*Anaceratagallia cuspidate* Dlabola 1957: 298–299, figs 106–110; Viraktamath 2011: 16, figs 100–105;

*Agallia pseudorobusta* Rao & Ramakrishnan 1978a: 236–237, figs. 1 a–l.

**Material examined:** Not available.

**Remarks:** This species is similar to *A. robusta* in morphology but can be distinguished by tridentate anal collar process and aedeagal shaft with tooth-like paired projections (Viraktamath 2011).

**Distribution:** India, Pakistan, Palaearctic region

#### *Anaceratagallia pararobusta* (Pruthi, 1936)

Image 1A, Figure 1A–C

*Agallia pararobusta* Pruthi 1936: 104–105, fig. 119,

pl. VIII, fig. 4; *Anaceratagallia pararobusta* Viraktamath, 2011: 17, figs 3, 4, 14, 106–108.

**Measurement:** Body length: Male. 3.1mm. Vertex width including eyes, 1mm; vertex length, 0.24mm; pronotum width, 0.93mm; pronotum length, 0.5mm; scutellum width, 0.5mm; scutellum length, 0.39mm.

**Material examined:** Hm035141–Hm035145, 5 males, 10.viii.2017, Pakistan: Azad Jammu & Kashmir: Rawalakot, 33.858°N, 73.765°E, 1638m, coll. Hassan Naveed.

**Diagnosis.** Vertex with a couple of rectangular black spots obliquely placed. Face Ochraceous, with a few fuscous markings, fronto-clypeus with dark brown spots at lateral margin. Pronotum with black spots on anterior margin, median longitudinal spot larger than lateral spots on both sides on posterior margin. Basal triangles of scutellum with two black spots, posterior half brown. Forewings ochraceous with fuscous veins, cells mostly infuscated.

Male genitalia. Pygofer caudo-ventrally produced into spine-like process of unequal width. Aedeagal shaft mostly slender with slender dorsal apodeme. Anal collar with finger-like process, dorsal process directed ventrally.

Female genitalia. Hind margin of seventh sternite broadly concave.

This species closely resembles *A. laevis* (Ribaut) but differs in aedeagal shaft more slender.

**Distribution:** India, Pakistan

#### *Anaceratagallia robusta* (Pruthi, 1930)

*Agallia robusta* Pruthi 1930: 10–12, text figs 10–12; *Agallia delhiensis* Rao & Ramakrishnan 1978b: 241, fig. 3 a–l; *Agallia robusta* Khatri et al. 2010: 36, plate I, Fig. 4; *Anaceratagallia robusta* Viraktamath 2011: 17, figs 3, 4, 14, 23, 41–44, 109–120, 563, 577, 592.

**Material examined:** Not available

**Remarks:** This species is similar to *A. laevis* (Ribaut) but can be differentiated by the shape of the anal collar process with dorsal finger-like projection, and caudal margin oblique, crenulate to smooth (Viraktamath 2011).

**Distribution:** India, Pakistan

#### Genus *Austroagallia* Evans

*Austroagallia* Evans, 1935: 70. Type-species: *Austroagallia torrid* Evans, by monotypy.

*Peragallia* Ribaut, 1948: 59. Type species: *Bythoscopus sinuatus* Mulsant and Rey, by original designation; synonymy by Le Quesne 1964: 73.

**Distribution:** Australian, Afrotropical, Oceanic,

Oriental and Palaearctic regions

#### Key to the species of *Austroagallia* from Pakistan (modified from Viraktamath 2011)

1. Forewing with brownish reticulate venation; crown and pronotum with minute dot-like marks ..... *A. robusta*
- Forewing venation not reticulated; crown with prominent spots ..... 2
2. Aedeagal shaft with basal stout, elongate process ..... *A. sarobica*
- Aedeagal shaft lacking basal process, or reduced, tooth-like ..... 3
3. Aedeagal shaft with laminate process surrounding gonopore; anal collar hook spindle-shaped ..... *A. nitobei*
- Aedeagal shaft neither laminately expanded nor with laminate process or may be slightly expanded medially ..... 4
4. Aedeagus with a pair of finger-like processes at apex ..... *A. fagonica*
- Aedeagus without a pair of finger-like processes at apex ..... *A. sinuata*

#### *Austroagallia fagonica* Singh & Gill, 1973

Image 1B, Figure 1D–J

*Austroagallia fagonica* Singh & Gill 1973, in Bindra, 1973: 12–14, pl. 3, figs. 1–11; Viraktamath and Sohi 1980: 287, figs 17–21; Viraktamath 2011: 28, Figs. 45–48, 134–140.

**Measurement:** Body length: Male. 3.8mm. Vertex width including eyes, 1.1mm; vertex length, 0.14mm; pronotum width, 1mm; pronotum length, 0.54mm; scutellum width, 0.6mm; scutellum length, 0.4mm.

**Material examined:** Hm35266–Hm35271, 6 males, Hm35272–Hm35282, 10 females, 11.viii.2017, Pakistan: Azad Jammu & Kashmir: Rawalakot, 33.858°N, 73.765°E, 1,638m, coll. Hassan Naveed.

**Remarks:** This species has considerable color variation as described by Viraktamath 2011, but the male genitalia characters are consistent, such as the aedeagal shaft slightly broadened at the basal half (it maybe slender in the same species), with two finger-like processes directed on one lateral side and the anal collar process without a dorsal marginal tooth. These variations are interpreted as intraspecific variation. *Austroagallia fagonica*, as discussed by Viraktamath and Sohi (1980) resembles the Egyptian species *Austroagallia canopus* Linnavuori (1969) from which it differs in having a simple anal collar process compared to the branched process found in *A. canopus*.

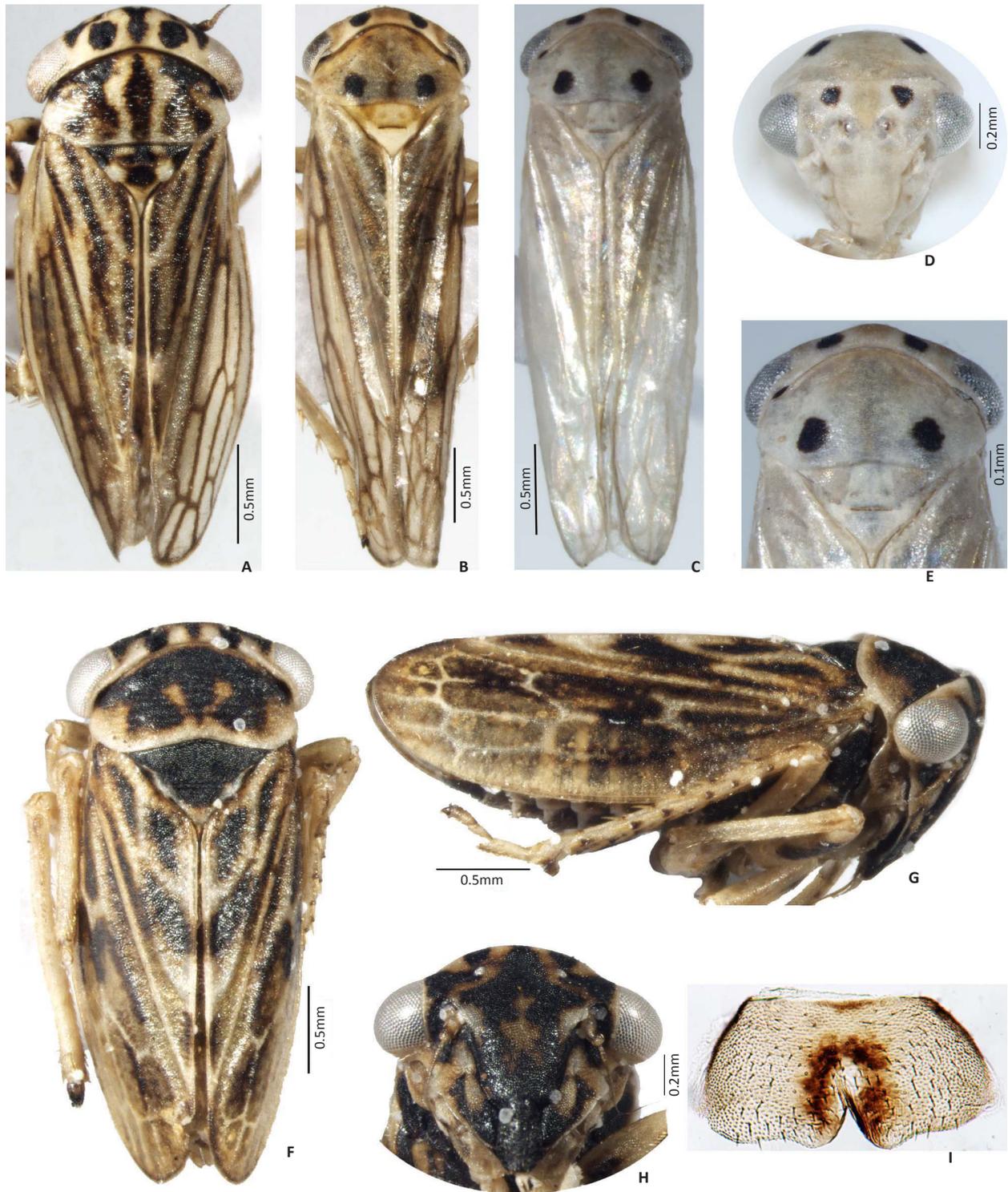


Image 1. A—*Anaceratagallia pararobusta* (Pruthi, 1936) habitus, dorsal view | B—*Austroagallia fagonica* Sawai Singh & Gill, 1973 habitus, dorsal view | C—*Austroagallia sinuata* (Mulsant & Rey, 1855): C—habitus, dorsal view | D—face | E—head | F—*Durgades sympatrica* Viraktamath, 2004: F—habitus, dorsal view | G—habitus, lateral view | H—face | I—female seventh sternite, ventral view. © Hassan Naveed.

**Distribution:** India, Pakistan.

***Austroagallia nitobei* (Matsumura, 1912)**

*Agallia nitobei* Matsumura 1912: 316;

*Austroagallia nitobei* (Matsumura), Viraktamath 1973: 307–308, figs 1, 2; Viraktamath & Sohi 1980: 285, figs. 1–4; Viraktamath 2011: 29, Figs. 141–143.

**Material examined:** Not available.

**Remarks:** Viraktamath (1973) recognized variation in populations of this species from Sri Lanka, Thailand, Vietnam, Pakistan and India. This species is similar to the Palearctic species *A. avicula* (Ribaut) in external features but can be distinguished by the aedeagus with a basal fold-like tubercle, shaft slender, and apical process elongate and oval with a crenulated lower border (Viraktamath 2011).

**Distribution:** India, Pakistan, Sri Lanka, China (Taiwan), Thailand, Vietnam.

***Austroagallia robusta* Singh & Gill in Bindra, 1973**

*Austroagallia robusta* Singh & Gill 1973, in Bindra 1973: 14–15, pl 4: figs 1–11; Viraktamath & Sohi 1980: 287, figs 11–16; Khatri et al. 2010: 35, pl 1b, fig. 2; Viraktamath 2011: 33, Figs. 36, 148–151.

**Material examined:** Not available.

**Remarks:** The aedeagus of *A. robusta* is about the same as that of the *A. sinuata*, but it differs in having the anal collar process slightly stout and with a curve. It can also be differentiated from other species of *Austroagallia* by the pair of very small speckle-like spots on the crown and pronotum and reticulate piceous venation on the disc of the corium (Viraktamath 2011).

**Distribution:** India, Pakistan.

***Austroagallia sarobica* (Dlabola, 1964)**

*Peragallia sarobica* Dlabola 1964: 246;

*Austroagallia sarobica* (Dlabola): Dlabola 1972: 218, generic placement; Bindra 1973: 4; Viraktamath & Sohi 1980: 289, figs 29–33; Khatri et al. 2010: 35, pl 1c, Fig. 3; Viraktamath 2011: 34, Figs. 152–155.

**Material examined:** Not available

**Remarks:** This species is similar to *A. robusta* in crown and pronotum having round spots, but differs in having the male genitalia with anal collar tridentate, aedeagal shaft with a basal process making it strongly asymmetrical, and forewings without subdivided antepical cells (Viraktamath 2011).

**Distribution:** India, Pakistan, Afrotropical and Palearctic regions

***Austroagallia sinuata* (Mulsant & Rey, 1855)**

Image 1C–E, Figure 2A–C

*Bythoscopus sinuatus* Mulsant & Rey 1855: 222;

*Agallia quadrisignata* Flor 1861: 557, synonymy by Fieber 1868: 462;

*Agallia homeyeri* Kirschbaum 1868: 32, synonymy by Fieber 1872: 32;

*Agallia fieberi* Vismara 1878: 41, synonymy by Löw 1885: 346;

*Austroagallia afganistanensis* Rao, Ramakrishnan & Ghai 1979: 655–656;

*Austroagallia sinuate* Khatri et al. 2010: 35, pl 1a, Fig. 1; Viraktamath 2011: 34, Figs. 24, 49–51, 156–158.

**Measurements.** Body length: Male. 3mm. Vertex width including eyes, 0.99mm; vertex length, 0.1mm; pronotum width, 0.85mm; pronotum length, 0.44mm; scutellum width, 0.6mm; scutellum length, 0.4mm.

**Material examined:** Hm032752–Hm032754, 3 males, Hm032751, 1 female, 4.viii.2016, Pakistan: Khyber Pakhtunkhwa, Abbottabad, 34.168°N, 73.221°E, 1,256m, coll. Hassan Naveed.

**Remarks:** This species is widely distributed in the southern Palearctic, Afrotropical and western Oriental and Neotropical regions. It shows great variation in the structure of both the anal collar process and aedeagus but usually is without reticulate venation of the forewing.

**Distribution:** India, Pakistan, Afrotropical, Palearctic regions and Neotropical regions.

**Genus *Durgades* Distant**

*Durgades* Distant 1912: 608; 1916: 237; Viraktamath 2004: 365–366.

Type-species: *Durgades nigropictus* Distant, by original designation.

**Distribution:** Foot hills of the Himalayas.

**Key to the species of *Durgades*** (modified from Viraktamath 2011)

- Aedeagal shaft with four finger-like processes surrounding gonopore ..... *D. idiocera*
- Aedeagal shaft with three finger-like subapical processes ..... *D. sympatrica*

***Durgades idiocera* Pruthi, 1930**

*Durgades idiocera* Pruthi 1930: 13–15, figs. 15–17, pl. II, figs. 1, 1a, 2; Viraktamath 2004: 369–370, figs 24–25; Viraktamath 2011: 46, Figs. 196–197.

**Material examined:** Not available.

**Remarks:** This species was collected by Pruthi (1930) from Murree Hills. This species can be distinguished from the other *Durgades* species in lacking a cross vein

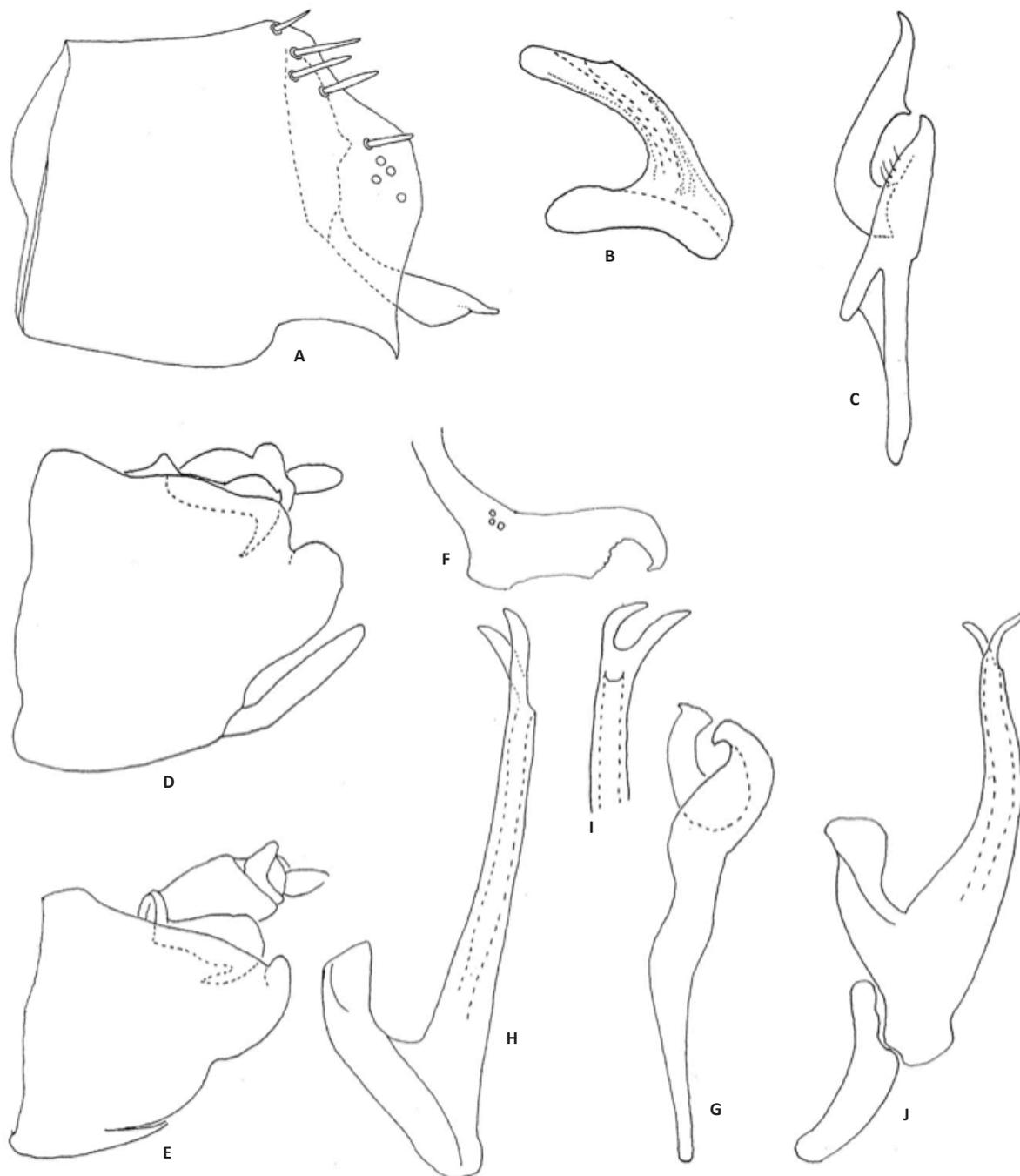


Figure 1. A–C—*Anaceratagallia pararobusta* (Pruthi, 1936): A—pygofer, lateral view; B—aedeagus, lateral view; C—style, dorsal view | D–J—*Austroagallia fagonica* Sawai Singh & Gill, 1973: D–E—pygofer, lateral view | F—anal collar process, lateral view | G—style, dorsal view | H—aedeagus, lateral view | I—apex of aedeagus, anterior view | J—connective and aedeagus, lateral view. (All reproduced from Viraktamath 2011).

between the claval veins of the forewings and having the aedeagal shaft with three curved finger-like processes and one straighter process surrounding the gonopore (Viraktamath 2011).

**Distribution:** Pakistan.

***Durgades sympatrica* Viraktamath, 2004**

Image 1F–I, Figure 2D–J

*Durgades sympatrica* Viraktamath 2004: 374, Figs. 57–65; Viraktamath 2011: 49, Figs. 229–237.

**Measurements.** Body length: Male. 3.2mm. Vertex width including eyes, 1.4mm; vertex length, 0.1mm;

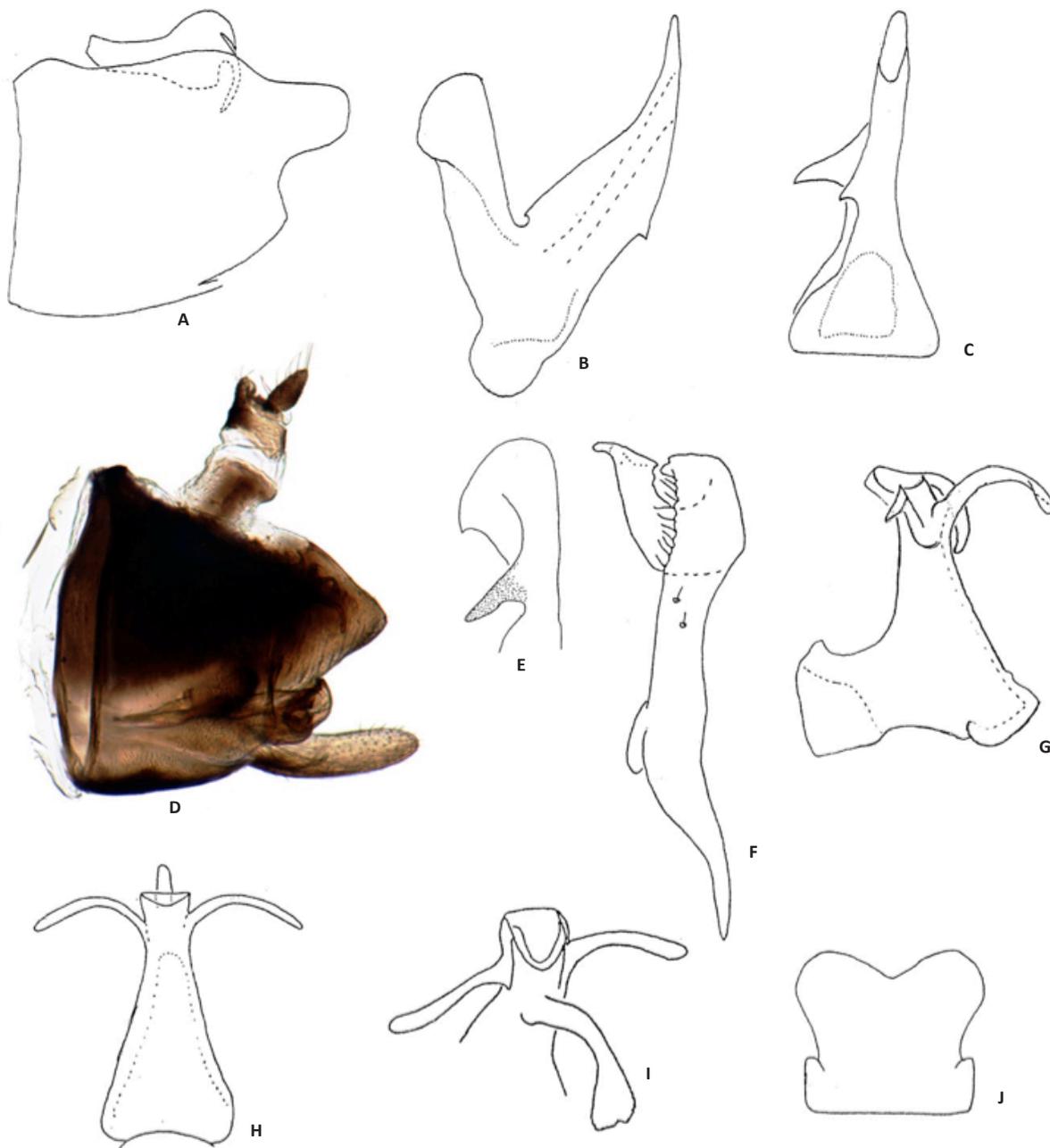


Figure 2. A–C. *Austroagallia sinuata* (Mulsant & Rey, 1855) (reproduced from Viraktamath 2011): A—pygofer, lateral view | B—aedeagus, lateral view | C—aedeagus, posterior view | D–J—*Durgades sympatrica* Viraktamath, 2004: D—pygofer, lateral view (reproduced from Viraktamath 2011) | E—mesal process of pygofer | F—style, lateral view | G—aedeagus, lateral view | H—aedeagus, dorsal view | I—apex of aedeagal shaft, posterior view | J—connective.

pronotum width, 1.1mm; pronotum length, 0.5mm; scutellum width, 0.8mm; scutellum length, 0.59mm.

**Material examined:** Hm35291–Hm35298, 8 males, Hm35288–Hm35290, 3 females, 25.viii.2017, Pakistan, Punjab, Murree Hills, 33.907°N, 73.394°E, 2291m, coll. Hassan Naveed.

**Remarks:** This species closely resembles *D. idiocera*

in coloration, external appearance and markings but can be readily distinguished by the three subapical aedeagal processes, of which one is distally bilobed with a serrated margin. The species can be brachypterous to macropterous.

**Distribution:** Pakistan.

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

December 2019 | Vol. 11 | No. 15 | Pages: 14927–15090

Date of Publication: 26 December 2019 (Online & Print)

DOI: 10.11609/jott.2019.11.15.14927-15090

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