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Contribution to the knowledge of the *Ormyrus* (Hymenoptera: Chalcidoidea: Ormyridae) with two new records from India

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Abstract

The present research was aimed to study the distribution of Ormyridae fauna of Indian states between 2006 and 2016 except *Ormyrus longicaudus* was collected in 1965 from Karnataka. The results revealed that four species were found belonging to genus *Ormyrus* (Hymenoptera: Chalcidoidea : Ormyridae) viz., *O. orientalis* Walker, *O. gopii* Narendran, *O. longicaudus* Narendran and *O. secus* Narendran were collected, identified and added. *Ormyrus longicaudus* and *O. secus* were reported for the first time from Indian fauna while *O. gopii* and *O. orientalis* were new record from the Indian state West Bengal and Tripura respectively. Key to the Indian species of *Ormyrus* was provided.

Keywords: Hymenoptera, Chalcidoidea, Ormyridae, *Ormyrus*, distribution, key, India

1. Introduction

The Ormyridae is one of the small families under superfamily Chalcidoidea^[4]. Indian fauna of Ormyridae is poorly known. Most of the ormyrids are inhabitants of plant galls. *Ormyrus gopii* Narendran probably develop in stems of grasses or other plants. *O. sheelae* Narendran and *O. zamoorini* Narendran are associated with the receptacles of *F. bengalensis* Linn.^[4]. Some may be partially phytophagous while others may be either entomophagous or phytophagous^[4]. Recently, Pramanik and Dey were recorded *Ormyrus benjaminiae* Narendran from India^[8]. In world, Ormyridae is represented by three genera i.e. *Ormyrus* Westwood, *Ormyrullus* Boucek and *Eubeckerella* Narendran. However, in India only two genera i.e. *Ormyrus* Westwood (14 species including 4 species recorded in the present study) and *Ormyrullus* Boucek (1 species) were reported^[4]. The objectives of the present research are to study the distribution of Ormyridae fauna of India and to provide the species key of *Ormyrus* for India.

2. Material and Methods

The present study was based on the unidentified collections from Hymenoptera section, Zoological Survey of India, Kolkata and College of Agriculture, Lembucherra, Tripura. The period of study between 2006 and 2016 except *Ormyrus longicaudus* was collected in 1965 from Karnataka. Specimens are collected by the net sweeping method and were collected with the help of aspirator. Freshly collected specimens were killed in ethyl acetate fumes and stored in 70% ethyl alcohol. They were later dried and mounted on rectangular card using water soluble glue. Specimens were photographed by Leica M205A stereo zoom microscope. Identification was made using keys provided by Narendran^[4]. Vouchered specimens are deposited in Zoological Survey of India, Kolkata, India.

Abbreviations: BBM- Bernice P. Bishop Museum, Honolulu, Hawaii; BMNH- The Natural History Museum, London; DZUC- Department of Zoology, University of Calicut, India; HNHM – Hungarian Natural History Museum, Budapest, Hungary; IARI- Indian Agriculture Research Institute, New Delhi; ZSIC- Zoological Survey of India, Calicut, India; NZSI- National Zoological Collection, Zoological Survey of India, Kolkata, India; M- male; F- female; T1-T6 – gastral terga 1 to 6; F1-F2- funicle segment 1 to 2.

3. Results

The results of the present study revealed that four species of *Ormyrus* were identified, out of which, two species were recorded first time from India while two species were newly recorded from different Indian states and a key to the Indian species of *Ormyrus* was also provided.

Genus *Ormyrus* Westwood

Ormyrus Westwood, 1832: 127. Type species *Ormyrus punctiger* Westwood, by monotypy.

Periglyphus Boheman 1838: 378. Type species *Periglyphus gastric* Boheman by monotypy. Synonymy by Dalla Torre, 1898: 282.

Siphonura Nees, 1834: 81. Type species *Siphonura variolosa* Nees, designated by Gahan & Fagan, 1923: 133. Synonymy by Forster, 1860: 98.

Cyrtosoma Perris, 1840: 96. Type species *Cyrtosoma papaveris* Perris, by monotypy. Synonymy by Mayr, 1904: 565.

Tribaeus Forster, 1860: 93. Type species *Tribaeus punctulatus* Forster, by monotypy. Synonymy by Mayr, 1904: 565.

Monobaeus Forster, 1860: 95. Type species *Monobaeus cingulatus* Forster, by subsequent designation by Ashmead, 1904: 245. Synonymy by Mayr, 1904: 560.

Chrysoideus De Stefani, 1898: 172. Type species *Torymus (Chrysoideus) chrysidiformis* De Stefani, designated by Gahan & Fagan, 1923: 34. Synonymy by Risbec, 1954: 535.

Avrasyamyus Doganalar, 1991: 7. Type species *Ormyrus orientalis* Walker, by original designation. Synonymy by Hanson, 1992: 1335.

Wania Risbec, 1951: 294. Type species *Wania ornate* Risbec, by monotypy. Synonymy by Boucek, 1988: 155.

Diagnosis: Female. Body Color usually metallic blue or green, sometimes metallic bronze or violet, head punctate; apex of clypeus usually straight; occipital carina present; mandibles bidentate, outer tooth acute, inner tooth broad with apical edge straight; antennal toruli situated slightly above ventral margin of eye; mesosomal sculpture usually weak, mesopleuron almost totally shiny, scutellum strigate to imbricate to reticulate usually with shiny interstices; pronotum almost as wide as scutum, notauli visible; fore wing ciliate, with post marginal and stigmal veins very short; costal cell asetose above, and with a row of setae below which may be complete or incomplete; hind coxae greatly enlarged, length sub equals to width, hind tibia with row of spines along outer edge and with two stout, curved spurs at apex, longest one greater than half the length of the first tarsomer; metasoma heavily sclerotized; apex of T1 usually straight, T3-T5 usually densely foveate anteriorly, imbricate to punctulate posteriorly.

Host: *Ormyrus* are mostly primary or hyperparasitoids of plant galls obtained by hymenopteran species (Chalcidoidea and Cynipidae) and Diptera (Agromyzidae, Cecidomyiidae and Tephritidae).

Distribution: *Ormyrus* are found in almost all zoogeographical regions.

Species Distribution: In World, three genera of Ormyrida i.e., *Ormyrus* Westwood (120 species), *Ormyrullus* Boucek (one species) and *Eubeckerella* Narendran (one species) were reported. In Indian region, two genera i.e., *Ormyrus* Westwood (14 species), *Ormyrullus* Boucek (01 species - *gibbus* Boucek) were reported.

Key to Indian species of *Ormyrus* Westwood based on females

(Adopted from Narendran)^[4]

1. Scutellum bearing normal adpressed pilosity, without

- pairs of setae as in alternate; fore wing with speculum closed by cubital line of setae.2
- . Scutellum bearing no adpressed pilosity, but with pairs of setae separated in middle by median bare area or strip; speculum usually open.9
- Speculum of fore wing asetose (not interrupted by setae).....3
- . Speculum of fore wing densely or sparsely setose.4
3. Metasoma without foveolae or sups or crenulated border visible, mostly granulate (parts of crenulated border may be visible on T3, T4 and T5); T5 longest.....
- langalandi* Girault
- . Metasoma with foveolae and little more than 2.15× as long as mesosoma; scape 4× as long as F1 and 2.6× of pedicel length; marginal vein slightly less than 4× of post marginal vein.
- calycopteridis* Narendran
4. Propodeum without any median or submedian carinae; mouth width more than 2× length of malar space in front view.....5
- . Propodeum with median or submedian carinae; mouth width less than 2× length of malar space.6
5. Dorsal side of hind coxa reticulate; apex of scutellum obtusely acuminate with a shorter median longitudinal carina; T3 with single row of basal foveolae.
- gopii* Narendran
- . Dorsal side of hind coxa longitudinally striated above and reticulate below; apex of scutellum depressed with a small groove at posterior margin without median longitudinal carina; T3 with two rows of foveolae. ...
- perseae* Girish *et al.*
6. 6. Metasoma with crenulate border modified into foveolae; propodeum with a pair of submedian carinae and with short and weak rugae in between them; basal cell of fore wing with 10 dorsal setae and 8 ventral setae.
- secus* Narendran
- . Metasoma with crenulate border not modified into foveolae.7
7. Metasoma slightly more than 2.5× length of mesosoma; basal cell of forewing with 3-4 ventral setae.....
- longicaudus* Narendran
- . Metasoma shorter than 2.5× length of mesosoma; basal cell of fore wing with 6-7 ventral setae.8
8. Metasoma with double dorsal carina from anterior margin of T2 to epipygium; upper clypeal margin distinct; scape 4× as long as pedicel and 5× or slightly longer than F1; hind coxa obliquely striate on dorsal side; longest spur of hind tibia slightly shorter than hind metatarsus.
- orientalis* Walker
- . Metasoma with single dorsal carina or ridge from T1 to T6; upper clypeal margin indistinct; scape slightly more than 2× length of pedicel and slightly less than 4× length of F1; hind coxa reticulate on dorsal side; longest spur of hind tibia almost reaching apex of hind metatarsus.....
- malabaricus* Narendran
9. Antennal formula 11263; F1 not anelliform.10
- . Antennal formula 11263 then F1 anelliform; if antennal formula 11263 then F1 anelliform; scape 1.8× longer than pedicel and equal to F1 and F2 combined; T6 concealed by T5; propodeum without a median carina.
- keralensis* Narendran & Abdurahiman
10. Scape 7× longer than F1; pedicel 0.5× of scape; mesoscutum (excluding scapulae) with two pairs of

- strong setae; propodeum without any carina. *noyesi* Narendran
 --. Scape less than 7× of F1; pedicel less than half of scape; mesoscutum with more than two pair of strong setae.....11
11. Lateral panel of pronotum cross striate in side view; hind coxa on outer dorsal side transversely striate and slightly reticulate; hind tibia with a row of 6 strong spines on dorsal edge; longer spur of hind tibia distinctly longer than hind metatarsus. *benjaminiae* Narendran
 --. Lateral panel of pronotum with striations coming down and turning towards posterior margin in side view; hind coxa obliquely striate on outer dorsal side; longest spur of hind tibia as long as hind metatarsus.12
12. Propodeum with longitudinal carina; scape 3.5× longer than pedicel and 6× longer than F1; Metasoma with a median longitudinal ridge extending from posterior margin of T1 to posterior margin of T5..... *sheelae* Narendran
 . Propodeum without longitudinal carina; scape length less than 3× of pedicel length; gaster with a median longitudinal ridge extending from posterior margin of T1 to posterior margin of T6.13
13. Scutellum with 7 pairs of strong setae; pedicel almost equal or slightly longer than F1; pedicel shorter than F1 and F2 combined; longest spur of hind tibia as long as hind metatarsus. *zamoorini* Narendran
 --. Scutellum with 4 pairs of strong setae; pedicel 2× of F1 and as long as or slightly shorter than F1 and F2 combined; longest spur of hind tibia distinctly shorter than metatarsus. *bouceki* Narendran

New distribution record of *Ormyrus* species for India

1. *Ormyrus longicaudus* Narendran, 1999 (Fig. 1)

Ormyrus longicaudus Narendran, 1999: 91-93, F, Holotype F: Malaysia, Sabah, Tenompok (BBM).

Diagnosis: Female. Head dull metallic green; scape pale brownish yellow; remaining antennal segments blackish brown; all coxae brown with metallic green and violet refringence; all tarsi pale yellow; wings hyaline; scape not reaching to ocellus and about 2.2× longer than pedicel; maginal vein and postmarginal vein of forewing 3.0 × longer than postmarginal vein and stigma vein respectively; longest spur of hind tibia shorter than hind metatarsus; Metasoma with a median longitudinal ridge; T1 distinctly cross reticulate.

Male: Unknown.

Hosts: Unknown.

Distribution: Malaysia [4], India (Karnataka) (new record).

Material examined: India: Karnataka, 1F, Mysore, 12.i.1965, Ex. Diptera CIEA 1919 (Regd. No. 18772/H3).

2. *Ormyrus secus* Narendran, 1999 (Fig. 2)

Ormyrus secus Narendran, 1999: 122-124, F, Holotype F: Philippines, Manila (BBM).

Diagnosis: Female. Body pinkish brown with metallic green reflections; antennal pale brown with pale yellow scape; all tarsi pale brownish yellow; wings hyaline; scape 2.4× longer than pedicel; F1 and F2 subequal in length; maginal vein and postmarginal vein of fore wing 4.0 × and about 1.8× longer than postmarginal vein and stigma vein respectively; longest spur of hind tibia shorter than hind metatarsus; metasoma

without a median longitudinal ridge; T1 reticulate with basal median black pit.

Male: Unknown.

Hosts: *Ficus* sp. [4].

Distribution: Philippines [4], India (Maharashtra) (new record).

Material examined: India: Maharashtra, 1F, Kholapur, 10.iii.2009, Coll. S. I. Kazmi. (Regd. No. 18771/H3)

New distribution record of *Ormyrus* species for Indian states

3. *Ormyrus gopii* Narendran, 1999 (Fig. 3)

Ormyrus gopii Narendran, 1999: 65-67, M,F, Holotype F: India, Kerala, Muliyar Reserve Forest (ZSIC).

Diagnosis: Female. Head and mesosoma with metallic bluish green; antenna with scape pale yellow; pedicel brown; remaining segments black; wings hyaline; Metasoma metallic bluish green with violet tinge; scape not reaching front ocellus; scape 3.0× longer than each antennal segments; pronotum, mesoscutum and scutellum uniformly pilose; apex of scutellum slightly extended beyond metanotum; fore wing with marginal vein about 3.5× of postmarginal vein; postmarginal vein 4.0× of stigma vein; hind coxa distinctly reticulate on dorsolateral side; longest spur of hind tibia slightly shorter than hind metatarsus; metasoma with a median longitudinal carina from T1 to T6; T1 distinctly reticulate.

Male: Similar to female except metasoma with without median carina.

Hosts: Stem galls of unidentified plant [4].

Distribution: India: Kerala [4], West Bengal (new record).

Material examined: India: West Bengal, 1 F, Nadia, Taherpur, 16.xi.2016, Coll. Girish Kumar (Regd. No. 18273/H3)

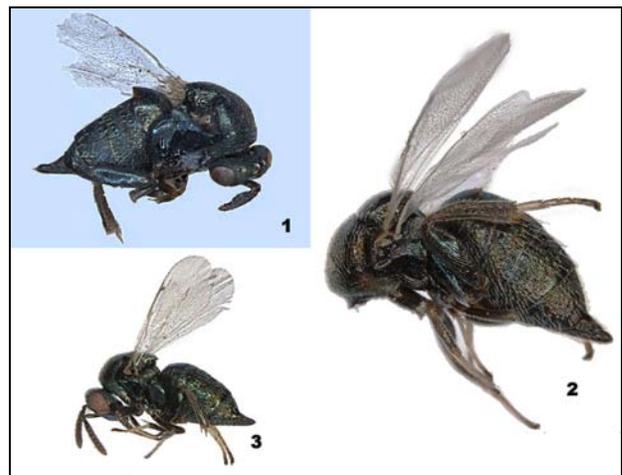


Fig 1-3: 1. *Ormyrus longicaudus*, female; 2. *Ormyrus secus*, female; 3. *Ormyrus gopii*, female

4. *Ormyrus orientalis* Walker, 1871 (Figs. 4 & 5)

Ormyrus orientalis Walker, 1871: 68, F, Lectotype F: Sri Lanka (BMNH).

Monobaes indicus Ahamad, 1946: 7, M, Holotype M: India, West Bengal, Sibpur (IARI). Synonymy by Narendran, 1999: 104.

Ormyrus peninsularis mani & Kaul, 1972:328-331, M,F, Holotype F: India, Tamil Nadu, Tanjore (IARI). Synonymy by Narendran, 1999: 104.

Ormyrus fredricki Narendran & Sumodan, 1990: 144, M, F, Holotype F: India, Tamil Nadu, Padappai (DZUC). Synonymy by Narendran, 1999: 104.

Ormyrus hungaricus Erdős, 1946: 79, F, Lectotype F: Hungary, Kalocsa (HNHM). Synonymy by Bouček, 1977: 123.



Fig 4-5: 4. *Ormyrus orientalis*, female; 5. *Ormyrus orientalis*, male.

Diagnosis: Female. Body brilliant metallic green; tegula blackish brown; wings hyaline; all tarsi pale yellowish brown; upper clypeal margin distinct; antenna 13-segmented (11263); scape 4.0× as long as pedicel and 5.0× or slightly longer than F1; fore wing with marginal vein much longer than postmarginal vein, postmarginal vein longer than stigma vein; hind coxa enlarged and obliquely striate on dorsal side; longest spur of hind tibia slightly shorter than hind metatarsus; metasoma strongly sclerotized and heavily sculptured with transverse rows of deep pits, apically narrowly produced; gaster with double dorsal carina from anterior margin of T1 to T7; T1 distinctly cross reticulate-striate; T2 completely concealed; Ovipositor not exerted.

Male: Similar to female except dorsoventrally flattened, without a median ridge.

Hosts: Parasitic on the gall wasps *Isocolusrogen hoferi* Wachtl found in inflorescence of *Centaurea* and the gall midge *Lasioptera eryngii* Vall^[11]; collected from inflorescence of *Centaurea sadleriana*, *C. pannonica* and *Carduus acanthoides*^[2, 10]; reared from flower heads of *Echinops* and *Cirsium*^[1]; from *Melanagromyza obtuse* from Pigeon pea^[5, 9]

Distribution: India: Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal^[6], Tripura (new record).

Material examined: India: **Uttar Pradesh**, 3F, Varanasi: Sarnatt, 29.iii.2006, Coll. Sheela S. (Regd. No. 9857/H3, 9859/H3 & 9864/H3); 2F, Rae Bareli, Safaitkhand, 7.iv.2006, Coll. Sheela S. (Regd. No. 9858/H3 & 9948/H3); 2F, Allahabad, Naini, 1.iv.2006, Coll. Sheela S. (Regd. No. 9860/H3 & 9869/H3); 1F, Lucknow, 11.iv.2006, 1F, Lucknow, 12.iv.2006, Coll. Sheela S. (Regd. No. 9861/H3 & 9868/H3); 3F, Fatehpur, 4.iv.2006, Coll. Sheela S. (Regd. No. 9862/H3, 9863/H3 & 9865/H3); 4F, Lucknow, Nawabganj, 18.iv.2006, Coll. Sheela S. (Regd. No. 9866/H3, 9870/H3,

9871/H3 & 9872/H3); 1F, Chandavali, Katesar, 29.iii.2006, Coll. Sheela S. (Regd. No. 9867/H3); 4F, Jaunpur, iv.2006, Coll. S. I. Kazmi. (Regd. No. 12791/H3, 12792/H3, 12799/H3 & 12800/H3); 2F, Allahabad, 2.iv.2006, Coll. Sheela S. (Regd. No. 12793/H3 & 12794/H3); 2F, Banaras (=Varanasi), 2.iv.2006, Coll. Sheela S. (Regd. No. 12795/H3 & 12796/H3); 2F, Faizabad, iv.2006, Coll. S. I. Kazmi. (Regd. No. 12797/H3 & 12798/H3); Maharashtra, 3F, Amravati, Pahara, 29.i.2009 Coll. Sheela S. (Regd. No. 18765/H3 – 18767/H3); 1F, Amravati, Chikaldhara, 30.i.2009, Coll. Sheela S. (Regd. No. 18770/H3); 2F, Wardha, Pownar, 1.ii.2009 Coll. Sheela S. (Regd. No. 18768/H3 – 18769/H3); 9F, 23M, Satara, Gadoli, 9.iii.2009, Coll. S. I. Kazmi. (Regd. No. 18274/H3 – 18305/H3); Tripura, 1F, 1M, West Tripura, Lembucherra, ii. 2016, Coll. N. Nair.

5. *Ormyrus perseae* Girish, Sheela & Narendran, 2013

Ormyrus perseae Girish *et.al.* 2013: 137-140, F, Holotype F: India, Assam, Jorhat (NZSI). (Type not examined)

Diagnosis: Female. Head and mesosoma with metallic bluish green refringence; antenna with scape pale yellow, pedicel brown, remaining segments black; all tarsi yellowish white except pretarsus brownish black; metasoma metallic bluish green with a violet tinge, pedicel subequal to F1; marginal vein of forewing 7.4× of stigmal vein; postmarginal vein 1.6× of stigma vein; longer spur of hind tibia slightly shorter than hind metatarsus; metasoma with a median longitudinal carina is present from posterior margin of T1 to T6; T1 distinctly reticulate.

Male: Unknown.

Hosts: *Persea bombycina* (King ex Hook. f.)^[3].

Distribution: India: Assam^[3].

4. Discussion

In the present study, four species of *Ormyrus* added and also two more species viz., *O. benjaminiae*^[4] and *O. perseae*^[3] were described from Oriental region and India respectively included and provided the Indian species key for 14 species of *Ormyrus*. The species keys were available only for Indo-Australian region^[4]. In World, 151 species of *Ormyrus* were recorded but for Indian region, 14 species including two species are recorded in this paper^[6]. Therefore, the further research of Ormyridae has to be continued for exploring the more species in India. As per Universal Chalcidoidea database^[6] *Ormyrus keralensis* Narendran & Abdurahiman was described in 1990 while *Ormyrus keralensis* Narendran 1999. The earlier species i.e., *Ormyrus keralensis* Narendran & Abdurahiman is valid species. *Ormyrus keralensis* Narendran is not mentioned in Indo-Australian chalcidoidea^[4].

5. Conclusion

Output of the present study will be useful for further research on *Ormyrus* in India and the Indian species key of *Ormyrus* act as an identification tool.

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