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New records of fourteen genera and twelve species of encyrtid (Chalcidoidea: Encyrtidae) from Bihar, India

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Abstract

Fourteen genera and twelve species of encyrtid viz., *Adekitopus hayati* Noyes & Hayat, *Alamella flava* Agarwal, *Anomalicornia tenuicornis* Mercet, *Callipteroma sexguttata* Motschulsky, *Cerapterocerus angustus* Hayat, *Encyrtus aurantii* Latreille, *Leptomastix nigrocincta* Risbec, *Microterys nietneri* Thomson, *Neodusmetia sangwani* Subba Rao, *Sakencyrtus mirus* Hayat, *Tetracnemus narendrani* Hayat & Kazmi, *Yasumatsuiola orientalis* Trjapitzin, *Parablatticida* Girault and *Psyllaphagus* Ashmead are newly recorded from different ecosystem of Bihar.

Keywords: hymenoptera, parasitoids, encyrtinae, tetracneminae, bihar, new records

Introduction

The superfamily, Chalcidoidea is one of the most species-rich and biologically diverse groups of insects in Hymenoptera. Encyrtidae (Hymenoptera: Chalcidoidea) is one among the major and diverse of the Chalcidoidea families. Presently it includes nearly 4,000 described species in 497 genera globally and 610 species in 142 genera from India^[5, 13] and signifies one of the most effective groups used in the biological control of agricultural pests worldwide mainly in the biocontrol of mealy bugs^[2, 11, 12]. Approximately half the number of the species of Encyrtidae reported are parasitoids of scale-insects (Homoptera: Coccoidea), mostly as endoparasitoids of immatures or fewer as adults, whereas egg predation is seen in some species of *Microterys*^[1, 15, 16]. More or less all species belonging to the Tetracneminae parasitizing Pseudococcidae, whereas species of Encyrtidae parasitize a wide range of coccids (rarely also of Pseudococcidae) and other insects along with mites, ticks, and spiders^[17]. Among a total of species known to parasitized psyllids, one is a parasitoid of the adults^[14]. Various other encyrtids are also known to have polyembryonic development (eg *Copidosoma* spp.) which are polyembryonic parasitoids of larvae of Lepidoptera. There is a need to make an inventory of such an agriculturally important group of parasitoids that have not been fully exploited throughout India except for a team of workers from Aligarh Muslim University from North and Annamalai University and NBAIR from South India. The encyrtids of Bihar is very little studied except for the reports by Hayat^[5]. The present work is in continuation of our consistent efforts to document the encyrtid fauna of Bihar.

Materials and Methods

The specimens were collected through yellow pan traps from different ecosystems viz., orchard, forest, grassland, aquatic, etc., in Bihar during the period from 2013-2015. The encyrtids were sorted, diagnosed and photographed using Leica M205C stereo zoom trinocular microscope attached with a DMC2900 camera. The voucher specimens were deposited with EDAU.

The following acronyms are used:

- NBAIR = National Bureau of Agricultural Insect Resources, Bengaluru.
- EDAU = Entomology Department, Annamalai University, Chidambaram
- BAU = Bihar Agricultural University, Bhagalpur.
- YPT = Yellow pan trap.
- OOL = Minimum distance between a posterior ocellus and eye margin.
- POL = Minimum distance between posterior ocelli.

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Results and Discussion

1. *Adektitopus hayati* Manickavasagam & Ramesh kumar

Diagnosis: (Fig.1) Head black with metallic violet luster; antennal scape yellow progressively darkening towards the apex, apical one-fourth brown; pedicel yellowish-brown; flagellum dark brown. Fore wing sub hyaline with a broad longitudinal infuscate patch from the proximal end of marginal vein to the apex and also below par stigma; hind wing sub hyaline. Mesosoma largely yellowish with light brown tinge except for the last tergite, dorsolateral sides of the first tergite, the tip of hypopygium and the exerted part of ovipositor sheath dark brown.

Distribution: Tamil Nadu ^[9], Bihar (Genus and species new record).

Materials examined: India: Bihar, Bhagalpur BAU Sabour, Agriculture Farm, 2 females, 26.vi.14. Mango orchard, YPT, Coll. Abhinav Kumar, (EDAU).

2. *Alamella flava* Agarwal

Diagnosis: (Fig. 2.) Head yellowish scape concolorous with dorsal margin apically a little dusky; pedicel and flagellum pale testaceous-brown; thorax yellowish, pronotum, anterior half of Mesoscutum and scutellum often distinctly orange; legs yellow; wings hyaline; gaster yellow, dusky dorsally; maxillary palpi 3-segmented; labial palpi 2-segmented; fronto-vertex varying from a little broader than eye length to much narrower.

Distribution: Andhra Pradesh, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Punjab, Tamil Nadu and Uttar Pradesh ^[5], Bihar (Genus and species new record)

Materials examined: India: Bihar, Bhagalpur BAU Sabour, Agriculture Farm, 9 females, 26.vi.14. Mango orchard, YPT, Coll. Abhinav Kumar, (EDAU).

3. *Anomalicornia tenuicornis*: Mercet

Diagnosis: (Fig. 3.) Fully winged or brachypterous. Head and thorax varying from orange to dark brown; scape yellowish to brown; flagellum entirely dark brown or distal three or four segments yellowish all funicle segments at least about 3x as long as broad, distal segments sometimes shorter in smaller individuals, proximal segments longest

Distribution: Andhra Pradesh, Delhi, Karnataka, Kerala, Rajasthan, Tamil Nadu ^[5], Odisha ^[6], Pondicherry ^[8], Uttar Pradesh ^[13], Bihar (Genus and species new record).

Materials examined: India Bihar Bhagalpur, Environment and forest department, Sundarvan, Barari, 20 females, 12. i. 15. Forest ecosystem, YPT, Coll. Abhinav Kumar, (EDAU).

4. *Callipteroma sexguttata* Motschulsky

Diagnosis

(Fig.4.) Fore wings mostly dark brown with a variable pattern of hyaline areas, but normally hyaline at base, two hyaline spots below submarginal vein, one on anterior wing margin at apex of venation and one opposite on posterior wing margin, one distad of this in disc of wing occasionally extending to posterior wing margin and apex narrowly hyaline; hind wing completely hyaline.

Distribution: Delhi, Karnataka, Kerala, Madhya Pradesh,

Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh ^[5], Andaman and Nicobar ^[3], Bihar (Genus and species new record).

Materials examined: India: Bihar: Nathnagar, Goddi Badarpur, 10 females, 16.X.14. Agriculture ecosystem, YPT, Coll. Abhinav Kumar, (EDAU).

5. *Cerapterocerus angustus* Hayat

Diagnosis: (Fig 5.) Female: fore wings strongly infuscate, with four hyaline areas distad of venation, the apex of fore wing rounded, dorsal length of clava as long as dorsal length funicle. Antenna dark brown. Frontovertex brownish with purple-bronzy shine; head 3x as wide as frontovertex width, POL greater than OOL

Distribution: Karnataka, Kerala ^[5], Bihar (Genus and species new record)

Materials examined: India: Bihar: Bhagalpur, Environment and forest department, Sundarvan, Barari, 2 females, 12.i.15. Forest ecosystem, YPT, Coll. Abhinav Kumar, (EDAU).

6. *Encyrtus aurantii* Latreille

Diagnosis: (Fig.6.) Fore wing infuscate with dark setae forming a characteristic pattern, curved stigma vein. Head with a genal expansion set with long, coarse, dark bristle-like setae, about twice as long as those on vertex. Antennae with long, cylindrical scape, rest of the segments progressively broader towards the apex and more flattened. Scutellum with a dense tuft of dark bristles. Ovipositor not visibly exerted.

Distribution: Andaman and Nicobar, Assam, Haryana, Karnataka, Kerala, Pondicherry, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand ^[5], West Bengal ^[6], Andhra Pradesh, Gujarat ^[13], Bihar (Genus and species new record).

Materials examined: India: Bihar: Nathnagar, Goddi Badarpur, 1 female, 16.X.14. Agriculture ecosystem, YPT, Coll. Abhinav Kumar, (EDAU).

7. *Leptomastix nigrocincta* Risbec

Diagnosis: (Fig.7.) F1 shorter than clava, Pedicel clearly longer than half the length of F1, fore wing with linea calva interrupted by not more than two lines of setae; base of mandible yellow. Antenna with six funicular segments, all longer than broad, F1 shorter than the club, pedicel distinctly longer than half the length of F1. Mandibles are bidentate.

Distribution: Andaman and Nicobar, Andhra Pradesh, Delhi, Karnataka, Kerala, Madhya Pradesh, Tamil Nadu, Uttar Pradesh ^[5], Pondicherry ^[8], Bihar (Species new record).

Materials examined: India: Bihar: Nathnagar, Goddi Badarpur, 8 females, 16.X.14. Agriculture ecosystem, YPT, Coll. Abhinav Kumar, (EDAU).

8. *Microterys nietneri* Motschulsky

Diagnosis: (Fig. 8.) Body more or less uniform yellowish-orange; antenna with scape and pedicel yellowish brown, F1-F3 slightly darker, yellowish brown, F4-6 white, clava black. Scutellum strongly convex and dome-shaped with dark brown to black setae. Fore wing with dark and hyaline patches, distal hyaline band interrupted in the middle by the mesal extension

of the proximal margin of apical infuscation, the hyaline band thus divided into two elongate-triangular areas.

Distribution: Karnataka, Kerala, Tamil Nadu, Uttar Pradesh^[5], Bihar (Genus and species new record).

Materials examined: INDIA: BIHAR: Bhagalpur, Environment and forest department, Sundarvan, Barari, 11 females, 22.vi.14. Forest ecosystem, YPT, Coll. Abhinav Kumar, (EDAU).

9. *Neodusmetia sangwani* Subba Rao

Diagnosis: (Fig.9.) Head and mesosoma (thorax) yellowish brown, antenna with scape and pedicel yellowish brown, funicular segments more or less brown, club white; mesosoma (abdomen/gaster) dark brown; legs yellowish brown. Antenna inserted almost on mouth margin, with six-segmented funicle and three-segmented club. Wings brachypterous, greatly reduced, fore wing reaching just anterior margin of first visible abdominal tergite.

Distribution: Andaman and Nicobar, Andhra Pradesh, Assam, Delhi, Karnataka, Kerala, Pondicherry, Rajasthan, Tamil Nadu, Uttar Pradesh^[5], Bihar (Genus and species new record).

Materials examined: INDIA: BIHAR: Bhagalpur, Environment and forest department, Sundarvan, Barari, 10 females, 22.vi.14. Forest ecosystem, YPT, Coll. Abhinav Kumar, (EDAU).

10. *Sakencyrtus mirus* Hayat

Diagnosis: (Fig.10.) Female: Body yellowish with pale brownish suffusions on front vertex and thoracic dorsum; propodeum brownish on sides; gaster dark brown; antennal radicle and scape in basal 2/3 as front vertex, but ventral margin of scape very narrowly reddish brown, rest of scape whitish; pedicel, funicle and clava dark brown to nearly black; fore wing reduced, hyaline; hind wings very short, about 2/5 of fore wings; legs yellowish.

Distribution: Assam, Odisha, Uttar Pradesh^[5], West Bengal^[6], Karnataka, Tamil Nadu^[7], Bihar (Genus and species new record).

Materials examined: INDIA: BIHAR: Nathnagar, Goddi Badnapur, 1 female, 16. X. 14. Agriculture ecosystem, YPT, Coll. Abhinav Kumar, (EDAU).

11. *Tetracnemus narendrani* Hayat & Kazmi

Diagnosis: (Fig.11.) Fore wing distad of venation with one complete hyaline band as in Fig. 11, hind wing hyaline; clava as long as funicle. Body dark brown with metallic reflections. legs; coxae dark brown, Propodeum with two setae on each side anterior to spiracles.

Distribution: Tamil Nadu^[4] and Bihar (Genus and species new record).

Materials examined: INDIA: BIHAR: Nathnagar, Goddi Badarapur, 1 female, 16.X.14. Agriculture ecosystem, YPT, Coll. Abhinav Kumar, (EDAU).

12. *Yasumatsuiola orientalis* Trjapitzin

Diagnosis: (Fig.12.) Body generally bright red; scape concolorous with head, but ventral margin white; pedicel brownish; flagellum with F4-6 and clava dark brown or black;

F1-3 largely white with at least F1 marked reddish or brownish ventrally; fore wing with a distinct pattern of infuscation; legs with femora reddish and tibiae reddish brown.

Distribution: Karnataka, Kerala, Tamil Nadu, Uttar Pradesh, Uttarakhand^[5], Bihar (Genus and species new record).

Materials examined: INDIA: BIHAR, Bhagalpur BAU Sabour, Agriculture Farm, 6 females, 26.vi.14. Mango orchard, YPT, Coll. Abhinav Kumar, (EDAU).

13. *Parablatticida* Girault

Diagnosis: (Fig. 13.) Mesoscutum and scutellum strongly convex, both with striate-reticulate or distinctly elongate reticulate sculpture, never smooth and shiny. All funicle segments are transverse except F6. Post marginal vein as long as or longer than stigmal vein. Forewing hyaline

Distribution: Arunachal Pradesh, Himachal Pradesh, Kerala, Odisha, Uttar Pradesh, Uttarakhand^[13], Bihar (Genus new record).

Materials examined: India: Bihar, Bhagalpur BAU Sabour, Agriculture Farm, 6 females, 26.vi.14. Mango orchard, YPT, Coll. Abhinav Kumar, (EDAU).

14. *Psyllaphagus* Ashmead

Diagnosis: (Fig. 14.) Mandible with one or two teeth and a truncation. Tegula often at least partly pale yellow, eyes more or less naked; marginal vein often punctiform, rarely longer than broad, sculpture on scutellum usually deeper than that on Mesoscutum; Mesoscutum and scutellum usually green or blue-green and often quite shiny.

Distribution: Andhra Pradesh, Arunachal Pradesh, Assam, Delhi, Goa, Daman & Diu, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Mizoram, Pondicherry, Punjab, Uttar Pradesh, Uttarakhand^[13], Bihar (Genus new record).

Materials examined: India: Bihar, Bhagalpur BAU Sabour, Agriculture Farm, 33 females, 26.vi.14. Mango orchard, YPT, Coll. Abhinav Kumar, (EDAU).

Conclusion

Bihar encyrtids fauna is very lesser known and explored compared to other Indian state the taxonomic studies on this important insect group is poorly done from this state only some few taxonomist have shown interest earlier there is no interested taxonomist so far to study the fauna of encyrtids from diverse ecosystems of Bihar. This present work is in continuation of the consistent efforts to document the unnamed and unidentified agriculturally important encyrtid fauna of Bihar.

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Plates



Fig 1: *Adeptitopus hayati*



Fig 2: *Alamella flava*



Fig 3: *Anomalicornia tenuicornis*



Fig 4: *Callipteroma sexguttata*



Fig 5: *Cerapterocerus angustus*



Fig 6: *Encyrtus aurantii*



Fig 7: *Leptomastix nigrocincta*



Fig 8: *Microterys nietneri*

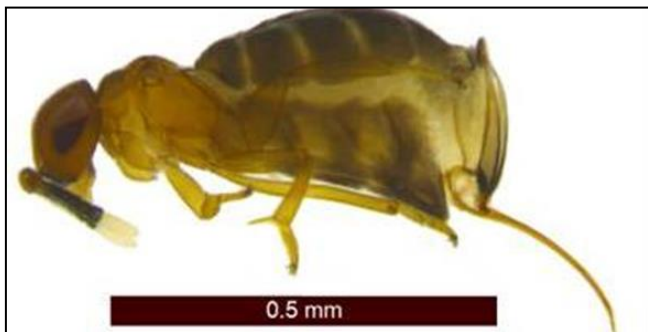


Fig 9: *Neodusmetia sangwani*



Fig 10: *Sakencyrtus mirus*



Fig 11: *Tetracnemus narendrani*.



Fig 12: *Yasumatsuiola orientalis*



Fig 13: *Parablatticida Girault*

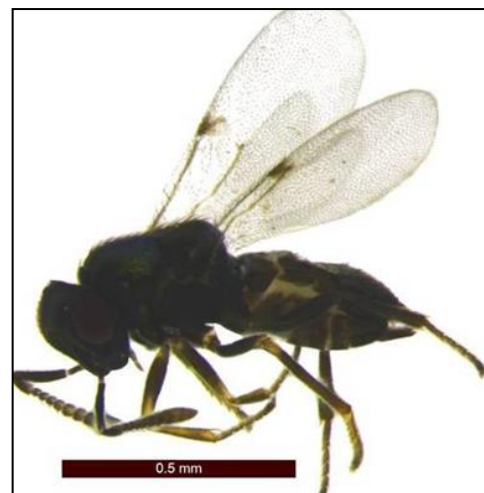


Fig 14: *Psyllaphagus Ashmead*

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