



Encyrtidae (Hymenoptera: Chalcidoidea) from Arunachal Pradesh, India

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ABSTRACT: Forty-one species of Encyrtidae (Hymenoptera: Chalcidoidea) are recorded and one new genus and six new species are described from the Indian State of Arunachal Pradesh. Of the 41 species, 38 species are newly recorded from Arunachal Pradesh. Also 18 genera are newly recorded from Arunachal Pradesh. These are: *Adelencyrtus* Ashmead, *Aenasius* Walker, *Apoleptomastix* Kerrich, *Blepyrus* Howard, *Callipteroma* Motschulsky, *Cheiloneuromyia* Girault, *Cheiloneurus* Westwood, *Gentakola* Noyes & Hayat, *Haligra* Noyes & Hayat, *Homalotylus* Mayr, *Leptomastix* Foerster, *Metaphycus* Mercet, *Neodusmetia* Kerrich, *Ooencyrtus* Ashmead, *Proleurocerus* Ferrière, *Psyllaephagus* Ashmead, *Rhopus* Foerster, *Trechnites* Thomson. The new taxa described are: *Chalaruna indica* Hayat, **gen. et sp. nov.**, *Cheiloneuromyia idnia* Hayat, **sp. nov.**, *Metaphycus zabica* Zeya, **sp. nov.**, *Ooencyrtus bidentatus* Hayat, **sp. nov.**, *Psyllaephagus pauropsylla* Hayat, **sp. nov.**, *Trechnites albicus* Hayat, **sp. nov.** A list of the 16 species of Encyrtidae known from Arunachal Pradesh prior to this publication is also given. © 2014 Association for Advancement of Entomology

KEYWORDS: Hymenoptera, Encyrtidae, new genus, new species, new records, Arunachal Pradesh, India.

INTRODUCTION

The fauna of the family Encyrtidae (Hymenoptera: Chalcidoidea) of Arunachal Pradesh (India), was very poorly known, with seven species. Hayat & Kazmi (2011) added nine species. A list of these 16 species is given below. This paper is based on the collections made by K. Veenakumari from Pasighat (Arunachal Pradesh).

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This paper describes one new genus and six new species, and reports 18 genera and 38 species as new record from Arunachal Pradesh. Thus the current faunal inventory of the family Encyrtidae of Arunachal Pradesh is 31 genera and 60 species.

METHODS

The terminology follows Hayat (2006), except for the use of the terms 'mesosoma' for the thorax plus propodeum, and 'metasoma' for the petiole plus gaster. Body length is given in millimetres; other measurements are relative, taken from the divisions of a linear scale micrometer placed in the eye piece of a stereozoom binocular microscope at 10× zoom 8 (one micrometer division = 0.01234 mm) for carded specimens, and placed in the eye piece of a compound microscope at 100× magnification (one micrometer division = 0.00988 mm) or 400× magnification (one micrometer division = 0.0025 mm) for slide-mounted parts.

Original citations to the species recorded here are not given as these are available in Hayat (2006), but citations are given for species described after 2006. We may note that the species of the tribe Anagyrini and of the genus *Metaphycus* Mercet were identified by the second author (SBZ) indicated in the text by an asterisk (*), and the remaining species were identified by the first author (MH).

The following abbreviations are used in the text:

F1, F2, etc. = Funicle segments 1, 2, etc.

(MT) = Malaise Trap. (Abbreviations placed in brackets indicate the method of collection.)

OCL = Minimum distance between a posterior ocellus and the occipital margin.

OOL = Minimum distance between a posterior ocellus and the corresponding eye margin.

POL = Minimum distance between the posterior ocelli.

(SN) = Sweep Net.

TI, TII, etc. = Tergites 1, 2, etc. of gaster.

(YPT) = Yellow Pan Trap.

The following acronyms are used for the depositories:

NBAIR = National Bureau of Agricultural Insect Resources, Bengaluru, India.

ZDAMU = Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, India.

RESULTS AND DISCUSSION

Description of new taxa

Chalaruna Hayat, gen. nov. (Figs 1–9)

urn:lsid:zoobank.org:act:F3221F7D-5D80-40B3-804A-A3DDB5689339

Type species *Chalaruna indica* Hayat, sp. nov.

Female

Head, in dorsal view, with frontovertex broad, about 0.5× head width; frontovertex nearly as long as broad; occipital margin narrow, but not sharp; eye posteriorly separated from occipital margin by about 3 diameters of a facet; head, in frontal view (Fig. 1), very slightly broader than high; scrobes long, extending to 0.79× head height, with margins rounded; mouth fossa broad, only slightly less than frontovertex width; antennal torulus near mouth margin; malar sulcus present; head, in profile, with eye small, only slightly (1.15×) higher than malar space. Mandible (Figs 1, 2) with 2 sharp teeth. Maxillary palp 4-segmented, labial palp 3-segmented. Antennal formula, 1163 (Fig. 3); scape almost cylindrical; pedicel distinctly (more than 2×) longer than F1, the latter shorter than F2; funicle segments, except F1, longer than broad; clava 3-segmented, sutures transverse, third segment with apex obliquely truncate.

Mesosoma (Fig. 4). Pronotum, visible part, short, one-fifth mesoscutum length; mesoscutum with notaular lines absent; axillae nearly meeting in the middle; scutellum with a distinct, translucent, apical flange overlapping about anterior half of propodeum; propodeum median length 0.32× scutellum length, including the apical flange; propodeum with dense, irregular sculpture and with a fine groove beginning from posterior margin of each spiracle and ending near posterior margin of propodeum (Fig. 5). Fore wing (Fig. 6) with postmarginal vein absent; stigmal vein nearly as long as marginal vein with a hyaline break at base, and with 4 circular sensilla arranged in a line; parastigma slightly swollen, with a hyaline break apically; costal cell with a line of 5 to 6 setae distally on dorsal surface, and a single line of setae on ventral surface; linea calva complete, posteriorly broad; filum spinosum present (6–7 spines); proximal to linea calva with about 7 lines of setae, but except for the presence of a line of setae below submarginal vein (= filum subvenale), bare in basal triangle. Legs unmodified; tarsal formula 5–5–5.

Metasoma 1.4× as long as mesosoma; gaster with TVI and TVII U-shaped; paratergites absent (Fig. 7); last two sternites with well-developed anterior apodemes; hypopygium extending slightly beyond apex of gaster; ovipositor exerted to 0.27× gaster length; third valvula long and in membranous connection with second valvifer.

Male. Unknown.

Comments: This new genus was initially confused for a tetracnemine (subfamily Tetracneminae) as most characters appear to be similar to those of the *Charitopus*-group of genera. After looking into the figures and description, Dr. J.S. Noyes (BMNH, London) convincingly proved that this genus is an encyrtine (subfamily Encyrtinae). The characters which place this genus in the Encyrtinae are: the presence of a filum spinosum in the fore wing; the absence of paratergites; and the U-shaped TVI and TVII of gaster. However, within the Encyrtinae, it is not possible to find a genus which can be considered as similar or related to this new genus. Because of the unusual combination of characters, this genus does not run to any genus in the available keys to the encyrtid genera (Prinsloo & Annecke, 1979, South African genera; Noyes, 1980, Neotropical genera; Noyes & Hayat, 1984, Indo-Pacific genera; Noyes, 1988, New Zealand genera; Trjapitzin, 1989, Palaearctic genera; Noyes et al., 1997, Nearctic genera). A similar situation still exists for the genera *Ruanderoma* Noyes & Hayat (1984), *Acerophagoides* Blanchard (see Noyes, 2000) which are currently placed, probably erroneously, in the Tetracneminae, and *Noyesencyrtus* Singh, in Singh et al. (2014).

Etymology: The generic name is an anagram of 'Arunachal' Pradesh.

1. *Chalaruna indica* Hayat, sp. nov. (Figs 1–9)

urn:lsid:zoobank.org:act:37AC7A2E-DA64-4D74-9D00-B6633BAD5E80

Female

Holotype. Length, 1.56 mm. Head black. Last segment of both maxillary and labial palp brown. Antenna black. Mesosoma, including tegula, black; scutellum with light bluish green shine. Fore wing lightly infusate pale brown, with infuscation dark brown below parastigma. Hind wing hyaline. Fore leg with coxa and femur black; tibia black, apically brownish yellow; tarsus brownish yellow, fifth segment brown. Mid leg with coxa black; femur black, becoming yellowish brown apically; tibia yellowish brown with upper half basally to upper fourth apically dark brown; tarsus yellowish brown, fifth segment brown. Hind leg with coxa and femur black; tibia yellowish brown, with upper half basally to upper third apically dark brown; tarsus as in mid leg. Metasoma black; ovipositor sheaths (= third valvulae) dark brown.

Head (Fig. 1). Ocellar triangle with apical angle obtuse, posterior ocellus separated from eye margin by nearly two diameters of an ocellus, and from occipital margin by 3 diameters of an ocellus; POL 3.75× OOL (36:13); frontovertex with raised, transversely elongate to nearly lineolate reticulate sculpture, and with minute setigerous punctures; face, except scrobes, with slightly longitudinally elongate reticulate sculpture; malar space behind sulcus with lineolate reticulate sculpture; setae brown; eye apparently bare, but at higher magnification sparse, short setae can be seen. Antenna (Fig. 3) with scape 3.8× as long as broad; pedicel 2.3× as long as broad, and about as long as F1 and F2 combined; F1 very slightly longer than broad, and shorter (0.63×) than F2; F2–F6 subequal in length, but gradually increasing in width, F1 1.46× and F6 1.1× as long as broad; clava slightly shorter than F3–F6 combined.

Relative measurements (card): head dorsal width, 29.5; head dorsal length, 16; frontovertex width, 15; head frontal height, 28; eye height, 15; malar space, 13; antennal scape length, 19. Antennal segments length (width) (slide, at 400×): scape, 76 (20); pedicel, 34 (14.75); F1, 12 (11); F2, 19 (13); F6, 22 (20); F3–F6, 87; clava, 80.

Mesosoma (Fig. 4). Pronotum with raised reticulate sculpture; mesoscutum with slightly raised, transversely elongate reticulate sculpture; scutellum with fine polygonal reticulate sculpture, but on card appears smooth; metanotum laterally with prominent longitudinal ridge-like reticulations; propodeum mesal to spiracular groove with raised, polygonal to irregular reticulate sculpture (Fig. 5); setae brown; propodeum distal to spiracles appears without setae, except for 1 seta anterior to each spiracle. Fore wing 2.87× as long as broad, otherwise as in Fig. 6. Hind wing 4.89× as long as broad; marginal fringe 0.23× wing width. Mid tibia 2.64× as long as mid basitarsus; mid tibial spur 0.88× mid basitarsus length. *Relative measurements* (card): mesosoma length, 46; pronotum visible part, length (width), 3.5 (26); mesoscutum length (width), 16 (33); scutellum length (width), 16 (16). (slide, at 100×): mid tibia length, 45; mid basitarsus length, 17; mid tibial spur length, 15.

Metasoma. Distal 3 tergites of gaster and part of ovipositor as in Fig. 7; hypopygium as in Fig. 9; ovipositor with second valvifer 3.4× as long as third valvula. *Relative measurements* (slide, at 100×): TVII length (width), both measured between cercal plates, 34 (34), but actual median length of TVII, 13; ovipositor length, 97; third valvula length, 22. [Ovipositor 2.15× as long as mid tibia; third valvula 1.29× as long as mid basitarsus.]

Male: Unknown.

Material examined: Holotype, female (on slide under 5 coverslips, slide No. EH.1759), labelled “INDIA: ARUNACHAL PRADESH: Pasighat, 5.v.2014 (YPT), Coll. K. Veenakumari” (NBAIR; registration No. ICAR/NBAIR/EN.44)

Distribution: India: Arunachal Pradesh.

Etymology: The species name is derived from the name of the country, India.

2. *Cheiloneuromyia idnia* Hayat, sp. nov. (Figs 10–15)

urn:lsid:zoobank.org:act:ED0792A5-BE4F-44D9-AE6C-9B3531DB1040

Female

Holotype. Length, 1.1 mm. Head yellow. Antenna with radicle and scape yellow; pedicel yellow, basal two-thirds dorsally pale brown; funicle yellow to pale brownish yellow; clava brown, with basal half of first segment pale brownish yellow. Mesosoma largely brownish yellow; pronotum brownish yellow, collar with purple shine, and about middle third dark brown; mesoscutum brownish yellow, with two broad longitudinal pale infusate brown bands;

tegula brownish yellow with a little bronzy shine; scutellum with irregular pale brownish patches, with sides and apex narrowly brown; metanotum on sides brown; propodeum yellowish brown; mesopleuron and metapleuron yellowish brown. Fore wing hyaline, with infuscation below distal half of venation (Fig. 13). Hind wing hyaline. Legs, including coxae, whitish; fore tibia and hind femur with very pale brown suffusions; last segment of all tarsi brown. Gaster largely dark brown; TI narrowly along base yellow, otherwise TI to TIII brown, with bluish green shine laterally.

Head, in dorsal view, nearly flat; ocellar triangle with apical angle slightly obtuse; posterior ocellus separated from eye margin by about half its diameter, and from occipital margin by about 3 diameters of an ocellus; head, in frontal view (Fig. 10, eyes collapsed), 1.3× as broad as high; frontovortex width 0.31× head width; mouth fossa width subequal to frontovortex width; antennal torulus with upper margin above lower margin of eye; inter-torular distance greater than torulus-mouth margin distance (7:5.5); torulus-mouth margin distance greater than torulus height (5.5:4.5); eye height 1.5× malar space; head, in profile, subtriangular, with the eye antero-posteriorly elongate, length greater than height [measurements not made]; frontovortex with slightly raised polygonal reticulate sculpture; face with same sculpture, but cells fine and slightly obliquely elongated; malar space behind sulcus with lineolate reticulate sculpture; setae on frontovortex brown; setae on face and malar space hyaline; eye setose, setae hyaline, and each seta shorter than a facet. Mandible (Fig. 11) with two teeth and a truncation. Antenna (Fig. 12) with scape 4× as long as broad; pedicel longer than F1; F1 slightly narrower and shorter than F2; funicle segments quadrate to slightly broader than long; clava subequal in length to preceding 3 segments combined. *Relative measurements* (slide, at 100×): head frontal width, eyes collapsed, 31.5; head frontal height, 24; frontovortex width, 10; mouth fossa width, 10.25; eye height, 18; malar space, 12; antennal scape length, 12.5; pedicel length, 4; F1 length, 2.5; funicle length, 21; clava length, 11.5.

Mesosoma (Fig. 14) slightly shorter than metasoma (41.5:50); mesoscutum between tegulae 1.28× as broad as long, and 1.31× as long as scutellum; scutellum slightly broader than long; propodeum medially short, about 0.125× scutellum length; mesoscutum with hardly raised, irregular, polygonal reticulate sculpture; scutellum with a similar sculpture, but the cells smaller and finer, and may appear almost smooth; setae brown on thorax; pronotal collar with a line of setae (in addition to several setae anterior to collar), with a long seta at each postero-lateral corner; mesoscutum, in addition to a curved line of shorter setae along anterior margin, with 38 (19 + 19) long setae, arranged in a bilateral symmetry; each axilla with 2 setae; scutellum with 12 (6 + 6) setae, arranged in two submedian lines; propodeum with a few short, hyaline setae distal to each spiracle. Fore wing (Fig. 13) 2.58× as long as broad; costal cell with a line of setae in distal third on dorsal surface, and at least about two lines of setae on ventral surface; linea calva open posteriorly; basal triangle largely bare. Mid tibia 3.28× as long as mid basitarsus; mid basitarsus 1.1× as long as mid tibial spur. *Relative measurements* (slide, at 100×): mesosoma length, 41.5; mesoscutum length (width), 21 (27); scutellum length (width), 16 (17.5); median length of propodeum, 2; fore wing length (width), 84 (32.5); mid tibia length, 34.5; mid basitarsus length, 10.5; mid tibial spur length, 9.5.

Metasoma (Fig. 15). Ovipositor extends from TIV of gaster, and hardly exerted at apex; hypopygium extends to three-fourths gaster length. *Relative measurements* (slide, at 100×): metasoma length, 50; gaster length, 48; TVII length, measured between cercal plates, 23; ovipositor length, 31; third valvula length, 5.5. [Ovipositor 0.89× mid tibia length; third valvula 0.52× mid basitarsus length, and 0.57× mid tibial spur length.]

Male: Unknown.

Material examined: Holotype, female (on slide under 4 coverslips, slide No. EH. 1740), labelled “INDIA: ARUNACHAL PRADESH: Pasighat, 5.v.2014 (YPT), Coll. K. Veenakumari”. (NBAIR; registration No. ICAR/NBAIR/EN.45)

Distribution: India: Arunachal Pradesh.

Comments: This species is problematic. It does not run to any genus in the keys to genera given by Prinsloo & Annecke (1979; Afrotropical genera), Trjapitzin (1989; Palaearctic genera) and Noyes et al. (1997; Nearctic genera), but runs to *Xenostryxis* Girault in the keys by Noyes & Hayat (1984; Indo-Pacific genera; there as *Paraschedius* Mercet) and Hayat (2006; Indian genera). However, it is out of place in *Xenostryxis* as that genus is characterized by the presence of a denticle on the mandible, presence of 3 circular sensilla on the stigmal vein, and propodeum medially very narrow. This species is apparently similar to *Cheiloneurella* Girault (Hayat, 2006: figs 763–767), but differs in having the pronotum (as seen from above) very short, several times shorter than mesoscutum. In *Cheiloneurella*: pronotum triangular, at least about 0.75× mesoscutum length.

This new species is placed in *Cheiloneuromyia* Girault as it agrees in a majority of characters of this genus, except for the presence of 4 circular sensilla on the stigmal vein. In *C. javensis* Girault, the stigmal vein has 3 circular sensilla as confirmed in the Indian specimens of this species (Hayat, 2006) present in ZDAMU.

Etymology: The species name is an anagram of India.

3. *Metaphycus zabica* Zeya, sp. nov. (Figs 16–23)

urn:lsid:zoobank.org:act:A7AC4E06-C4B2-430F-A966-0B6F91DD02AE

Female

Holotype. Length, 0.73 mm (paratypes, 0.62–0.92 mm). Head with frontovertex and face up to toruli, white; yellow below toruli; mouth margin dark brown; eye bordered posteriorly by white, otherwise brown; malar space ventrally dark brown; occiput dark brown. Mandible with apex dark brown. Palps white. Antenna (Fig. 19) with radicle dark brown; scape dark brown with dorsal margin and apex white; pedicel basal two-thirds dark brown, apical third

white; F1–3 brown, F4–6 white; clava with basal two segments dark brown, base of third segment brown, rest of third segment yellowish. Mesosoma (Fig. 21) with pronotal collar and sides white, otherwise dark brown, with a dark brown spot at each posterolateral corner; mesoscutum, except white lateral margins, axilla and scutellum brown; tegula white, with distal half (or a spot at distal half) brown; metanotum dark brown; propodeum mesal to spiracles dark brown, distal to spiracles white; pleurites and sternites white. Fore wing (Fig. 20) hyaline, with pale infuscation from base to at least slightly beyond end of venation; discal setae brown. Hind wing hyaline. Legs, including coxae, white, with brown incomplete bands on tibiae as follows (Fig. 21): fore tibia with a pale brown band at about basal fourth, and apex narrowly brown; mid tibia with 4 brown to pale brown bands, two at middle and one each at base and apex, the second medial band may be faint, and the apical spot may be absent; hind tibia with a basal band, a sub-basal incomplete brown band, subapical band very faint or absent; fore tarsus yellow, with fifth segment brown; mid and hind tarsi white, with fifth segment brown. Metasoma (Fig. 21) with petiole dark brown; dorsum of gaster dark brown, except sides up to cercal plates white; venter white; ovipositor sheaths yellow.

Head, in frontal view [frontovertex shrunken], 1.2× as broad as high; frontovertex width 0.21× head width; in a paratype (Fig. 16), head in frontal view, 1.28× as broad as high; frontovertex width nearly 0.24× head width; ocellar triangle with apical angle acute; posterior ocellus nearly touching eye margin; frontovertex with regular polygonal reticulate sculpture, cells small; face with longitudinally elongate reticulate sculpture; setae on head white. Mandible (Fig. 18) with three teeth, ventral tooth short, pointed; middle and dorsal teeth rounded. Maxillary palp (Fig. 17) and labial palp 2-segmented. Antenna (Fig. 19) with scape 2.23× as long as broad, ventral margin rounded [the slight notch on ventral margin of the right antenna in Fig. 19, as an artefact]; pedicel subequal in length to F1–F3 combined; F1–F4 subequal in length and width, each slightly smaller than F5; F6 larger than F5; clava about as long as F2–F6 combined; only F6 with longitudinal sensilla. *Relative measurements* (holotype, slide, at 100×): head frontal width, 33; head frontal height, 27.5; frontovertex width, 7; eye height, 22; malar space, 7; antennal scape length (width), 14.5 (6.5). [In paratype, Fig. 16: head frontal width, 31.5; head frontal height, 24.5; frontovertex with, 7.5; eye height, 19.5; malar space, 9]

Mesosoma as in Fig. 21; sculpture on mesoscutum and scutellum as in Figs 22 and 23; setae white. Fore wing (Fig. 20) 2.48× as long as broad; linea calva interrupted by 4 lines of setae. Hind wing 6.1× as long as broad; marginal fringe 0.55× wing width. Mid tibia 2.6× as long as mid basitarsus; mid tibial spur 0.8× mid basitarsus length. *Relative measurements* (holotype, slide, at 100×): mesosoma length, 42; mesoscutum length (width), 18 (37); scutellum length (width), 19 (18.5); fore wing length (width), 82 (33); hind wing length (width), 55 (9); marginal fringe length, 5; mid tibia length, 26; mid basitarsus length, 10; mid tibial spur length, 8.

Metasoma (Fig. 21), slightly distended in figure; second valvifer 4.4× as long as third valvula. *Relative measurements* (holotype, slide, at 100×): TVII length (width), 23 (27); ovipositor length, 27; third valvula length, 5. [Ovipositor subequal in length to mid tibia; third valvula 0.5× mid basitarsus length, and 0.62× mid tibial spur length.]

Male: Unknown.

Material examined: Holotype, female (on slide under 4 coverslips, slide No. EH.1840), labelled “INDIA: ARUNACHAL PRADESH: Pasighat, 5.v.2014 (SN), Coll. K. Veenakumari” (NBAIR, registration No. ICAR/NBAIR/EN.51)

Paratypes: 26 females: 4 females (1 on slide, EH.1841), with same data as holotype; 22 females with same data as holotype, but collected on different dates or by different methods: 6 females, 3.v.2014 (YPT); 8 females, 5.v.2014 (YPT); 6 females, 7.v.2014 (MT); 1 female, 7.v.2014 (YPT); 1 female (on slide, EH.1842), 10.v.2014 (YPT). (6 females in ZDAMU, registration No. HYM.CH.724; 20 females in NBAIR, registration No. ICAR/NBAIR/EN.52–62)

Distribution: India: Arunachal Pradesh.

Comments: This species belongs to the *alberti* species-group of *Metaphycus* Mercet, characterized by having both the maxillary and labial palps 2-segmented (palp formula, 2–2).

Because of the following combination of characters, this new species does not run well in the available keys to species of *Metaphycus* (Anneck & Mynhardt, 1981, mainly South African species; Trjapitzin, 1989, Palaearctic species; Guerrieri & Noyes, 2000, European species; Noyes, 2004, Cota Rican species; Hayat, 2006, Indian species): malar space and mouth margin dark brown; antennal scape dark brown with dorsal margin and apex white; mesothoracic dorsum brown; metanotum and propodeum mesal to spiracles dark brown; fore wing lightly but distinctly infuscate below venation, the infuscation extending slightly beyond apex of venation; all tibiae with a basal and a sub-basal brown, the latter incomplete; sub-apical incomplete brown band present on mid and hind tibiae, and in some specimens, an apical narrow brown band is also present on mid and hind tibia; metasoma dorsally dark brown, except sides up to cercal plates white; antennal scape 2.23× as long as broad; only F6 with longitudinal sensilla; second valvifer 4.4× as long as third valvula; ovipositor subequal in length to mid tibia (27:26); and third valvula 0.62× mid tibial spur length.

Etymology: The species name is an arbitrary combination of letters, and may be taken as a noun in apposition.

4. *Ooencyrtus bidentatus* Hayat, sp. nov. (Figs 24–29)

urn:lsid:zoobank.org:act:C234F562-179B-4179-8348-A39FC78CF98F

Female

Holotype. Length, 1.3 mm. Head black, shiny. Antenna with radicle black; scape whitish in basal two-fifths, brownish in apical three-fifths; pedicel dark brown, apex ventrally whitish; funicle and clava dark brown. Mesosoma black; tegula dark brown. Fore wing with light

yellowish tinge from base to about end of venation, beyond venation hyaline. Hind wing hyaline. Legs, including coxae, yellow. Gaster dark brown laterally and on TVII; TIV–TVI brown; TI–TIII, except for dark brown sides, yellow; venter pale brownish yellow, becoming white in distal half of hypopygium.

Head, in dorsal view, 2× as broad as long, and 7.4× as broad as frontovertex width; (frontovertex width 0.13× head width); ocellar triangle with apical angle strongly acute; posterior ocellus touching eye margin, and removed from occipital margin by about one diameter of ocellus; POL equal to OCL (2:2); head, in frontal view (Fig. 24), slightly (1.057×) broader than high; eye height 3× malar space; frontovertex with raised reticulate sculpture, but finely reticulate on face with cells slightly elongated and obliquely oriented; malar space with fine, longitudinally elongate reticulate sculpture; setae on head pale brown; eye densely setose, setae hyaline, each seta clearly longer than a facet. Mandible (Figs 24, 25) bidentate, upper tooth shorter than lower tooth. Antenna (Fig. 26) with scape 5.37× as long as broad; pedicel 2.2× as long as broad, as long as F1 and F2 combined; funicle segments, except F6, longer than broad, 1.6× (F1) to 1.2× (F5), as long as broad; F6 quadrate; F3 longer than F1 and F2 individually; clava with second suture slightly oblique, and third segment obliquely truncate; clava about as long as distal half of F2 and F3–F6 combined. *Relative measurements* (card): head dorsal width, 37; head dorsal length, 18; frontovertex width, 5. (From slide, at 100×): head frontal width, 49; head frontal height, 43; frontovertex width, 5.5; eye height, 34; malar space, 11.

Mesosoma (Fig. 28). Mesoscutum with slightly raised, irregular polygonal reticulate sculpture; scutellum with deep, regular polygonal reticulate sculpture, the cells small, and on sides slightly elongate reticulate; sculpture on scutellum deeper than on mesoscutum; propodeum medially with a ridge on each side, and on sides with a groove behind each spiracle; mesoscutum with setae silvery white, except brown setae along posterior margin; axilla and scutellum with brown setae; propodeum distal to spiracles with fine, long, silvery white setae. Fore wing 2.7× as long as broad; disc nearly bare in basal triangle; otherwise venation and setation as in Fig. 27. Hind wing 5.22× as long as broad; marginal fringe 0.32× wing width. Mid tibia 3× as long as mid basitarsus; mid basitarsus 1.25× as long as mid tibial spur. *Relative measurements* (slide, at 100×): mesosoma length, 52; mid tibia length, 46; mid basitarsus length, 15; mid tibial spur length, 12.

Metasoma (Fig. 29) 1.3× as long as mesosoma; ovipositor extending from base of gaster, and exerted at apex, the exerted part 0.18× gaster length. *Relative measurements* (slide, at 100×): ovipositor length, 75; third valvula length, 22.5 [Ovipositor 1.63× as long as mid tibia; third valvula 1.5× as long as mid basitarsus, and 1.87× as long as mid tibial spur.]

Male: Unknown.

Material examined: Holotype, female (on slide under 4 coverslips, slide No. EH.1752), labelled “INDIA: ARUNACHAL PRADESH: Pasihat, 7.v.2014 (YPT), Coll. K. Veenakumari” (NBAIR; registration No. ICAR/NBAIR/EN.46).

Distribution: India: Arunachal Pradesh.

Comments: The following combination of characters distinguishes this new species from all the described species of *Ooencyrtus* Ashmead: mandible with two sharp teeth; frontoververtex very narrow, at least one-seventh of head width; eye large, 3× as high as malar space; clava with second suture slightly oblique and apical segment obliquely truncate; fore wing with marginal vein longer than broad, and slightly longer than stigmal vein; and ovipositor long, 1.63× as long as mid tibia, and distinctly exerted at apex of gaster, the exerted part slightly more than one-fifth gaster length. Because of these combination of characters, this new species does not run to any known species in the available keys to *Ooencyrtus* species (Prinsloo, 1987, species from sub-Saharan Africa; Noyes, 1985, Neotropical species; Trjapitzin, 1989, Palaearctic species; Huang & Noyes, 1994, Indo-Pacific species; Zhang et al., 2005, Chinese species; Hayat, 2006, Indian species; Noyes, 2010, Costa Rican species.) It may further be noted that because of the bidentate mandibles, this species does not even run to *Ooencyrtus* in the available keys to the genera of Encyrtidae.

Etymology: The species name refers to the bidentate mandibles.

5. *Psyllaephagus pauropsylla* Hayat, sp. nov. (Figs 30–42)

urn:lsid:zoobank.org:act:301EF6FA-95B2-4E58-A74C-D1D01691FB46

Female

Holotype. Length, 1.4 mm (paratype, on card, 1.39 mm). Head with bluish shine with purple in ocellar triangle; inter-torular area violet. Antenna with radicle and scape black; pedicel dark brown with apex narrowly yellow; F1 brown; F2 brown or with apex narrowly yellow; F3 and F4 each with about basal half brown and apical half yellow; F5 and F6 narrowly brown basally, otherwise yellow; clava yellow with about basal half of first segment brown. Mesosoma black; pronotum and mesonotum uniformly bluish with some purple shine; tegula dark brown. Wings hyaline. Legs pale yellow, with all coxae, fore femur except pale yellow apex, and hind femur except pale yellow base and apex, dark brown. Metasoma black.

Head, in dorsal view (Fig. 30), 2.9× as broad as long; frontoververtex width 0.39× head width; ocellar triangle with apical angle a right angle; posterior ocellus close to eye margin; OOL, OCL, POL ratios, 1:2.5:8; head, in frontal view, 1.28× as broad as high (in paratype on slide, 1.35× as broad as high, Fig. 31); eye height 2.2× malar space; frontoververtex with raised, polygonal reticulate sculpture and with fine setigerous punctures; malar space with fine, elongate reticulate sculpture; setae on head silvery white; eye appears bare, but with very short, hyaline setae, each seta much shorter than a facet diameter. Mandible (Fig. 32) with two teeth and a dorsal truncation. Antenna (Fig. 35, paratype) with scape 3.62× as long as broad; pedicel 1.5× as long as broad, and shorter than F1 and F2 combined; F1 and F2 each shorter than F3; F3 and F4 each slightly longer than broad; 1.4× (F1), 1.23× (F2), 1.29× (F3), and 1.11× (F4), as long as broad; F5 nearly quadrate, and F6 1.13× as broad as long; clava about as long as distal half of

F4, F5 and F6 combined. *Relative measurements* (holotype, card): head dorsal width, 41; head dorsal length, 14; frontovertex width, 16; head frontal height, 32; eye height, 22; malar space, 10.

Mesosoma (Fig. 33). Mesoscutum with raised polygonal reticulate sculpture, the cells very small; scutellum with similar sculpture, but cells smaller than and not deeper than on mesoscutum; setae on thoracic dorsum and on sides of propodeum distal to spiracles silvery white. Fore wing 2.3× as long as broad; ratios of marginal, postmarginal and stigmal veins, 14:25:37; disc sparsely setose below parastigma and submarginal vein, with a large bare area in basal triangle (Fig. 34). Mid tibia 3.36× as long as mid basitarsus; mid basitarsus 1.38× as long as mid tibial spur. *Relative measurements* (paratype, slide, at 100×): mid tibia length, 42; mid basitarsus length, 12.5; mid tibial spur length, 9.

Metasoma, in holotype, as long as mesosoma (gaster with tergites slightly stretched), but in one paratype, 0.8× mesosoma length; ovipositor (Fig. 36, paratype) with second valvifer 6.83× as long as third valvula. *Relative measurements* (paratype, slide, at 100×): ovipositor length, 47; third valvula length, 6. [Ovipositor 1.11× as long as mid tibia; mid basitarsus 2.08× as long as third valvula; mid tibial spur 1.5× as long as third valvula.]

Male

Length, 1.22 mm. Head with frontovertex with bluish shine; ocellar area with largely purple bronzy shine; face, scrobes and malar space with intense bluish shine. Antenna with radicle, scape and pedicel dark brown; flagellum yellowish brown. Mesosoma, including tegula, dark brown; pronotum bluish with collar purple; mesoscutum bluish with purple bronzy anteriorly and medially; scutellum violet with sides and apex bluish. Wings hyaline. Leg colour as in female. Gaster black, TI–TIV with bluish shine, but purple along posterior margins.

Head, in dorsal view, transverse, 3.54× as broad as long; frontovertex width 0.5× head width; ocellar triangle with apical angle obtuse; ratios of POL, OOL, OCL, 11:2:2; head, in frontal view (Fig. 37), 1.3× as broad as high; scrobes shallow, margins rounded; torulus with lower margin nearly in line with lower margin of eye; inter-torular distance equal to torulus height; torulus-mouth margin distance slightly more than torulus height (7:6); eye height 1.46× malar space; frontovertex with raised polygonal reticulate sculpture, the cells small; between sides of scrobes and eye margin finely reticulate; scrobes and inter-antennal prominence nearly smooth; setae on head small and silvery white, except setae brown between posterior ocelli and occipital margin. Mandible as in female (Fig. 38). Antenna with scape 1.8× as long as broad, otherwise as in Fig. 39.

Mesosoma. Mesoscutum and scutellum with sculpture about as in female; setae on mesoscutum silvery white and brown; scutellum with setae brown. Fore wing 2.11× as long as broad; venation and setation as in Fig. 40. Hind wing 3× as long as broad. Mid tibia 3× as long as mid basitarsus; mid basitarsus 1.6× as long as mid tibial spur. *Relative measurements*

(paratype, slide, at 100×): mid tibia length, 37; mid basitarsus length, 12; mid tibial spur length, 7.5.

Metasoma shorter than mesosoma (40:48); genitalia as in Figs 41, 42. [Phallobase 0.54× mid tibia length.]

Material examined: Holotype, female (on card, right antenna beyond distal part of F4 broken off and lost), labelled “INDIA: ARUNACHAL PRADESH: Pasighat, 17.iv.2014 (A.1363[1]), Coll. K. Veenakumari” and “Ex psyllids on *Alstonia*” [2] (NBAIR; registration No. ICAR/NBAIR/EN.47)

Paratypes: 2 females (1 female on slide No. EH.1736), 2 males (1 male on slide No. EH.1737), with same data as holotype. (1 female, 1 male, in NBAIR; registration No. ICAR/NBAIR/EN.48 and 49; 1 female, 1 male, on slides EH.1736 and EH.1737, in ZDAMU; registration No. HYM.CH.723)

[1] This number refers to the number maintained by K. Veenakumari for host reared material.

[2] The host insect was identified as *Pauropsylla tuberculata* Crawford by the first author, M.H. (2 specimens returned to NBAIR and 2 specimens retained in ZDAMU)

Host: *Pauropsylla tuberculata* Crawford (Hemiptera: Psylloidea).

Distribution: India: Arunachal Pradesh.

Comments: This new species does not run to any species in the keys to the species of *Psyllaephagus* Ashmead given by Trjapitzin (1989; Palaearctic species), Noyes & Hanson (1996; Costa Rican species) or Hayat (2006; Indian species) and it runs out at couplet No. 14 in the key to the South African species given by Prinsloo (1981). The new species differs from similar species in having the fore femur dark brown; in other species which are similar to the new species, the fore femur is yellow to white.

Etymology: The species name is derived from the generic name of the host insect.

6. *Trechnites albicus* Hayat, sp. nov. (Figs 43–46)

urn:lsid:zoobank.org:act:6249E698-865B-4579-AE5C-4E05BCB62977

Female

Holotype. Length, 1.25 mm. Head completely greenish blue. Antenna with radicle dark brown; scape yellow in about basal third and apically, medially brownish; pedicel brown, apical half yellow; funicle brownish yellow; clava brown. Mesosoma dark brown, with pronotum, mesoscutum and axilla shiny greenish blue; scutellum bluish, but not as shiny as mesoscutum;

tegula dark brown. Wings hyaline. Legs, including coxae, whitish yellow. Gaster dark brown, with violet shine.

Head, in frontal view (Fig. 43), 1.22× as broad as high; frontovertex width 0.33× head width; eye height 2.15× malar space; frontovertex with raised, irregular polygonal reticulate sculpture, and with minute setigerous punctures; face with fine, obliquely elongate reticulations; malar space with elongate reticulate sculpture; setae on head largely brown, with some setae white; eye setose, setae hyaline, each seta shorter than a facet. Mandible 4-dentate, upper tooth rounded (Fig. 43). Maxillary and labial palps each 3-segmented. Antenna (Fig. 44) with scape 5.7× as long as broad; pedicel 2.42× as long as broad, longer than F1 and F2 combined, but shorter than F1–F3 combined; F1–F3 individually shorter than F4; F2–F4 very slightly longer than broad, F1 and F5 quadrate; clava 3-segmented, about as long as 3 preceding segments combined; longitudinal sensilla absent on F1. *Relative measurements* (slide, at 100×): head frontal width, 46; head frontal height, 37.5; frontovertex width, 15.5; mouth fossa width, 16; eye height, 28; malar space, 13; antennal scape length, 20.

Mesosoma (Fig. 46). Mesoscutum with notaular lines complete; mesoscutum and axilla with slightly raised, irregular polygonal reticulate sculpture; scutellum with raised reticulate sculpture, slightly elongate on sides, but fading apically, cells deeper than those on mesoscutum; setae pale brown; setae on sides of propodeum distal to spiracles silvery white. Fore wing 2.42× as long as broad, otherwise as in Fig. 45; basal triangle largely bare. Hind wing 3.83× as long as broad. Mid tibia 3× as long as mid basitarsus; mid basitarsus slightly longer than mid tibial spur. *Relative measurements* (slide, at 100×): mesosoma length, 58; mid tibia length, 40; mid basitarsus length, 13; mid tibial spur length, 11.

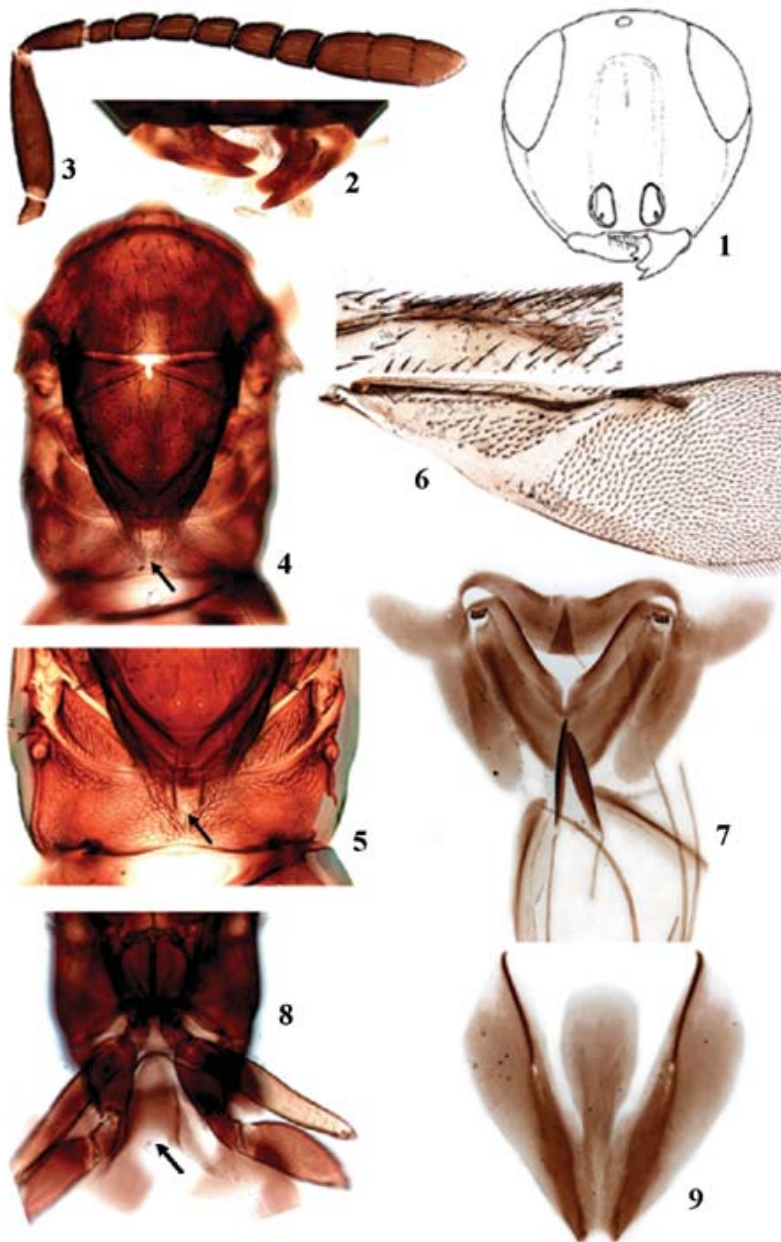
Metasoma. Hypopygium about as in *T. concinnus* Kazmi & Hayat (see Fig. 55). *Relative measurements* (slide, at 100×): metasoma length, 50; ovipositor length, 27; third valvula length, 5.5. [Ovipositor 0.67× mid tibia length; mid basitarsus and mid tibial spur both longer than third valvula, 13:11:5.5]

Male: Unknown.

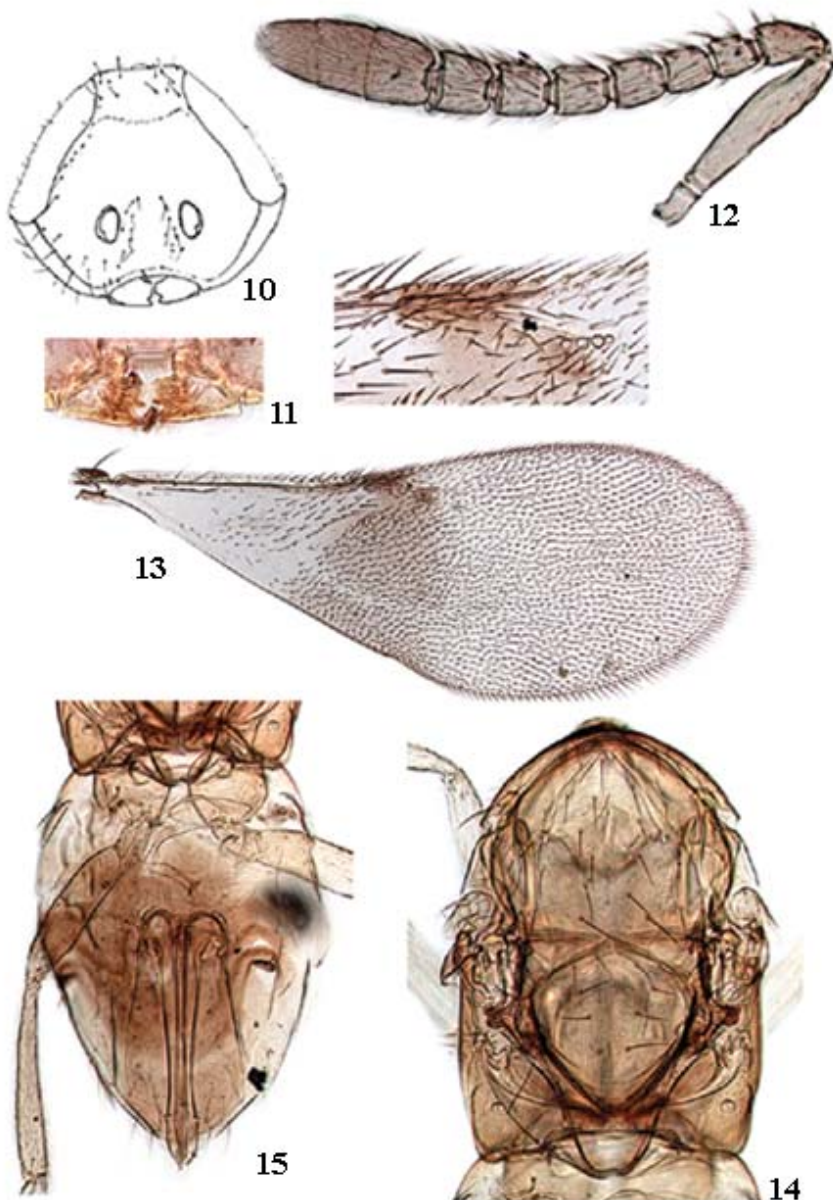
Material examined: Holotype, female (on slide under 4 coverslips, slide No. EH.1745), labelled “INDIA: ARUNACHAL PRADESH: Pasighat, 3.v.2014 (YPT), Coll. K. Veenakumari” (NBAIR; registration No. ICAR/NBAIR/EN.50)

Distribution: India: Arunachal Pradesh.

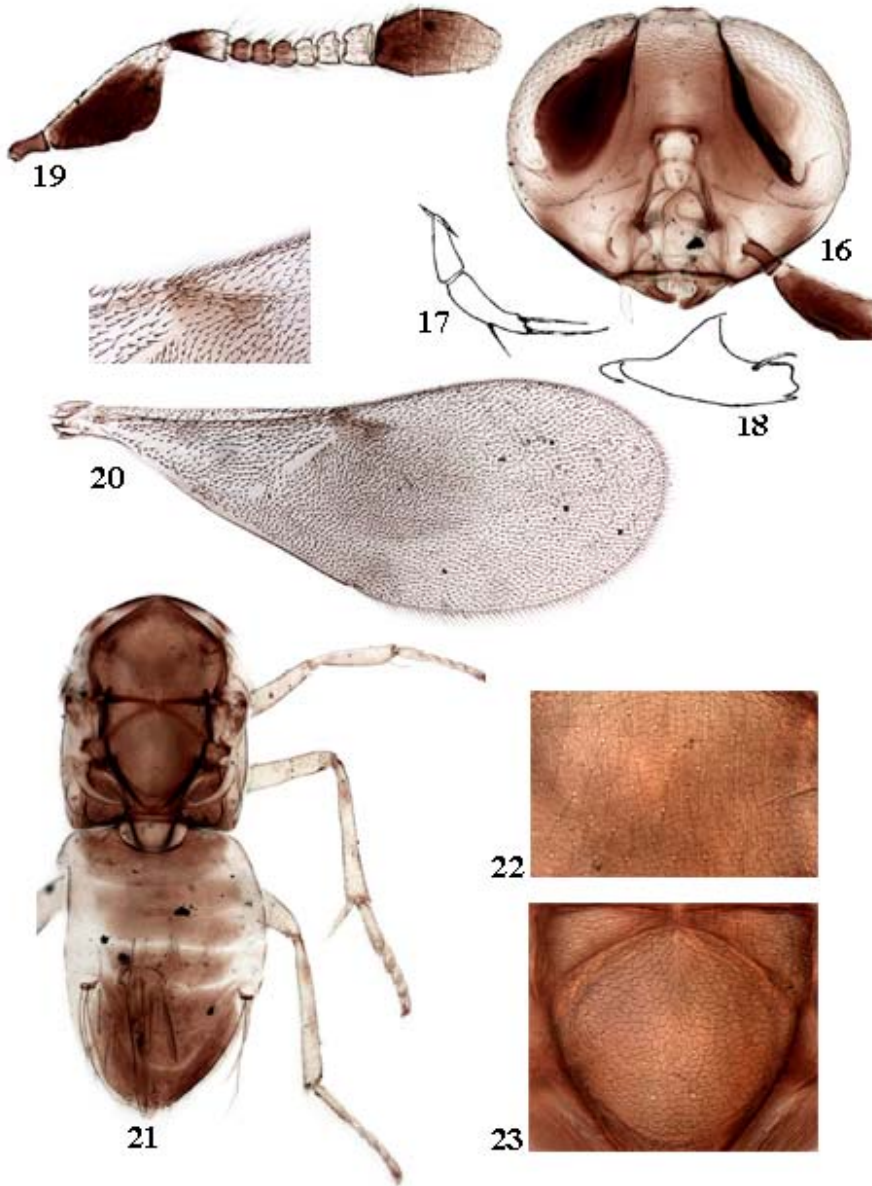
Comments: This species of *Trechnites* Thomson belongs to a group of species characterized by a 3-segmented antennal clava and presence of complete notaular lines on the mesoscutum. To this group belong 8 species of which the following 3 species have their legs, including coxae, completely pale yellow to white: *T. angolensis* Prinsloo (1981), *T. flavipes* (Mercet, 1921), and *T. versicolor* Prinsloo (1981).



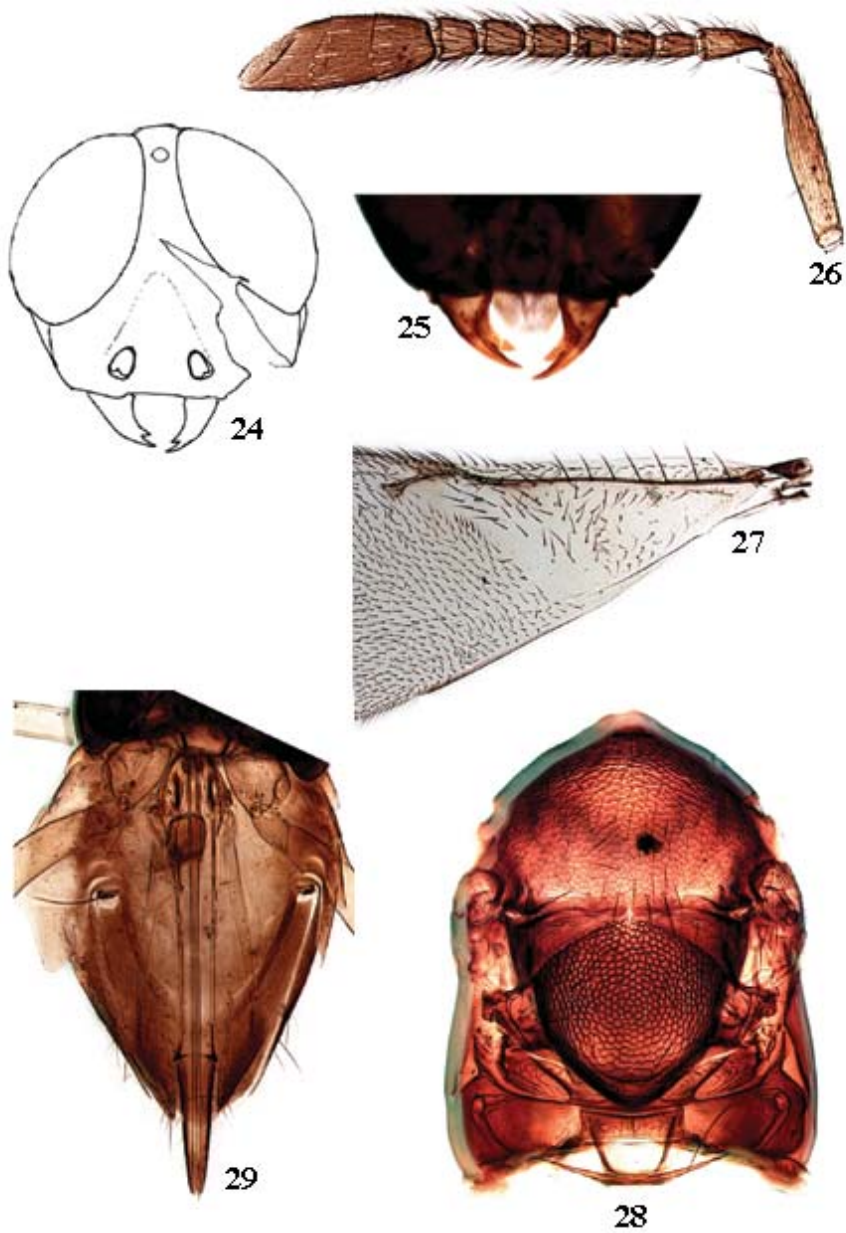
FIGURES 1–9. *Chalaruna indica* Hayat, gen. et sp. nov., female, holotype: 1, head, frontal view; 2, mandibles, 3, antenna; 4, mesosoma, arrow points to the apex of scutellar flange; 5, apex of scutellum, metanotum and propodeum, arrow points to the apex of scutellar flange; 6, fore wing, with distal veins enlarged; 7, TV–TVII and distal part of ovipositor; 8, sternite 1, shown by an arrow; 9, hypopygium.



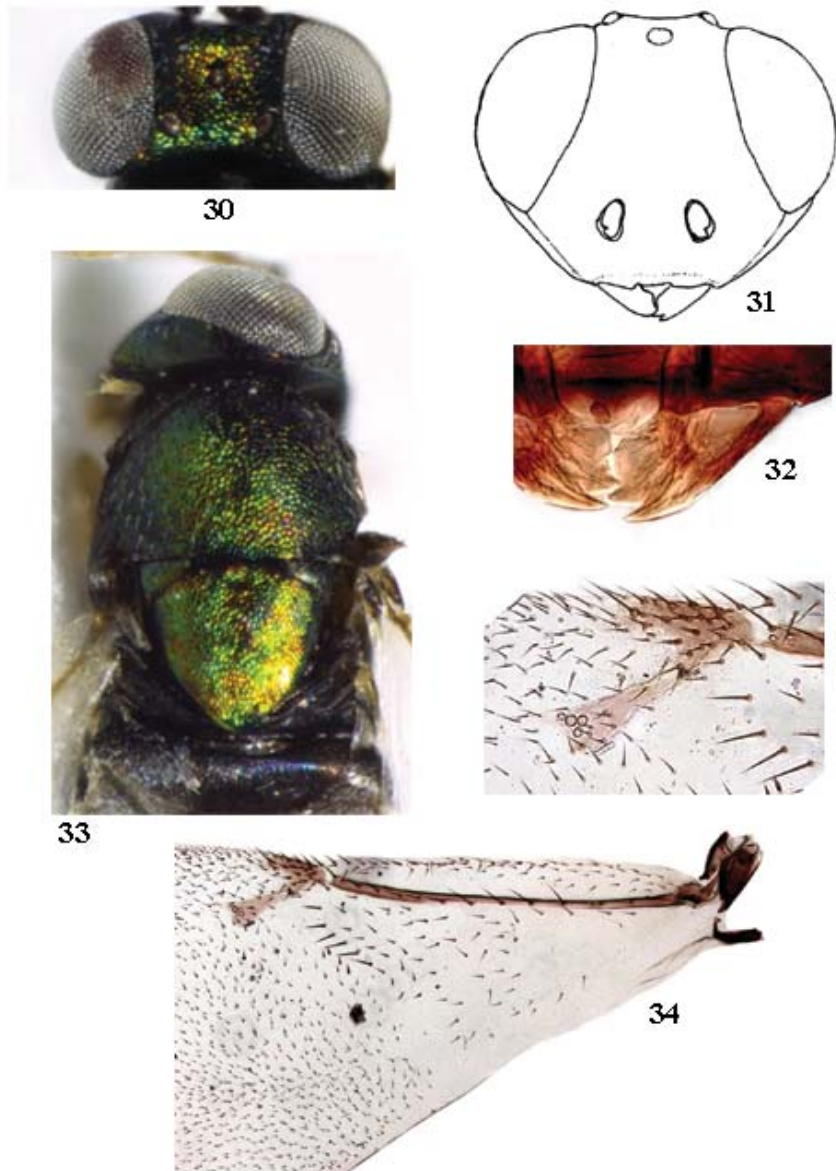
FIGURES 10–15. *Cheiloneuromyia idnia* Hayat, sp. nov., female, holotype: 10, head, frontal view; 11, mandibles; 12, antenna; 13, fore wing, with distal veins enlarged; 14, mesosoma; 15, propodeum and metasoma.



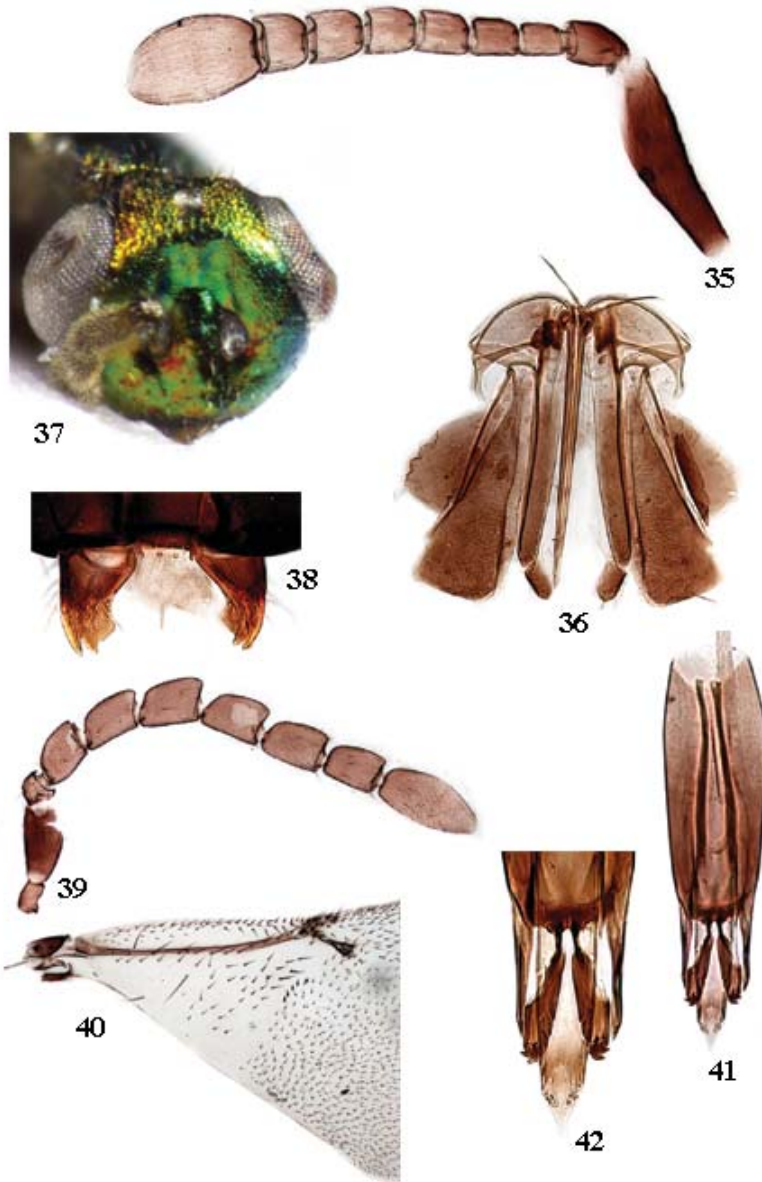
FIGURES 16–23. *Metaphycus zabica* Zeya, sp. nov., holotype, except Fig. 16, female: 16, head, frontal view, paratype; 17, maxillary palp; 18, mandible; 19, antenna; 20, fore wing, with distal veins enlarged; 21, meso- and metasoma; 22, sculpture of mesoscutum; 23, sculpture of scutellum.



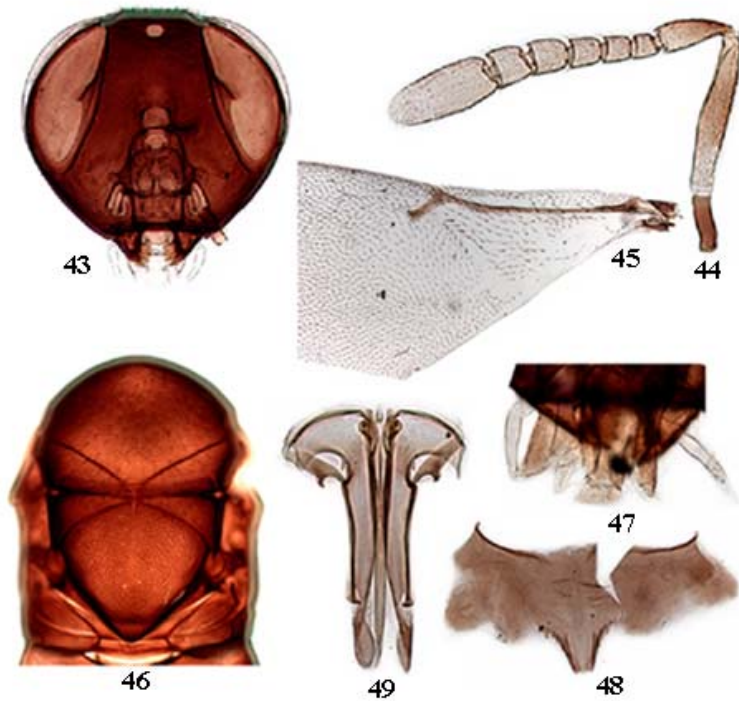
FIGURES 24–29. *Ooencyrtus bidentatus* Hayat, sp. nov., female, holotype: 24, head, frontal view; 25, mandibles; 26, antenna; 27, fore wing, basal part; 28, mesosoma; 29, metasoma.



FIGURES 30–34. *Psyllaephagus pauropsylla* Hayat, sp. nov., female, Figs 30 and 33, holotype, rest from paratype: 30, head, dorsal view; 31, head, frontal view; 32, mandibles; 33, head and mesosoma; 34, fore wing basal part, with distal veins enlarged.

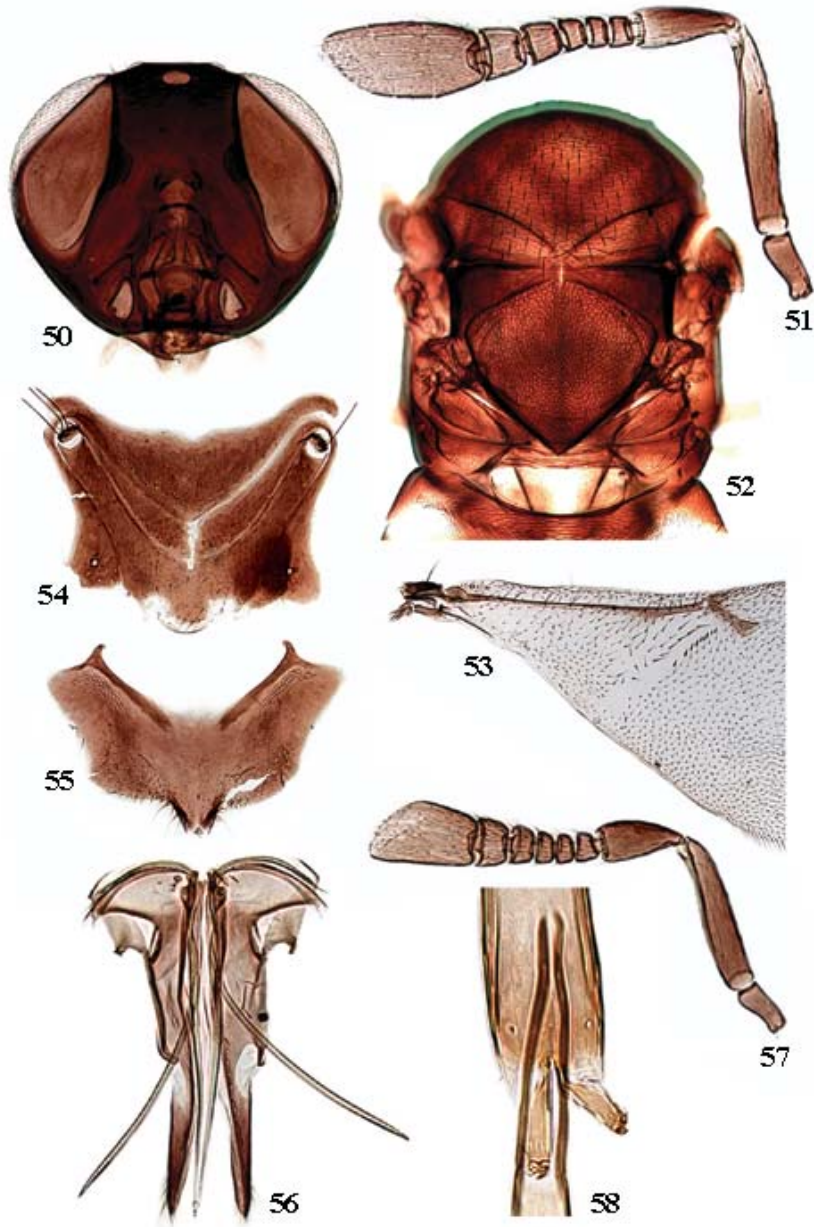


FIGURES 35–42. *Psyllaephagus pauropsylla* Hayat, sp. nov., paratypes: (female, 35, 36): 35, antenna; 36, ovipositor. (Male, 37–42): 37, head, frontal view; 38, mandibles; 39, antenna; 40, fore wing, basal part; 41, genitalia; 42, distal part of genitalia.



FIGURES 43–49. (43–46) *Trechnites albicrus* Hayat, sp. nov., female, holotype: 43 head, frontal view; 44, antenna; 45, fore wing, basal part; 46, mesosoma. (47–49) *Trechnites albipodus* Kazmi & Hayat, female, Arunachal Pradesh specimen: 47, palps; 48, hypopygium; 49, ovipositor.

This new species appears similar to the southern African species, *T. versicolor* and *T. angolensis*. It differs from *T. versicolor* in having the head width $2.96\times$ as broad as frontovertex width; antennal scape with basal third and apex yellow, and medially brownish; and sculpture of the scutellum deeper than that on the mesoscutum. (In *T. versicolor*: head width $2.5\text{--}2.7\times$ as broad as frontovertex width; antennal scape yellowish; and sculpture of mesoscutum and scutellum of same coarseness. Relative lengths of the ovipositor and mid tibia were not given in the original description.) The new species differs from *T. angolensis* in having the head $2.96\times$ as broad as frontovertex width; and mesoscutum entirely greenish blue. (In *T. angolensis*: head width $3.2\times$ as broad as frontovertex width; and mid lobe of mesoscutum dark metallic green, but side lobes blackish purple. This species was described from a card mounted female (holotype) and 5 males. The female antenna and genitalia were described in relation to *T. versicolor*, and were not illustrated). The new species also differs from *T. flavipes* in having the head width $2.96\times$ as broad as frontovertex width; ovipositor $0.67\times$ mid tibia length; and second valvifer $3.9\times$ as long as third valvula. (In *T. flavipes*: head width $2.5\times$ as broad as



FIGURES 50–58. *Trechnites concinnus* Kazmi & Hayat, Arunachal specimens: (female, 50–56): 50, head, frontal view; 51, antenna; 52, mesosoma; 53, fore wing, basal part; 54, TV–TVII of gaster; 55, hypopygium; 56, ovipositor. (Male): 57, antenna; 58, genitalia, distal part enlarged.

frontovertex width; ovipositor 1.18× as long as mid tibia; and second valvifer 2× as long as third valvula. Based on the diagnosis and illustrations given by Guerrieri & Noyes, 2009).

Etymology: Latin, *albus* = white, *crus* = leg; and refers to the white legs in this species.

Records of species

All the specimens were collected from Pasighat (Arunachal Pradesh) by K. Veenakumari. Therefore collector's name is not given under 'Material examined' section.

Out of the 41 species recorded here, **38 species are newly recorded from Arunachal Pradesh**. The 3 species already known from Arunachal Pradesh are: *Anagyrus diversicornis* (Howard), *Protyn darichoides indicus* Singh & Agarwal and *Tassonia gloriae* Girault.

1. *Adelencyrtus moderatus* (Howard)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female (on slide, No. EH.1739), 10.v.2014 (MT). (ZDAMU).

2. *Aenasius arizonensis* (Girault)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 3.v.2014 (YPT). (NBAIR).

3. *Agarwalencyrtus citri* (Agarwal)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 2 females, 3.v.2014 (YPT); 2 females, 4.v.2014 (YPT). (NBAIR).

4. *Anagyrus aquilonaris* (Noyes & Hayat) (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 5.v.2014 (SN). (NBAIR).

5. *Anagyrus diversicornis* (Howard) (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 2.v.2014 (SN); 2 females, 3.v.2014 (YPT); 2 females, 7.v.2014 (YPT). (NBAIR).

6. *Anagyrus gracilis* (Hayat) (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 3 females, 2.v.2014 (SN) 15 females, 3.v.2014 (YPT); 1 female, 7.v.2014 (YPT); 1 female, 10.v.2014 (YPT). (NBAIR).

7. *Anagyrus shahidi* Hayat (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 7 females, 3.v.2014 ((YPT); 1 female, 5.v.2014 (SN); 2 females, 5.v.2014 (YPT); 1 female, 7.v.2014 (YPT). (NBAIR).

8. *Anagyrus tricolor* (Girault) (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 2 females, 5.v.2014 (SN); 1 female, 7.v.2014 (YPT). (NBAIR).

9. *Apoleptomastix bicoloricornis* (Girault) (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 4 females, 2.v.2014 (SN); 15 females, 3.v.2014 (YPT); 3 females, 5.v.2024 (YPT); 1 female, 10.v.2014 (YPT). (NBAIR).

10. *Blepyrus insularis* (Cameron)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 3.v.2014 (YPT); 2 females, 5.v.2014 (YPT). (NBAIR).

11. *Callipteroma sexguttata* Motschulsky (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 2.v.2014 (SN); 1 female, 5.v.2014 (YPT). (NBAIR).

12. *Cheiloneurus bangalorensis* (Subba Rao)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 3.v.2014 (YPT); 1 female, 4.v.2014 (YPT); 4 females, 5.v.2014 (YPT); 2 females, 7.v.2014 (MT); 3 females, 7.v.2014 (YPT); 9 females, 10.v.2014 (MT); 1 female, 10.v.2014 (YPT). (NBAIR).

13. *Cheiloneurus exitiosus* (Perkins)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, Ayung, 1 female, 5.v.2014 (SN); Pasighat, 1 female, 5.v.2014 (YPT). (NBAIR).

14. *Cheiloneurus gonatopodis* Perkins

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 2 females, 2.v.2014 (SN); 1 female, 4.v.2014 (SN); 1 female, 4.v.2014 (YPT); 1 female, 5.v.2014 (SN); 2 females, 7.v.2014 (YPT); 4 females, 8.v.2014 (SN); 3 females, 10.v.2014 (YPT). (2 females in ZDAMU; rest of the material in NBAIR).

15. *Cheiloneurus hadrodorys* Anis & Hayat

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 10.v.2014 (MT). (ZDAMU).

16. *Cheiloneurus latifrons* Hayat, Alam & Agarwal

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 3 females, 2.v.2014 (SN); 1 female, 3.v.2014 (YPT); 7 females, 5.v.2014 (YPT); 1 female, 10.v.2014 (MT). (NBAIR).

17. *Cheiloneurus nigricornis* Hayat, Alam & Agarwal

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 5.v.2014 (YPT). (NBAIR).

18. *Cheiloneurus quadricolor* (Girault)

Material examined: [mac. = macropterous; brac. = brachypterous] INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, mac., 2.v.2014 (SN); 1 female, brac., 3.v.2014 (YPT); 1 female, mac., 5.v.2014 (SN); 1 female, brac., 7.v.2014 (MT). (NBAIR).

19. *Eugahania flaviscapus* Singh & Agarwal

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 2 females, 5.v.2014 (YPT); 1 female, 7.v.2014 (MT). (1 female in ZDAMU; 2 females in NBAIR).

20. *Gentakola trifasciata* (Saraswat)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 7.v.2014 (YPT). (NBAIR).

21. *Haligra concolor* Noyes & Hayat

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female (on slide. EH.1742), 7.v.2014 (MT). (NBAIR).

22. *Homalotylus hemipterinus* (De Stefani)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 10.v.2014 (MT). (NBAIR).

23. *Leptomastix salemensis* Hayat, Alam & Agarwal (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 7.v.2014 (YPT). (NBAIR).

24. *Leptomastix tsukumiensis* Tachikawa (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 2.v.2014 (SN); 1 female, 3.v.2014 (YPT); 2 females, 5.v.2014 (YPT); 1 female, 7.v.2014 (YPT). (NBAIR).

25. *Metaphycus bolangerae* Hayat (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 2.v.2014 (SN); 1 female, 3.v.2014 (SN); 8 females (one on slide No. EH.1837), 5.v.2014 (SN); 1 female, 7.v.2014 (MT); 4 females (one on slide, EH.1838), 7.v.2014 (YPT). (6 females, in ZDAMU; 9 females, in NBAIR)

26. *Metaphycus cassiae* Singh & Hayat (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 2 females, 2.v.2014 (SN); 6 females (one on slide, EH.1826), 3.v.2014 (YPT); 7 females, 4.v.2014 (YPT); 1 female, 5.v.2014 (SN); 2 females (on one slide, EH.1827), 7.v.2014 (MT); 2 females, 7.v.2014 (YPT); 1 female, 10.v.2014 (YPT). (8 females, in ZDAMU; 13 females, in NBAIR)

27. *Metaphycus gilvus* Compere (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 3.v.2014 (YPT); 1 female (on slide, EH.1828), 4.v.2014 (YPT); 7 females (Two on two slides, EH.1829, EH.1830), 5.v.2014 (SN); 4 females, 4 males (Two females, 4 males, on 3 slides, EH.1831, EH.1832, EH.1833), 5.v.2014 (YPT); 2 females (one on slide, EH.1834), 7.v.2014 (YPT). (5 females, 4 males, in ZDAMU; 10 females, in NBAIR)

28. *Neodusmetia sangwani* (Subba Rao)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 1 male, 5.v.2014 (SN); 2 females, 7 males, 7.v.2014 (MT); 2 females, 7.v.2014 (YPT); 4 females, 10.v.2014 (YPT); 2 females, 4 males, 10.v.2014 (MT). (NBAIR).

29. *Ooencyrtus guamensis* Fullaway

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 2 females, 3.v.2014 (YPT); 8 females, 1 male, 5.v.2014 (YPT); 4 females, 7.v.2014 (YPT). (NBAIR).

30. *Ooencyrtus segestes* Trjapitzin

Material examined: [mac. = macropterous; brac. = brachypterous] INDIA: ARUNACHAL PRADESH: Pasighat, 8 females, mac., 6 females, brac., 2.v.2014 (SN); 4 females, mac., 22 females, brac., 3.v.2014 (YPT); 1 female, mac., 4.v.2014 (SN); 1 female, mac., 4 females, brac., 5.v.2014 (SN); 1 female, mac., 9 females, brac., 7.v.2014 (YPT); 1 female, brac., 10.v.2014 (YPT). (NBAIR).

31. *Parablatticida citri* (Mercet)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female (on slide, EH.1756), 5.v.2014 (YPT); 1 female (on slide, EH.1757), 7.v.2014 (YPT). (NBAIR).

32. *Proleurocerus litoralis* Hayat & Kazmi

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 3.v.2014 (YPT). (NBAIR).

33. *Protyndarichoides indicus* Singh & Agarwal

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 4.v.2014 (YPT); 1 female, 5.v.2014 (SN); 1 female, 7.v.2014 (YPT); 1 female, 10.v.2014 (MT). (1 female in ZDAMU; 3 females in NBAIR).

34. *Psyllaephagus tekeddyensis* Singh & Agarwal

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female (on slide, EH.1820), 7.v.2014 (YPT); 1 female, 3.v.2014 (YPT). (1 female, on slide, in ZDAMU; 1 female in NBAIR)

35. *Rhopus gramineus* Hayat (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female (on slide EH.1819, left side coverslips), 3.v.2014 (YPT); 1 female (on slide, EH.1817), 4.v.2014 (YPT). (NBAIR).

36. *Rhopus harena* Noyes & Hayat (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female (on slide, EH.1818), 2.v.2014 (SN). (NBAIR).

37. *Rhopus nigroclavatus* (Ashmead) (*)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female (on slide, EH.1806), 2.v.2014 (SN); 2 females (one on slide EH.1807, second on slide EH.1819, right side coverslips), 3.v.2014 (YPT); 1 female (on slide EH.1808), 4.v.2014 (YPT); 4 females (on slides EH.1809–EH.1812), 5.v.2014 (YPT); 2 females (on slide, EH.1813), 2 females (on slide, EH.1814), 1 female

(on slide, EH.1815 – antennae missing), 7.v.2014 (YPT); 1 female (on slide, EH.1816), 10.v.2014 (MT). (NBAIR).

38. *Tassonia gloriae* Girault

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 5.v.2014 (YPT); Pasighat, Ayang, 1 female, 5.v.2014 (SN). (NBAIR).

39. *Trechnites albipodus* Kazmi & Hayat (Figs 47–49)

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female (on slide, EH.1746), 7.v.2014 (MT). (NBAIR).

Comments: In the original description of this species, Kazmi & Hayat (1995) did not mention the number of segments of the maxillary and labial palps. In the paratype (ZDAMU) from Kerala State as well as in the above listed specimen from Arunachal Pradesh, the maxillary and labial palps are both 2-segmented (Fig. 47). We have also illustrated the hypopygium and the ovipositor (Figs 48, 49)

40. *Trechnites concinnus* Kazmi & Hayat (Figs 50–58)

This species was described by Kazmi & Hayat (1995) from a single female collected in Kerala (India). It is newly recorded here from Arunachal Pradesh, and the male is recorded for the first time. As the head of the holotype was slightly shrunken and the ovipositor length was measured from an intact gaster, we provide here some relative measurements and illustrations (Figs 50–58).

Female

Relative measurements (slide at 100×)—Head frontal width, 37.5; head frontal height, 30; frontovertex width, 13.5; mouth fossa width, 13; eye height, 23; malar space, 9.5; mid tibia length, 29; ovipositor length, 25; third valvula length, 10.

Male

Length, 0.64 mm. More or less similar to female, except for the antenna and genitalia. Antenna (Fig. 57) with funicle segments all transverse; clava solid. Genitalia (Fig. 58) with phallobase 0.57× mid tibia length, and 1.71× as long as mid basitarsus; digitus 0.54× mid tibial spur length; each digitus with two denticles.

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 1 female, 1 male (on slides, EH.1805 and EH.1748), 5.v.2014 (SN); 1 female (on slide, EH.1747), 7.v.2014 (YPT). (1 female, slide EH. 1747, in NBAIR; 1 female, 1 male, slides EH. 1805, EH.1748, in ZDAMU)

41. *Trechnites hairah* Hayat

Trechnites hairah Hayat, in Hayat & Veenakumari, 2013: 102 – 105, female, male. Holotype, female, India, Kerala. Paratypes from Kerala and Andaman & Nicobar Islands.

Material examined: INDIA: ARUNACHAL PRADESH: Pasighat, 3 females, 3.v.2014 (YPT); 3 females, 2 males (1 male, on slide EH.1755), 5.v.2014 (YPT); 1 female, 7.v.2014 (MT); 2 females (on slides, EH.1753, EH.1754), 2 males, 7.v.2014 (YPT); 1 female, 10. v.2014 (YPT); 1 male, 10.v.2014 (MT). (3 slides and 2 females in ZDAMU; rest of the material in NBAIR).

Comments: This species was described from specimens collected in Kerala State (holotype, paratypes) and from Andaman and Nicobar Islands (paratype), and later Hayat & Veenakumari (2014) recorded 13 females and 2 males from Andaman and Nicobar Islands.

LIST OF ENCYRTIDAE FROM ARUNACHAL PRADESH (INDIA)

This list includes only the species known prior to the publication of this paper. The reference to the first record of a species from Arunachal Pradesh is given in square brackets. For species described on material (holotypes/paratypes) from Arunachal Pradesh, only the year is enclosed in square brackets.

1. *Agarwalencyrtus dispar* Hayat [Hayat & Kazmi, 2011]
2. *Anagyrus diversicornis* (Howard) [Hayat & Khan, 2009]
3. *Charitopus panchgania* (Mani & Saraswat) [Singh & Agarwal, 1993]
4. *Cladiscodes orientalis* Singh & Agarwal [1993]
5. *Eugahania indicus* Singh & Agarwal [1993]
6. *Ixodiphagus sureshani* Hayat & Kazmi [2011]
7. *Parablatticida brevicornis* (Dalman) [Hayat & Kazmi, 2011]
8. *Parencyrtomyia zedesi* Hayat & Kazmi [2011]
9. *Protyndarichoides indicus* Singh & Agarwal [1993]
10. *Rhytidothorax horticola* Hayat & Kazmi [2011]
11. *Rhytidothorax namdapha* Hayat & Kazmi [2011]

12. *Rhytidothorax nigrum* Singh & Agarwal [Hayat & Kazmi, 2011]
13. *Rhytidothorax ramakrishnai* Hayat & Kazmi [2011]
14. *Sharqencyrtus hulbi* Hayat & Kazmi [2011]
15. *Tassonia amaaura* Hayat [Hayat & Khan, 2009]
16. *Tassonia gloriae* Girault [Hayat & Khan, 2009]

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