

**ELASMUS WESTWOOD (HYMENOPTERA:
CHALCIDOIDEA: EULOPHIDAE: EULOPHINAE:
ELASMINI) OF MAHARASHTRA, INDIA**

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ABSTRACT: The present paper deals with the study of subfamily Eulophinae of Maharashtra which includes 14 female species. Out of one *Elasmus flavescens* Verma & Hayat is new records from Maharashtra. A key to Maharashtra species is also given.

KEY WORDS: New record, Parasitic wasps, Chalcidoidea, Eulophidae, Elasmmini, Maharashtra.

Indian genus *Elasmus* Westwood was reviewed by Verma et al. (2002) and Narendran et al. (2008). The genus *Elasmus* contains 54 species from India; out of which 14 species are represented from the state of Maharashtra. In the present paper one species *Elasmus flavescens* Verma & Hayat, is recorded for the first time from Maharashtra. Besides, new records, diagnosis, hosts and distribution of all known species are provided. The key to species are adopted from Verma et al. (2002) and Narendran et al. (2008).

An asterisk (*) marked after the name of the species indicates that it is a new record from the state Maharashtra. The species studied are deposited in the National Zoological collections of Northern Regional Centre, Zoological Survey of India, Dehradun, India.

The following abbreviations are used: F1-F3 = first, second and third funicle segments; TI – TVII = gastral terga 1 to 7; F = female; M = male; BMNH = The Natural History Museum, London; QMB = Queensland Museum, Brisbane; USNM = The U. S. National Museum, Washington, D.C.

Genus *Elasmus* Westwood

Elasmus Westwood, 1833: 343 [Type species *Elasmus flabellatus* Fonscolombe, by monotypy]

Aneure Nees, 1834: 194 [Type species *Aneure nuda* Nees, designated by Gahan & Fagan, 1923: 12.

Synonymy by Westwood, 1839: 74]

Heptocondyla Rondani, 1877: 182 [Type species *Heptocondyla unicolor* Rondani, by monotypy.

Synonymy by Bouček, 1974: 252, 279]

Cyclopleura Cameron, 1913: 96 [Type species *Cyclopleura fumipennis* Cameron (*Elasmus cameroni* Verma & Hayat as replacement name), designated by Gahan & Fagan, 1923: 41. Synonymy by Waterston, in Mahdhasan, 1925]

Austelasmus Riek, 1967: 148 [Type species *Elasmus trifasciiventris* Girault, by original designation. Synonymy by Burks, in Krombein et al., 1979: 1020]

Diagnosis:

Female. The *Elasmus* are easily recognized by the enlarged body, yellowish, and brown to black in colour, with metallic luster. Antenna with funicle 3-segmented and a conspicuous anellus, scutellum with a triangular apical projection, notaular

lines incomplete, fore wings elongate and narrow, densely covered with setae, with a very long marginal vein, hind coxae compressed and disc like; hind tibiae with diamond-shaped or wavy lines patterns of setae, tarsi four-segmented.

Male. Similar to female except antennal formula (1143) with F1 to F3 each with a dorsal ramus.

Biology. *Elasmus* are mainly primary parasitoids of the larvae of Lepidoptera or hyperparasitoids on them through various Hymenoptera, in particular the Ichneumonidae and Braconidae. Some species develop regularly both as primary and hyperparasitoids. They are usually gregarious. In India, *Elasmus nephantidis* on coconut black headed caterpillar and *Elasmus zehntneri* on sugarcane top borer are commonly collected.

Distribution. *Elasmus* have been distributed all over major zoogeographical regions but they are not particularly abundant.

Statistics. Number of world genera one and species nearly 226 (from Indian region 54, Nearctic 16, Neotropical 20).

Key to Maharashtra species of *Elasmus* (Female)
(Adopted from Verma et al., 2002 and Narendran et al., 2008)

1. Mesothoracic dorsum (also prothorax and propodeum) dark brown to black; occasionally mesoscutum with a whitish or yellowish spot on each side near tegulae and or scutellum with a longitudinal yellowish band on each side or with a transverse yellowish band at apex.....2
- Mesothoracic dorsum not completely dark.....10
2. Hind coxa completely dark brown to black, at most with extreme apex yellowish (Mid coxa largely dark brown to black).....3
- Hind coxa yellow at least apical third.....8
3. F1 slightly shorter than pedicel and at most slightly longer than broad, F2 and F3 broader than long; body blackish; gaster completely black or apices of TI and TII and occasionally also TIII, and basal four sternites, honey yellow.....*brevicornis* Gahan
- F1-3 usually elongate, F1 almost sub-equal in length to pedicel; F3 at most quadrate, usually larger than broad, if pedicel longer than F1 then F2 and F3 quadrate, usually clearly longer than broad.....4
4. Gaster entirely dark brown to black, at most ventre yellowish.....5
- Gaster with apical half of TI and basal half or so of TII yellowish; pedicel shorter than F1; F1-3 each slightly more than 2.5X as long as broad.....*indicus Rohwer*
5. Mesoscutum with yellowish spot on each side near tegulae; pedicel 1.5X as long as broad; scape about 4X as long as broad; fore femur brownish in basal half and yellowish in apical half.....*anticles Walker*
- Mesoscutum without such spot; scutellum completely dark.....6
6. Hind tibia (also mid tibia) yellow to pale yellow.....7
- Hind tibia (also mid tibia) brownish, at most with both ends pale; Pedicel shorter than F1; F1-3 relatively longer; F3 1.5X as long as broad; forewing 3.5 X as long as broad.....*johnstoni Ferriere*
7. F1-3 subequal in length, each about 1.5X as long as broad; clava longer shorter than preceding two funicle segments combined.....*krishnagiriensis Mani & Saraswat*

- Funicle segments shorter, F3 slightly longer than broad; clava longer than preceding two funicle segments combined.....**mahabali Mani & Saraswat**
8. Mesoscutum with a yellowish spot on each side near tegulae.....**punctulatus Verma & Hayat**
- Mesoscutum completely dark, without such yellow spots.....9
9. Gaster with narrow, dusky yellow stripes at apices of TI-TIV; pedicel only slightly shorter than F1 which is at most 2.5X as long as broad; forewing hyaline; Hind femur yellowish with blackish margins; mid coxa and femur largely yellow.....**viridiscutellatus Verma & Hayat**
- Gaster reddish, orange, or honey yellow, at most with dark spots or bands, but apical two terga more or less completely dark; pedicel about 2X as long as broad and only slightly shorter than F1; F1 about 2.5X as long as broad; gaster with T1 about 3X as long as TII; head entirely blackish.....**zehntneri Ferriere**
10. Either mesoscutum (save axillae) or scutellum not entirely yellow; mesoscutum yellowish-brown with a black transverse band posteriorly; F1-3 each about 3X as long as broad, and each about 1.5X as long as pedicel; gaster yellowish-brown with base of T1 and apical fourth, blackish.....**khandalus Mani & Saraswat**
- Mesoscutum (save axillae) and scutellum entirely yellow.....11
11. Mid coxa more or less blackish in basal half.....**punensis Mani & Saraswat**
- Mid coxa wholly or almost wholly yellow.....12
12. Gaster, except for the blackish band in basal half of T1, orange yellow to honey- yellow.....**queenslandicus Girault**
- Gaster, apart from basal half of T1, with some terga with blackish spots or bands.....13
13. Gaster with TVI largely blackish, TVII yellow; scape 3.5X as long as broad; ovipositor with exerted part about 1/9th of gaster.....**flavescens Verma & Hayat**
- Gaster with TIV-VII blackish; scape 4.5X as long as broad; ovipositor with exerted part 1/12th of gaster.....**cavicolous Verma & Hayat**

***Elasmus brevicornis* Gahan**

Elasmus brevicornis Gahan, 1922: 50, M, F. Type F: Indonesia: Java, Buitenzora (USNM).

Diagnosis: Body dark brown to black; head, pronotum and mesoscutum with bluish shine; tegula brownish, yellowish at base, gaster blackish with the venter except at apex, apices of TI and TII somewhat honey yellow; antennal radicle and scape pallid, flagellum yellowish brown; wings hyaline. Legs: coxae dark brown except yellowish at apex of fore coxa; fore femur with brownish infuscation at base; middle and hind femora dark brown, yellowish at base and tip; all trochanters, tibiae and tarsal segments yellowish.

Hosts: *Biloba subsecivela*; *Cnaphalocrocis medinalis*; *Diaphania indica*; *Hapalia machaeralis* on *Tectona grandis*; *Lamprosema indicata*; *Lygropia quarternalis* defoliating *Helictares isora*; *Marasma suspicalis*; *Nausinoe geometralis*. Braconid, *Apanteles machaeralis*.

Distribution: India: Andhra Pradesh, Kerala, Punjab, Chhattisgarh, Uttar Pradesh, Delhi, Goa, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttarakhand, West Bengal.

Specimen examined: 2 females, INDIA: Maharashtra, Ratnagiri, Chiplun, Kapsar, 17.iii.2009 (S. I. Kazmi), Regd. No.A-11407, A 11410; 1 female, INDIA, Maharashtra, Satara, Soangaon, 8.iii.2009 (S. I. Kazmi), Regd. No. A-11409.

***Elasmus johnstoni* Ferriere**

Elasmus johnstoni Ferriere, 1929: 258, F, M. Type F: Sudan, Wad Medani (BMNH).

Elasmus valparaicus Mani & Saraswat, 1972: 481, F.: India (USNM). Synonymy by Narendran et al., 2008: 12.

Diagnosis: Body dark brownish with bluish green shine on propodeum and base of TI of gaster; tegulae brownish; antennal radicle and scape dusky; flagellum brownish; wings hyaline; legs concolourous with body, except sometimes trochanters, base and apex of all femora, base and extreme apex of hind tibia and tibial spurs yellowish.

Hosts: *Earias insulana*; *E. cupreoviridis*; *E. fabia*; *Hapalia machaeralis*; *Hyblaea puera*; *Nephanteryx rhodobasalis*; *Pectinophora gossypiella*; *Sylepta derogate*; Braconidae: *Apanteles impartunus*; *A. machaeralis*; *A. malevolus*.

Distribution: India: Haryana, Jharkhand, Maharashtra, Rajasthan, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Tamil Nadu, Chhattisgarh, West Bengal.

Specimen examined: None. Specimen examined is based on Verma et al., 2002.

***Elasmus viridiscutellatus* Verma & Hayat**

Elasmus viridiscutellatus Verma & Hayat, 2002: 270-271, F. Type F: India: Maharashtra, Elephanta, caves off Mumbai (BMNH).

Diagnosis: Body blackish with greenish blue shine on frontovertex, pronotum and mesoscutum, more intense on scutellum, propodeum less bluish; tegulae dark, appear metallic; posterior extension of metanotum hyaline except at base yellowish; gaster blackish dorsally with bluish green shine at base of TI; apex of TI-IV with transverse dusky yellow strips; antennal pedicel yellow, dorsal margin slightly brownish; flagellum dark brown covered with short black setae; wings hyaline; legs yellowish except extreme base of fore coxa, sides of middle coxa at base, dorsal and ventral margin in middle of middle femur, brownish; slightly less than basal half of hind coxa blackish with bluish shine, dorsal margin of hind femur and a spot on ventral margin, brownish.

Hosts: *Cnephlocrosis medinalis*, larvae.

Distribution: India: Andhra Pradesh, Bihar, Maharashtra, Tamil Nadu, West Bengal.

Specimen examined: None. Specimen examined is based on Verma et al., 2002.

***Elasmus zehntneri* Ferriere**

Elasmus sp. Zehntner, 1900: 1 (by Ferriere, 1929).

Elasmus zehntneri Ferriere, 1929: 417, F, M. Type F: Indonesia, West Java (BMNH).

Elasmus mahabaleswarensis Mani & Saraswat, 1972: 475-476, F: India (USNM). Synonymy by Narendran et al., 2008: 13.

Diagnosis: Head and thorax blackish with bluish green shine on frontovertex, pronotum and mesoscutum; less bluish on scutellum; gaster honey yellow with brownish spots as follows: faint brownish spots at base of TI; bases of TII-V slightly extending on lateral side with triangular brownish spots; TVI to apex completely dark brown to blackish; antennal radicle dusky; scape yellowish, dorsal margin slightly brownish; flagellum brownish; wings hyaline; legs yellowish; basal third of hind coxa metallic black, basal third or so of middle femur broadly brownish; tibia and tarsal segments of all legs yellowish.

Hosts: *Bissetia steniella*; *Chilo infuscatellus*; *Pectinophora gossypiella*; *Scirpophaga* sp. *S. auriflua*; *Tryporyza monostigma*; *T. novella*; *T. rhodoproctalis*.

Distribution: India: Andhra Pradesh, Bihar, Delhi, Karnataka, Maharashtra, Tamil Nadu, Punjab, Kerala, West Bengal.

Specimen examined: None. Specimen examined is based on Verma et al., 2002.

***Elasmus khandalus* Mani & Saraswat**

Elasmus khandalus Mani & Saraswat, 1972: 471-472, F. Holotype F: India, Khandala (USNM).

Diagnosis: Yellowish brown; legs including coxae light brown; mesoscutum with a transverse black band posteriorly; hind coxa narrowly above, TI baso-dorsal part and last 1/4th of gaster black.

Host: Unknown.

Distribution: India: Kerala, Maharashtra, West Bengal.

Specimen examined: None. Specimen examined is based on Kazmi & Girish Kumar, 2013.

***Elasmus punensis* Mani & Saraswat**

Elasmus punensis Mani & Saraswat, 1972: 479, F. Holotype F: India, Pune, Khandakwasla Sinhagarh Fort (USNM).

Diagnosis: Body yellowish brown; flagellum dark brown; head with ocellar triangle, a conspicuous narrow transverse band on posterior margin of mesoscutum, propodeum, basal third of mid coxa, a narrow patch above near base on hind coxa, a spot on base of first abdominal tergite, ovipositor sheath brownish black; fore wing sub hyaline; head with fine setigerous punctures; antennal scape about 5X as long as broad; all funicle segments longer than broad; scape about 2X as long as pedicel; propodeum without transverse carina and smooth shiny; gaster short, conical; ovipositor slightly exerted.

Host: Unknown.

Distribution: India: Karnataka, Kerala, Andhra Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh.

Specimen examined: None. Specimen examined is based on Verma et al., 2002.

***Elasmus queenslandicus* Girault**

Elasmus queenslandicus Girault, 1913: 82, F. Holotype F: Australia, Queensland, Kuranda (QMB). Synonyms given in Riek 1967: 159.

Diagnosis: Body orange yellow except a spot above foramen continued on to frontovertex surrounding ocelli and extending on front of anterior ocellus; a large convex spot on basal half of pronotum with slight greenish shine; axillae blackish; tegulae dark violet; a spot on side of metanotum; propodeum dark brown in middle and light brown infusate area surrounding spiracle; a blackish band with greenish shine in basal half of TI of gaster, in some specimens a brown small spot in middle of TIV; antennal radicle yellow; scape slightly dusky; flagellum brown with some orange tinge; fore wing hyaline; legs yellowish except dorsal margin of hind coxae in distal half or so, dorsal margin of middle femur narrowly; most of dorsal margin of hind femur, tarsal segments of all legs brownish.

Host: Unknown.

Distribution: India: Karnataka, Kerala, Tamil Nadu, Odisha, Uttar Pradesh, Uttarakhand, Jharkhand, Delhi, Chhattisgarh, West Bengal.

Specimen examined: None. Specimen examined is based on Kazmi & Girish Kumar, 2013.

***Elasmus indicus* Rohwer**

Elasmus indicus Rohwer, 1921: 123-124, F. M. Holotyp F, India, Coimbatore (USNM).

Diagnosis: Head and thorax blackish; posterior extension of metanotum hyaline; gaster dark brown, apical half of TI, basal half or more of TII slightly extending on sides, reddish yellow; legs dark brown except fore leg beyond basal half of coxa, basal third or so of fore femur, distal fourth or so of middle femur, tibiae, tarsi and tibial spurs of all legs yellow.

Hosts: *Anomalococcus* sp.; *A. indicus*; coccids on *Acacia* sp. *Diaphania* (*Margaronia*) *indica*; *Lamprosema indicata*; *Eublemma* sp. predaceous on *A. indicus*; probably parasitic on larvae of *Eublemma* sp.; *Sylepta derogate*.

Distribution: India: Karnataka, Tamil Nadu, Uttarakhand, Maharashtra.

Specimen examined: 1 female, INDIA: Maharashtra, Sindhudurg, Kudal, 13.iii,2009 (S. I. Kazmi), Regd No. A-11412.

***Elasmus anticles* Walker**

Elasmus anticles Walker, 1846: 181, F. Type F, India, Mumbai (=Bombay) (BMNH).

Elasmus albomaculatus Gahan, 1920: 347, F. Holotype F, Philippines, Manila, Luzon (USNM). Synonymy by Kerrich, 1970: 89-91.

Elasmus ricinus Husain & Kudeshia, 1984: 363-365, F, India, Aligarh (Type lost?).

Synonymy by Narendran et al., 2008: 15.

Diagnosis: Black with green refringence on head, thorax dorsum and on sides of basal TI (in some specimens body dark brown); tegulae dark brown; mesoscutum with a yellow or pale yellow or whitish yellow spot on each side near tegulae; scutellum black with slightly metallic refringence; metanotum yellow at base of posterior hyaline extended part; legs black or dark brown with trochanters, apical half of fore femur, apices and middle of hind femur and tibiae of all legs pale yellow; gaster slightly longer than head and thorax combined.

Hosts: *Apanteles malevolus* Rolston through *Hyblaea puera* Cramer, *Bracon* sp. and *Cheionus* sp. through *Epicephala pulcherrima* (Linn.) in Philippines. *Inglisia bivalvata* Green (Coccidae) on Sandalwood.

Distribution: India: Karnataka, Kerala, Tamil Nadu, Uttar Pradesh, Uttarakhand, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra.

Specimen examined: 1 female, INDIA: Maharashtra, Alibag, Naogaon Forest, 19.iii,2009 (S. I. Kazmi), Regd No A-11405 ; 1 female, INDIA: Maharashtra, Ahmadnagar, Vilad Ghat, 6.iii,2009 (S. I. Kazmi), Regd No A-11406.

***Elasmus krishnagiriensis* Mani & Saraswat**

Elasmus krishnagiriensis Mani & Saraswat, 1972: F. Holotype F, 474-475, India, Mumbai (=Bombay), Krishnagiri (USNM).

Diagnosis: Black with metallic green refringence; head metallic green; fore leg pale yellow except black basal part of fore coxa, obscure basal part of femur; middle coxa black with apex pale yellow; middle femur black or dark brown with apex pale yellow; hind femur black with base and apex pale yellow; gaster mostly black with ventral part mostly yellowish brown; fore wing with an obscure and faint infuscation behind stigmal vein.

Hosts: Unknown.

Distribution: India: Kerala, Maharashtra.

Specimen examined: None. The above account is based on the original description of Mani & Saraswat 1972.

***Elasmus mahabalii* Mani & Saraswat**

Elasmus mahabalii Mani & Saraswat, 1972: F., M. Holotype F, 477. India, Mahabalipuram (USNM).

Diagnosis: Black with metallic blue refringence; basal half of fore coxa, basal half of fore femur, whole of middle and hind coxae and femora black, rest of legs

pale brown; gaster dorsally and apically brownish black to black; posterior borders of tergites and venter brown.

Hosts: Unknown.

Distribution: India: Kerala, Karnataka, Tamil Nadu, Maharashtra.

Specimen examined: None. The above account is based on the original description of Mani & Saraswat 1972.

***Elasmus punctulatus* Verma & Hayat**

Elasmus punctulatus Verma & Hayat, 2002: 267-268, F. Type F: India: Tamil Nadu (BMNH).

Diagnosis: Body blackish with bluish refringence; tegulae brownish with base yellowish; mesoscutum with two yellow spots, one on each side near tegulae; posterior extension of metanotum hyaline with base dark brown; gaster dark brown or black dorsally, with bluish refringence on sides of T₁, yellowish brown laterally and ventrally, brownish stripes at apex of T₁, T_{III}, T_{IV} and T_V, faintly on T_{II}; legs yellowish, with brownish as follows: basal half or so of fore coxa, basal 2/3 or so of hind coxa, and base of mid coxa, dorsal and ventral margins at base of fore femur, tip of middle and basal half of hind femora.

Hosts: Unknown.

Distribution: India: Kerala, Karnataka, Tamil Nadu, Maharashtra.

Specimen examined: None. Specimen examined is based on Verma et al., 2002.

Elasmus flavescens* Verma & Hayat

Elasmus flavescens Verma & Hayat, 2002: 284-285, F. Type F: India: Karnataka (BMNH).

Diagnosis: Body yellow to honey yellow, following parts brown to blackish: a large area above foramen continued on to frontovertex surrounding ocelli and extending in front of anterior ocellus; head behind up to middle with a large area between eyes except on sides above; pronotum largely brownish, on sides and narrowly at apex, yellowish; mesoscutum with a faint brownish middle area extending from base up to middle and a blackish spot on sides below notauli; axillae and tegulae brownish; metanotum dark brown or black; propodeum with metallic blue refringence; gaster yellow with following parts as follows: basal half of T_I black with metallic bluish refringence, dark brown median patch or spot on T_{III} to T_V; T_{VI} black except basal part; legs yellow with a dark brown or black spot at base of hind coxa.

Hosts: Unknown.

Distribution: India: Kerala, Karnataka, Maharashtra.

Specimen examined: 1 female, INDIA: Maharashtra, Ratnagiri, Chiplun, Kapsar, 17.iii.2009 (S. I. Kazmi) Regd. No. A-11408.

***Elasmus cavicolous* Verma & Hayat**

Elasmus cavicolous Verma & Hayat, 2002: 285-286, F. Type F: India: Maharashtra (BMNH).

Diagnosis: Body yellowish with following parts as follows: a black spot on head below, between eyes; axillae and tegulae dark brown; gaster honey yellow with T_{VI} and T_{VII} black; fore wing faintly infuscated; hind wing hyaline; legs mostly yellowish, with dorsal margin of hind femur narrowly brown.

Hosts: Unknown.

Distribution: India: Maharashtra.

Specimen examined: 1 female, INDIA: Maharashtra, Sindhudurg, Kudal, 13.iii.2009 (S. I. Kazmi) Regd. No. A-11411.

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