

A REVISION OF THE INDIAN CHALCID WASPS OF THE SUB-FAMILY LEUCOSPIDINAE (PARASITIC HYMENOPTERA)¹.

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This paper is a resumé of my three years' work on the Indian Leucospidinae and represents the results of studies on practically all the material available in India. Fortunately unlike most other groups of the Chalcidoidea, the paratypes of several of the Indian species of Leucospidinae are available in this country. Through the courtesy of the authorities of the various institutions, I have been able to examine the valuable collections of the Zoological Survey of India, Indian Museum, Calcutta ; Imperial Agricultural Research Institute, New Delhi and the Agricultural College and Research Institute, Coimbatore. Dr. T. V. Ramakrishna Ayyar, late Government Entomologist, Madras, also very generously placed at my disposal his extensive collections of Leucospids. As a result, except for Cameron's species, which have not been recognised since they were first described, I have examined all the species so far described from India. In two earlier papers (15, 16) I have described seven new species and recorded one well known species for the first time from India. I also recently described the male of *Leucospis bengalensis* Weld, which was described from females only. Of the sixteen species dealt with in this paper one is new to science ; several of these species are redescribed, and notes on distribution and inter-relationships are added. A key to Indian species of *Leucospis* Fab. is also given. In the bibliography, the more important papers are arranged chronologically under authors, bringing the literature up to date.

I take this opportunity of recording my grateful thanks to Dr. Bains Prasad, Director, Zoological Survey of India, Indian Museum, Calcutta, for guidance, facilities for work and constant encouragement ; to Dr. T. V. Ramakrishna Ayyar, late Government Entomologist, Madras, for his valuable suggestions and for donations and loan of valuable material ; to Dr. Hem Singh Pruthi, Imperial Entomologist, Imperial Agricultural Research Institute, New Delhi and Mr. M. C. Cherian, Government Entomologist, Agricultural College and Research Institute, Coimbatore for loan of material for study.

LEUCOSPIDINAE.

The subfamily Leucospidinae is one of the easily recognised groups of the Chalcidoidea. Its members, mostly parasitic in the nest of bees, are found in all parts of the world, though the species are more numerous in the tropics than in the temperate regions. It comprises over two hundred species of the genera *Leucospis*, *Polistomorpha*, *Marres* and *Epexochlaenoides*.

Leucospids were recognised as a distinct group by Walker, though Dalla Torre (6) incorrectly gave the credit to Förster. Early workers

¹ This paper was prepared and submitted as a thesis for the M. A. degree in Research of the University of Madras in March, 1937.

like Walker, Haliday, Förster, etc., treated the group as a separate family. Howard (12) and Ashmead (1) recognised their close relationship to the Chalcidinae and placed them with the latter in the family Chalcididae. In 1890, Schletterer (19) comprehensively monographed the subfamily and recorded sixty species in three genera *Leucospis* (57 spp.), *Polistomorpha* (2 spp.) and *Marres* (1 sp.). In 1898, Dalla Torre (6) recorded eighty species from different parts of the world in his *Catalogus Hymenopterorum*; several of these species have, however, been regarded as synonyms by later workers. Crésson (5), Howard (12) and Ashmead (1) described several American species. Klug (14) made several additions to the European species. Kirby (13) also characterised the genera and described some species from England and other places. Ashmead (1) tabulated the genera in his monumental work on the classification of the Chalcid flies, and later Schmiedeknecht (20) monographed the subfamily in the *Genera Insectorum* series. Girault (11) studied the Australian forms and erected some new genera and species, most of which are not, however, valid. Weld (27) published a monographic revision of the Leucospidinae of the world, which is still a standard work of reference in the group.

Very little work has, however, been done on this group in India. *Leucospis guzeratensis* Westwood, the first species of the Leucospidinae to be recorded from India, was described by Westwood in 1839. Later on in 1906, Cameron (4) described two Indian species. In 1912, Enderlein (9) described one species from Ceylon. In 1922, Weld (27) described three Indian species, and in 1925, Brues (2) recorded one species from Malabar, South India. Several Indian species were recently described by me and altogether sixteen species have been recorded from India so far.

Leucospids are usually robust-bodied Chalcids, ranging in length from about 5 mm. to 15 mm. Pronotum is usually large. Black is the predominating colour, but most species are also conspicuously spotted or marked yellow, orange, red and sometimes white. Fore wings, while not in use, are longitudinally folded as in the Vespidae, which is an unusual feature among the Chalcids. Hind coxa and femur are very much swollen, the latter is also armed beneath with teeth. Hind tibia is strongly arched and always shorter than hind femur. Abdomen is elliptical or obovate in the lateral view; usually swollen behind the middle in the dorsal view; and sometimes subcompressed apically. Ovipositor is usually long, exerted, reflexed over the dorsum of abdomen, sometimes reaching forward to the scutellum of thorax. These characters readily serve to distinguish the Leucospidinae from the closely related Chalcidinae.

Genus **Polistomorpha** Westwood.

1839. *Polistomorpha*, Westwood, *Zeitschr. Entomol.*, I (2), p. 265.
 1862. *Polistomorpha*, Walker, *Journ. Entomol.*, I, p. 22.
 1874. *Polistomorpha*, Westwood, *Thesaur. Entomol. Oxon.*, p. 133.
 1890. *Polistomorpha*, Schletterer, *Berlin. Entomol. Zeitschr.*, XXXV, p. 292.
 1904. *Polistomorpha*, Ashmead, *Mem. Carnegie Mus.*, I (4), pp. 247, 402.
 1906. *Polistomorpha*, Ducke, *Bull. Soc. Entomol. France*, pp. 163-166.
 1909. *Polistomorpha*, Schmiedeknecht, *Gen. Ins.*, fas. 97, p. 14.
 1922. *Polistomorpha*, Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, p. 4.
 1935. *Polistomorpha*, Mani, *Rec. Ind. Mus.*, XXXVII, pp. 242-243.

Polistomorpha was erected as a subgenus of *Leucospis* Fab. in 1839 by Westwood for his species *surinamensis*; it was raised to a generic rank by Walker in 1860. Since then seven species have been described: *sphgoides* Walker¹ and *fasciata* Westwood² from the Amazon; *nigri-maculata* Cameron³ from Panama; *nitidiventris* Ducke⁴ from Europe; and *indica* Mani and *paivai* Mani (*vide infra*) from India. In 1922, Weld transferred the Mexican species *bulbiventris* Cresson⁵ from the genus *Leucospis* to *Polistomorpha*.

The genus has a wide range of distribution, though the species appear to be more numerous in the tropics than in the temperate regions. Of the two Indian species one is known from North and the other from South India.

The genus can be recognised by the following characters: Vertex not cornuted, posterior margin of head straight or nearly so; third antennal segment as long as or longer than second; pronotum equally broad both anteriorly and posteriorly; scutellum normal, never heart-shaped; central part of metathorax projecting; hind coxae with or without a strong erect spur above; abdomen spindle-shaped, never compressed, with or without median longitudinal furrow towards the posterior end, pointed apically; ovipositor limited to the underside of abdomen.

Polistomorpha is readily distinguished from *Marres* Walk. by its non-cornuted head. From *Leucospis* Fab. and *Epexochlaenoides* Gir. it is separated by the fact that the ovipositor is not reflexed over the dorsum of abdomen but lies on the under side.

The relationship of the Indian species to the other known species is shown in the key below, which is modified from Ducke (7).

Key to species.

- I. Hind coxa unspurred above; usually small species
 - A. Hind femur with over 10 teeth, first tooth large, rest small; carina on pronotum faint *P. bulbiventris* (Cresson).
 - B. Hind femur with only 5 teeth; first tooth small, second, third and fourth long, fifth large and tridenticulate; single well developed carina on pronotum *P. indica* Mani.
- II. Hind coxa spurred above; or at least with a carinate upper edge; usually large species
 - A. Hind femur with 8 teeth, first larger than the rest; two transverse carinae on pronotum *P. paivai* Mani.
 - B. Hind femur with only 6-7 teeth; first tooth larger than the rest
 - 1. Body black *P. sphgoides* Walker.
 - 2. Body testaceous
 - a. Fourth tergite of abdomen shiny, with a coarse punctation; first tooth of hind femur triangular *P. nitidiventris* Ducke.

¹ Walker, *Journ. Entomol. London*, I, p. 22, (1862).

² Westwood, *Thesaur. Entomol. Oxon.*, p. 133, (1874).

³ Cameron, *Trans. Amer. Entomol. Soc.*, XXX, p. 96, (1904).

⁴ Ducke, *Bull. Soc. Entomol. France*, p. 165, (1906).

⁵ Cresson, *Trans. Amer. Entomol. Soc.*, IV, p. 29, (1872).

- b. Fourth tergite of abdomen somewhat opaque, with a fine punctation; first tooth of hind femur very long and sharp *P. fasciata* Westwood.
- c. Fourth tergite of abdomen opaque, finely and densely punctate; first tooth of hind femur large and triangular *P. surinamensis* Westwood.

Polistomorpha indica Mani.

1935. *Polistomorpha indica*, Mani, *Rec. Ind. Mus.*, XXXVII, pp. 243-244, fig. 1.
 1936. *Polistomorpha indica*, Mani, *Rec. Ind. Mus.*, XXXVIII, p. 338.

This species was originally described from a specimen from Yercaud, South India, in a collection of Chalcids received from Dr. T. V. Ramakrishna Ayyar. The female is easily recognised by the presence of a single well developed transverse carina on the pronotum posteriorly parallel to its hind margin, with two transverse elliptic yellow spots at its ends. There is also a somewhat broad, transverse, complete yellowish band anteriorly on the pronotum. Dorsum of abdomen has three transverse, yellow bands. Hind femur has four simple and one (fifth) compound teeth. The upper edge of hind femur is bordered by a broad yellow band on the outer side; there is also a longitudinal, oblong, yellow spot on the outer side just above the third, fourth and first part of the fifth teeth. The male is unknown.

Polistomorpha paivai Mani.

1936. *Polistomorpha paivai*, Mani, *Rec. Ind. Mus.*, XXXVIII, p. 338.

This species is closely related to *P. indica* Mani, from which, however, it is easily distinguished by the following characters: There are two transverse carinae on pronotum parallel to its hind margin, which is also carinate. Hind femur has eight teeth, the last one being compound. There is a single yellow, transverse band on the carina on pronotum. Hind femur has only a single irregularly-shaped yellow spot outside at the base and not extending to apex. There are only two transverse yellow bands on the dorsum of abdomen.

No females of the species have been discovered so far.

Described from a specimen in the collections of the Zoological Survey of India, Indian Museum, Calcutta, bearing the label: "Coll. Paiva, Katihar, Purneah Dist., 4-viii-1907"

Genus **Leucospis** Fabricius.

1775. *Leucospis*, Fabricius, *Syst. Entomol.*, I, p. 361.
 1874. *Leucospis*, Westwood, *Thesaur. Entomol. Oxon.*, p. 135.
 1890. *Leucospis*, Schletterer, *Berlin. Entomol. Zeitschr.*, XXXV, p. 141.
 1894. *Exochlaenus*, Shipp, *Entomologist*, XXVII, p. 16.
 1904. *Leucospis*, Ashmead, *Mem. Carnegie Mus.*, I (4), p. 247.
 1909. *Leucospis*, Schmiedeknecht, *Gen. Ins.*, fas. 97, p. 14.
 1922. *Leucospis*, Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, pp. 4-35.
 1935. *Leucospis*, Masi, *Boll. Soc. Entomol. Italiana*, LXVII, pp. 36-43.
 1935. *Leucospis*, Mani, *Rec. Ind. Mus.*, XXXVII, p. 244.

This genus was erected by Fabricius in 1775 and was comprehensively dealt with by Schletterer in his monograph on the genera *Leucospis*,

Polistomorpha and *Marres*. In 1894, Shipp transferred the species *L. anthioides* Westw. to his new genus *Exochlaenus*; and this was accepted by Ashmead and Schmiedeknecht. In his recent monograph on the Leucospidinae, Weld has reunited under *Leucospis* all the species referred to *Exochlaenus*, which according to him is not distinct from the former. From a study of the various Indian species Dr. Ramakrishna Ayyar and I agree with Weld's view.

Body more or less robust. Head triangular in the front view; vertex not cornuted; cheek long, not converging below; posterior margin of head curved inwards; maxillary palpi quadriarticulate; labial palpi triarticulate; mandibles short and broad. Eyes large. Antennae slightly thickened apically, with 12 segments. Pronotum nearly of equal width both anteriorly and posteriorly. Mesonotum longer than pronotum in the median line, at least never shorter. Scutellum never heart-shaped. Metanotum either rounded or with a spinous process apically. Hind coxa with or without a spur above. Hind femur with less than twenty teeth, which are never minute or comb-like. Fore tibia with one spur; hind tibia with two spurs. Abdomen elliptic or obovate in the lateral view, more or less compressed sub-apically; the apex rounded. Ovipositor reflexed over the dorsum of abdomen.

Abdomen is composed of eight tergites, not counting the median segment (propodium), but several of the tergites are more or less telescoped and hidden from view. First tergite is narrow and ring-like, forming a short constricted portion between the median segment and the second (the *first* apparent) tergite. Second tergite is well developed and in some species is longer in the median line than the others. Third and fourth tergites are usually telescoped together but the former is distinctly visible in the female of *L. indiensis* Weld. Fourth and fifth are together shorter than the second tergite. Sixth tergite is usually the largest. Seventh is small and is easily recognised by its conspicuous spiracle. Eighth varies according to sex; in female it consists of two halves, enclosing the ovipositor. In male several of the tergites are more or less fused together.

Species of *Leucospis* are parasitic in the nests of bees and attack *Chalicodoma*, *Megachile*, *Anthidium* and *Osmia*. No work has been done so far on the biology of any Indian species.

Leucospis guzeratensis Westwood¹, described in 1839, was the first species of *Leucospis* recorded from India. Eleven more species and one variety have since been described from different parts of India: *nursei* Cameron² and *quettaensis* Cameron² from Quetta; *viridissima* Enderlein³ from Ceylon; *malabarensis* Brues⁴ from Malabar, South India; *indiensis* Weld⁵ from Coimbatore; *bengalensis* Weld⁶ from Pusa; *mee-nakshiae* Mani⁷ from Tanjore; *bombayensis* Mani⁸ from Bombay;

¹ Westwood, *Zeitschr. Entomol.*, I (2), p. 253, (1839).

² Cameron, *Journ. Bombay Nat. Hist. Soc.*, XVII, pp. 91-92, (1906).

³ Enderlein, *Entomol. Mitteil.*, I (5), p. 144, (1912).

⁴ Brues, *Psyche*, XXXII, p. 27, (1925).

⁵ Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, p. 20, (1922).

⁶ Weld, *ibid.*, p. 32.

⁷ Mani, *Rec. Ind. Mus.*, XXXVII, p. 244, (1935).

⁸ Mani, *ibid.*, p. 246.

ramakrishnai Mani¹ from Pusa and *assamensis* Mani² from Assam. *L. ornatifrons* Weld,³ originally described from the Philippines also occurs in South India. *L. bengalensis* var. *mackenziei* Mani² is known from Chapra, Bihar.

A key to all the species so far described from India is given below. Cameron's two species *nursei* and *quettaensis* are placed in the key from Cameron's descriptions only. All the species so far described from India have one or two transverse carinae on pronotum parallel to its hind margin, which latter is also sometimes carinate. The following nine species have a single carina on pronotum: *L. indiensis* Weld, *L. darjilingensis*, sp. nov., *L. ornatifrons* Weld, *L. malabarensis* Brues, *L. viridissima* Enderlein, *L. meenakshiae* Mani, *L. nursei* Cameron and *L. quettaensis* Cameron.

Key to species.

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| 1. Pronotum with only <i>one</i> transverse carina parallel to its hind margin | 2. |
| Pronotum with <i>two</i> transverse carinae parallel to its hind margin | 11. |
| 2. Ovipositor reflexed over the dorsum of abdomen but not reaching the hind margin of the second (first apparent) tergite of abdomen | 3. |
| Ovipositor reflexed over the dorsum of abdomen, reaching forward beyond the hind margin of the second tergite of abdomen | 4. |
| 3. Ovipositor nearly touches the anterior margin of the sixth tergite; pronotal carina faint; hind coxa with a sharp angle above; metanotum rounded apically | <i>L. indiensis</i> Weld. |
| 4. Metanotum simple, rounded posteriorly | 5. |
| Metanotum produced or spined (bidentate) | 10. |
| 5. Ovipositor reaches forward a little of the middle of the second tergite | <i>L. darjilingensis</i> , sp. nov. |
| Ovipositor reaches forward of front margin of the second tergite | 6. |
| 6. Ovipositor reaches metanotum, small species | <i>L. ornatifrons</i> Weld. |
| Ovipositor reaches forward beyond metanotum | 7. |
| 7. Ovipositor reaches forward beyond the apex of scutellum | <i>L. malabarensis</i> Brues. |
| Ovipositor reaches apex of scutellum | 8. |
| 8. Pronotum reticulately sculptured, length of female 12.5 mm., colour metallic | <i>L. viridissima</i> Enderlein. |
| Pronotum umbilicately or rugosely punctate | 9. |
| 9. Spots and markings mostly reddish in colour; length of female 9.25 mm.; pedicel of antenna about half the length of the first funicular segment; fourth funicular about three fourths length of third; mesopleura with a large sub-triangular spot | <i>L. meenakshiae</i> Mani. |
| Spots and markings gamboge yellow; length of female 10 mm.; pedicel of antenna less than half the length of the first funicular segment; fourth funicular equal to third; mesopleura unspotted | <i>L. assamensis</i> Mani. |

¹ Mani, *Rec. Ind. Mus.*, XXXVII, p. 248, (1935).

² Mani, *Rec. Ind. Mus.*, XXXVIII, p. 338, (1936).

³ Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, p. 22, (1922).

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| 10. Hind femur with 8 teeth | <i>L. nursei</i> Cameron. |
| Hind femur with 10 teeth | <i>L. quettaensis</i> Cameron. |
| 11. Ovipositor does not reach the middle of second tergite of abdomen | 12. |
| Ovipositor reaches forward of the middle of the second tergite of abdomen | 13. |
| 12. Length of female 11-12 mm. ; propodium with distinct median keel and prominent lateral carinae ; hind femur with 10 teeth | <i>L. bengalensis</i> Weld. |
| Length of female 9.5 mm. ; propodium without median keel and lateral carinae ; hind femur with 11 teeth | <i>L. bengalensis</i> var. <i>mackenziei</i> Mani. |
| 13. Sixth tergite of abdomen most usually with spots or markings, rarely without | 14. |
| Sixth tergite of abdomen always without spots or markings | <i>L. guzeratensis</i> Westwood. |
| 14. Length of female 5.5 mm. ; with numerous white spots and markings | <i>L. bombayensis</i> Mani. |
| Length of female 10 mm. ; with a few pale yellow or yellow spots ; sixth tergite is rarely unspotted ; hind femur always unspotted ; pubescence of abdomen as in <i>L. guzeratensis</i> Weld | <i>L. ramakrishnai</i> Mani. |

***Leucospis indiensis* Weld.**

1922. *Leucospis indiensis*, Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, p. 20, pl. iii, fig. 19.

1935. *Leucospis indiensis*, Masi, *Boll. Soc. Entomol. Italiana*, LXVII, (3), p. 41.

1936. *Leucospis indiensis*, Mani, *Rec. Ind. Mus.*, XXXVIII, p. 339.

This species was originally described by Weld from a female collected by Dr. Ramakrishna Ayyar at Coimbatore, South India. I recently recorded this species from the Sunderbans, Bengal. Masi has recently described the male.

This species is easily recognised by the single, faint, transverse carina on pronotum, ovipositor reaching only the anterior margin of the sixth tergite of abdomen, sharply angled hind coxa and apically rounded metanotum. From the closely related *L. ornatifrons* Weld this species is readily distinguished by its much larger size, ovipositor not reaching metanotum and by colouration.

Female.—Length 10.5-11.25 mm. Head somewhat wider than the anterior margin of pronotum, densely clothed with silvery white pubescence ; finely, closely and rugosely punctate. Inner border of eyes more pronouncedly sinuate than in *L. guzeratensis*. Ocelli reddish brown, the front one placed outside the antennal fovea. Vertex more or less striated on the outer side of lateral ocelli. Occipital carina, though distinct between eyes, disappears behind them. Pronotum with long, faint, transverse carina, parallel to its hind margin and covered by a white, pale yellow or yellow band ; the anterior white or yellow band on pronotum is long, and follows its front margin ; it is separated from the front margin of pronotum by a distance about twice that between the posterior band and posterior margin of pronotum ; punctation rugose. Scutellum umbilicately punctate. Metanotum rounded apically. Spiracular areas of propodium densely clothed with long, silvery white pubescence. Hind coxa with a sharply angled upper margin, where there is no punctation.

Abdomen reddish towards the base ; in the dorsal view narrowed just in front of and swollen behind middle, compressed apically ; in the lateral view broadest in the middle, depressed apically. Ovipositor very nearly touches the anterior margin of sixth tergite ; its groove is rather deep.

General colour of body black ; spotted or marked white, pale yellow or yellow as follows : Narrow, long transverse bands anteriorly and posteriorly on pronotum ; the posterior band shorter than the anterior ; a semi-circular spot on the smooth polished postero-median area of propodium ; two small subtriangular spots postero-laterally on second tergite ; one narrow band posteriorly on sixth tergite ; fore femur apically above ; outer basal half of fore tibia ; base and apex of middle tibia ; there is a broad irregular band near basal tooth of hind femur and extends across front and upper margin to apex ; outside of hind tibia apically.

***Leucospis darjilingensis*, sp. nov.**

This new species is easily distinguished from the closely related *L. ornatifrons* Weld, *L. meenakshiae* Mani and *L. assamensis* Mani by its relatively shorter ovipositor and spotted eighth tergite of abdomen.

Female.—Length 8 mm. Head somewhat wider than the anterior width of pronotum ; not narrow in dorsal view ; frons rugosely sculptured, moderately densely pubescent ; line from front ocellus to lower border of clypeus nearly equal to the greatest distance between eyes ; outer edges of scapal furrows faintly carinate ; eyes very slightly sinuate ; front ocellus outside the scapal furrows ; postocellar space nearly equal to the ocellocular ; occipital carina faint ; striations on the outer side of lateral ocellus rather prominent. Pronotum about three fourths the length of mesonotum in the median line, with one faint transverse carina parallel to its hind margin, which is also rather faintly carinate. Pro- and mesonotums closely rugosely punctate. Front half of thorax bent downwards. Scutellum broadly rounded apically. Propodium slightly longer than the metanotum in the median line, without a median keel but with lateral carinae and hairy spiracular areas. Hind coxa closely and minutely punctate. Hind femur about twice as long as wide, closely setigerous, punctate ; teeth five ; first tooth small ; second long and blunt ; third and fourth longer and sharper than second ; fifth tridenticulate. Fore wings faintly clouded apically.

Seen from above, abdomen has a length about twice its greatest width ; second tergite longest, with a single median longitudinal furrow for ovipositor ; third and fourth tergites covered. Seen from the side, abdomen is straight along the dorsum, narrow basally, wide apically ; finely punctate, pubescence more dense apically than elsewhere. Ovipositor reaches the basal one fourth of second tergite.

Body spotted or marked yellowish brown as follows : A broad band, irregular in width, which begins near the front, where it is broadest, extends across upper margin to apex ; a stripe posteriorly from the base to apex of hind tibia on the outer side ; scape of antennae below ; and two oblong, oblique stripes on eighth tergite. Other spots and markings are brick red as follows : Frons between eyes and antennal foveae,

broader below than above; spur between the antennal foveae (scapal furrows); broad, curved, transverse band anteriorly on pronotum; a darker band on the pronotal carina posteriorly; a curved band at posterior margin of scutellum; elongated spot on metapleura; short stripes above and below on fore femur; fore tibia in front; fore tarsus; middle tibia in front; middle tarsus; hind coxa at base above and at apex below; hind tarsus; pair of oblique bands on second tergite, beginning antero-medially and running latero-posteriorly, narrow at base and broad apically; narrow transverse band on fifth tergite; broad transverse band posteriorly on sixth tergite. Propodium unspotted.

Holotype.—One pinned female, Mus. Coll., Darjiling, Himalayas, 1000-3000 ft., May, 1912. Reg. No. 1571/H3. In the collections of the Zoological Survey of India, Indian Museum, Calcutta.

Leucospis ornatifrons Weld.

1922. *Leucospis ornatifrons*, Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, p. 22.
 1935. *Leucospis ornatifrons*, Masi, *Boll. Soc. Entomol. Italiana*, LXVII, p. 41.
 1935. *Leucospis ornatifrons*, Mani, *Rec. Ind. Mus.*, XXXVII, p. 245.

This species was described by Weld from Manila, Philippine Islands and was later recorded by Masi from Borneo and other places. It is represented by one specimen in a collection of Leucospids from South India received about three years ago from Dr. Ramakrishna Ayyar, bearing the label "Coll. T. V R., Salem, 2-8.xii.1914"

This is a small species (length about 6-7 mm.) with a single carina on pronotum, in which respect it resembles *L. darjilingensis*, but it is easily distinguished from the latter species by its rather long ovipositor reaching metanotum. Face has a conspicuous yellowish marking. Sixth tergite of abdomen and pleurae are spotted. Median segment is unspotted.

Leucospis malabarensis Brues.

1925. *Leucospis malabarensis*, Brues, *Psyche*, XXXII, p. 27.

This is a medium-sized species easily recognised by the single pronotal carina, carinate posterior margin of pronotum, ovipositor reaching forward of the apex of scutellum, apically rounded metanotum and yellow and ferruginous markings. Frons minutely and reticulately sculptured. Outer edges of scapal furrows are distinctly carinate. Basal tooth of hind femur is small, the next three long and widely separated, fifth shorter, sixth compound. Pleurae and spiracular areas of propodium have long, villous, silvery white pubescence.

According to Brues this species differs from *L. nursei* Cam. and *L. quettaensis* Cam. in the apically rounded metanotum. The species is known from Malabar, South India.

Leucospis viridissima Enderlein.

1912. *Leucospis viridissima*, Enderlein, *Entomol. Mitteil.*, I, p. 144.

This Ceylonese species is distinguished from all the other Indian species so far described by its metallic colouration. From *L. malabarensis* it is further distinguished by its much larger size (length 12.5

mm.) and shorter ovipositor. Pronotum reticulately sculptured; mesonotum and scutellum are also similarly sculptured. Head, thorax, abdomen, legs, antennal scapes and sheath of ovipositor are deep metallic green; dorsum of thorax and anterior part of abdomen are not, however, metallic.

Leucospis meenakshiae Mani.

1935. *Leucospis meenakshiae*, Mani, *Rec. Ind. Mus.*, XXXVII, pp. 244-246, fig. 2.

This species very closely resembles *L. ornatifrons* Weld, from which, however, it is easily distinguished by the relatively longer ovipositor, clouded fore wings and other characters. Spots and markings are usually more reddish or orange than yellow.

Female.—Head transverse, slightly wider than the anterior margin of pronotum; frons rugosely punctate, shortly pubescent; outer edges of scapal furrows distinctly carinate; there are two faint depressions a little below the lower level of scapal furrows; line from the front ocellus to the lower level of clypeus about equal to the greatest distance between eyes; malar space about one fourth the length of eyes; eyes slightly sinuate; front ocellus at the apex of the antennal foveae; postocellar space about one half the ocellular; occipital carina prominent in the median line and faint behind the eyes; occiput is faintly striate outside the eyes. Propodium almost equal in length to metanotum in the median line, nearly twice laterally, without median keel but with prominent lateral carinae and hairy spiracular areas. Hind coxa closely punctate.

Holotype re-examined. Coll. Miss Meenakshi, Tanjore, 29-xi-1932. Reg. No. 893/H3. In the collections of the Zoological Survey of India, Indian Museum, Calcutta.

Leucospis assamensis Mani.

1936. *Leucospis assamensis*, Mani, *Rec. Ind. Mus.*, XXXVIII, p. 339.

This species agrees with *L. meenakshiae* Mani in all essential characters but differs in the following:—

Female.—Head densely clothed with silvery white pubescence. All spots and markings on body are wholly gamboge yellow. Pedicel of antenna somewhat less than half the length of first funicular segment. Hind femur glossy, more finely and closely punctate than hind coxa; third tooth stouter than second. Spot on face between eyes and scapal furrows relatively larger and contiguous with eye and borders of furrows. Anterior band on pronotum not dilated at ends. Mid-dorsum of mesonotum unspotted. Mesopleura usually unspotted. There is sometimes a minute subelliptic spot on either side of eighth tergite of abdomen. Metanotum usually rounded apically, sometimes slightly pointed. Lateral carina on propodium faint. Fore wings hyaline basally and faintly clouded antero-apically.

Holotype re-examined. Coll. S. E. Peal, Sibsagar, Assam, Reg. No. 930/H3. In the collections of the Zoological Survey of India, Indian Museum, Calcutta.

Leucospis nursei Cameron.

1906. *Leucospis nursei*, Cameron, *Journ. Bombay Nat. Hist. Soc.*, XVII, p. 92.

This species was described by Cameron from Quetta, and has not since been recognised, though Brues (2) discusses its relationship to *L. malabarensis* Brues in the light of Cameron's description.

Leucospis quettaensis Cameron.

1906. *Leucospis quettaensis*, Cameron, *Journ. Bombay Nat. Hist. Soc.*, XVII, p. 91.

This species, described by Cameron from Quetta, has not also been since recognised. According to Cameron it differs from *L. nursei* Cameron mainly in its smaller size.

Leucospis bengalensis Weld.

1922. *Leucospis bengalensis*, Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, p. 32.

1936. *Leucospis bengalensis*, Mani, *Rec. Ind. Mus.*, XXXVIII, p. 339.

This species has two pronotal carinae. It was originally described by Weld from females collected by Dr. Ramakrishna Ayyar at Pusa. I recently described the male from a specimen in the material received from Dr. Hem Singh Pruthi, Imperial Entomologist, New Delhi.

The female ranges in length from about 11 to 12 mm. Occipital carina is not very high. In addition to the two usual carinae, the hind margin of pronotum is also carinate. Fore wings are dark and have a purplish iridescence. Hind coxa is unspurred above. Propodium has a distinct median keel and prominent lateral carinae. Ovipositor reaches the basal fourth of second tergite; fovea of ovipositor reaches the base of abdomen.

Male.—Length 10 mm. Head narrower than the anterior margin of pronotum; coarsely rugosely sculptured; covered with moderately dense, short, silvery white pubescence; line from front ocellus to the lower edge of clypeus about one and one third the greatest distance between eyes; clypeus sinuate at lower edge, with minute teeth in the median line; eyes very slightly sinuate; post-ocellar space somewhat less than ocellular; third funicular segment of antennae somewhat shorter than fourth. Pronotum transversely rugosely punctate; almost equal in length to mesonotum in the median line; with two transverse carinae parallel to its hind margin, which is also carinate, anterior carina short, posterior long. Mesonotum somewhat more coarsely sculptured than pronotum. Scutellum coarsely umbilicately punctate. Propodium about twice the length of metanotum in the median line, rugosely sculptured, median keel absent, lateral carinae prominent, spiracular areas hairy. Hind coxa closely punctate. Hind femur finely, closely and setigerously punctate, twice as long as wide, with ten teeth beneath; front tooth broad and blunt; second small, next longer, the last four gradually growing smaller and semifused.

Abdomen almost equal to the rest of body in length, seen from above narrow and constricted in the second tergite; swollen behind; sixth tergite largest and covers three fourths the abdomen. Wings brown, with a slight iridescence. Scape yellowish white beneath nearly the

whole of its length. Hind coxa unspotted. A narrow, transverse yellowish band at basal third and two large napiform markings laterally at basal two thirds on sixth tergite. A small spot on anterior carina on pronotum in the median line.

Allotype re-examined. Coll. F. M. Howlett, Pusa. 4-iv-1911.

Leucospis bengalensis var. **mackenziei** Mani.

1936. *Leucospis bengalensis*, var. *mackenziei*, Mani, *Rec. Ind. Mus.*, XXXVIII, p. 339.

This variety of *L. bengalensis* Weld is easily distinguished from the typical form by the following characters:—

Female.—Length 9.5 mm. Markings on anterior carina on pronotum relatively longer in some specimens. Propodium without a median keel or lateral carina. Hind femur with 11 teeth, basal tooth broad and blunt, second and third teeth minute, fourth to seventh large, eighth to eleventh small, semifused. Face relatively more densely clothed with longer silvery white hairs.

Holotype re-examined. Coll. Mackenzie, Chapra, Bihar. Originally described from a specimen received from Dr. Hem Singh Pruthi, Imperial Entomologist, New Delhi.

Leucospis guzeratensis Westwood.

1787. *Leucospis petiolata*, Fabricius, *Mantiss. Ins.*, I, p. 285.

1793. *Leucospis petiolata*, Fabricius, *Syst. Entomol.*, II, p. 247.

1798. *Leucospis atra*, Fabricius, *Syst. Entomol.*, Suppl., p. 259.

1839. *Leucospis atra*, Westwood, *Zeitschr. Entomol.*, I, (2), p. 252.

1839. *Leucospis petiolata*, Westwood, *Zeitschr. Entomol.*, I, (2), p. 253.

1839. *Leucospis guzeratensis*, Westwood, *Zeitschr. Entomol.*, I, (2), p. 253.

1890. *Leucospis guzeratensis*, Schletterer, *Berlin. Entomol. Zeitschr.*, XXXV, p. 224.

1898. *Leucospis guzeratensis*, Dalla Torre, *Cat. Hymen.*, V, p. 411.

1909. *Leucospis guzeratensis*, Schmiedeknecht, *Gen. Ins.*, fas., 97, p. 16.

1922. *Leucospis guzeratensis*, Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, p. 33.

This species is easily recognised by the two transverse carinae on pronotum, relatively long ovipositor reaching forward of the middle of the second tergite, single spot on pronotum and unspotted sixth tergite. It exhibits a great variation in size, the length ranging between 9-12 mm. It was originally described from Gujerat, Bombay Presidency and Tranquebar, Madras Presidency. It is represented by one female in a small collection of Leucospids (taken at Coimbatore) received from Mr. M. C. Cherian, Government Entomologist, Coimbatore. Weld has also recorded the species from the same place.

From *L. bengalensis* Weld this species is distinguished by its relatively longer ovipositor; large, sharp, basal tooth and blunt, small apical teeth of hind femur; basally and posteriorly semi-hyaline fore wings; absence of median keel on propodium; and an irregular transverse band on anterior pronotal carina.

Leucospis bombayensis Mani.

1935. *Leucospis bombayensis*, Mani, *Rec. Ind. Mus.*, XXXVII, p. 246.

This species resembles *L. guzeratensis* Westw. in its two pronotal carinae and long ovipositor but it is easily distinguished from it by its

smaller size, spotted sixth tergite and non-iridescent fore wings. It bears a superficial resemblance to *L. ornatifrons* Weld and *L. meenakshiae* Mani, from both of which it is easily separated by the presence of two carinae on pronotum.

Female.—Head somewhat wider than the anterior margin of pronotum, densely clothed with silvery white hairs; line from the front ocellus to the lower border of clypeus about equal to inter-ocular space; eyes very slightly sinuate; postocular space twice the ocellocular; malar space about one fourth the length of eye; occipital carina wanting; striations on the outer side of lateral ocelli rather faint. Pronotum rather bent downwards, with two transverse carinae parallel to its hind margin, which is also carinate. Propodium about twice the length of metanotum in the median line, without a median keel but with distinct lateral carinae and hairy spiracular areas. Scutellum obtusely rounded apically.

Holotype re-examined. Coll. R. B. S. Sewell and H. S. Rao, Satara, Bombay, 24-iii-1932. Reg. No. 894/H3. In the collections of the Zoological Survey of India, Indian Museum, Calcutta.

***Leucospis ramakrishnai* Mani.**

1935. *Leucospis ramakrishnai*, Mani, *Rec. Ind. Mus.*, XXXVII, p. 248.

This species is very closely related to *L. guzeratensis* Westw. and *L. bengalensis* Weld. From the former it is easily distinguished by its unspotted hind femur, usually spotted sixth tergite and two small spots medially on anterior carina of pronotum. From the latter it is distinguished by its relatively longer ovipositor.

The species was originally described from Pusa. In a small collection of Leucospids recently received from Mr. M. C. Cherian, Government Entomologist, Coimbatore, it is represented by one female bearing the label: "Pudur, Visiting flowers of Mango" This is the first record of the species from South India.

Female.—Head almost as wide as anterior margin of pronotum; face rather densely clothed with long, silvery white hairs; line from the front ocellus to the lower edge of clypeus about one and one seventh of the inter-ocular space; malar space about one third the length of eye; clypeus truncate at the lower edge; eye distinctly sinuate; spur between scapal furrows carinate; occipital carina rather prominent between the two lateral ocelli, wanting beyond; postocellar space about one and one fourth the ocellocular. Lateral margin of pronotum carinate. Scutellum obtusely rounded apically; transversely and deeply punctate along the posterior margin. Propodium slightly longer than the metanotum in the median line, without median keel but with prominent lateral carinae and hairy spiracular areas. Fifth tergite of abdomen about one and one fourth times the fourth tergite along the median line. Ovipositor reaching a little forward of the basal fourth of second tergite. Second tergite is more densely hairy and sculptured than sixth tergite.

Holotype re-examined. Coll. Ramakrishna, Pusa, 23-v-1906. Reg. No. 885/H3. In the collections of the Zoological Survey of India, Indian Museum, Calcutta.

Genus **Epexochlaenoides** Girault.

1915. *Epexochlaenoides*, Girault, *Mem. Queensland Mus.*, IV, p. 357.
 1922. *Epexochlaenoides*, Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, p. 35.

This genus bears a general resemblance to *Leucospis* but differs in the comb-like teething following the large basal tooth of hind femur (teeth over twenty in number); pear-shaped, apically subglobose abdomen; and large sixth tergite. Only two species of this genus are known: *E. bicinctus* Gir. from Australia and *E. pyriformis* Weld from India.

Epexochlaenoides pyriformis Weld.

1922. *Epexochlaenoides pyriformis*, Weld, *Proc. U. S. N. Mus.*, LXI, art. 6, p. 35.
 1936. *Epexochlaenoides pyriformis*, Mani, *Rec. Ind. Mus.*, XXXVIII, p. 338.

This species was originally described by Weld from Pusa and I recently recorded it from Bombay. In a collection of Chalcids received for identification from Dr. Hem Singh Pruthi, Imperial Entomologist, New Delhi, this species is represented by a series of specimens labelled as parasitising *Rhynchium nitidulum*.

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