

Miscellaneous Bulletin No. 30

The Imperial Council of Agricultural Research

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**BIOLOGICAL NOTES ON INDIAN PARASITIC  
CHALCIDOIDEA**

BY

**HEM SINGH PRUTHI, M.Sc., Ph.D. (Cantab.), F.N.I.**  
*Imperial Entomologist*

AND

**M. S. MANI, M.A.**  
*Assistant to the Imperial Entomologist, New Delhi*



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(Received for publication on 24th August 1938)

(With Plates I-XXII)

## INTRODUCTION

THE biological control of insect pests is receiving considerable attention in all parts of the world. Knowledge of the natural composition of parasitism of a pest and the variety of hosts attacked by a parasite is the most essential preliminary work in the investigation of the possibilities of controlling pests by biological methods. Notes on the biology and hosts of various Indian parasites have been taken by numerous entomologists during the last thirty years, but they mostly exist either in manuscript form in the records of different entomological departments or occur scattered in numerous periodicals published in different parts of the world, some of which are not readily available to Indian workers. The Forest Entomologist is publishing a series of papers entitled 'Biology of Families of Forest Insects', containing biological observations mainly concerning the species available in the collection of the Forest Research Institute, Dehra Dun. In this series, papers dealing with important groups of parasitic Hymenoptera, with the exception of the Chalcidoidea, have been published.

The insect collections in the laboratory of the Imperial Entomologist, referred to as the 'Pusa collection' in the following pages, contain a large number of parasitic species, bred in the insectary from material collected from different parts of India. Detailed studies of some species which parasitise important crop pests have also been made in the insectary. In addition, information summarized from literature, about parasites which are not represented in the Pusa collection is also available in the laboratory of the Imperial Entomologist. In order that the whole of this valuable information may be available to workers in India and other countries, it has been thought desirable to publish it, dealing with one group at a time. We are beginning this series with Chalcidoidea, a very important group, but one about which practically no information is available in a comprehensive form at present, because even the species which attack forest insects have not yet been reported upon, as referred to above.

As is now well known, certain families of the Chalcidoidea are not parasitic but phytophagous, e.g. Agaonidae, Torymidae (part), Eurytomidae (part), etc. Information about the phytophagous species is not included in this bulletin. About 450 parasitic species of Chalcidoidea have been recorded from India so far. In the case of about 175 species, hosts are known and are described in this bulletin. The arrangement of the families, subfamilies and genera followed is based on the works

of Ashmead, Schmiedeknecht and Girault and is given in outline below. The individual species have been arranged in alphabetical order and illustrations of important species have been appended. At the end, a host index arranged according to the main orders of insects and a general index to parasites are appended.

Naturally no claim is made that this bulletin contains a complete list of hosts of various parasites. It is only during the last decade that Indian parasites have received careful attention in various parts of the country. It is, therefore, probable that there are many more hosts than have been actually recorded so far.

### SYSTEMATIC ARRANGEMENT

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## Family TORYMIDAE

## Subfamily MONODONTOMERINAE

**Monodontomerus trichiophthalmus** (Cameron)Cameron, *Ind. For. Rec.*, 4, p. 94 (1912), (*Paroligosthenus*)

First described by Cameron from specimens taken on leaves of *Shorea robusta* at Dehra Dun. Waterston [1922] recorded it as having been bred from larvae of a leaf-cutting bee at Dehra Dun. Mani [1936] recorded it from Lyallpur.

**Eridontomeroidella gibboni** GiraultRamakrishna, *Rep. Proc. 3rd Ent. Meet. Pusa*, p. 935 (1919)

The species is ascribed to Girault but reference to its description cannot be traced in the literature available in this country; the name does not also occur in the *Zool. Rec.* up to the year 1936.

In the Pusa collection there are two specimens of this species bred from the grubs of the Chalcid, *Bruchophagus mellipes* Gahan (= *Eurytoma indi*), infesting young pods of the Leguminous plants *agathi* and *daincha* at Coimbatore.

## Subfamily PODAGRIONINAE

**Pachytomus mantisiphagus** ManiMani, *Rec. Ind. Mus.*, 38, p. 126 (1936)

Recorded to have been bred from eggs of a mantid in the Barkuda Island, Chilka Lake.

**Podagrion mantoidae** (Motschulsky)Motschulsky, *Etud. Ent.*, 8, p. 16 (1859), (*Anastatus*)

First described from specimens bred from the eggs of a mantid in Ceylon and was placed in the genus *Anastatus* (Fam. Encyrtidae). Though Dalla Torre [1898] accepted the genus *Anastatus* as valid, he transferred the species to *Podagrion*. Gahan and Fagan [1923] did not, however, agree with this view.

**Podagrion pachymerum** (Walker)Walker, *Ent. Month. Mag.*, 1, p. 118 (1833), (*Priomerus*)

Ramaswamayya [1923], and Ramakrishna and Margabandhu [1934] recorded this species as having been bred from the eggs of *Mantis religiosa* at Coimbatore.

## Family CHALCIDIDAE

## Subfamily LEUCOSPIDINAE

**Epexochlaenoides pyriformis** WeldWeld, *Proc. U. S. N. Mus.*, 61, (Art. 6), p. 35 (1922)

The original description of this species was based on specimens collected at Pusa. In the Pusa collection there are several female specimens bred out of the Eumenid wasp *Rhynchium nitidulum* from Pusa and Bombay. It also occurs at Coimbatore [Mani 1933].

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Subfamily CHALCIDINAE

**Meyeriella indica** Krausse

Krausse, *Archiv Naturgesch.*, 82, Abt. A, Heft 1, pp. 93-95, figs. 1-5 (1916)

Described from material bred from *Delias eucharis* at Trichinopoly (South India). No specimen of this species is available to us from any institute in India for examination.

**Oncochalcis nursei** Cameron

Cameron, *J. Bombay Nat. Hist. Soc.*, 17, p. 580 (1907)

Originally described from Bombay. It has since been bred from pupae of *Plecoptera reflexa* attacking *Dalbergia sissoo* at Chichawati, Punjab.

**Brachymeria argentifrons** (Ashmead)

Ashmead, *J. N. Y. Ent. Soc.*, 12, p. 136 (1904)

Originally described from America. In the Pusa collection there are four specimens (named by Ashmead) bred from pupae of a Lasiocampid moth at Coimbatore.

**Brachymeria criculae** (Kohl)

Kohl, *Ind. Mus. Notes*, 1, p. 80 (1889)

Described from specimens bred from caterpillars of a wild silk moth, *Cricula*, at Ranchi.

**Brachymeria euplocae** (Westwood)

Westwood, *Trans. Ent. Soc. London*, 1, p. 6 (1837)

This species occurs in the Indo-Australian region. In India it parasitises caterpillars of a variety of moths. Cotes [1888] recorded it on the caterpillars of *Euploea* from Eastern Dooars. It was bred from caterpillars of *Virachola isocrates* infesting pomegranate fruits at Krishnagar, Bengal and from *Hyblaea pueri* at Puri.

Girault [1915] reported it on *Antheraea simplex* from New South Wales, Australia.

There appears to be considerable variation in the size of this species, depending upon the nature of the host.

**Brachymeria excarinata** Gahan

Gahan, *Philip. J. Sci.*, 27, p. 90 (1925)

Described from material bred as pupal parasite of the moth *Cnaphalocrocis medinalis* Gn., a pest of rice in the Dutch East Indies and Philippines. In the Pusa collection there is one specimen of this species bred by Cherian from the pupae of the diamond-back moth *Plutella maculipennis* Curtis, at Coimbatore. Dr. Masj of Italy in a private letter informs us that this species occurs in Egypt also.

PLATE I

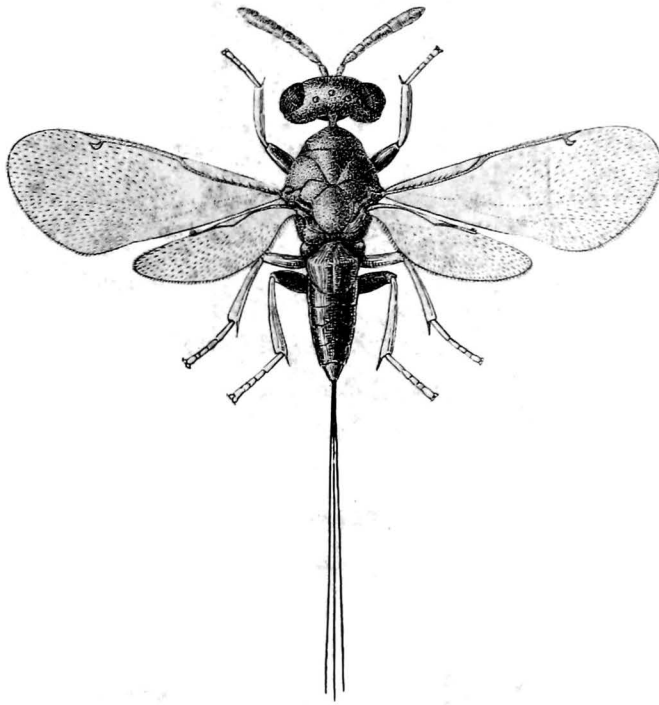


FIG. 1. *Eridontomeroidella gibboni* Gir. (Female)

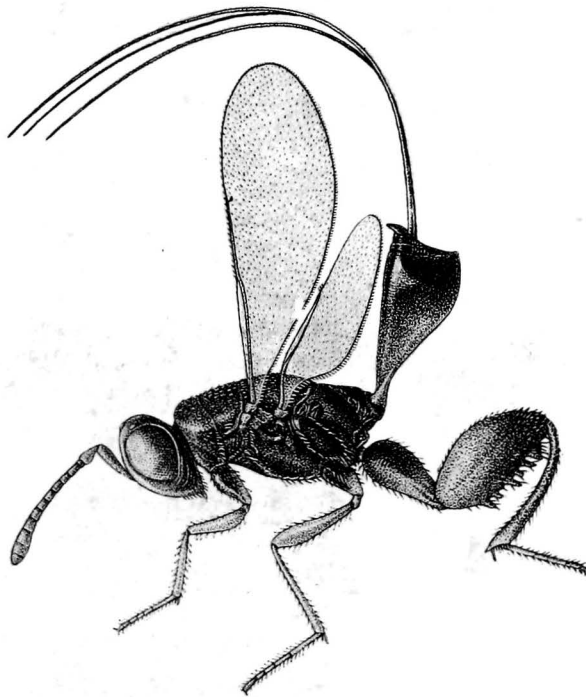


FIG. 2. *Podagrion mantoidae* (Motsch.) (Female)



PLATE II

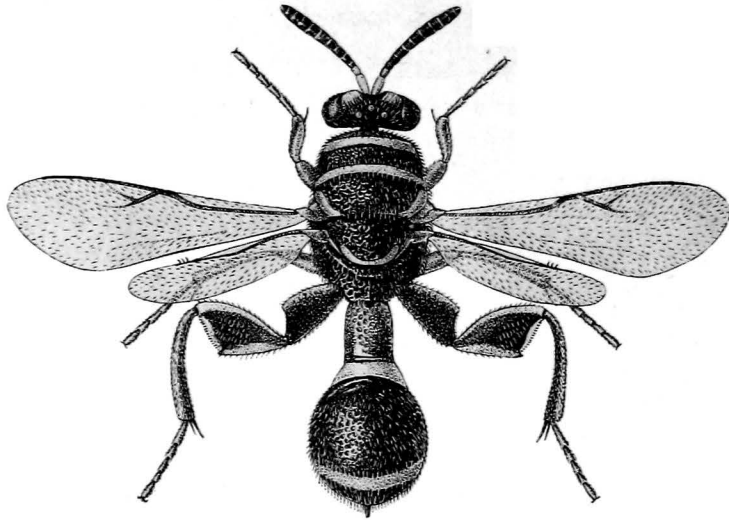


FIG. 3. *Epexochlaenoides pyriformis* Weld (Female)

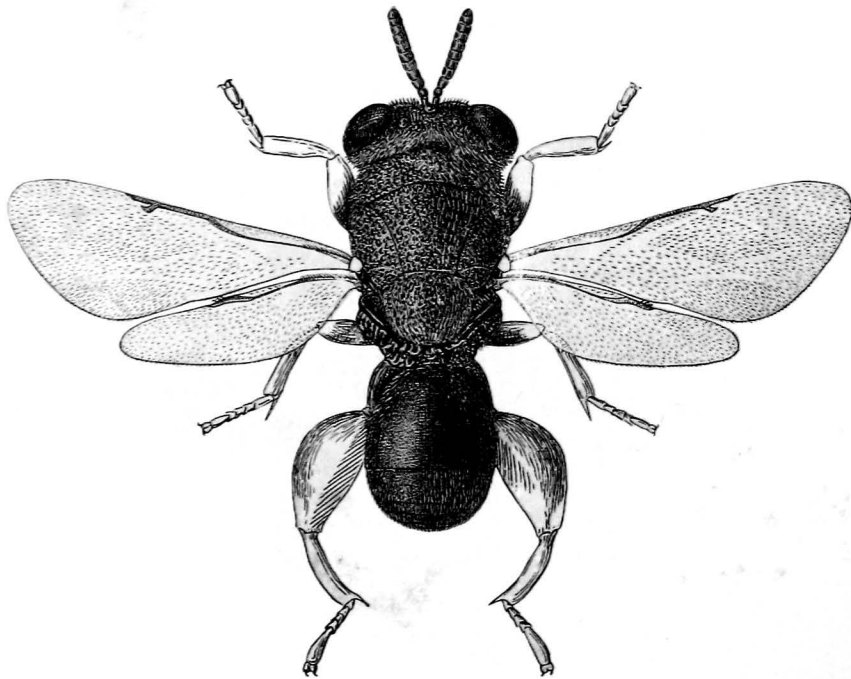


FIG. 4. *Brachymeria argentifrons* (Ashm.) (Male)

**Brachymeria hearseyi** (Kirby)

Kirby, *J. Linn. Soc. London (Zool.)*, 17, p. 76 (1883)

This species has been bred from pupae of *Hypsipyla robusta*, which attacks leaves of *Cedrela toona* at Dehra Dun.

Waterston [1922] described *xanthotenus* as a variety of this species from material bred from pupae of *Hypsipyla* and *Euploea* at Dehra Dun.

**Brachymeria nephantidis** Gahan

Gahan, *Proc. U. S. N. Mus.*, No. 2831, Art. 77, p. 5 (1930)

This is parasitic on pupa of *Apanteles taragamae* which is a parasite of *Nephantis serinopa*, a serious pest of coconut leaves. It was bred from this host at Coimbatore, Ayodyapatnam, Mangalore, Cochin and Samalkota.

**Brachymeria plutellophaga** Girault

This species was bred by Cherian [1938] on one occasion only from the pupae of the diamond-back moth, *Plutella maculipennis* Curtis, at Coimbatore, which was generally parasitized by *B. excarinata* described above.

**Brachymeria tachardiae** (Cameron)

Cameron, *Ind. For. Rec.*, 4, p. 93 (1913)

In the Pusa collection there are two specimens of this species from Namkum, Bihar, bred from larvae of the noctuid, *Eublemma amabilis*, predaceous on lac. It also attacks other moths, such as *Earias insulana* at Pusa and in the Punjab.

It was also bred from *Hypsipyla robusta* at Dehra Dun [Husain 1924].

**Tumidicoxoides** sp.

Ramakrishna, *Spol. Zeyl.*, 13, p. 245 (1923)

Ramakrishna reported this species to be a parasite of *Carea subtilis* at Coimbatore.

**Spilochalcis fletcheri** Mani

Mani, *Rec. Ind. Mus.*, 38, p. 340 (1936)

This species can be easily recognised by the brick red spots and markings on its body. One female specimen was bred by Fletcher from the rose tenthrinid, *Arge luteiventris* Cam., at Shillong in September 1917.

**Neochalcis myrmeleonae** Mani

Mani, *Rec. Ind. Mus.*, 38, p. 471 (1936)

Several specimens of this species were bred from nymphs of a species of antlion (Neuroptera) at Madras.

**Euchalcis myrmeleonae** ManiMani, *Rec. Ind. Mus.*, 38, p. 470 (1936)

This species was also bred in fair numbers from nymphs of a species of antlion at Madras.

**Anacryptus chilkaensis** ManiMani, *Rec. Ind. Mus.*, 38, p. 127 (1936)

Found along with the grubs of the ant, *Camponotus compressus*, at Barkuda Island, Chilka Lake. As almost all species of the tribe Chalcitellini, to which this species belongs, are known to be parasites of ants, it is very probable that *A. chilkaensis* is also parasitic on the grubs of *Camponotus*.

**Antrocephalus destructor** WaterstonWaterston, *Ind. For. Rec.*, 9, p. 64 (1922)

Described from material bred from pupae of *Hypsipyla robusta*, the larvae of which feed on the leaves of *Cedrela toona* at Dehra Dun.

**Antrocephalus renalis** WaterstonWaterston, *Ind. For. Rec.*, 9, p. 69 (1922)

This species was bred from the pupae of *Hypsipyla robusta*, a defoliator of toon tree at Dehra Dun.

**Stomatoceras ayyari** GahanGahan, *Proc. U. S. N. Mus.*, 56, p. 518 (1919)

In the Pusa collection there are two specimens bred from the larvae of *Parasa lepida*, infesting mango, castor, etc., at Coimbatore in 1914.

**Stomatoceras sulcatiscutellum** GiraultRamakrishna, *Rep. Proc. 3rd Ent. Meet. Pusa*, p. 934 (1920)

A reference to the original description of this species by Girault cannot be traced in the literature available in this country. It is reported to have been bred from the pupa of *Nephantis serinopa*, infesting coconut leaves at Coimbatore.

**Dirhinus pachycerus** MasiMasi, *Eos*, 3, p. 42 (1927)

The Pusa collection contains one specimen bred by Mr. Cherian from fruit-fly (*Dacus* sp.) maggots infesting cucumber at Coimbatore.

*Dirhinus excavatus*, which is known to occur in some parts of Africa and Asia (including India) and parasitises fruit-fly maggots, was successfully introduced by Silvestri [1914] into Hawaii.

Another species of *Dirhinus* (*D. sarcophagae* Frogg.) digs into loose soil with its horned head and stout legs and lays eggs on the buried pupae of *Sarcophaga aurifrons* [Froggatt, 1919].

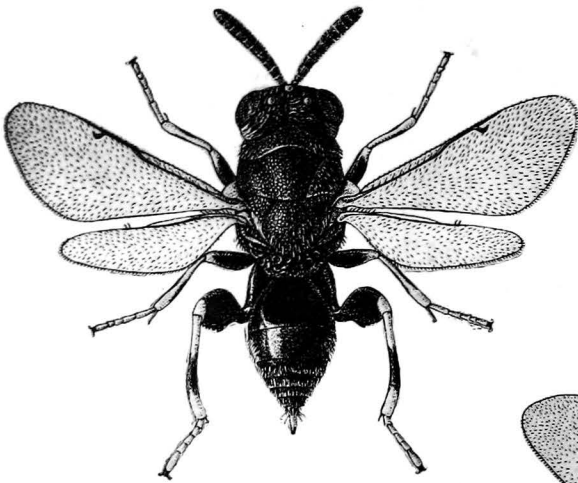


FIG. 5. *Brychymeria excarinata* Gah.  
(Female)

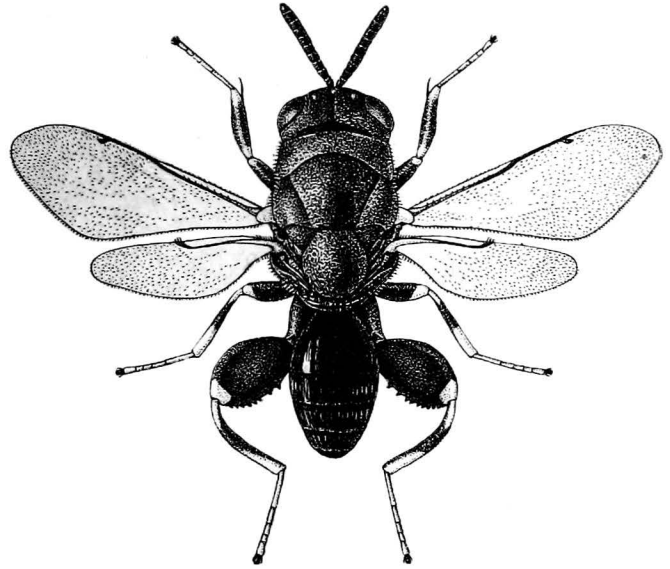


FIG. 6. *Brachymeria tachardiae* (Cam.) (Male)

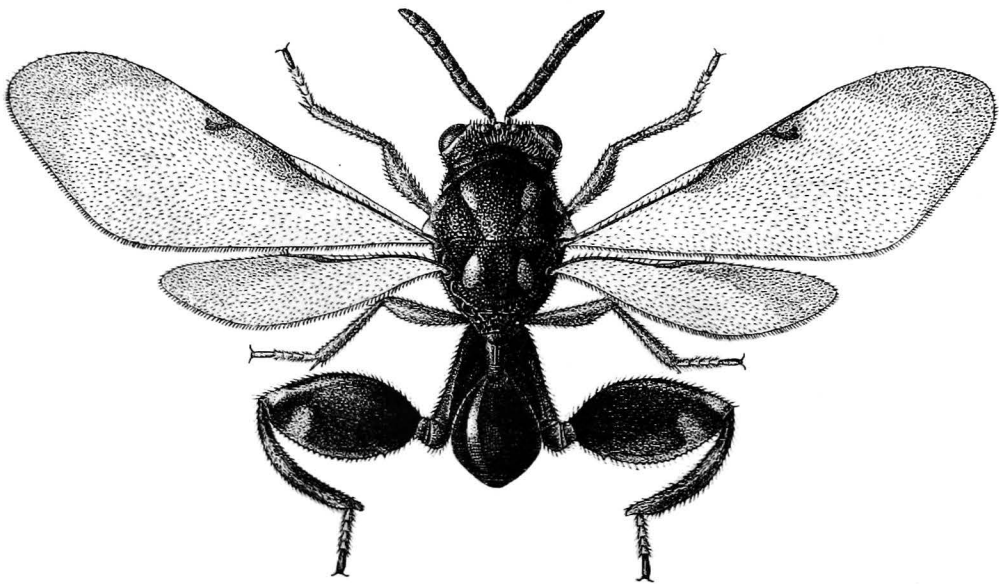


FIG. 7. *Spilochalcis fletcheri* Mani (Male)

PLATE IV

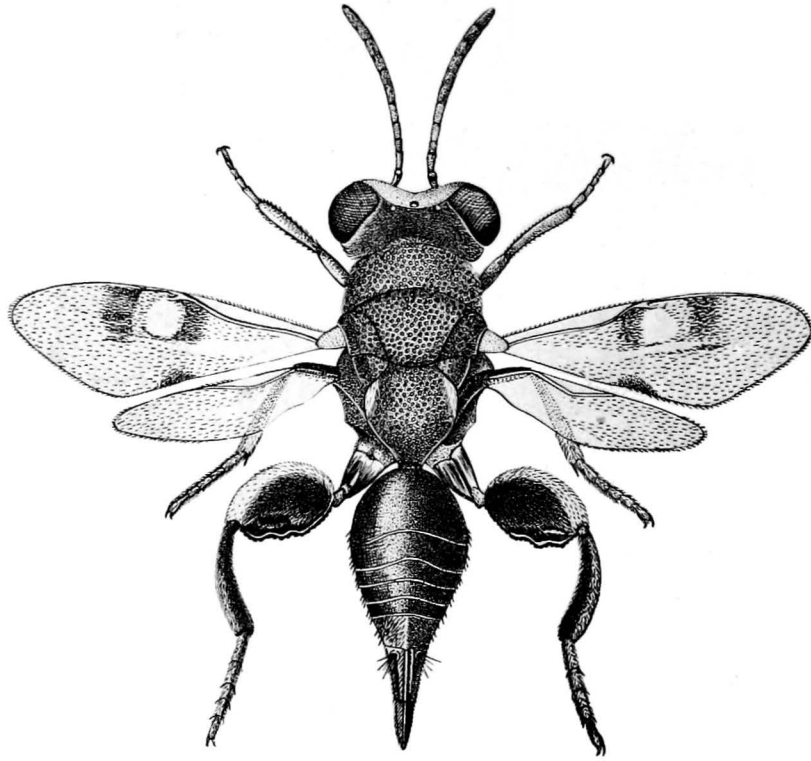


FIG. 8. *Antrocephalus destructor* Waterst. (Female)  
[ From *Ind. For. Rec.* by kind permission of the Forest Entomologist ]

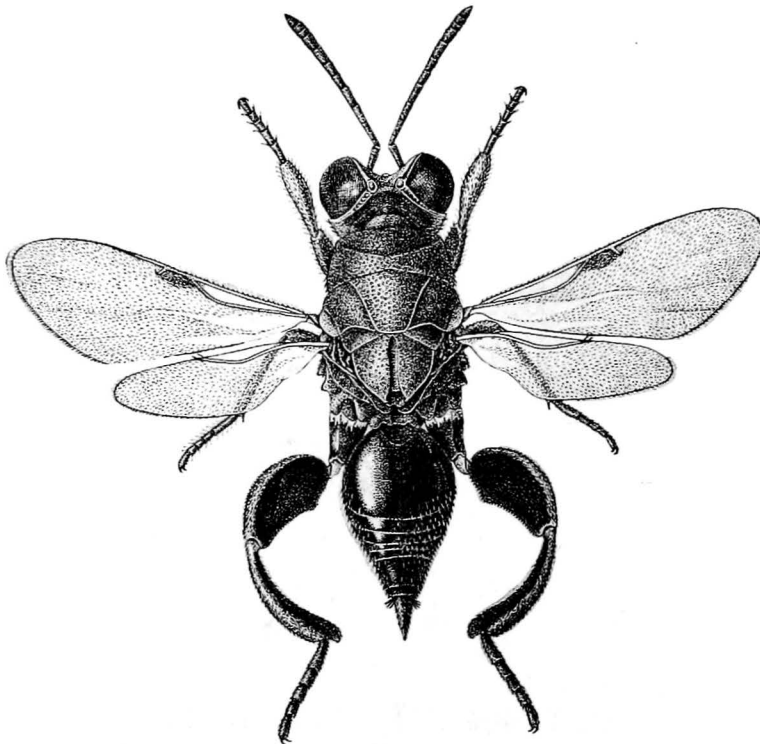


FIG. 9. *Antrocephalus renalis* Waterst. (Female)  
[ From *Ind. For. Rec.* by kind permission of Forest Entomologist ]

## Family EURYTOMIDAE

## Tribe DECATOMINI

*Prodecatoma* sp.

In the Pusa collection there are several specimens of this parasite bred from the larvae of the weevil *Microlarinus rhinocylloides* Hochh., which bore into the fruits of *Tribulus* sp. in Delhi. In the month of July the larval period was about three days, the pupal period about four days and the total pre-imaginal period was about a week. The adult females of the parasite lay eggs on the full-grown grubs of the host.

## Tribe EURYTOMINI

*Eurytoma albotibialis* Ashmead

Ashmead, *Proc. U. S. N. Mus.*, 28, p. 965 (1905)

This species was originally described from the Philippines. Ramakrishna [1939] recently recorded it from South India as having been bred from the larva of *Perisierola nephantidis* Meuseb., a bethylid larval parasite of *Nephantis serinopa*.

*Eurytoma curculionum* Mayr

Mayr, *Verh. Zool.-bot. Ges. Wien.*, 28, pp. 301, 306, 314 (1878)

We are not certain about the identification of the species in the Pusa collection. There are two specimens bred from the pupae of the amaranthus weevil, *Lixus truncatulus* at Pusa. The species was originally described as parasitic on the grubs of the beetles *Cleopus campanulae* and *Gymnetron asellus* Grav. in Austria. It has recently been bred from the grubs of the weevil, *Lixus junci* in Italy [Menozzi, 1934], where it is found to be of sufficient importance and is being tried in the control of the weevil by biological methods. Faure [1923] bred the parasite from *Baris* spp. in France. One of us bred it from the amaranthus weevil in Madras also.

*Eurytoma monemae* Ruschka

Ruschka, *Ent. Mitt.*, 7, p. 161 (1918)

This species was described from specimens bred from cocoons of *Monema flavescens* Walk. at Tientsin, China. Gahan [1938] recently synonymised with it his *E. parasae* Gah., bred from *Parasa lepida* at Coimbatore.

*Eurytoma nesiotēs* Crawford

Crawford, *Proc. U. S. N. Mus.*, 38, p. 129 (1910)

This species was originally described from the Philippines by Crawford under the name *E. fulvipes*, but as this name was pre-occupied, he later [1911] changed it to *E. nesiotēs*. Gahan [1938] has recently synonymised with it his two Indian species, *E. denticoxa* and *E. denticpectus*, described from specimens bred from a meal-worm in stored maize and from the til gall midge, *Asphondylia sesami* Felt, at Coimbatore. One of us bred it in association with *Inostemma* sp. from the latter host at Tanjore and Madras also. *E. nesiotēs* is itself parasitised by another Eurytomid at Tanjore.

**Eurytoma pallidiscapus** Cameron

Cameron, *Ind. For. Rec.*, **4**, p. 98 (1912)

The Pusa collection contains one female specimen bred from the caterpillars of the blastobasid moth, *Holcocera pulverea* Meyr., which is predaceous on *Laccifer lacca* at Namkum, Ranchi (Bihar).

**Eurytoma pigra** Girault

As in the case of several other species described by Girault, the original description of this parasite could not be traced in the literature available in this country.

Ramakrishna [1920] bred it from the grubs of the weevil, *Alcides bubo*, a pest of *Sesbania* in South India.

**Eurytoma setitibia** Gahan

Gahan, *Proc. U. S. N. Mus.*, **56**, p. 517 (1919)

There is one specimen in the Pusa collection reared from a 'weevil grub' producing galls on leaves of *Cordia myxa* at Coimbatore.

Ramakrishna [1927] reported that this species also parasitises the nymphs of the psyllid, *Trioza fletcheri* Crawford, which causes large, tubercular galls on leaves of *Trewia nudiflora* at Coimbatore. One of us bred the species from the same host at Calcutta.

**Eurytoma sulcata** Kieffer

Kieffer, *Ann. Soc. Sc. Bruxelles*, **29**, p. 192 (1905)

Kieffer described this species as a parasite of the *Cynip* producing galls on *Quercus pachyphylla* in Bengal.

## Family PERILAMPIDAE

**Monacon abruptum** Waterston

Waterston, *Ind. For. Rec.*, **9**, p. 79 (1922)

This species parasitises *Platypus uncinatus* Blandf. of *Heritiera* at Tumbulani, Sunderbans (Bengal).

**Monacon productum** Waterston

Waterston, *Ind. For. Rec.*, **9**, p. 75 (1922)

This is a parasite of *Diapus furtivus* Samp. infesting *Shorea robusta* trees in the Apalchand Range, Jalpaiguri, Dooars, and Rajabhatkhawa (Bengal).

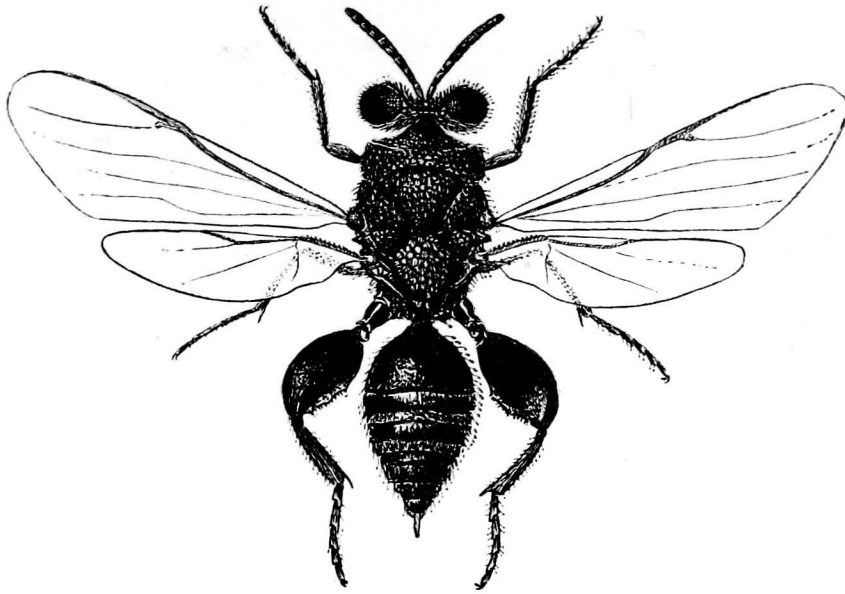


FIG. 10. *Stomatoceras ayyari* Gah. (Female)  
[ From *Rep. Proc. IV Ent. Meet. Pusa* ]

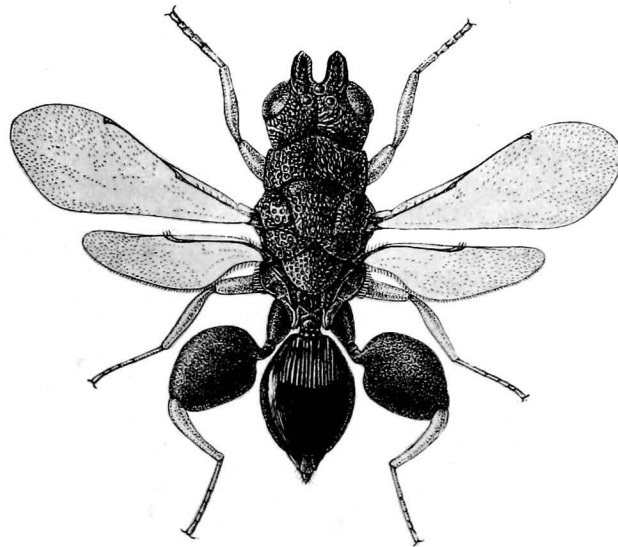
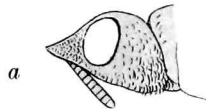


FIG. 11. *Dirhinus pachycerus* Masi (Female)  
(a) Lateral view of head.



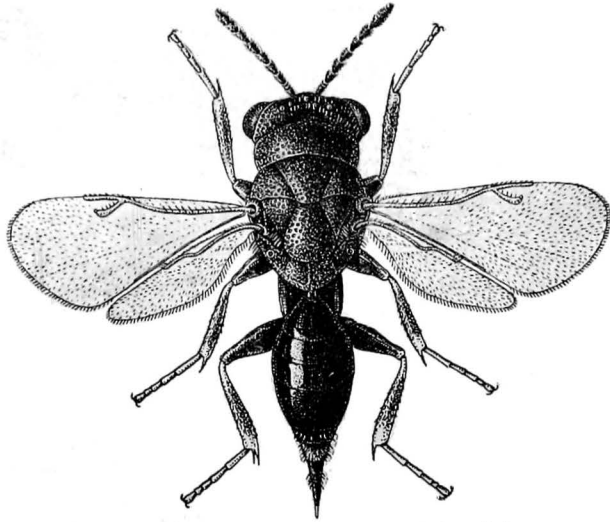


FIG. 12. *Prodecatoma* sp. (Female)

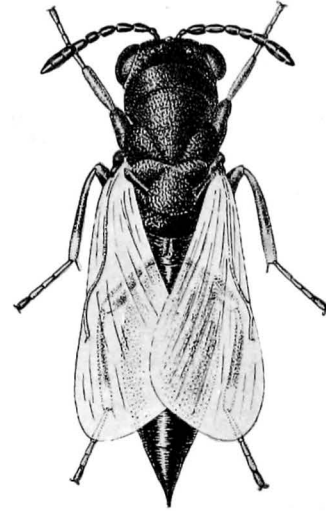


FIG. 13. *Eurytoma curculionum* Mayr. (Female)

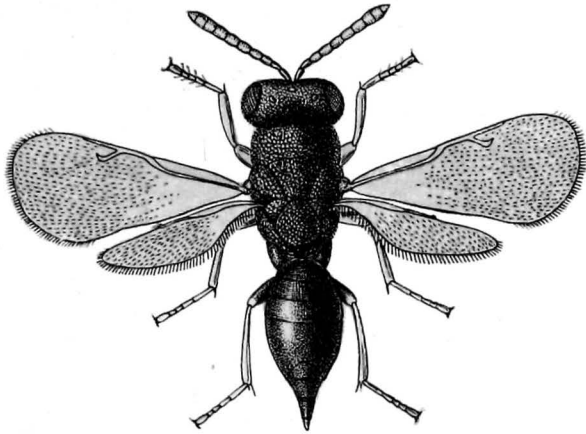


FIG. 14. *Eurytoma setitibia* Gah. (Female)

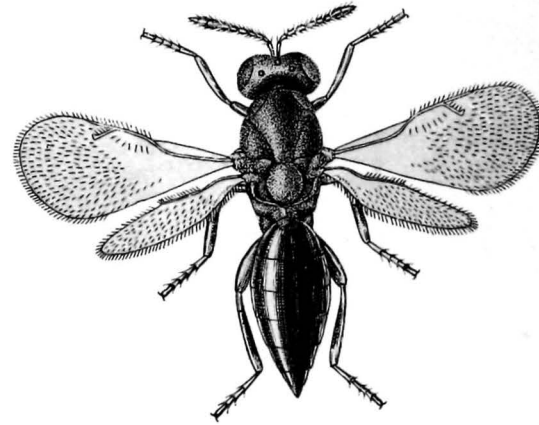


FIG. 15. *Systasis dasyneuræ* Mani (Female)

**Perilampus microgastris** FerriereFerriere, *Bull. Ent. Res.*, 21, p. 353 (1930)

This species has been reported [Ramakrishna and Margabandhu, 1934] to be parasitic on the Braconids *Microgaster indicus* at Hoshangabad and *Apanteles machaeralis* which are primary parasites of *Hapalia machaeralis* at Dehra Dun. It was also bred at Coimbatore from *A. taragamae* Vier., another Braconid parasite of *Nephantis serinopa*, which is a serious pest of coconut in the west coast.

**Perilampus** sp.

Cotes [1898] bred this species from the caterpillars of the moth, *Dasychira thwaitesii* Moore, defoliating *sal* in the Eastern Doocars. He figured the species but it appears that no description has been published, nor any specimens thereof are in the Indian Museum collection.

## Family MISCOGASTERIDAE

## Subfamily PIRENINAE

**Ecrizotomorpha taskhiri** ManiMani, *Ind. J. Agric. Sci.*, 9, p. 538 (1939)

In the Pusa collection there are several specimens bred from the linseed midge *Dasyneura lini* along with its larval parasite *Systasis dasyneurae* (referred to below) at Pusa and Karnal. The species is probably either a hyperparasite or secondary parasite.

## Subfamily TRIDYMINAE

**Systasis dasyneurae** ManiMani, *Ind. J. Agric. Sci.*, 9, p. 535 (1939)

There are several specimens of this species in the Pusa collection bred in the laboratory of the Imperial Entomologist from the larvae of the linseed gall midge, *Dasyneura lini* Barnes, from material obtained from Pusa, Karnal, Delhi and Nagpur. The parasite lays eggs singly inside the unopened flower buds of linseed but rarely on the host larvae. In February the egg stage lasts for about three to four days. The young parasite larva on hatching wanders for a time in search of the host maggot, to which it ultimately attaches itself and begins to feed. The larval period lasts for 12 to 15 days at 18° C. The larva consumes about three to four host maggots before pupating. Pupal period lasts for 11 to 13 days at 18°C. The whole life-cycle is thus completed in about a month at 18°C. The percentage of natural parasitization in February was found to be 50.7 at Pusa. Ahmad [1939] has recently published a full account of the biology of this species.

**Dinarmus sauteri** Masi\*Masi, *Konowia*, 5, p. 360 (1926)

The species was originally described by Masi from four female specimens in the Sauter's collection from Formosa.

\* *Dinarmus coimbatorensis*, recently described by Ferriere [1939] from Coimbatore, is in all probability identical with this species.

In the Pusa collection there are several specimens (det. Gahan) of this species (including males, which have not been described so far) bred by T. Ahmad [1939] from the grubs of the amaranthus weevil, *Lixus truncatulus* at Pusa. This is the first record of this parasite from India. One of us bred it from the same host at Madras.

#### Subfamily BRUCHOBINAE

#### *Bruchobius colemani* Crawford

Crawford, *Proc. U. S. N. Mus.*, 45, p. 250 (1913)

The genus *Bruchobius* Ashm. was originally referred to the family Pteromalidae but later on Masi [1924] and Mani [1939] studied it in detail and included it in the family Miscogasteridae.

There is one female specimen in the Pusa collection bred by Y. Ramchandra Rao from a mixed infestation of red gram pods by *Bruchus* spp. at Coimbatore.

According to Ramakrishna [1927] this species also occurs in Bangalore and Mysore in addition to Coimbatore. One of us bred this parasite from the larvae of *Bruchus analis* infesting *Cicer* seeds in Calcutta.

#### *Bruchobius laticeps* Ashmead

Ashmead, *Mem. Carnegie Mus.*, 1 (4), p. 314 (1904)

Originally described as a larval parasite of the pulse beetle, *Bruchus quadrimaculatus* Fabr., from America. The type was later redescribed by Crawford [1913]. The species has not been previously recorded from India. Recently it has been bred in very large numbers as a larval parasite of a mixed infestation of *Phaseolus mungo* by *Bruchus analis*, *Bruchus chinensis* and another undetermined species of *Bruchus* in the laboratory of the Imperial Entomologist at New Delhi. The percentage of parasitization was found to vary from 29 to 67 between September 1937 and January 1938 inside the laboratory.

The adult female actively moves about among the grains in search of host. The host eggs attached to the grains are felt by the antennae and if found hatched, the ovipositor is thrust through the empty shell and one or two eggs are laid on the newly hatched host grubs, before it eats its way deep into the grain. Oviposition lasts about one minute. The parasite, when adult, has usually to bite its way out of the seed.

Copulation has not been described in this species before. On approaching the female, the male rapidly waves its antennae, beats its wings and rides over the female. Quickly moving forward over the thorax of the female, it catches hold of its face with its fore legs, and the thorax with its other legs, taps and rubs its antennae against those of its spouse for a couple of minutes. This excites the female which then tilts up the abdomen. The male at once starts copulating which lasts for only thirty to fifty seconds. The act is repeated several times by the same pair. Soon after copulation the female is capable of laying eggs, but usually does not do so for a day.

PLATE VII

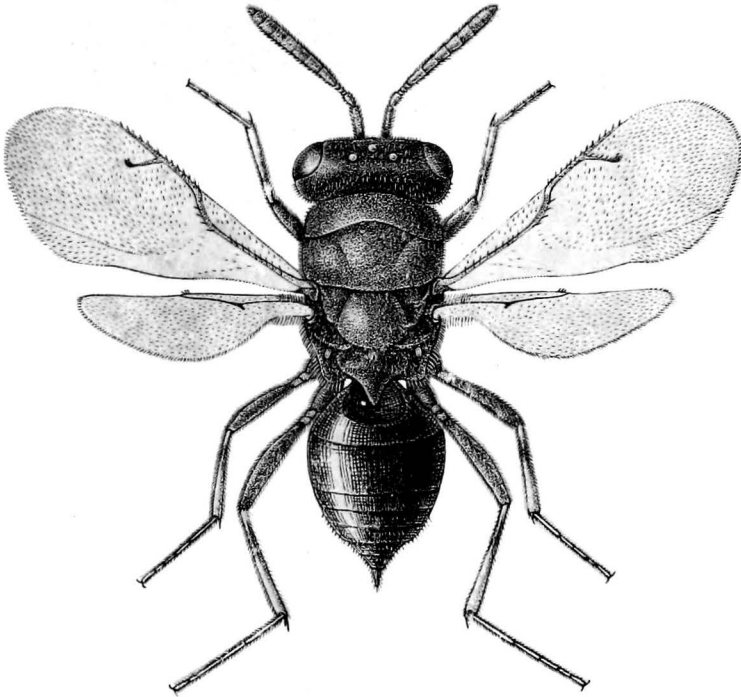


FIG. 16. *Bruchobius laticeps* Ashm. (Female)

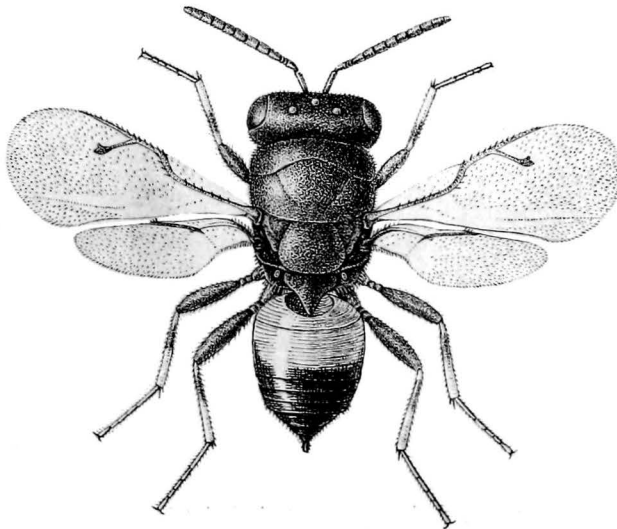


FIG. 17. *Bruchobius laticeps* Ashm. (Male)

PLATE VIII

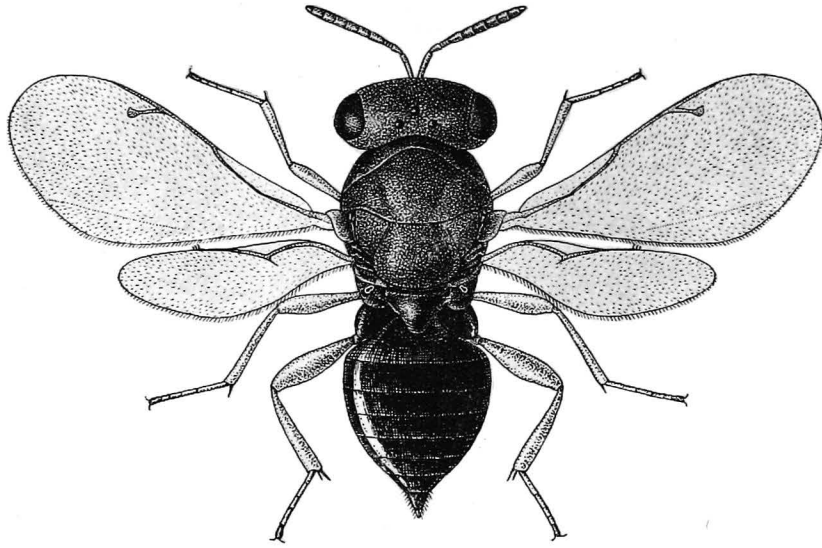


FIG. 18. *Bruchobius colemani* Crawf. (Female)

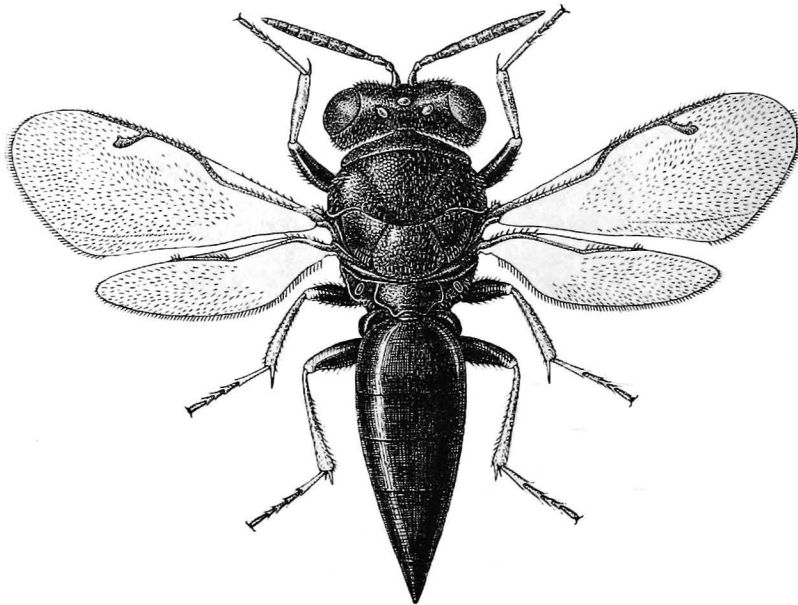


FIG. 19. *Dinarmus sauteri* Masi (Female)

**Oedaule stringifrons** Waterston

Waterston, *Ind. For. Rec.*, 9, p. 82 (1922)

This species was recorded as parasitic on the grubs of *Caryoborus gonagra* at Dehra Dun.

**Anysis alcocki** (Ashmead)

Ashmead, *Ind. Mus. Notes*, 5, p. 61 (1903), (*Eurycephalus*)

The genus *Anysis* Howard was placed by previous workers in the subfamily Eunotinae of the Pteromalidae; Smith and Compere [1928], however, disagreeing from this view, included it in Miscogasteridae. Mani [1938] has confirmed this.

Ashmead described *A. alcocki* from specimens bred at Waltair from the scale insect *Ceroplastes actiniformis* Green, which is a pest of coconut, mango, *Canna*, *Ficus* sp., *Calophyllum*, etc., in South India and Ceylon.

**Anysis saissetiae** (Ashmead)

Ashmead, *Proc. U. S. N. Mus.*, 24, p. 405 (1905), (*Eurycranium*)

Ashmead described this species under the genus *Eurycranium* from specimens bred from *Saissetia nigra* (Nietn.) collected in the Philippine Islands. Smith and Compere [1928] recorded it to be parasitic on *Saissetia oleae* at Swatow (China) and in Formosa, and *Saissetia hemisphaerica* at Manila (Philippines).

In India it has been bred from an unidentified Coccid at Waltair.

Family ENCYRTIDAE

Subfamily EUPELMINAE

**Eupelmus amorphococci** Ashmead

Reference to the original description of this species could not be traced in the literature available in this country.

Ramakrishna [1925] recorded this species as having been bred from *Amorphococcus mesuae* in Ceylon.

**Eupelmus carinatus** Kieffer

Kieffer, *Ann. Soc. Sci. Bruxelles*, 29, p. 194 (1905).

This species was described from specimens bred from the gall midge, *Panteliola hassi* (Kieff.), producing galls on the shoot of *Artemisia* in Tuticorin, South India.

**Eupelmus tenuicornis** Kieffer

Kieffer, *Ann. Soc. Sci. Bruxelles*, 29, p. 192 (1905).

This species was recorded as a larval parasite of the gall midge, *Lasioptera textor* Kieff., producing galls on *Polygonum molle* in 'Bengal'.

**Eupelmus tachardiae** (Howard)Howard, *Proc. U. S. N. Mus.*, 18, p. 641 (1896), (*Anastatus*)

Howard described this species from material bred from lac in Ceylon.

In the Pusa collection there are two specimens bred from lac at Namkum, Ranchi. Glover *et al.* [1935] consider it to be parasitic on the lac insect, whereas Mahdihassan [1935] bred it from the lac predator, *Eublemma amabilis* Moore.

*Brasema annulicaudis* Cameron, described from Dehra Dun, is believed by Ferriere [1935] to be identical with this species.

**Bruchocida orientalis** CrawfordCrawford, *Proc. U. S. N. Mus.*, 45, p. 247 (1913)

This species was described from specimens bred from the grubs or pupae of the pulse beetles, *Bruchus* spp., at Bangalore. Ramakrishna [1920] recorded it from the same hosts at Coimbatore.

**Anastatus blattidarum** FerriereFerriere, *Bull. Ent. Res.*, 21, p. 33 (1930)

In the Pusa collection there are several specimens bred by one of us from oothecae of a cockroach infesting old, stored tamarind at Calcutta.

Ferriere originally described this species from Sudan (Africa) and later on received specimens from Mysore also.

**Anastatus coimbatorensis** GiraultRamakrishna, *Rep. Proc. 3rd Ent. Meet. Pusa*, p. 933 (1920)

This species, attributed to Girault, has not apparently been described so far; the name does not occur in the *Zool. Rec.* up to the year 1937, the latest received.

The Pusa collection contains only one specimen bred by Y. Ramchandra Rao from the eggs of *Oxya velox* at Coimbatore.

**Anastatus colemani** CrawfordCrawford, *Proc. U. S. N. Mus.*, 42, p. 6 (1912)

This species was bred by Coleman from the eggs of the Pentatomid, *Degonetus serratus* at Bangalore. Krishna Ayyar [1929] considered it to be a probable parasite of *Tetroda histeroides* also in S. India.

**Anastatus** sp.Ramakrishna, *Spol. Zeyl.*, 13, p. 247 (1925).

Eggs of the grasshopper, *Oxya velox*, and that of the Spingid moth, *Polyptychus dentatus*, are recorded to be parasitised by this species at Coimbatore. It is possible that there are actually two species of *Anastatus*, one on each of the two hosts mentioned above.

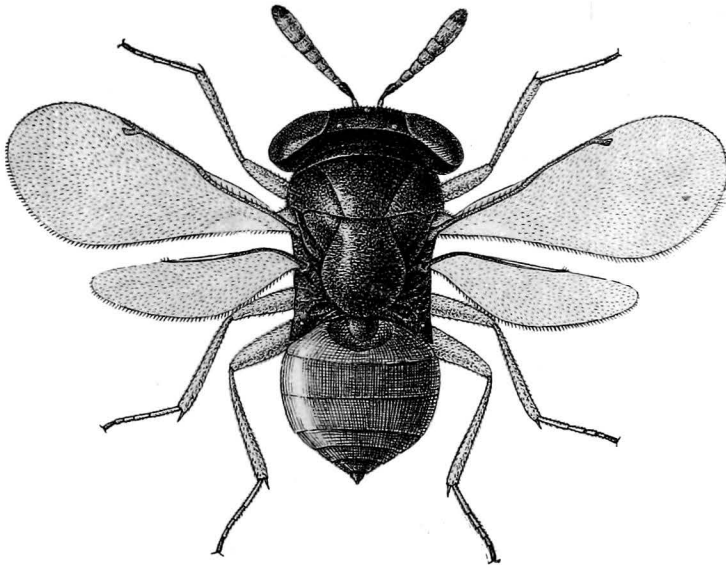


FIG. 20. *Anysis saissetiae* Ashm. (Female)

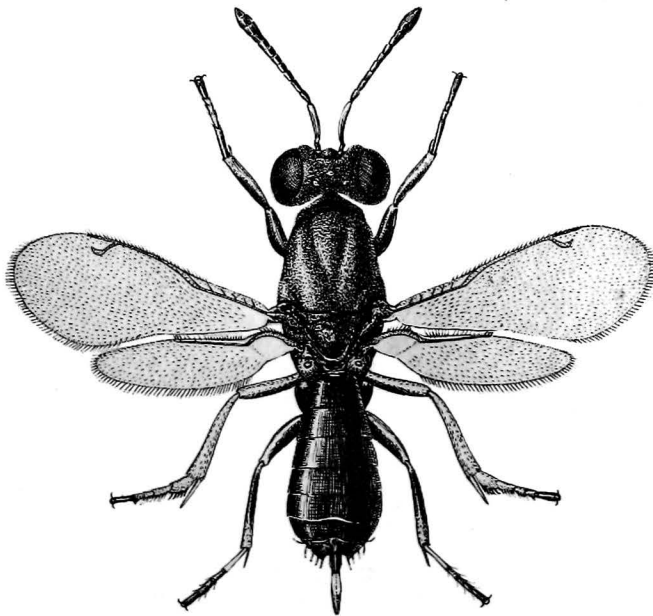


FIG. 21. *Eupelmus tachardiae* (How.) (Male)



PLATE X

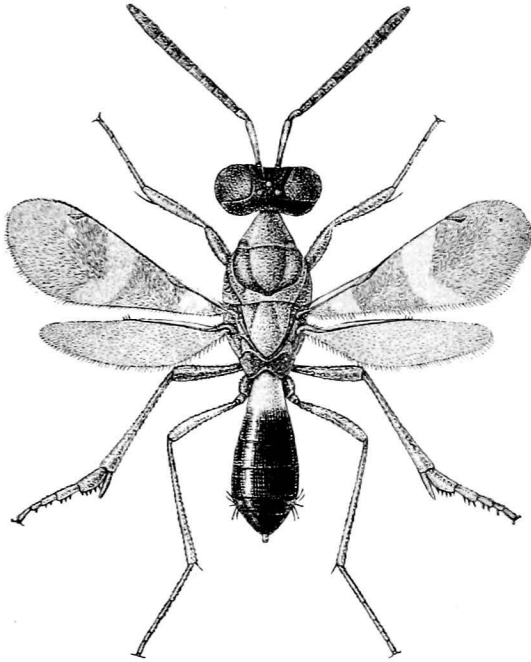


FIG. 22. *Anastatus blattidarum* Ferr. (Female)

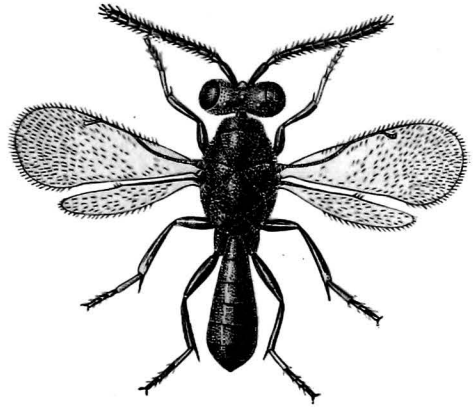


FIG. 23. *Anastatus* sp. (Male)

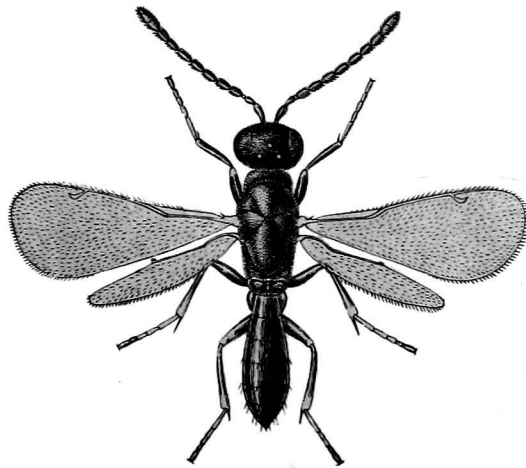


FIG. 24. *Anastatus* sp. *prox. coleopterorum* Gir. (Male)

**Anastatus spp.**

In the Pusa collection there are two distinct species bred by T. Ahmad [1939] from eggs of the amaranthus weevil *Lixus truncatulus* at Pusa. The incidence of these species is much lower than that of *Pareuderus toymoides* Ferr., another Chalcid parasite of the weevil-borer. One of the species approaches *A. coleopterorum* Gir. very closely, from which it is, however, distinct.

## Subfamily ENCYRTINAE

**Eucomys lecaniorum (Mayr)**

Mayr, *Verh. zool.-bot. Ges. Wien*, 25, p. 740 (1875), (*Comys*)

In the Pusa collection there are four specimens of this species bred from the scale-insect, *Lecanium* sp., infesting cotton at Coimbatore.

Ramakrishna [1927] called it *Encyrtus lecaniorum* and found it parasitizing *Saissetia nigra* at Coimbatore.

**Eucomys rufescens (Motschulsky)**

Motschulsky, *Bull. Soc. Imp. Nat. Moscou*, 36 (3), p. 53 (1863), (*Cheiloneurs*)

This species was recorded as a parasite of *Saissetia hemisphaerica* Ceylon.

**Paraleptomastix dactylopii (Howard)**

Howard, *Bull. U. S. Bur. Ent.*, 5, p. 23 (1885), (*Leptomastix*)

This species was originally described from specimens bred from *Pseudococcus citri* Risso in America.

In the Pusa collection there are several specimens of the species bred from the mealy bug, *Dactylopius saccharifolii*, in Delhi in September, 1938 [Mani, 1939].

**Anagyrus greeni Howard**

Howard, *Proc. U. S. N. Mus.*, 18, p. 639 (1896)

This species is recorded as a parasite of the scale-insect, *Maskellia zonata*, in Ceylon.

**Anagyrus saccharicola Timberlake**

Timberlake, *Proc. Hawaii. Ent. Soc.*, 8 (1), pp. 159-162 (1931)

This species was originally described from specimens bred from the red-scale of sugarcane, *Trionymus sacchari*, at Serdang, Selangor, Federated Malay States and Los Banos, Luzon, Philippines.

In the Pusa collection there are two specimens of the species bred from the same host at Karnal (Punjab). The species has also been reported to occur in Zululand, Africa [Mani, 1939].

**Comperiella bifasciata** HowardHoward, *Ent. News*, p. 121 (1906)

This cosmopolitan species has been recorded as parasitic on a variety of scale insects in different parts of the U. S. America, China, Hawaii, Australia, etc. In India it was reported on *Aspidiotus orientalis* by Glover [1935] and on *Chrysomphalus* by Mani [1938].

**Comperiella indica** RamakrishnaRamakrishna, *Rec. Ind. Mus.*, 36, p. 219 (1934)

This was the first species of the genus *Comperiella* How. to be recorded from India. The species was bred in large numbers from the tamarind scale, *Aspidiotus tamarindi*, at Coimbatore.

**Krishnieriella ceroplastodis** ManiMani, *Rec. Ind. Mus.*, 37, p. 422 (1935)

Described from specimens bred in large numbers, by Ramakrishna from *Ceroplastodes cajani* at Coimbatore.

**Tetracnemus indicus** RamakrishnaRamakrishna, *Rec. Ind. Mus.*, 34, p. 287 (1932)

This is a parasite of the mealy bug, *Pseudococcus citri*, infesting *Sesbania aculeata* at Coimbatore.

**Parechthrodryinus clavicornis** (Cameron)Cameron, *Ind. For. Rec.*, 4, p. 101 (1912), (*Copidosoma*)

This species was recorded to have been bred from the lac insect at Dehra Dun.

**Paracopidosomopsis javae** GiraultGirault, *Psyche*, 23, p. 49 (1916)

In the Pusa collection there is one specimen of this species bred from *Plusia signata* on *ragi* at Coimbatore.

**Homalotylus flaminus** (Dalman)Dalman, *Svensk. Vet.-Akad. Handl.*, 41, p. 340 (1820), (*Encyrtus*)

Ramakrishna and Margabandhu [1934] bred this species from the grubs of a Coccinellid at Coimbatore. In the Pusa collection there are several specimens of the species bred from the larvae and pupae of *Adonia variegata*, *Brumus suturalis* and *Chilocorus* sp. at Delhi and *Novius guerni* at Coimbatore. It has been recorded to parasitize a variety of Coccinellids in all parts of the world.

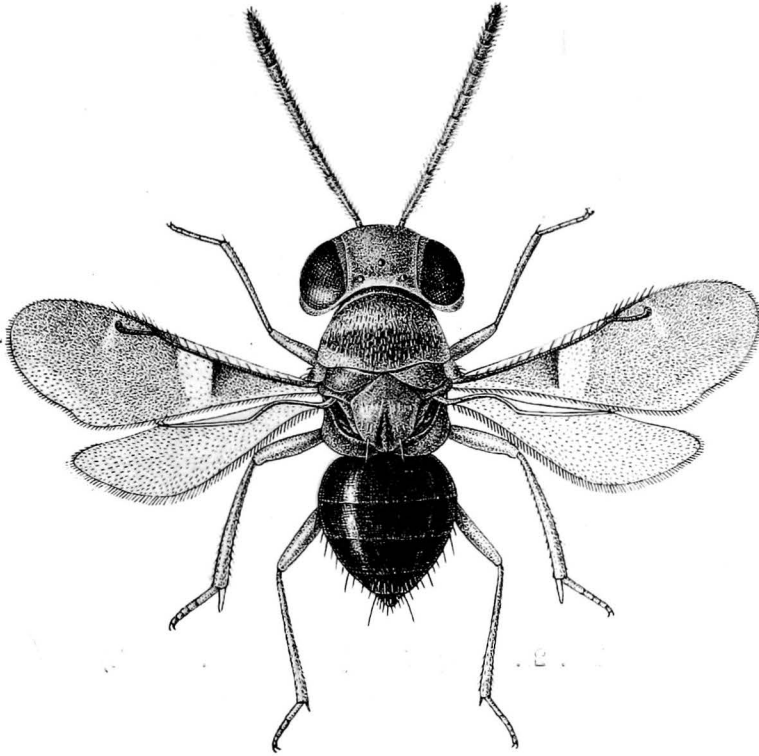


FIG. 25. *Eucomys lecaniorum* (Mayr)

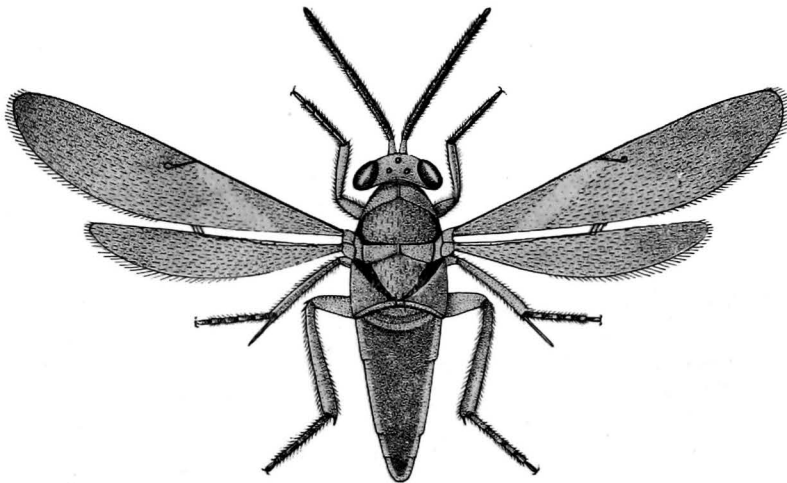


FIG. 26. *Paraleptomastix dactylopii* (How.) (Female)

PLATE XII

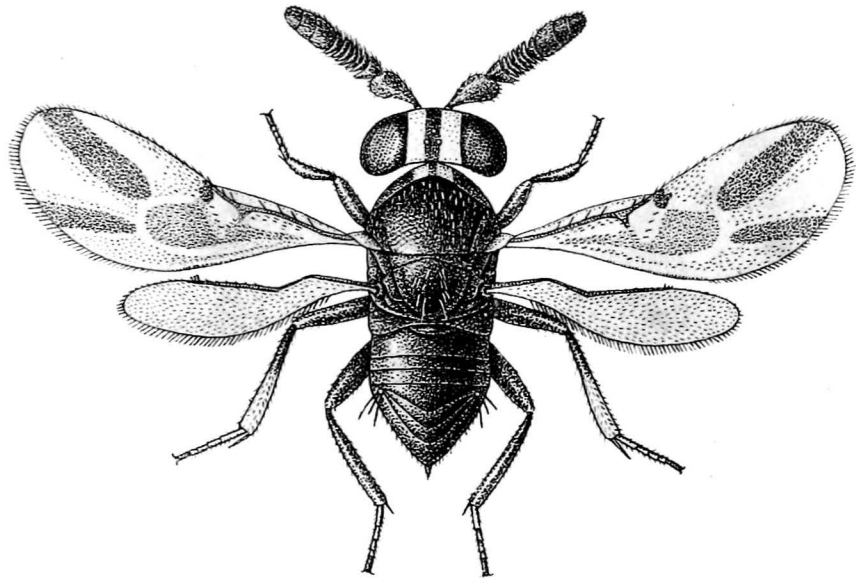


FIG. 27. *Comperiella bifasciata* How. (Female)

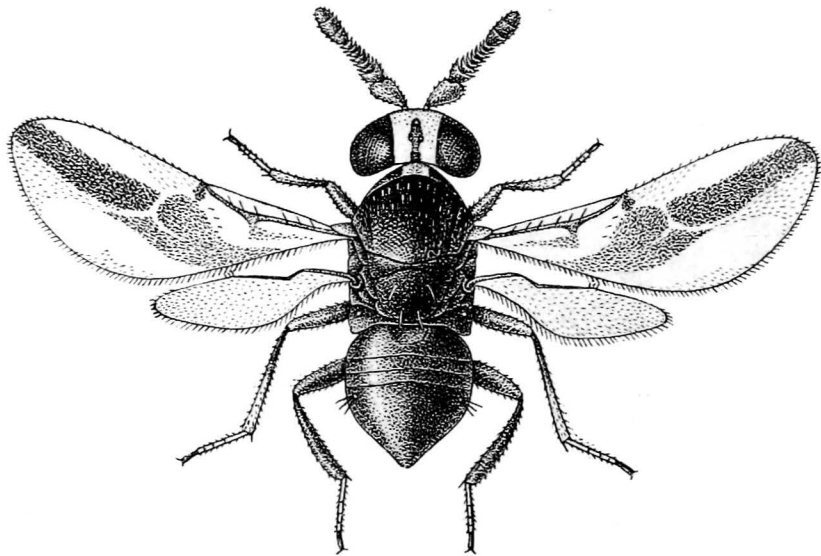


FIG. 28. *Comperiella indica* Ramakr. (Female)

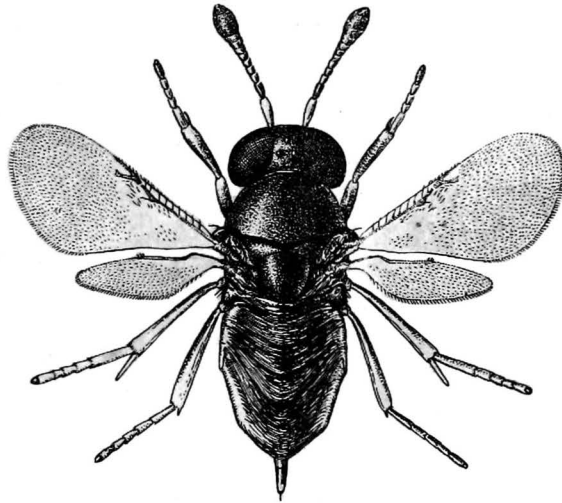


FIG. 29. *Parechthrodryinus clavicornis* (Cam.) (Female)

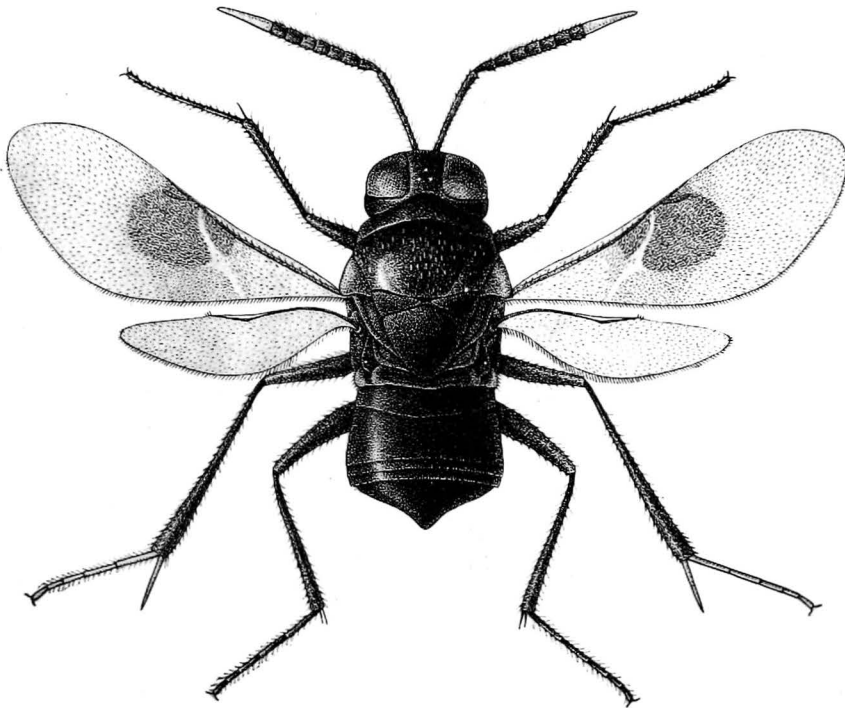


FIG. 30. *Homalotylus flaminus* (Dalm.) (Female)

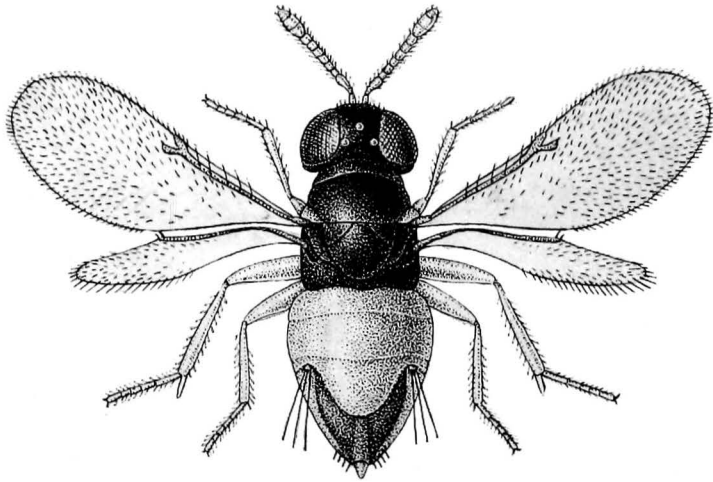


FIG. 31. *Ageniaspis pyrillae* Mani (Female)

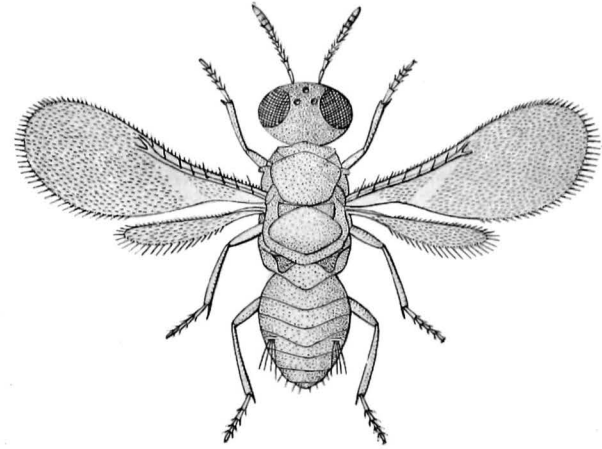


FIG. 32. *Aphycus flavus* How. (Female)

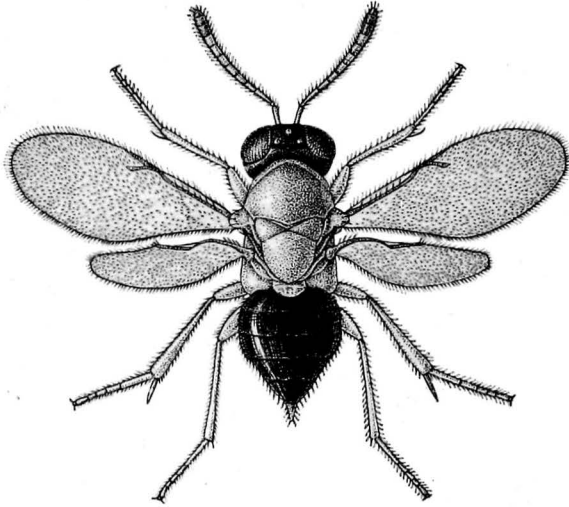


FIG. 33. *Tachardiaepagus tachardiae* (How.) (Female)

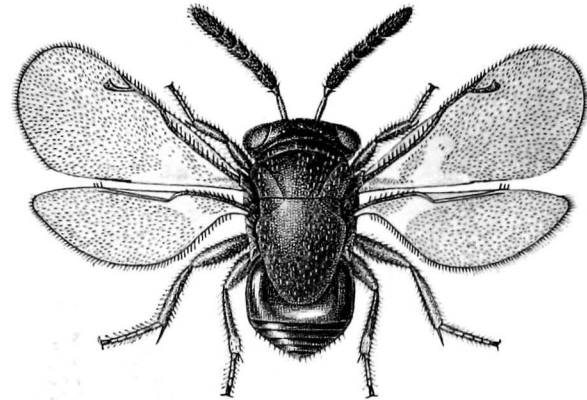


FIG. 34. *Scutellista cyanea* Motsch. (Male)

**Ooencyrtus pyrillae** CrawfordCrawford, *Insec. Inscit. Menstr.*, 4, p. 102 (1916)

In the Pusa collection there are numerous specimens of this species bred from the eggs of *Pyrilla* spp. at Nagpur, Pusa, etc.

This is an important parasite of the *Pyrilla* pest of sugarcane in most cane-growing tracts of India. It sometimes parasitizes about 80 per cent of *Pyrilla* eggs in North India.

*O. papilionus*, another related species, is also parasitic on *Pyrilla* eggs on sugarcane in the Punjab.

**Ageniaspis pyrillae** ManiMani, *Ind. J. Ent.*, 1, p. 72 (1939)

This species was received from Mr. P. V. Isaac, labelled as having been bred from the eggs of *Pyrilla* spp. at Delhi and Karnal (Punjab). It appears to have been confused with *Ooencyrtus pyrillae* so long. In Delhi area this is the most important parasite of *Pyrilla*.

**Aphycus flavus** Howard

This species parasitises the male scales of *Saissetia oleae* in America. Quayle [1911] recorded it as an internal parasite of the second instar male and just before the second moult in the case of the female scale in California. Under the name *Euaphycus* (*Aphycus*) *flavus* it has been recorded in recent years to be parasitic on the fluted scale, *Pulvinaria iceryi*, in America. Ramakrishna [1927] recorded it as parasitic on *Pulvinaria* sp. in South India.

**Aphycus fusidorsum** GahanGahan, *Proc. U. S. N. Mus.*, 56, p. 521 (1919)

Recorded by Ramakrishna [1921] as a parasite of the scale *Ceroptastes cajani* at Coimbatore.

**Aphycus litchensiae** HowardHoward, *Proc. U. S. N. Mus.*, 8, p. 640 (1896)

Described from specimens bred from the scale *Litchensia koebelei* in Ceylon.

**Encyrtus adustipennis** MotschulskyMotschulsky, *Bull. Soc. Imp. Nat. Moscou*, 36 (3), p. 55, (1863)

This species was recorded as a parasite of the scale *Saissetia hemisphaerica* (= *Lecanium coffeae*) in Ceylon.

**Encyrtus barbatus** TimberlakeTimberlake, *Proc. Hawaii. Ent. Soc.*, 4, p. 209 (1919)

Ramakrishna and Margabandhu recorded [1934] this species as parasitic on the scale *Saissetia nigra* at Coimbatore.



**Encyrtus flavus** Howard

Howard, *Ann. Rep. U. S. Dept. Agric.*, p. 367 (1880)

This is a parasite of the scales *Lecanium* spp. in Ceylon and *Pulvinaria* at Coimbatore. Quayle [1911] recorded it as parasitic on *Coccus hesperidum* in California.

**Encyrtus kotinskyi** (Fullaway)

Fullaway, *Ann. Rep. Hawaii. Agric. Expt. Sta.*, p. 26 (1913), (*Apentelicus*)

Ramakrishna and Margabandhu [1934] recorded this species as parasitic on *Saissetia nigra*.

**Encyrtus litchensiae** Howard

Howard, *Proc. U. S. N. Mus.*, 8, p. 636 (1836)

Described from the specimens bred from the scale *Litchensia koebelei* in Ceylon.

**Tachardiaepagus tachardiae** (Howard)

Howard, *Proc. U. S. N. Mus.*, 18, p. 637 (1896), (*Encyrtus*)

In the Pusa collection there is one specimen bred from the lac insect at Namkum, Ranchi (Bihar).

It has been recorded (under the name *Lissencyrtus troupi*) from lac at Dehra Dun, on *Laccifer javanus* in Malaya; and under the name *T. thoracicus* Girault from Ceylon [Girault, 1916]. Mahdihassan [1923] recorded *somervilli* Mahd., variety of this species from Mysore.

**Erencyrtus dewitzii** Mahdihassan

Mahdihassan, *J. Sci. Assoc. Maharaja's Coll. Vizianagram*, 1, p. 71 (1923)

This species was described from specimens bred from lac at Mysore.

**Cheiloneurs paradisicus** Motschulsky

Motschulsky, *Bull. Soc. Imp. Nat. Moscou*, 36 (3), p. 52 (1863)

This species was described from specimens bred from *Saissetia hemisphaerica* in Ceylon.

**Cheiloneurs pyrillae** Mani

Mani, *Ind. J. Ent.*, 1, p. 73 (1939)

This species was received from Mr. P. V. Isaac, labelled as having been bred from the eggs of *Pyrilla* spp. in Karnal (Punjab).

**Adelencyrtus chionaspidis** (Howard)

Howard, *Proc. U. S. N. Mus.*, 18, p. 637 (1896), (*Encyrtus*)

Described from specimens bred from the scale *Chionaspis graminis* in Ceylon.

**Adelencyrtus planchoniae** (Howard)Howard, *Proc. U. S. N. Mus.*, 18, p. 637 (1896), (*Encyrtus*)This was bred from the scale *Planchonia delicata* in Ceylon.**Adelencyrtus solidus** (Howard)Howard, *Proc. U. S. N. Mus.*, 18, p. 638 (1896), (*Encyrtus*)This species was recorded as parasitic on the scale *Eriococcus rhodomartyi* in Ceylon.**Anicetus ceylonensis** HowardHoward, *Proc. U. S. N. Mus.*, 18, p. 639 (1896)Originally described from specimens bred by E. E. Green from the scale *Vinsonia stellifera* in Ceylon.Ramakrishna recorded this species as parasitic on the *tur* scale, *Ceroplastes cajani* [1921] and *neem* scale, *Pulvinaria maxima* [1927] at Coimbatore.**Psylledontus secundus** GiraultGirault, *Ann. Ent. Soc. Amer.*, 13, p. 28 (1915)

This species was recorded by Ramakrishna [1925] as parasitic on a gall-forming psyllid (unidentified) in Ceylon.

**Homalopoda cristata** HowardHoward, *J. Linn. Soc. London (Zool.)* 25, p. 91 (1894)This species was originally described from St. Vincent Islands and was later on recorded by Howard [1896] as a parasite of the scale *Aspidiotus secretus* in Ceylon.**Arrhenophagus chionaspidis** AurivilliusAurivillius, *Ent. Tidskr.*, 9, p. 146 (1888)This species was originally described by Aurivillius from specimens bred from the scale, *Chionaspis salicis* in Sweden.Howard [1896] recorded it on *Diaspis rosae* in Missouri, U. S. A., and also as having been bred by E. E. Green from *Fiorinia saprosoma* in Ceylon.

## Family PTEROMALIDAE

## Subfamily EUNOTINAE

**Scutellista cyanea** MotschulskyMotschulsky, *Etud. Ent.*, 8, p. 172 (1859)Originally described from Ceylon. It has in recent years been recorded from several parts of India, Australia, Italy, France, Spain, China, Hawaii, Africa, California, Louisiana and other parts of the world. It is a parasite of a variety of scale insects, e.g. *Ceroplastes rusci*, *C. sinensis*, *C. galeatus*, *Saissetia hemisphaerica*, *S. nigra*, *S. oleae*, *S. persicae*, *Phaenococcus artemisiae*, *Coccus hesperidum*, *Eulecanium ficinum*, etc.

Ramakrishna [1920] reported it as parasitic on *Saissetia oleae* at Coimbatore. According to the same author [1924] this species exercises an extremely efficient check on the spread of several species of *Lecanium* in South India. He bred the parasite in large numbers from *S. oleae* and *S. nigra* at Coimbatore. The latter being a pest of cotton, the parasite does considerable good by destroying its eggs and nymphs. The pupal period was found to be about ten days at Coimbatore. It is considered to be the most important insect enemy of the black scale in California, where the parasitization often runs as high as 75 per cent.

**Cardiogaster fusciventris** Motschulsky

Motschulsky, *Bull. Soc. Imp. Nat. Moscou*, 36 (2), p. 72 (1863)

This species was described from specimens bred from the coffee scale *Saissetia hemisphaerica* (= *Lecanium coffeae*) at Colombo.

**Cardiogaster secundus** Mani

Mani, *Ind. J. Ent.*, 1, p. 77 (1939)

This new species was bred from *Aleurolobus barodensis* in Delhi.

Subfamily PTEROMALINAE

**Pteromalus luzonensis** Gahan

Gahan, *Philip. J. Sci.*, 27, p. 99 (1925)

This species was originally described from specimens bred from the butterfly *Papilio* sp. at Luzon, Philippine Islands.

Mani [1938] also recorded it as having been bred from caterpillars of *Papilio* sp. at Calcutta.

**Aplastomorpha calandrae** (Howard)

Howard, in Comstock's *Rep. Ent., U. S. Dept. Agric. Washington*, 1880, p. 273 (1883), (*Pteromalus*)

In the Pusa collection there are several specimens of this species bred from the larvae of *Sitodrepa* sp. infesting stored coriander 'seeds' at Madras and from the grubs and pupae of the rice-weevil, *Calandra oryzae*, at Pusa. Ramakrishna [1925] recorded it from Coimbatore on the same host.

Under the name *A. pratti* it has been reported to parasitize the grubs of the pulse-beetles, *Bruchus quadrimaculatus*, in Texas [Crawford, 1913]. *Pteromalus oryzae* Cam., bred from *Calandra granaria* in some parts of India, e.g. Coimbatore, is most probably identical with this species [Mani, 1938].

On the host *C. oryzae* the pupal period of the parasite lasted for about seven days at Pusa in September.

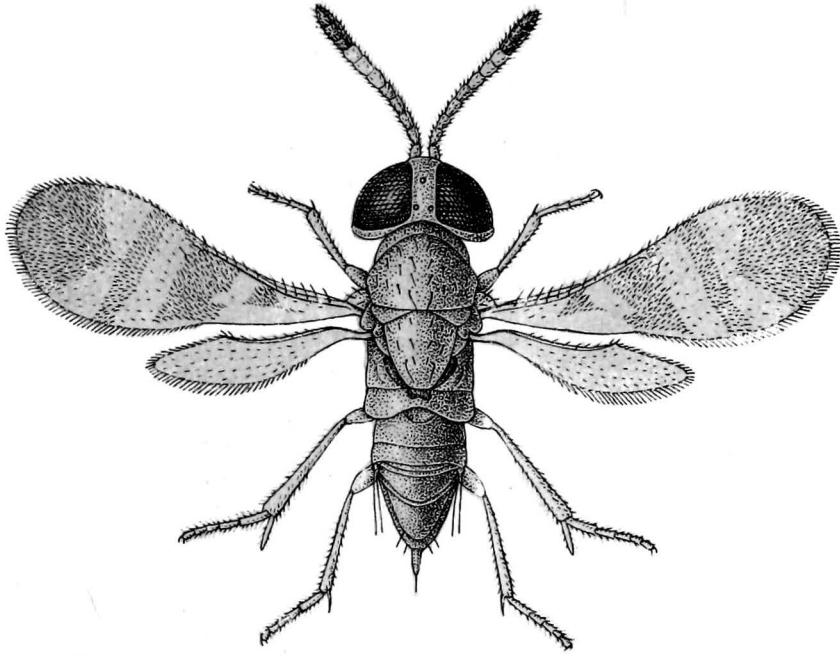


FIG. 35. *Encyrtus flavus* How. (Female)

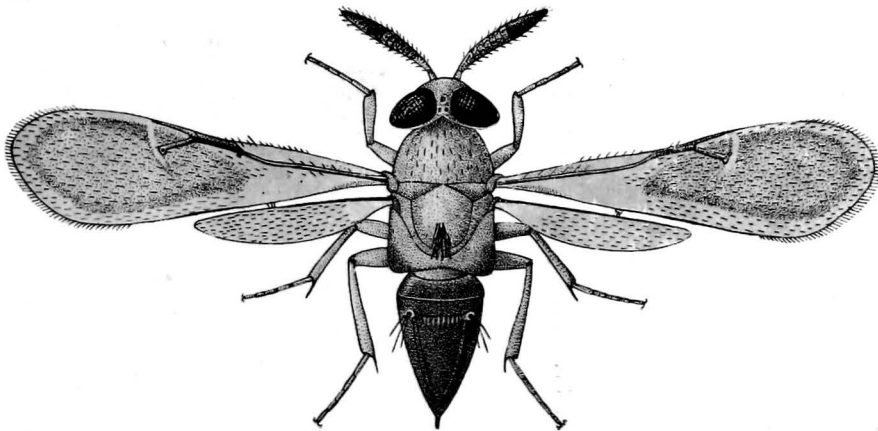


FIG. 36. *Cheiloneurus pyrillae* Mani (Female)

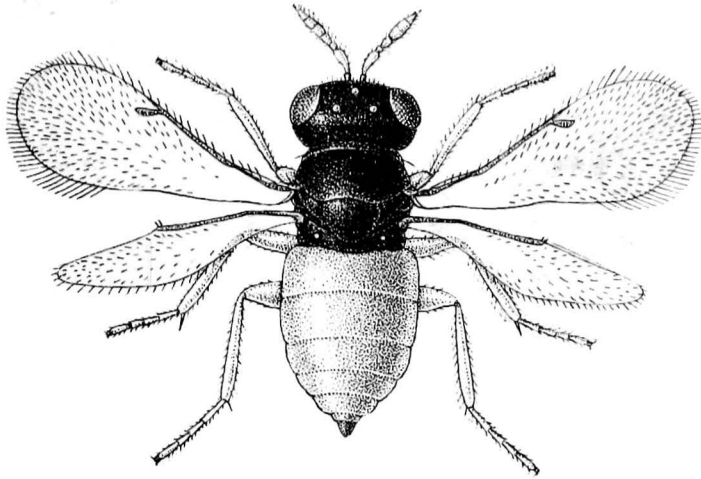


FIG. 37. *Cardiogaster secundus* Mani (Female)

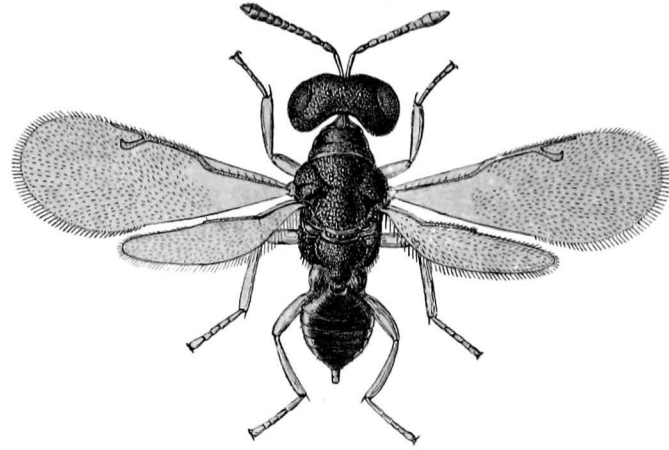


FIG. 38. *Eupteromalus parnarae* Gah. (Male)

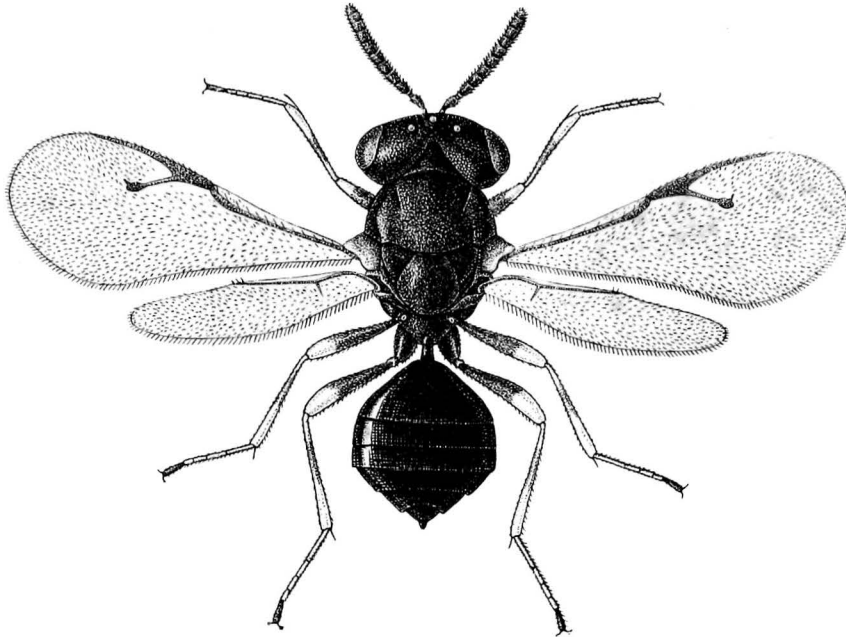


FIG. 39. *Pachumason lili* Mani (Female)

**Eupteromalus parnarae** GahanGahan, *Proc. U. S. N. Mus.*, 56, p. 522 (1919)

Described by Gahan from specimens bred by Ramakrishna from caterpillars of *Parnara mathias* at Karvetnagar (S. India).

**Neocatolaccus indicus** Ramakrishna and ManiRamakrishna and Mani, *Rec. Ind. Mus.*, 39, p. 126 (1937)

This species was bred from the grubs of the Buprestid Cotton stem borer *Sphenoptera gossypii* at Coimbatore.

**Neocatolaccus sphenopterae** FerriereFerriere, *Bull. Ent. Res.*, 22, p. 130 (1931)

This species was originally described from specimens bred from the grubs of *Sphenoptera gossypii* in Sudan. Mani [1938] recently recorded it as having been bred from the same host from the Punjab.

## Subfamily SPHEGIGASTERINAE

**Pachyneuron** WalkerWalker, *Ent. Mag.*, 1, p. 371 (1833)

Species of the genus *Pachyneuron* are usually primary parasites of a large variety of insects, e.g., Aphids, Coccids, Coccinellids, Syrphids, Chamaemyids, Anthomyids, etc. Several species are also recorded to have been bred from codling moth, *Drosophila* sp., and sawflies of the genus *Diprion*. Many species are hyperparasites and attack other Chalcid, Braconid or Ichneumonid parasites of Aphids and Coccids. A few species are reported to be both primary as well as hyperparasites. *Pachyneuron coccorum* (Linn.), for example, attacks the scale insect *Eulecanium coryli* and its hymenopterous parasites *Blastothrix sericea* and *Aphycus punctipes*. All the *Pachyneuron* species so far known are larval or pupal parasites. Egg-parasitism was recently recorded by Mani [1939] in an Indian species.

**Pachyneuron karnalensis** ManiMani, *Ind. J. Ent.*, 1, p. 85 (1939)

This species was bred from the puparium of *Syrphus* sp. on wheat leaves at Karnal (Punjab).

**Pachyneuron lali** ManiMani, *Ind. J. Ent.*, 1, p. 81 (1939)

This species was bred from *Aphis rumicis* Linn. on *Solanum nigrum* at Karnal (Punjab).

**Pachyneuron leucopiscida** ManiMani, *Ind. J. Ent.*, **1**, p. 86 (1939)

This species was bred at Coimbatore by Mr. M. C. Cherian from the puparia of *Leucopis nigricornis*, predaceous on aphids on cotton, sorghum, maize, etc. It is itself parasitized by *Perissopterus cheriani* Mani (*vide infra*).

**Pachyneuron nazeeri** ManiMani, *Ind. J. Ent.*, **1**, p. 81 (1939)

This species was bred by Nazeer Ahmad from *Lachnus persicae* at Quetta.

**Pachyneuron pentatomivora** ManiMani, *Ind. J. Ent.*, **1**, p. 81 (1939)

This species was bred from the eggs of the pentatomid, *Urostylis punctigera*, on *Michelia champaca* by N. C. Chatterji at Kalimpong, Eastern Himalayas in October, 1934. This is the first record of a species *Pachyneuron* attacking the eggs of its host and also the first record on a pentatomid host.

**Acroclisoides indicus** FerriereFerriere, *Bull. Ent. Res.*, **22**, p. 279 (1931)

This species was recorded as having been bred from the eggs of a pentatomid bug on leaves of *Tectona grandis* at Dehra Dun.

**Trigonogastra brunneicornis** FerriereFerriere, *Bull. Ent. Res.*, **21**, p. 356 (1930)

This species was described from specimens bred from the pupae of an agromyzid in stems of *Hibiscus esculantus* in Peradeniya, Ceylon.

**Trigonogastra rugosa** WaterstonWaterston, *Bull. Ent. Res.*, **5**, p. 326 (1914)

This species was described from specimens bred from *Agromyza phaseoli* in Ceylon.

**Polycystus propinquus** WaterstonWaterston, *Bull. Ent. Res.*, **5**, p. 325 (1925)

This species was also found parasitizing an *Agromyza* in Ceylon.

**Agiommatus acherontiae** FerriereFerriere, *Bull. Ent. Res.*, **22**, p. 280 (1931)

Found as an egg-parasite of the sphingid moth *Acherontia styx* Westw. at Dehra Dun.

## Family ELASMIDAE

**Elasmus albomaculatus** GahanGahan, *Philip. J. Sci.*, 17, p. 347 (1920)

This species was originally described from the Philippine Islands.

Mani [1938] recorded it as having been bred from the braconid *Apanteles male volus*, which is a larval parasite of *Hyblaea puera* which defoliates teak in Dehra Dun.**Elasmus brevicornis** GahanGahan, *Treubia*, 3, p. 50 (1922)Originally described from specimens bred from *Erionata thrax* at Buitenzorg (Java). Ferriere [1929] recorded the species as having been bred from larvae of *Hapalia machaeralis* defoliating *Tectona grandis* at Dehra Dun and from *Psalis stuttalis* on *Pogostemon patchouli* at Kuala Lumpur (Malaya). Ramakrishna and Margabandhu [1934] recorded it as parasitic on *Sylepta derogata* in S. India.**Elasmus ceylonicus** FerriereFerriere, *Bull. Ent. Res.*, 20, p. 418 (1929)Recorded as having been bred from the tea bagworms *Psyche albipes* at Pelmadulla in Ceylon.**Elasmus claripennis** (Cameron)Cameron, *Ind. For. Rec.*, 4, p. 97 (1913), (*Cyclopleura*).Originally described by Cameron from Dehra Dun. Under the name *E. colemani* Mahdihassan [1923] recorded it on lac from Mysore. Miller [1933] reported it as parasitic on the lac predator, *Eublemma amabilis* Moore from Malaya.In the Pusa collection there is one specimen of this species reared from the caterpillar (?) of the Noctuid moth *Eublemma amabilis* Moore, predaceous on lac insect at Namkum, Ranchi (Bihar).**Elasmus fumipennis** (Cameron)Cameron, *Ind. For. Rec.*, 4, p. 97 (1913), (*Cyclopleura*)Originally described from Dehra Dun (no host stated). Ferriere [1929] recorded it as having been bred from *Tirathaba* sp. in Java.**Elasmus homonae** FerriereFerriere, *Bull. Ent. Res.*, 20, p. 415 (1929)King [1933] recorded this species as having been bred from the caterpillars of the tortricid *Homona coffiaria* Nietn. a nest of tea leaves in Ceylon.



**Elasmus hutsoni** Ferriere

Ferriere, *Bull. Ent. Res.*, 20, p. 412 (1929)

Described from specimens bred from tea bagworm *Psyche albipes* in Ceylon.

**Elasmus hyblaeae** Ferriere

Ferriere, *Bull. Ent. Res.*, 20, p. 414 (1929)

Recorded as parasitic on the second instar larvae of *Hyblaea puera* in the Aravallicadu Forest, Nilambur (South India).

**Elasmus indicus** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, 17, p. 124 (1921)

There are two specimens of this species in the Pusa collection, bred from *Anomalococcus* sp., infesting *Acacia* sp. at Coimbatore.

**Elasmus johnstoni** Ferriere

Ferriere, *Bull. Ent. Res.*, 20, p. 258 (1929)

This species is a parasite of the cotton spotted-bollworms, *Earias insulana* and *Earias fabia*, at Karnal (Punjab). Husain and Mathur [1924] recorded the same species as parasitic on *Hypsopygia mauritialis* at Lyallpur. It is also recorded as having been bred from the cotton pink-bollworm, *Platyedra gossypiella*, though it is probable that the parasite of this latter host is *Elasmus platyedrae*.

**Elasmus nephantidis** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, 7, p. 125 (1921)

In the Pusa collection there is one female specimen of this species found parasitizing the coconut caterpillar *Nephantis serinopa* at Coimbatore.

**Elasmus zehntneri** Ferriere

Ferriere, *Bull. Ent. Res.*, 20, p. 411 (1929)

Originally recorded by Zehntner [1900] as *Elasmus* sp. from Java. Ferriere described it as *E. zehntneri* from specimens obtained from the Philippines and Formosa. Cherian and Israel [1937] recorded this species from the eggs of the sugarcane white moth borer (*Scirpophaga*) in the Punjab, at Coimbatore, Bobbili, Vizagapatam, Godavari, Chittoor and Tanjore.

In the Pusa collections there are several specimens of this parasite bred from *Scirpophaga nivella* at Pusa and Delhi.

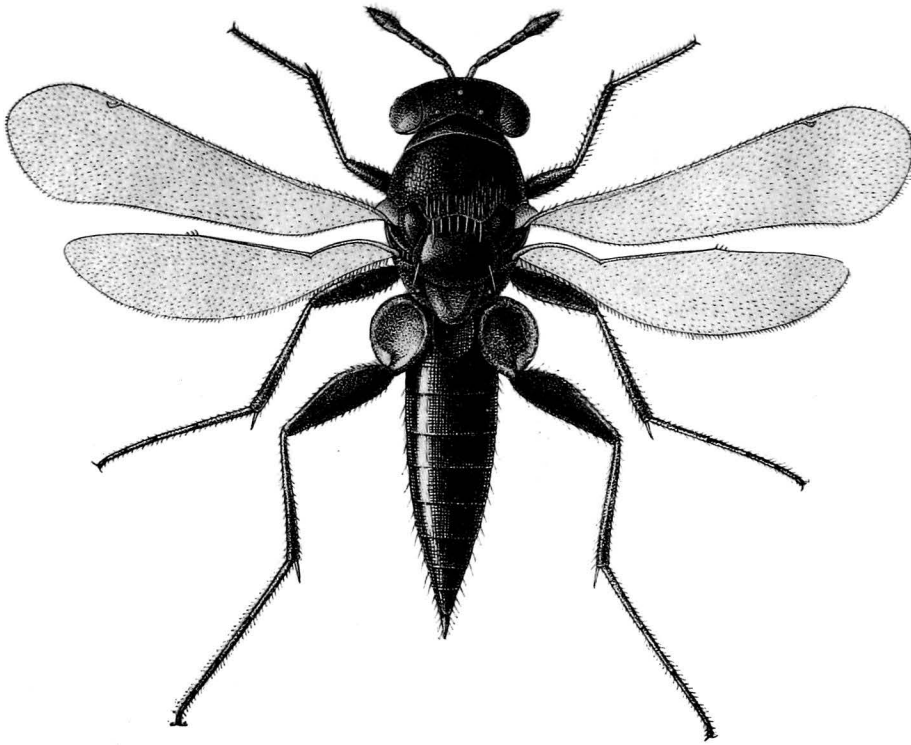


FIG. 40. *Elasmus johnstoni* Ferr. (Female)

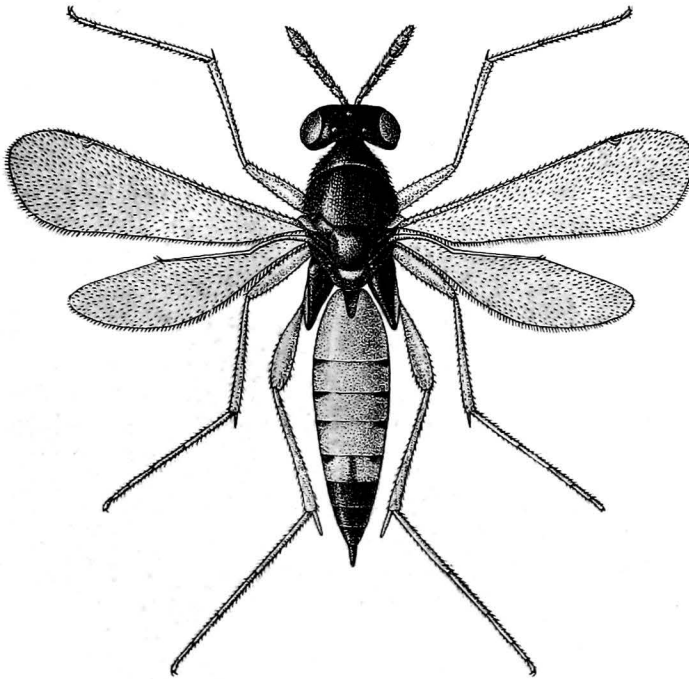


FIG. 41. *Elasmus zehntneri* Ferr. (Female)

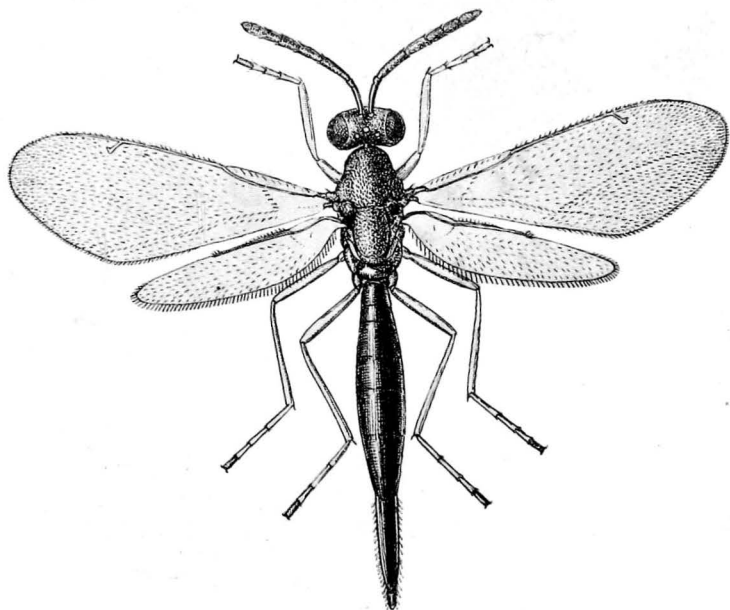


FIG. 42. *Asympiesiella india* Gir. (Female)

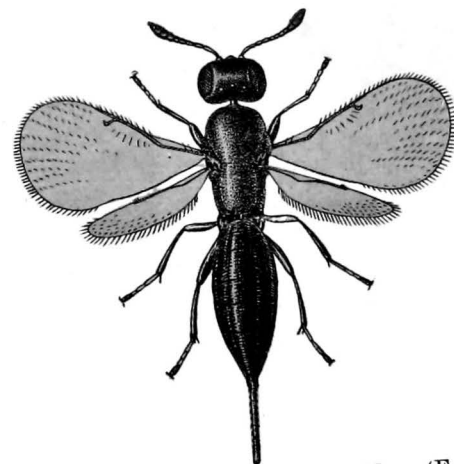


FIG. 43. *Pareuderus torymoides* Ferr. (Female)

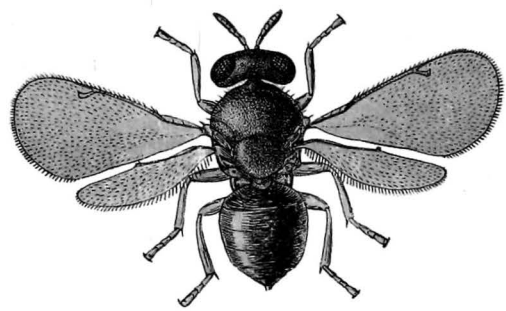


FIG. 44. *Pediobopsis locustivora* Rohw. (Female)

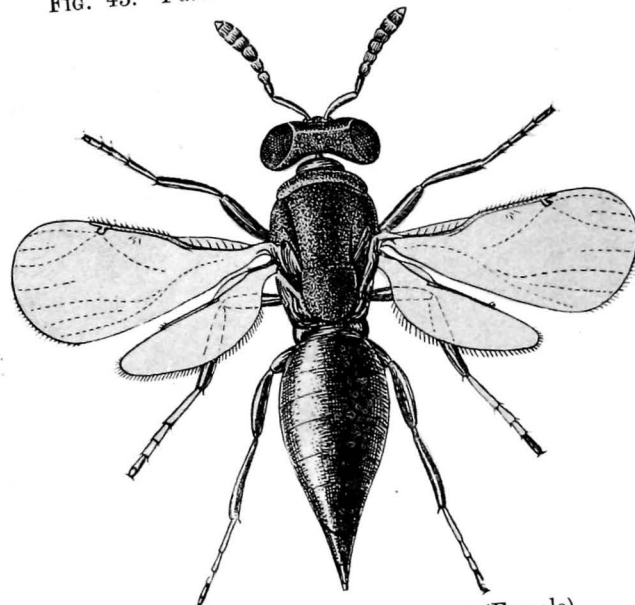


FIG. 45. *Euderus lividus* (Ashm.) (Female)

## Family EULOPHIDAE

## Subfamily ELACHERTINAE

**Cirrospilus coccivorus** Motschulsky

Motschulsky, *Bull. Soc. Imp. Nat. Moscou*, **36** (3), p. 68 (1863)

Described from specimens bred from the coffee scale *Saissetia hemisphaerica* (= *Lecanium coffeae*) at Colombo.

**Trichospilus pupivora** Ferriere

Ferriere, *Bull. Ent. Res.*, **21**, p. 358 (1930)

This species is parasitic on coconut moth *Nephantis serinopa*, *Thosea cervina*, *Spodoptera mauritia* and *Tirathaba* spp. in Ceylon and at Coimbatore. Ananthanarayanan [1934] gave a short account of the bionomics of this species.

**Euryscotolinx coimbatorensis** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, **7**, p. 134 (1921)

Described from specimens bred from the larvae of *Cyphosticha caerulea*, mining the leaves of lab-lab at Coimbatore.

**Euplectrus busyi** Crawford

Crawford, *Proc. U. S. N. Mus.*, **41**, p. 279 (1909)

Described from specimens bred from the lepidopterous leaf-miner of *Pongamia glabra* at Coimbatore. In the Pusa collection there are two specimens of this parasite bred from the same host at Delhi.

**Euplectrus ceylonensis** Howard

Howard, *Proc. U. S. N. Mus.*, **18**, p. 641 (1896)

This species was recorded to be parasitic on the caterpillars of *Euproctis falerna* in Ceylon.

**Euplectrus euplexiae** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, **7**, p. 135 (1921)

This species was bred from larvae of the Noctuid *Perigea* (= *Euplexia*) *capensis* at Coimbatore.

**Euplectrus leucostomus** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, **7**, p. 134 (1921)

This species was bred from the hairy caterpillars of *Trabala vishnu* (?) of castor at Coimbatore.

**Euplectrus nyctemeræ** CrawfordCrawford, *Proc. U. S. N. Mus.*, 42, p. 9 (1912)

Described from specimens bred from the caterpillars of the hypsid *Nyctemera lacticinia* at Bangalore.

## Subfamily EULOPHINÆ

**Sympiesis purpureus** WaterstonWaterston, *Bull. Ent. Res.*, 5, p. 333 (1914)

Described from specimens bred from an *Agromyza* sp. in Ceylon.

**Asympiesiella india** GiraultGirault, *Canad. Ent.*, 48, p. 341 (1916)

There are several specimens of this species in the Pusa collection bred from the larvae of *tur* leaf-roller *Gracillaria soyella* at Pusa, Nagpur and Chaubattia.

The species was described by Girault from material sent from Pusa in 1912 and again to Howard in 1916. Dutt [1921] published a brief account of the biology of this species.

## Subfamily ENTEDONINÆ

**Cassidocida aspidomorphae** CrawfordCrawford, *Proc. U. S. N. Mus.*, 45, p. 253 (1913)

Described from specimens bred from the grubs of the cassidid *Aspidomorpha miliaris* at Bangalore. Ramakrishna [1927] recorded it from the same host at Coimbatore.

**Closterocerus insignis** WaterstonWaterston, *Bull. Ent. Res.*, 5, p. 330 (1914)

Recorded as having been bred from *Oscinis theae*.

**Euderus gossypii** FerriereFerriere, *Bull. Ent. Res.*, 22, p. 132 (1931)

This species was originally recorded as a parasite of the grubs of the cotton buprestid, *Sphenoptera gossypii*, in Sudan and in the Punjab. Ramakrishna and Mani [1937] recently recorded it from the same host at Bellary, South India.

**Euderus lividus** (Ashmead)Ashmead, *J. Linn. Soc. London (Zool.)* 25, p. 175 (1894), (*Chrysocharis*)

In the Pusa collection there are several specimens of this species bred by T. Ahmad from the larvae of the *tur*-pod fly, *Agromyza obtusa*, at Pusa, Karnal and Delhi. The pre-imaginal period lasts for 11 to 12 days at 27° C., 15 to 18 days at 22° C., and 41 to 43 days at 17° C.

**Euderus pempheriphila** Ramakrishna and Mani

Ramakrishna and Mani, *Rec. Ind. Mus.*, **39**, p. 127 (1937)

This species was bred from the grubs of the cotton stem-borer weevil, *Pempheres affinis*, at Coimbatore.

**Pareuderus torymoides** Ferriere

Ferriere, *Bull. Ent. Res.*, **22**, p. 287 (1931)

There are several specimens of this species in the Pusa collection bred by T. Ahmad from the grubs of the amaranthus weevil *Lixus truncatulus* at Pusa.

The species was originally bred from the weevil *Alcides leeuweni* at Buitenzorg, Java, and has not been recorded so far from India. The pre-imaginal period lasts for about fifteen days at 27° C. and three weeks during December at 17-21° C. In the field at Pusa the percentage of parasitization was 13 in March-April, 1936.

**Pleurotropis epilachnae** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, **7**, p. 126 (1921)

In the Pusa collection there are four specimens bred out of the pupae of *Epilachna* sp. at Coimbatore. It parasitized full-grown larvae of *Epilachna* and emerged as adult after the latter had pupated.

**Pleurotropis foveolatus** Crawford

Crawford, *Proc. U. S. N. Mus.*, **42**, p. 7 (1912)

This species was also recorded to have been bred from the grubs of *Epilachna* sp. at Bangalore.

**Pleurotropis** spp.

Ramakrishna [1939] records from South India a species of *Pleurotropis* as parasitizing the larva of the Braconid, *Microbracon serinopae* Rohw., which is a larval parasite of *Nephantis serinopa*. He also records another species as having been bred from *Perisierola nephantidis* Meuseb., another Bethyloid larval parasite of *N. serinopa*.

**Pediobopsis locustivora** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, **7**, p. 125 (1921)

Ramakrishna [1927] recorded this species as having been bred from the eggs of Tettigonids found on leaves of *Cordia* at Coimbatore.

## Subfamily APHELININAE

**Aphelinus diaspidis** Howard

Howard, in Comstock's *Rep. Ent., U. S. Dept. Agric.*, 1880, p. 355 (1881)

This species parasitizes several species of scale insects in various parts of the world. It was used in the control of *Aulacaspis pentagona* in the Bermudas by biological methods. It has been recorded from several diaspine scale-insects in Ceylon.

**Aphelinus fuscipennis** Howard

Howard, in Comstock's *Rep., Ent. U. S. Dept. Agric.*, 1880, p. 356 (1881)

This species is widely distributed as parasite of Coccids in the United States of America. Misra [1924] bred it as an internal parasite of *Dialeurodes citri* and *Aleyrodes ricini* at Pusa; this being the first instance of a species of *Aphelinus* known to parasitize an *Aleyrodid*.

**Aphelinus mytilaspidis** Le Baron

Le Baron, *Amer. Ent.*, 2, p. 220 (1870)

Howard [1896] recorded this species as having been bred from the Coccids *Mytilaspis pomorum*, *Chionaspis pinifolii* and *Diaspis carneti* in the United States and *Chionaspis graminis* in Ceylon. Widiez [1932] recorded it as a parasite of *Lepidosaphes ficus* in Algeria, and Suter [1933] bred it from *L. ulmi* in Switzerland. Alden [1933] recorded it as parasitic on *Aspidiotus perniciosus* also in the United States.

**Aphelinus mali** Hald.

This is a well-known parasite which has been used for the control of the woolly-aphis, *Eriosoma lanigera*, a pest of apple trees in India and several other parts of the world.

An attempt to introduce this parasite from Australia against control of the woolly-aphis in the fruit gardens at Saharanpur, United Provinces and in Kashmere proved unsuccessful. About 1930 it was again introduced in the United Provinces through the parasitic laboratory at Farnham Royal. It has not yet been possible to establish this parasite in the United Provinces. Attempts are also being made to establish this parasite in the Punjab.

**Aphelinus theae** Cameron

Cameron, *Mem. Proc. Manchester Lit. Philos. Soc.*, 4, p. 183 (1891)

Described from specimens bred from *Aspidiotus theae* in the Kangra Valley (Punjab).

**Physcus varicornis** (Howard)

Howard, in Comstock's *Rep. Ent., U. S. Dept. Agric.*, 1880, p. 360 (1881), (*Coccophagus*)

Howard [1896] recorded this species as having been bred from the scales *Aspidiotus ancylus*, *Chionaspis quercus* and *Chionaspis americana* in America, and from *Chionaspis eleangi* in Ceylon.

**Encarsia aonidiae** Howard

Howard, *Proc. U. S. N. Mus.*, 18, p. 636 (1896)

Described from specimens bred from the scale *Aonidia corniger* in Ceylon.

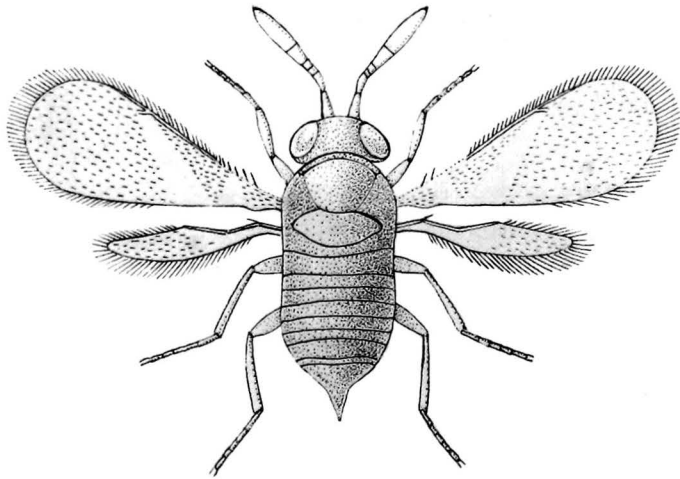


FIG. 46. *Aphelinus diaspidis* How. (Female)



FIG. 47. *Aphelinus mali* Hald. (Female)

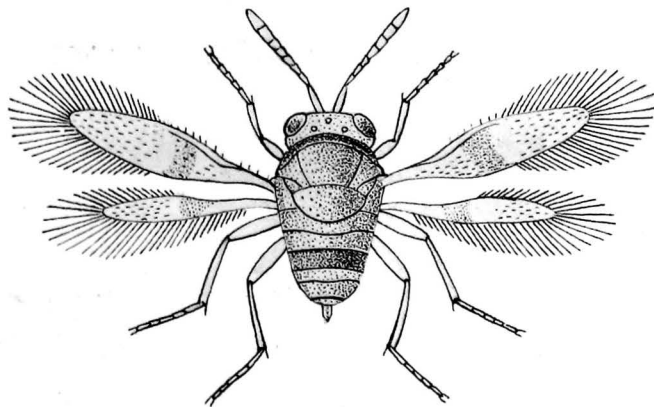


FIG. 48. *Aspidiotiphagus citrinus* (Craw.) (Female)

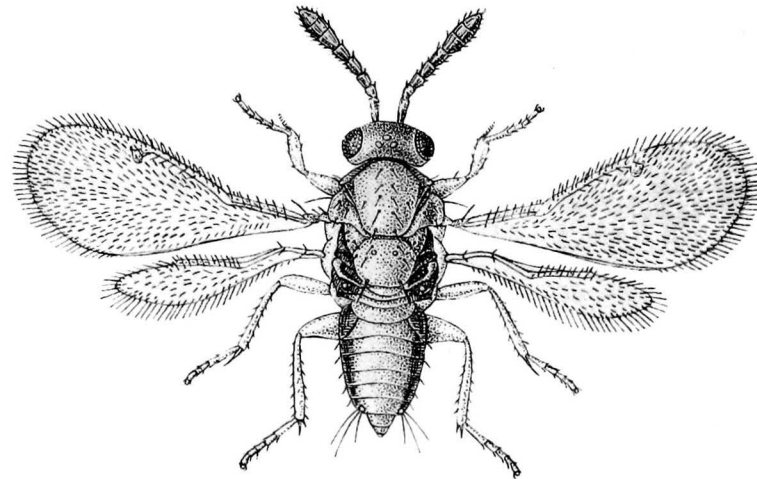


FIG. 49. *Coccophagus longifasciatus* How. (Female)



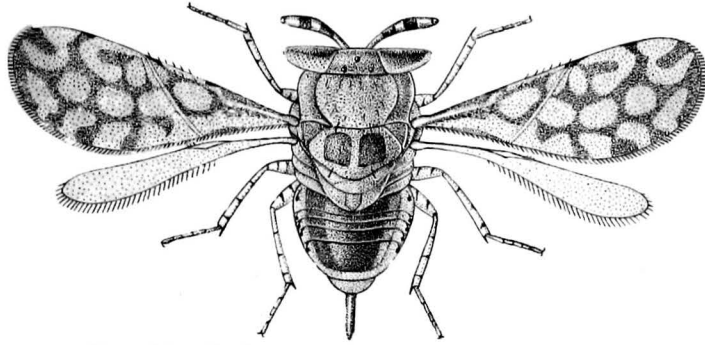


FIG. 50. *Perissopterus cheriani* Mani. (Female)

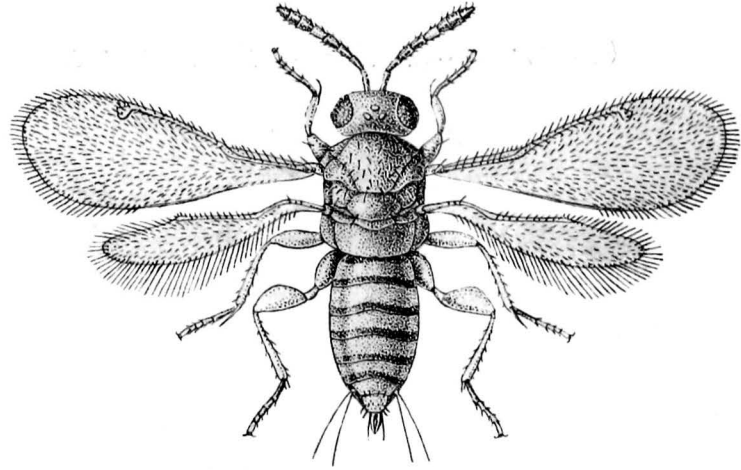


FIG. 51. *Coccophagus zebratus* How.

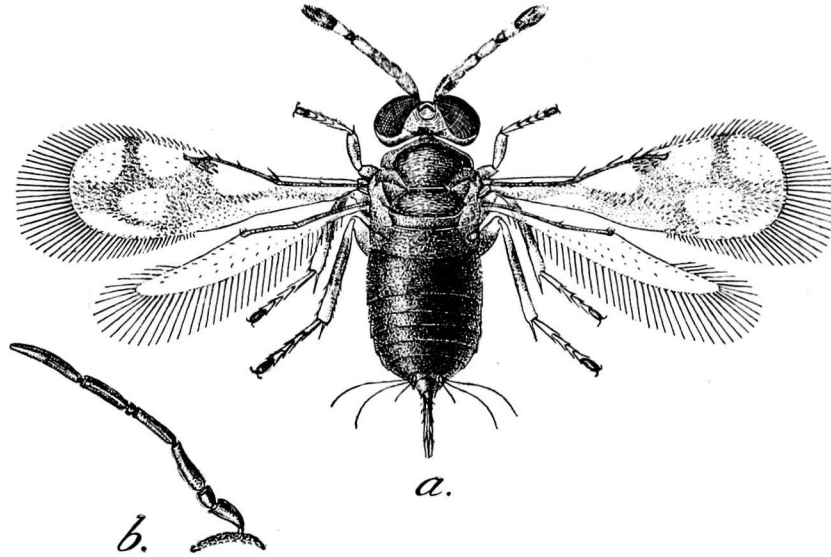


FIG. 52. *Azotus delhiensis* Lal. (Female)

[ From *Rec. Ind. Mus.*, by kind permission of the Director, Zoological Survey of India, Calcutta ]

**Encarsia planchoniae** HowarHoward, *Proc. U. S. N. Mus.*, **18**, p. 635 (1896)

This was also described from specimens bred from a scale *Planchonia delicata* in Ceylon.

**Aspidiotiphagus citrinus** (Crawford)Crawford, *Destruct. Ins.*, p. 28 (1891), (*Coccophagus*)

Howard [1896] recorded this species as having been bred from the scale *Diaspis lanatus* in Ceylon.

It has, in recent years, been bred from a variety of scales, e.g. *Chrysomphalus dictyospermis* in Italy [Silvestri, 1926]; *Aspidiotus hederæ* in Switzerland [Ferriere, 1926] and Algeria [Bouhelier, 1932]; *Aspidiotus destructor* in Guatemala [Vandenberg, 1926] and Fiji [Tothill, 1927]; and *Aspidiotus perniciosus* in the United States of America [Alden, 1933].

**Prospaltella lahorensis** HowardHoward, *J. Econ. Ent.*, **4**, p. 132 (1911)

Described from specimens bred from the citrus white-fly, *Dialeurodes citri*, at Lahore. Misra [1924] recorded it also on *Aleyrodes ricini* at Pusa.

It may be mentioned that some Californian entomologists found it in several citrus-growing parts of India, and they attempted to introduce this parasite into California but were not successful.

**Aneristus ceroplastae** HowardHoward, *Canad. Ent.*, **27**, p. 351 (1895)

Howard originally described this species from the U. S. A. In 1896 he recorded this species (under the name *Coccophagus orientalis*) as having been bred from several scales in Ceylon, e.g. *Ceroplastes actiniformis*, *Lecanium viride*, *Dactylopius adonidum* and *Saissetia hemisphaerica*. At this time he called the Ceylonese species as *Coccophagus orientalis*, but later on found it to be the same as *Aneristus ceroplastae*. Box [1925] recorded it as parasitic on several other coccids in Porto Rico. Smith and Compere [1926, 1928] recorded it as parasitizing the black scale and the scale *Lecanium viride* in California. From Formosa it was reported by Shiraki [1934] as parasitizing *Pulvinaria polygonata*.

**Coccophagus flavescens** HowardHoward, *Proc. U. S. N. Mus.*, **18**, p. 634 (1896)

Described from specimens bred from the scale *Saissetia hemisphaerica* in Ceylon.

**Coccophagus longifasciatus** HowardHoward, *Bull. U. S. Dept. Agric. Div. Ent., Tech. Ser.*, **12**, p. 80 (1907)

Described from specimens bred from the scale *Saissetia nigra* in Ceylon.

**Coccophagus tschirchi** Mahdihassan

Mahdihassan, *J. Sci. Assoc. Maharaja's Coll. Vizianagram*, **1**, p. 82 (1923)

In the Pusa collection there are three specimens bred from lac insect (on *Butea frondosa*) at Namkum, Bihar.

The species was originally described from Khode Bhair in Kolar District, Mysore. Ferriere [1928] redescribed it from material bred from lac at Kundari, Bengal. Recently it has been reported from Coimbatore also [Ramakrishna and Margabandhu, 1934].

**Coccophagus zebratus** Howard

Howard, *Bull. U. S. Dept. Agric., Div. Ent., Tech. Ser.*, **12**, p. 81 (1907)

This species was described from specimens bred from the scale insect *Aclerda distorta* Green, at Punduloya, Ceylon.

**Perissopterus cheriani** Mani

Mani, *Ind. J. Ent.*, **1**, p. 88 (1939)

This new species was bred by Mr. M. C. Cherian from *Pachyeuron leucopiscida* Mani at Coimbatore; its host itself is a primary parasite of the aphid predator, *Leucopis nigricornis*.

**Marietta javensis** Howard

This species is considered to be both a primary and hyper parasite of lac insect in India. It has been bred at Namkum (Ranchi) as a hyper-parasite of *Aspidiotus orientalis*.

**Marietta leopardina** Motschulsky

Motschulsky, *Bull. Soc. Imp. Nat. Moscou*, **36** (3), p. 51 (1863)

This species was recorded to have been bred from *Pulvinaria maxima* at Coimbatore and *Saissetia nigra* in Ceylon.

**Azotus delhiensis** Lal

Lal, *Rec. Ind. Mus.*, **40**, pp. 1-4 (1938)

Bred at Karnal from the white-fly, *Aleurolobus barodensis*, a serious pest of sugarcane in some parts of India. This was the first record of the genus from India. All the other known species of *Azotus* are parasitic on coccids and this species was the first record on an Aleurodid.

## SUBFAMILY TETRASTICHINAE,

**Hyperteles longicauda** Kieffer

Kieffer, *Ann. Soc. Sci. Bruxelles*, **9**, p. 195 (1905)

Described from specimens bred from the larvae of a cecidomyid which produce galls on *Artemisia* in Tuticorin, 'Bengal'. Evidently Kieffer made a mistake in considering Tuticorin to be situated in Bengal. It is at the sea coast near the southernmost extremity of India.

**Melittobia indicum** (Silvestri)

Silvestri, *Boll. Lab. Zool. Portici*, 4, p. 228 (1910) (*Syntomosphyrum*)

Described from specimens bred at Bangalore from the maggots of a fruit-fly.

**Syntomosphyrum taprobanes** Waterston

Waterston, *Bull. Ent. Res.*, 5, p. 337 (1914)

Described from specimens bred from the grubs of a coccinellid, *Scymnus* sp. in Ceylon.

**Tetrastichus asthenogmus** (Waterston)

Waterston, *Bull. Ent. Res.*, 5, p. 340 (1914), (*Tetrastichodes*)

This species was recorded as parasitic on eggs of cockroaches in Ceylon.

**Tetrastichus ayyari** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, 7, p. 128 (1921)

Bred from the eggs of *Chilo simplex* at Coimbatore.

**Tetrastichus coimbatorensis** Rohwer

Rohwer, *Ann. Mag., Nat. Hist.*, 7, p. 133 (1921)

In the Pusa collection there are three specimens bred from the larvae of the *cholum* gall fly (Itonididae) at Coimbatore.

**Tetrastichus colemani** Crawford

Crawford, *Proc. U. S. N. Mus.*, 42, p. 8 (1912)

Bred from grubs of the cossid *Aspidomorpha miliaris* at Bangalore.

**Tetrastichus gardneri** Ferriere

Ferriere, *Bull. Ent. Res.*, 22, p. 291 (1931)

Described from specimens bred from the eggs of a pentatomid bug on teak leaf at Dehra Dun.

**Tetrastichus isaaci** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, 7, p. 130 (1921)

Bred from the larvae of a 'gall midge' on *Macrina arenaria*.

**Tetrastichus nyemitanus** Rohwer

Rohwer, *Ann. Mag. Nat. Hist.*, 7, p. 131 (1921)

In the Pusa collection there is one specimen bred from the maggots of the *cholum* Anthomyid, *Atherigona* sp., infesting shoot at Coimbatore.

**Tetrastichus okawus** RohwerRohwer, *Ann. Mag. Nat. Hist.*, **7**, p. 128 (1921)

There is one specimen in the Pusa collection bred from *cambu* grains at Coimbatore. It was probably parasitic on the larvae of some granary pest.

**Tetrastichus ophiusae** CrawfordCrawford, *Proc. U. S. N. Mus.*, **42**, p. 8 (1912)

This species is parasitic on the castor semi-looper *Achaea* (= *Ophiusa*) *janata* at Bangalore.

**Tetrastichus purpureus** (Cameron)Cameron, *Ind. For. Rec.*, **4**, p. 103 (1913), (*Hadrothrix*)

Originally described from Dehra Dun. (Under the name *T. immsii*) Mahdihassan [1923] described the same species from Dehra Dun from material bred out from lac on *Zizyphus*.

In the Pusa collection there is one specimen bred from the lac insect (on *Butea frondosa*) at Namkum, Bihar.

**Tetrastichus pyrillae** CrawfordCrawford, *Insec. Inscit. Menstr.*, **4**, p. 101 (1916)

There are numerous specimens in the Pusa collection bred from eggs of *Pyrilla* spp. at Pusa, and several other localities in North India. The species is also known to parasitize *Pyrilla* eggs at Lyallpur, Karnal, in the United Provinces and the Central Provinces and Coimbatore.

Whereas the *Pyrilla* starts appearing in the field in March, this parasite appears in the field sometime in April and May. At this time the parasitization is about 3-4 per cent. As the season advances the percentage rises and in October-November it is about 80 per cent or even higher. When the weather becomes very cold (December and January) and *Pyrilla* lays eggs under leaf sheaths, the percentage of parasitization falls down.

**Tetrastichus radiatus** WaterstonWaterston, *Bull. Ent. Res.*, **13**, p. 55 (1922)

This species was recorded as a parasite of the citrus psylla, *Diaphorina citri*, in the Punjab.

**Tetrastichus schoenobii** FerriereFerriere, *Bull. Ent. Res.*, **22**, p. 290 (1931)

This species was recorded as parasitic on the eggs of *Schoenobius bipunctifer* in Malaya, Siam and S. India and *Spodoptera mauritia* in Ceylon.

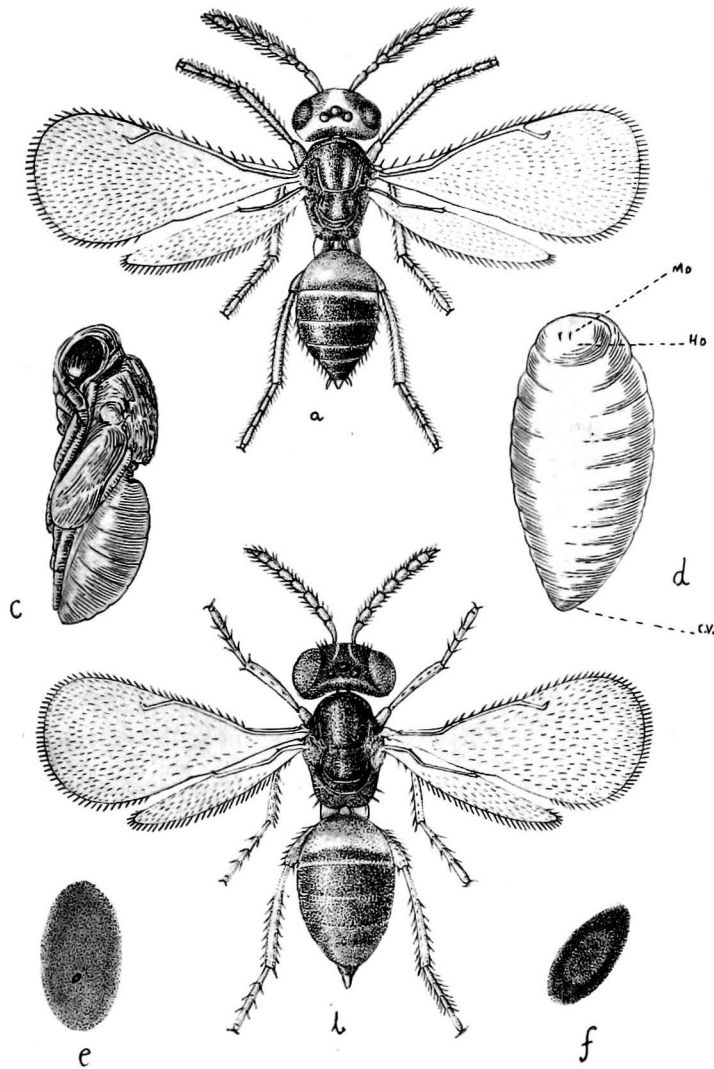


FIG. 53. *Tetrastichus pyrillae* Crawf. (a) male, (b) female, (c) pupa, (d) larva, (e) egg inside host egg, (f) egg about to hatch

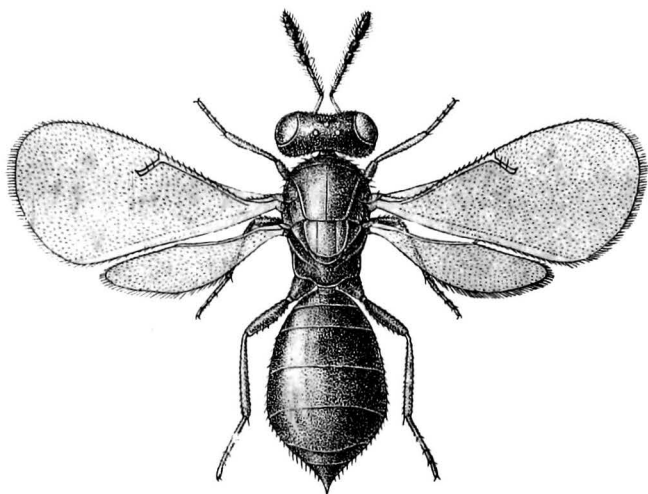


FIG. 54. *Tetrastichus spirabilis* Waterst. (Female)  
[ From *Ind. For. Rec.*, by kind permission of the  
Forest Entomologist ]

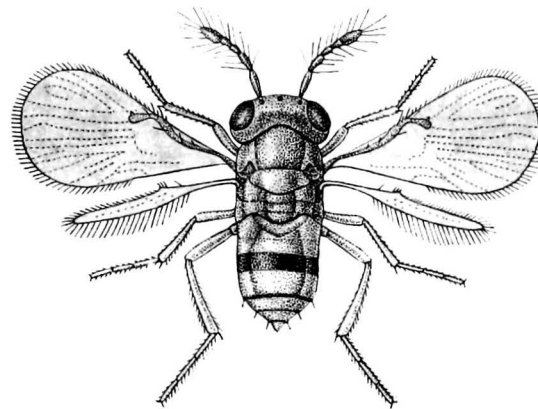


FIG. 55. *Trichogramma intermedium* How. (Female)

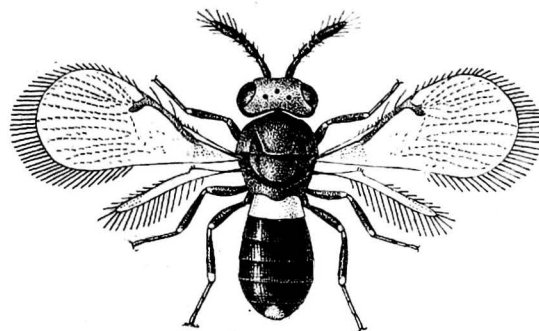


FIG. 56. *Chaetostricha mukerjii* Mani (Female)

**Tetrastichus spirabilis** WaterstonWaterston, *Ind. For. Rec.*, **9**, p. 89 (1922)

Described from specimens bred from the eggs of the defoliator *Hypsipyla robusta* at Dehra Dun.

**Neparaprostocetus asphondyliae** ManiMani, *Ind. J. Ent.*, **1**, p. 90 (1939)

Specimens of this species were bred from the pupae of the gall midge, *Asphondylia riveae* Mani, which attacks the twiner, *Rivea hypocrateriformis* Choisy, at Tanjore, South India.

**Ootetrastichus** sp.

Ramakrishna [1925] recorded a species of this genus as parasitic on a Fulgorid at Coimbatore. This was the first record of the genus from India.

**Thriptoctenus maculatus** WaterstonWaterston, *Ann. Mag. Nat. Hist.*, **5**, p. 243 (1930)

This species was described from specimens bred as an internal parasite of the nymphs of the vine thrips, *Rhipiphorothrips cruentatus* at Lyallpur.

**Tumidiscapus oophagus** GiraultGirault, *Proc. U. S. N. Mus.*, **53**, p. 445 (1917)

This species was described from specimens bred from the eggs of the grasshopper, *Oxya velox* at Coimbatore.

## Family TRICHOGRAMMIDAE

## Subfamily OLIGOSITINAE

**Paruscanoidea indica** ManiMani, *Ind. J. Ent.*, **1**, p. 91 (1939)

This new species was bred from the eggs of *Hilda bengalensis* at Pusa.

**Oligosita nephotetticum** ManiMani, *Ind. J. Ent.*, **1**, p. 92 (1939)

This new species was bred from the eggs of *Nephotettix bipunctatus* on rice at Pusa.

**Westwoodella nephotetticum** ManiMani, *Ind. J. Ent.*, **1**, p. 92 (1939)

This new species was bred from the eggs of *Nephotettix bipunctatus* on rice at Balasore (Orissa).



## Subfamily TRICHOGRAMMINAE

*Trichogramma evanescens* Westwood

Westwood, *Philos. Mag.*, 2, p. 444 (1883)

This species is an important egg-parasite of a very large number of insects, chiefly moths, in various parts of the world. Some of its hosts are serious pests in certain countries. It occurs in several different forms and in the opinion of Flanders [1935] *T. minutum* (Riley) is only a variety of this species.

It has been bred artificially in large numbers and liberated in sugarcane fields for the control of moth borers of *Diatraea* species in West Indies, Hawaii, Philippine, Louisiana, etc. It has also been tried for the control of the oriental peach moth, the European corn-borer, etc., in the United States of America.

In Ceylon it was introduced for the control of coffee-tortricid, and other tea pests. In India it has been found to parasitize eggs of a large number of pests, especially the stem-borer of sugarcane, the paddy *Schoenobius* spp. stem-borer, the flour moth, spotted bollworms of cotton, etc.

Flanders [1930] found that *Sitotroga cerealella* was the most satisfactory host in the mass production of this species for use in biological control work.

Subramaniam recently [1937] found that *Corcyra cephalonica* was a more satisfactory host under Indian conditions. It was liberated in weekly batches in sugarcane fields in Mysore State against the stem-borer *Diatraea sticticrasis* and it was found that the cane harvest increased by about 50 per cent.

*Trichogramma intermedium* Howard

Howard, in *Scudder's Butterflies of United States*, p. 1895, pl. 89, fig. 8 (1895)

In the Pusa collection there are numerous specimens of this species bred from the eggs of the cane root-borer, *Emmalocera depressella* at Delhi and the eggs of a butterfly, *Danais limniace*, at Pusa [Pose, 1924]. It was recently recorded for the first time from India [Mani, 1939].

It is known to be a parasite on the eggs of *Aglais milberti*, *Thanaos lucilius* *Danais plexippus*, *Polygonia interrogationis*, etc., in America.

*Chaetostricha mukerjii* Mani

Mani, *Rec. Ind. Mus.*, 37, p. 337 (1935)

In the Pusa collection there are several specimens of this species, bred from a mixed infestation of *Bruchus chinensis* and *B. analis* of stored seeds of *Phaseolus mungo* and *Cicer* at Delhi. This species was found parasitizing about 58.3 per cent of *Bruchus* eggs at this locality during September-December 1937.

It was originally described from material bred from eggs of *Bruchus quadrimaculatus* at Calcutta infesting gram. It completes one life cycle in about a fortnight during summer and about a month during winter (Delhi). It is, therefore, capable of passing through several generations in one year if host eggs are available. Only one individual develops in each egg of the host.

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- ICAR. 8-2. No. 2. List of Publications on Indian Entomology, 1931. Compiled by the Imperial Entomologist, Pusa. (1934). Price As. 8 or 10d.
- ICAR. 8-3. No. 3. List of Publications on Indian Entomology, 1932. Compiled by the Imperial Entomologist, Pusa. (1934). Price As. 12 or 1s. 3d.
- ICAR. 8-4. No. 4. Host Plant Index of Indo-Ceylonese Coccidæ. By S. Ramachandran, L.Ag. and T. V. Ramakrishna Ayyar, B.A., Ph.D., F.Z.S. (1934). Price Re. 1-10 or 2s. 9d.
- ICAR. 8-5. No. 5. List of Publications on Indian Entomology, 1933. Compiled by the Officiating Imperial Entomologist, Pusa. (1935). Price As. 9 or 1s.
- ICAR. 8-6. No. 6. Bee-keeping. By C. C. Ghosh, B.A., F.R.E.S. (4th Edition.) (1936). Price Re. 1-14 or 3s. 3d.
- ICAR. 8-7. No. 7. List of Publications on Indian Entomology, 1934. Compiled by the Imperial Entomologist, Pusa. (1935). Price Re. 1-2 or 2s.
- ICAR. 8-8. No. 8. Selected Clinical Articles, Part I. By G. K. Sharma, G.P.V.C. and R. L. Kaura, B.V.Sc., M.R.C.V.S. (1936). Price As. 8 or 10d.
- ICAR. 8-9. No. 9. Statistical Methods and their Application to Agronomy: A Bibliography. Compiled by K. K. Guha Roy, B.A. (1936). Price Rs. 2-2 or 4s.
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- ICAR. 8-13. No. 13. Two New Statistical Tables based upon Fisher's 't'. By M. Vaidyanathan, M.A. (1936). Price As. 6 or 8d.
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- ICAR. 8-16. No. 16. Indian Grazing Conditions and the Mineral Contents of Some Indian Fodders. By P. E. Lander, M.A., D.Sc., F.I.C., I.A.S. (1937). Price Rs. 3-14 or 6s. 9d.
- ICAR. 8-17. No. 17. A Brief Survey of some of the Important Breeds of Cattle in India. By Col. Sir Arthur Olver, C.B., C.M.G., F.R.C.V.S., F.N.I. (1938). Price Rs. 2 or 3s. 6d.
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- ICAR. 8-23. No. 23. The Cold Storage of Fruits and Vegetables. By G. S. Cheema, D.Sc., I.A.S. and D. V. Karmarkar, M.Sc., Ph.D., A.I.I.Sc. (1939). Price As. 10 or 1s.
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**9. Miscellaneous**

- VRI. 1. A Description of the Imperial Institute of Veterinary Research, Muktesar, and its Sub-station, the Imperial Veterinary Serum Institute, Izatnagar. By F. Ware, F.R.C.V.S., I.V.S. Price Re. 1-4-0 or 2s.
- ARI. 7-187. The Production of Cigarette Tobacco by Flue-curing. By F. J. F. Shaw, C.I.E., D.Sc., A.R.C.S., F.L.S. and Kashi Ram. *Imp. Inst. Agri. Res., Pusa Bull.* No. 187. Reprinted (1935). Price Re. 1 or 1s. 9d.

- ICAR. 16. A Handbook of Statistics for Use in Plant Breeding and Agricultural Problems  
By F. J. F. Shaw, C.I.E., D.Sc., A.R.C.S., F.L.S. Price Rs. 4-6-0 or 7s. 3d.
- ICAR. 7. Report on the Work of the Imperial Council of Agricultural Research in applying  
Science to Crop Production in India. By Sir John Russell, D.Sc., F.R.S.  
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- ICAR. 18. Report on the Development of the Cattle and Dairy Industries of India. By  
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### 10. Catalogue of Indian Insects

The following Parts have been issued.—

- ICAR. 11-1. 1. Acrydidæ (Tettigidæ). By T. Bainbriggé Fletcher. 1921. Price  
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- ICAR. 11-2. 2. Culicidæ. By R. Senior-White. 1923. Price Re. 1-10.
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