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STUDIES ON INDIAN ITONIDIDAE (CECIDOMYIDAE : DIPTERA).

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INTRODUCTION.

The Itonididae, gall midges or gall gnats, generally known as the Cecidomyiidae, are a very large family of small Nemocerate Diptera of world-wide distribution. They are well-known for the galls or similar deformities which they produce on various kinds of plants. The family comprises over three thousand species, distributed over four hundred genera of small, slender, soft-bodied flies, ranging in length from 0.5 mm. or even less to 8.0 mm., usually with broad wings and relatively long antennae. The tibiae are unarmed apically, the coxae are not produced and the wings usually have but three or four long veins. Except in the more generalised forms, ocelli are absent. They are closely related to the family Mycetophilidae, from which they are distinguished by the shorter coxae, the absence of apical tibial spurs and fewer veins in the wings. From the other allied families, Culicidae and Chironomidae, of the Nemocerate Diptera, they differ in not having aquatic larvae, in the unscaled wing veins and in the non-plumose male antennae.

They lay eggs on various kinds of plants and the minute apodous larvae hatching from them attack vegetable tissues resulting in the

formation of excrescences or galls. The larvae derive both shelter and nourishment from the vegetable tissues and except in some genera most of them pupate in the gall itself. A considerable number of midges, however, do not produce galls on plants and many more live on decaying vegetable matter. Several species are also known to be zoophagous, attacking other gall midges, mites, scale-insects, plant-lice, Psyllids, etc.

Several of the gall midges are of great economic importance and include both beneficial and injurious species. Some seed-infesting forms are materially useful in checking the spread of undesirable or injurious plants on cultivated lands (127). *Asphondylia opuntiae* Felt, for instance, has in America completely eradicated a species of *Cactus*, a serious pest of agricultural lands in many parts of the world. Another notorious pest of America, the Canada Thistle, has also been eradicated by the midge, *Dasyneura gibsoni* Felt. Among the injurious species, the Hessian Fly, *Phytophaga destructor* Say, is a very serious pest. It is stated that the estimated loss, due to this fly, in wheat cultivation in New York State, was \$3,000,000 in a single year. Pear midge, clover midge, rose midge, willow midge, chrysanthemum midge and many others are also serious pests of numerous cultivated plants in Europe and America. The Paddy silver-shoot gall midge has often caused considerable damage in rice plantations in many parts of South India. The damage in kitchen gardens due to the Bitter-gourd vine gall fly, *Lasioptera falcata* Felt, is sometimes very great. Their zoophagous habits, however, make them at times a friend of the agriculturist, as they attack and effectively check the spread of the injurious aphids, scale-insects, etc., on which they feed.

Gall midges have been known from very early times. Pliny, Malpighi and Reaumer seem to have been acquainted with them. Linnaeus and De Geer described them as *Tipula*. Fabricius classed them as *Chironomus*. It was only in 1800, when Meigen (129) published his *Nouvelle Classification des mouches a deux ailes* (Diptera L.) *d' apres un plan tout nouveau*, and erected the genus *Itonida* Meig., that their true position was made known. Three years later Meigen (130) published diagnoses of a number of genera already described in 1800 but gave new names to almost all of them. In this work the genus *Cecidomyia* Meig. was erected and the name Cecidomyidae proposed for the family, with *Tipula pini* D. G. as the genotype. For years there was disagreement as to the exact position of *Cecidomyia* Meig. and in 1850 Loew (120), to avoid confusion, proposed the generic name *Diplosis* H. Loew. In the year 1805 Latreille (115) created the genus *Oligotrophus* Lat. In 1818, Meigen (131) erected the genus *Lasioptera* Meig. Rondani (147) divided the family into the sub-families Lestremiinae and Cecidomyiinae. In 1908, Hendel (84) republished the "Nouvelle Classification" of Meigen (129) and suggested that as the descriptions corresponded more or less closely with those in Meigen's 1803 paper (130), the earlier set of names should be given priority over those of 1803 in general use. The decision of the International Commission on Zoological Nomenclature also agreeing with this view, the name *Cecidomyia* Meig. was replaced by the earlier *Itonida* Meig. Since then a satisfactory classification has been worked out by such well-known specialists as Rubsaamen, Kieffer and Felt. In addition

to describing numerous new genera and species from Europe, Kieffer (111) also published in 1913 his well-known monograph of Cecidomyiidae in the *Genera Insectorum* series. The gall midges of America have been made known chiefly through the descriptions of Felt. His studies have also enriched our knowledge of the morphology and biology, while his *Key to Gall midges* (76) published in 1925, has placed the taxonomy of this group on a sound basis.

Occasional descriptions of gall midges of India were published from time to time in periodicals, several of which are not easily accessible. Brunetti (12) published a list of all Indian gall midges known up to 1920, and later Senior-White (167) collected together all references to the gall midges described from this country. The first gall midge to be described from India, *Lasioptera bryoniae* Schin., was by Schiner (165), while the well-known silver-shoot gall midge of Paddy was recorded by Wood-Mason (187) a few years later under the name *Cecidomyia oryzae*¹. Kieffer (103) described some Bengal species in 1905, and later a number of midges from other parts of India (105). He (109) has also described a few species from Ceylon. Ramachandra Rao made extensive collections of these insects and made valuable observations (140) on the food-habits of numerous grass-infesting midges. One Indian fossil gall midge, *Winnertzia burmitica* (Cockl.)², was described by Cockerell (13) from burmite deposits. Houard (85) and Van Leeuwen (177 and 178) also described some midge galls from India. Sundar Raman (168) published a summary of the available information on the midge galls described from India. Felt's recent contributions on the Indian species of this family are the most important, and in all about one hundred species distributed over forty eight genera have so far been recorded from India. The rich flora of India, however, supports a much larger number of gall midges.

I began my studies on this group in 1926 and made extensive collections in various parts of India, particularly in South India. A considerable portion of the material studied was bred from various plant galls, though many midges were captured while on flight. Through the courtesy of the various authorities concerned, I have been able to examine the collections in the Agricultural Research Institute, Coimbatore and the Central Agricultural College and Research Institute, Pusa. Numerous unidentified midges collected at various times by the late Dr. N. Annandale, Dr. Stanley Kemp and the other officers of the Zoological Survey of India, were also placed at my disposal through the kindness of Dr. Baini Prashad, Director, Zoological Survey of India. A number of midges were also received from various other sources by presentations and exchanges.

As a result of these studies I have come across several new genera and species and the following well-known genera not previously recorded from this country: *Catocha* Hal., *Microcerata* Felt, *Clinophena* Kieff., *Neolasioptera* Felt, *Prolasioptera* Kieff., *Stefaniola* Kieff., *Thurauia* Rubs., *Myricomyia* Kieff., *Microdiplosis* Tav., *Cecidomyiella* D. G. and *Xylodiplosis* Kieff. Two new genera and nineteen new species are described

¹ This midge was referred by Felt (72) to the genus *Pachydiplosis* Kieff., but has never been described. I have described it in detail in this paper p. 433.

² Originally described as *Winnertzia burmitica* Cockl. *vide infra* p. 384.

below. The arrangement of the sub-families, tribes and genera is based on the classification proposed by Felt (76). In the matter of nomenclature, the decisions of the International Commission have been strictly adhered to and Meigen's earlier name of 1800 is used. Notes on the habits and life-history of the midges are also given in a few cases. The galls made by the various new species of midges are also described in detail. The elaborate keys of Felt to the genera and species, revised wherever necessary to include the new forms which are given in this paper, will, it is hoped, be found useful by future workers on this difficult group. The types of the new genera and species described here are deposited in the collections of the Zoological Survey of India, Indian Museum, Calcutta.

I take this opportunity of recording my great indebtedness to the world-authority on this family, Dr. E. P. Felt, State Entomologist, New York, whose works have been indispensable throughout my studies. My grateful thanks are due to Dr. Bains Prashad, Director, and to Dr. Hem Singh Pruthi, formerly Assistant Superintendent, Zoological Survey of India, for giving me all facilities for work, for valuable suggestions and for constant encouragement and help. My sincere thanks are also due to Rao Bahadur Y. Ramachandra Rao, Locust Entomologist, Karachi, for guiding me in the early stages of my study. Last but not the least, my thanks are also due to Dr. Ronald Senior-White, Malariologist, Bengal Nagpur Railway, Calcutta, for helping me with important literature.

SYSTEMATIC.

The family Itonididae is divided into three sub-families, *viz.*, Lestremiinae, Heteropezinae and Itonididinae.¹ The sub-family Lestremiinae is the most generalised group of this family, being the connecting link between the families Itonididae and Mycetophilidae. In its general characters and habits, it is not far removed from the Mycetophilidae, but it is easily distinguished by the absence of apical tibial spurs and by the moderate development of the coxae. The members of this sub-family are mostly small or medium-sized, dark brown or black midges, and are characterised by the metatarsus being longer than the following segments, by the presence of the long forked or simple fourth vein and by the entire absence of circumfili. Most midges belonging to this group breed, like the Mycetophilidae, in dead or decaying vegetable matter. There are two tribes under this sub-family : Lestremiinae and Campylomyzariae. The tribe Lestremiinae, comprising eight genera, is characterised by a forked fourth vein. The other tribe Campylomyzariae is recognised by a simple fourth vein and includes twenty three genera ; it is more specialised than the Lestremiinae.

¹ Some authors recognise a fourth sub-family, Termitomastinae. This sub-family is rather decadent and its exact relation to the other sub-families is not clearly understood. It includes the genus *Termitomastus* Silvestri, which consists of rather peculiar, nearly apterous midges, exclusively found as guests in the nests of termites. The sub-family differs from all others in the very much atrophied wings, two long and two cross-veins ; in the enormously swollen first five abdominal segments and in the small, slender posterior four abdominal segments. It is apparently confined to the Neotropical Region of South America.

The sub-family Heteropezinae is a connecting link between the two other sub-families, and according to Felt, is one of the oldest and most decadent group of midges. In general, it resembles Lestremiinae but is readily distinguished by the metatarsus being longer or shorter than the following segments, by the wings having not more than three long veins and by the absence of a cross-vein connecting the third vein with the sub-costa. There are about seventeen genera in this group. No form of this sub-family has yet been found in India.

The remaining sub-family Itonididinae is much larger than either of the preceding two and includes a great number of midges. The members of this sub-family are recognised by the metatarsus being always shorter than the following segment and by the presence of circumfli. It is divided into six tribes: Porricondylariae, Lasiopterariae, Dasyneurariae, Oligotrophiariae, Asphondylariae and Itonididinariae.

The tribe Porricondylariae is related to the tribe Lestremiinae of the sub-family Lestremiinae, but is easily recognised by a distinct cross-vein connecting the third vein with the sub-costa. It comprises thirty genera, of which eight have been found in India. Most of the species breed in decaying vegetable matter, although many attack living plants and produce galls on them.

The tribe Lasiopterariae includes a large number of well-marked gall-forming midges, distributed over eighteen genera, three of which occur in India. The members of this tribe are recognised by the great reduction of the costa and the more or less close approximation of the costa, the sub-costa and the third vein. These three veins are also thickly scaled. The abdomen is often thickly covered with black and silvery-white or yellowish scales. The antennae are short and have numerous short, sessile, cylindrical segments.

The next tribe, Dasyneurariae, comprises over forty-two genera, distributed all over the principal continents. Four genera have been found in India. The midges of this tribe are separated from all others by their denticulate claws, by the third vein being well separated from the costa and by the antennal segments being produced and often stemmed. They breed in wrinkled leaves, buds, and leaf galls.

The Oligotrophiariae are distinguished from the foregoing tribe by their simple claws. They include twenty-eight genera, of which only two have been found so far in this country. The genera of this tribe were originally included by Kieffer and Rubsaamen in the Dasyneurariae but Felt has rightly separated them.

The tribe Asphondylariae is widely distributed and comprises large-sized midges, distributed over twenty-seven genera, three being known from India. The midges of this tribe are recognised by the sessile, elongate, cylindrical antennal segments, simple claws and the usually aciculate ovipositor. They are all gall-forming in habit and mostly attack leaves and flowers but sometimes fruits as well.

The remaining tribe Itonididinariae is the most specialised group and is the richest in genera and species. It includes more than half the known genera and about one-third of the known species. It is subdivided into two sub-tribes: Bifila and Trifila. Thirty-two Indian genera fall under this group. The species belonging to it are characterised

by the greatly produced binodose male antennal segments, and the circumfila formed into bow-like loops. The sub-tribe Bifila has the nodes of the male antennal segments equal and with only two whorls of circumfila on the enlargements. The sub-tribe Trifila differs in having the nodes distinctly unequal and with three whorls of circumfila. Most midges included in this tribe are gall-forming, while many are mycophagous or zoophagous. A key to the sub-families and tribes from Felt is given below, while for the genera reference may be made to Felt (76).

Key to sub-families and tribes.

- I.** Metatarsus longer than the following segment, tarsal segments five; wings with four long veins, cross-vein usually present
 - A.** Fourth vein forked Lestremiinae.
 - B.** Fourth vein simple, not forked Lestremiinariae.
- II.** Metatarsus longer or shorter than the following segment; wings with not more than three long veins, cross-vein absent; circumfila wanting Campylomyzariae.
- III.** Metatarsus always shorter than the following segment; wings with three or four long veins; circumfila present
 - A.** Wings with a distinct cross-vein connecting third vein and sub-costa and usually parallel with costa Heteropezinae.
 - B.** Wings without a distinct cross-vein.¹
 - 1.** Costa thickly scaled, third vein usually very close to the anterior margin of the wing; antennal segments cylindrical, sessile and not produced Itonididinae.
 - 2.** Costa rarely thickly scaled, third vein well separated from costa; antennal segments produced Porricondylariae.
 - a.** Flagellate antennal segments cylindrical, never binodose in the male.
 - i.** Claws toothed Lasiopterariae.
 - ii.** Claws simple.
 - A.** Flagellate antennal segments cylindrical, not greatly elongated, usually stemmed in the male; ovipositor not aciculate Dasynaurariae.
 - B.** Flagellate antennal segments cylindrical, elongated, sessile; ovipositor usually aciculate Oligotrophiariae.
 - b.** Flagellate antennal segments of male greatly produced; binodose; circumfila usually formed into bow-like loops Asphondylariae.
 - i.** Nodes of the male flagellate antennal segments equal, circumfila two Itonididinariae.
 - ii.** Nodes of the male flagellate antennal segments distinctly unequal, circumfila three Bifila.

¹ Except in some genera of the Itonididinariae, the cross-vein is generally absent. These genera are included by Felt (76) both under Porricondylariae and Itonididinariae, in the latter tribe on account of the antennal structure. I am, however, inclined to bring together under the Porricondylariae all genera with a cross-vein, which I believe is of greater phylogenetic importance than the antennal structure. Felt's table of Itonididinariae needs revision.

Sub-family LESTREMIINAE.

Tribe LESTREMIINARIAE.

Genus **Catocha** Hal.

1833. *Catocha*, Haliday, *Entomol. Mag. London*, I, p. 156.
 1846. *Macrostyla*, Winnertz, *Stett. Entomol. Zeit.*, VII, p. 20.
 1846. *Furcinerva*, Rondani, *Nuov. Ann. Sc. Nat. Bologna*, (2) V, p. 7.
 1862. *Catocha*, Osten Sacken, *Mon. N. Amer. Dipt.*, I, p. 177.
 1864. *Catocha*, Schiner, *Fauna Austriaca, Dipt.*, II, p. 412.
 1895. *Catocha*, Kieffer, *Bull. Soc. Entomol. France*, p. 319.
 1900. *Furcinerva*, Kieffer, *Ann. Soc. Entomol. France*, LXIX, pp. 438-443.
 1908. *Catocha*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 308.
 1913. *Catocha*, Felt, *Bull. N. Y. St. Mus.*, No. 165, pp. 129-131.
 1913. *Catocha*, Kieffer, *Gen. Ins.*, fas. 152, p. 306.
 1925. *Catocha*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 136.

This genus, with about a dozen species mostly from America, has not so far been recorded from India. Some species occur on mosses; but no information is available about their habits and life-history.

The species of this genus are readily distinguished by the antennae having 11-16 segments, with the second segment not greatly enlarged and sometimes with several whorls of hairs on the segments. The palpi are quadriarticulate. Costa extends beyond the apex of the wing where it is joined by third vein.

Genotype.—*Catocha latipes* Hal.

Key to species, revised from Felt.

- | | |
|---|-----------------------------|
| I. Flagellate antennal segments uninodose. | |
| A. Pulvilli rudimentary. | |
| 1. Second, third and fourth palpal segments | |
| sub-equal | <i>C. barberi</i> Felt. |
| 2. Second, third and fourth palpal segments | |
| unequal | <i>C. indica</i> , sp. nov. |
| B. Pulvilli well-developed | |
| <i>C. slossonae</i> Felt. | |
| II. Flagellate antennal segments binodose | <i>C. americana</i> Felt. |

Catocha indica, sp. nov.

This new species appears to be closely allied to the American *Catocha barberi* Felt, but differs in the distal three palpal segments being of unequal length.

Female.—3 mm. long. Antennae about one-fourth the length of the body, thickly haired, dark brown, segments 16; flagellate segments uninodose, fifth antennal segment of a length about twice its diameter, ninth and tenth segments barrel-shaped, eleventh segment with a stem one-fourth the length of the cylindrical basal enlargement, terminal segment fusiform, stout, of a length a little over twice its diameter. First palpal segment short, stout; second segment one and a half times stouter than the third, the latter a little more than twice its diameter. Mesonotum black. Scutellum and post-scutellum black. Abdomen dark brown. Basal plate of lamellae of ovipositor sub-quadrate, with a length nearly equal to its width; terminal plate elliptic, a little over half the breadth of the basal plate and a little over twice as long as broad. Metatarsus nearly as long as all the succeeding segments.

Co-types.—Females on slide Nos. $\frac{972}{H\ 6}$ and $\frac{973}{H\ 6}$.

Type-locality.—Lutkoh Valley, Chitral, N.-W. F. Provinces. Coll. Dr. B. N. Chopra, at light.

Genus *Lestremia* Macq.

1826. *Lestremia*, Macquart, *Rec. Soc. Sc. Ag. Lille*, p. 173.
 1826. *Lestremia*, Meigen, *Syst. Besch.*, V, p. 308.
 1840. *Mimosciara*, Rondani, *Mem. Ia. Ital. Sc. Nat. Milano*, (4) II, p. 287.
 1844. *Cecidogona*, Herman Loew, *Stett. Entomol. Zeit.*, V, p. 324.
 1846. *Mimosciara*, Rondani, *Nuov. Ann. Soc. Nat. Bologna*, (2) VI, p. 10.
 1846. *Furcinerva*, Rondani, *Nuov. Ann. Soc. Nat. Bologna*, (2) VI, p. 369.
 1856. *Yposatea*, Rondani, *Dipt. Ital. Prodr.*, I, p. 198.
 1860. *Molobroea*, Rondani, *Atti Soc. Sc. Nat. Lest. Milano*, II, p. 287.
 1862. *Lestremia*, Osten Sacken, *Mon. N. Amer. Dipt.*, I, p. 178.
 1864. *Lestremia*, Schiner, *Fauna Austriaca, Dipt.*, II, p. 413.
 1870. *Lestremia*, Winnertz, *Verh. zool-bot. Ges. Wien.*, XX, p. 30.
 1897. *Lestremia*, Kieffer, *Syn. Cecid. Europ. Alg.*, p. 52.
 1900. *Mimosciara*, Kieffer, *Ann. Soc. Entomol. France*, LXIX, p. 437.
 1900. *Cecidogona*, Kieffer, *Ann. Soc. Entomol. France*, LXIX, p. 443.
 1900. *Furcinerva*, Kieffer, *Ann. Soc. Entomol. France*, LXIX, p. 443.
 1908. *Lestremia*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 31.
 1913. *Lestremia*, Felt, *Bull. N. Y. St. Mus.*, No. 165, p. 133.
 1913. *Lestremia*, Kieffer, *Gen. Ins.*, fas. 152, p. 307.
 1920. *Lestremia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 17.
 1925. *Lestremia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 136.
 1928. *Lestremia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 19.

This is the most generalised genus of the family. It has a world-wide distribution. About thirty species, most of them from America, have been recorded so far. Some European forms have been bred from decaying wood, but no information is available regarding the habits and life-history of the others. Two Indian species were described by Kieffer.

This genus is closely related to the genus *Catocha* Hal., but differs in the costa not extending beyond the apex of the wing. It is readily recognised by the following characters: Palpi quadriarticulate. Antennal segments 11-16, the second segment not greatly enlarged, third and fourth segments not fused, short, sub-cylindrical or sub-conical in the female; the male antennal segments with a distinct stem, the basal enlargements with crenulate whorls and long curved setae. Costa does not extend beyond the apex of wing before which it is joined by third vein. Fourth vein is forked.

Genotype.—*Lestremia cineria* Macq.

Key to species.

- I. Terminal plate of lamellae of ovipositor lengthened,
twice as long as broad; body yellowish in colour *L. indica* Kieff.
 II. Terminal plate of lamellae of ovipositor short, sub-
orbicular; body reddish in colour *L. ceylanica* Kieff.

Lestremia indica Kieff.

1909. *Lestremia indica*, Kieffer, *Rec. Ind. Mus.*, III, p. 29, fig. 1.
 1913. *Lestremia indica*, Kieffer, *Gen. Ins.*, fas., 152, p. 308.
 1920. *Lestremia indica*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 18.
 1928. *Lestremia indica*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 19.

This species was described from midges collected by Dr. Annandale in Calcutta. The wing is figured by Kieffer. The type is in the Indian

Museum. Gravely observed it at Kurseong, Eastern Himalayas. One female was captured at light in Howrah. It appears to breed in decaying leaves. The adults avoid strong day light and hide in crevices in the bark of shady trees.

***Lestremia ceylanica* Kieff.**

1912. *Lestremia ceylanica*, Kieffer, *Spol. Zeyl.*, VIII, p. 29.

1920. *Lestremia ceylanica*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 18.

1928. *Lestremia ceylanica*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 19.

This species was described from a female taken at light in Peradeniya, Ceylon. The type is lost due to bad preservation. One female was collected at light in a railway train at Trichinopoly, South India, which I readily identified as this species. Apparently it is distributed throughout South India. The species is not recorded by Kieffer in *Genera Insectorum*. The midges of this species are smaller than those of *L. indica* Kieff. and are of reddish colour.

Genus *Neolestremia*, nov.

This new genus is erected for midges bred from the leaf bud galls of *Boerhaavia* spp. It approaches *Lestremia* Macq. very closely, but is chiefly distinguished from it by its triarticulate palpi.

The following additional characters should prove useful for the identification of the genus. Antennae with 16 segments in the female, the first two flagellate segments not fused, second segment not greatly enlarged, all segments sub-cylindrical, uniformly covered with short setae and with stems never produced. Costa not reaching the apex of the wing but nearly disappearing at its union with third vein as in the genus *Lestremia* Macq., which it resembles in all other characters. The midges are also relatively larger.

Genotype.—*Neolestremia boerhaaviae*, sp. nov.

To indicate the exact relationships of the new genus *Neolestremia* with the allied genera I give below a revised version of Felt's Key (76), to the genera in which the antennae are moderately developed, having at least 11-16 segments, and with the second segment not greatly enlarged.

A. Palpi quadriarticulate.

- | | |
|---|------------------------|
| 1. Costa extending beyond apex of wing | <i>Catocha</i> Hal. |
| 2. Costa not reaching apex of wing but nearly disappearing at its union with third vein | <i>Lestremia</i> Macq. |

B. Palpi triarticulate.

- | | |
|--|---------------------------------|
| Costa not reaching apex of wing but nearly disappearing at its union with third vein | <i>Neolestremia</i> , gen. nov. |
|--|---------------------------------|

***Neolestremia boerhaaviae*, sp. nov.**

Female.—3.5 mm. long. Body brownish in colour. Antennae one-third the length of body; segments 16; stems of flagellate segments grow longer towards the distal part of antennae, first antennal segment irregular, second segment globose, both with lengths a little greater than their diameters, third segment with a length over twice its diameter, with a stem roughly one-sixth the length of the enlargement, fifth segment with a length about twice its diameter and with a stem one-fourteenth the length of enlargement, twelfth segment with a length

twice its diameter and with a stem one-sixth the length of enlargement, terminal segment longer than all the preceding, somewhat reduced towards the apex and with a length about four times its basal diameter. Palpi first segment sub-globose, stout; second segment roughly obovate-elliptic, with a length about twice its diameter and a little over four times the first segment and somewhat more slender; third segment more slender than the second, sub-cylindrical, basally narrowed somewhat, with a length a little over four times its diameter. Metatarsus of fore-legs as long as all the next three other segments, metatarsus of mid-legs longer than the next three segments and the metatarsus of hind-legs longer than all the other segments and also nearly two-thirds longer than the metatarsi of the mid and fore-legs. Claws simple. Pulvilli short but longer than half the length of claws in the fore-legs and much shorter than half its length in the other legs. Basal segment of lamellae of ovipositor roughly quadrilateral, with somewhat rounded sides, and a little longer than twice its breadth. Terminal segment as long as the basal segment, linear-elliptic and one-third narrower than the basal segment.

Holotype.—Male, on slide No. $\frac{975}{H 6}$.

Type-locality.—Madras Medical College Grounds, Madras Presidency, South India. Coll. M. S. Mani, 11.xi.1929.

Habitat.—Leaf bud galls of *Boerhaavia* spp. (Nyctagenae).

Life-history.—The eggs are laid on the tender buds and minute, colourless, apodous maggots hatch from them on the second day. The larvae attack the buds, the further development of which is thus interfered and instead of normally opening turn into a gall¹. They feed on the viscid juice exuding from the glandular hairs and develop for nine days, at the end of which they are 3 mm. long and yellowish in colour. They then migrate from the galls and wander on the surface of the plant for a time and drop to the soil where they pupate. Pupal period occupies four days, at the end of which the adults fly out. There are several generations in one year. They also seem to hibernate in the soil during the hot summer months.

Genus *Microcerata* Felt.

1908. *Microcerata*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 309.

1911. *Microcerata*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 32.

1913. *Microcerata*, Kieffer, *Gen. Ins.*, fas. 152, p. 309.

1925. *Microcerata*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 136.

This genus has not been previously recorded from India. It is characterised by the great reduction of the antennae, which have only 8-10 or 11 segments. The species of this genus are believed to breed in decaying vegetable matter.

The genus may be recognised by the following characters: Palpi tri- or quadriarticulate; second antennal segment sub-globose and greatly enlarged; flagellate segments gradually grow shorter towards

¹ I am not quite sure whether this midge really causes gall-formation in this case as it is apparently the first record of such a habit. It appears probable that some other agency, possibly another midge, is the true gall-maker and *Neolestremia boerhaaviae*, sp. nov. may be an inquiline. I record here only the life-history, and the exact rôle of the species remains to be determined by future observations.

the distal part of the antennae; sub-costa and third vein united as though by a very short cross-vein, the fork of the fourth vein even; claws simple or denticulate.

Genotype.—*Microcerata perplexa* Felt.

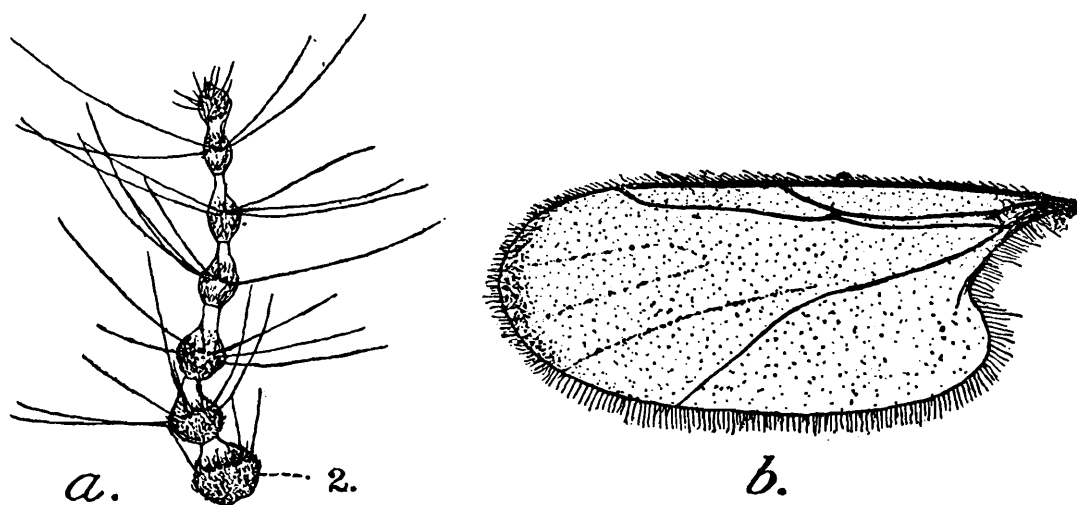
Key to species, revised after Felt.

- I. Antennal segments 8.
 - A. Claws simple *M. cockerelli* Felt.
 - B. Claws denticulate.
 - 1. Palpi triarticulate *M. indica*, sp. nov.
 - 2. Palpi quadriarticulate *M. johnsoni* Felt.
- II. Antennal segments 9.
 - A. Palpi triarticulate *M. diervilli* Felt.
 - B. Palpi quadriarticulate.
 - 1. First three palpal segments sub-equal, fourth segment twice the length of the third *M. corni* Felt.
 - 2. First two palpal segments sub-equal, third segment one half longer, fourth segment twice the length of third *M. spinosa* Felt.
- III. Antennal segments 10.
 - A. Pulvilli shorter than claws *M. perplexa* Felt.
 - B. Pulvilli as long as claws *M. borealis* Felt.
- IV. Antennal segments 11 *M. texana* Felt.

***Microcerata indica*, sp. nov.**

(Text-figs. 1 & 2.)

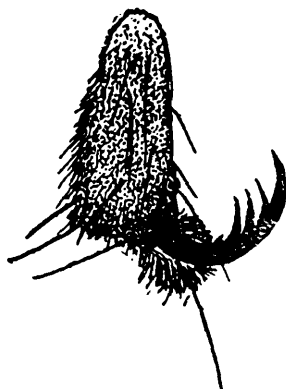
Male.—1 mm. long. Body reddish-brown in colour. Antennal segments 8, first two segments reddish-brown, flagellate segments fuscous,



TEXT-FIG 1.—*Microcerata indica*, sp. nov. a. antennae of male showing the segments becoming gradually smaller and shorter (Highly magnified); b. wing showing the third vein united with sub-costa as though by a very short cross-vein.

second antennal segment with a stem one-sixth the length of the basal enlargement, fourth segment with a stem one half the length of the basal

enlargement, terminal segment somewhat stouter than the one immediately preceding. Palpi triarticulate, first segment stout and expanded apically, second and third segments sub-equal and nearly half the length of the first. Mesonotum brownish-black. Wings coloured brown towards the apex. Claws tridentate. Empodium one half the length of claws.



TEXT-FIG 2.—*Microcerata indica*, sp. nov. Fifth tarsal segment with denticulate claws and empodium. (Highly magnified.)

Co-types.—Males, partly dissected on two slides. Nos. $\frac{976}{H 6}$ and $\frac{977}{H 6}$.

Paratypes.—Dry on pins. No. $\frac{978}{H 6}$.

Type-locality.—Medha, Yenna Valley, Satara District, Bombay Presidency, 2000 ft. Coll. F. H. Gravely, 17-23. iv.1912.

Tribe CAMPYLOMYZARIAE.

Genus *Peromyia* Kieff.

- 1894. *Peromyia*, Kieffer, *Bull. Soc. Entomol. France*, p. 63.
- 1911. *Peromyia*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 32.
- 1912. *Peromyia*, Felt, *Bull. N. Y. St. Mus.*, No. 165, p. 160.
- 1913. *Peromyia*, Kieffer, *Gen. Ins.*, fas. 152, p. 292.
- 1920. *Peromyia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 17.
- 1925. *Peromyia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 137.
- 1928. *Peromyia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 19.

This genus appears to be identical with *Neurolyga* Rond. It seems to be insufficiently defined and appears in two places in Felt's (76) key to genera : between *Projoanissia* Kieff. and *Trichopteromyia* Will., and again between *Tetraxyphus* Kieff. and *Micromyia* Kieff. Two species, including one from India, have been described so far.

The following diagnosis of Felt will help in the identification of this genus : Palpi biarticulate ; antennal segments 13 in female and 14, sub-globose and long-stemmed in male ; third vein curves distally and joins the margin of the wing near the rudimentary fourth vein ; claws sharply bent at right angles and swollen at the apical third ; pulvilli long ; basal clasp segment stout and truncate ; terminal clasp segment short, stout, curved apically, greatly swollen and obtusely rounded distally ; ovipositor quadriarticulate.

Genotype.—*Peromyia leveillei* Kieff.

Peromyia bengalensis Kieff.

1905. *Peromyia bengalensis*, Kieffer, *Ann. Soc. Sc. Bruxelles*, XXIX, p. 158.
 1913. *Peromyia bengalensis*, Kieffer, *Gen. Ins.* fas. 152, p. 292.
 1920. *Peromyia bengalensis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 17.
 1928. *Peromyia bengalensis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 19.

This species was bred along with *Daphnephila lindrae* Kieff. (*vide infra* p. 415) from the galls of the latter, in which it appears to be an inquiline. The type could not be traced.

It may be recognised by the following characters: 1.5 mm. long.; reddish in colour; third antennal segment with a length twice its diameter; claws simple, twice as long as the empodium.

Sub-family ITONIDIDINAE.

Tribe PORRICONDYLARIAE.

Genus **Winnertzia** Rond.

1834. *Cecidomyia* (*partim*), Bouche, *Naturgesch. Insekten.*, I, p. 27.
 1853. *Asynapta* (*partim*), Winnertz, *Linn. Entomol. Stett.*, VIII, p. 305.
 1860. *Winnertzia*, Rondani, *Atti. Soc. Ital. Sc. Nat. Milano*, II, p. 287.
 1864. *Clinorhiza*, Kieffer, *Ann. Soc. Entomol. France*, LXIII, p. 340.
 1908. *Winnertzia*, Felt, *Bull. N. Y. St. Mus.*, No. 124, pp. 415, 421-422.
 1913. *Winnertzia*, Kieffer, *Gen. Ins.*, fas. 152, p. 281.
 1913. *Winnertziola*, Kieffer, *Marcellia*, II, p. 235.
 1913. *Winnertziola*, Kieffer, *Gen. Ins.*, fas. 152, p. 283.
 1915. *Winnertziola*, Felt, *Bull. N. Y. St. Mus.*, No. 180, p. 130.
 1925. *Winnertzia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 139.

This genus, not previously recorded from this country, includes about thirty living and a few fossil species. It may be recognised by the cross-vein rising from third vein at an obtuse angle and by the horse-shoe shaped circumfila on opposite faces of the antennal enlargements. Fifth vein of wing is well developed.

Genotype.—*Winnertzia lugubris* Rond. (By original designation.)

Winnertzia burmitica (Cockerell).

1917. *Winnertziola burmitica*, Cockerell, *Psyche*, XXIV, p. 200, figs.

This fossil species was described by Cockerell from Burmese Amber, under the name *Winnertziola burmitica* Cockl. Felt (57) considers *Winnertziola* Kieff. to be identical with *Winnertzia* Rond. My own study of the diagnoses of the two genera has confirmed this view.

This species was found in clay of Miocene age, but Cockerell believes it to be older. The type location is not cited but it is presumably in the British Museum. Palpus, basal part of antenna, wing, part of haltere, claw and genitalia of this fossil are figured by Cockerell. Fletcher (80) has included this species in his account of Indian fossil insects and has reproduced the figures of Cockerell. Senior-White (167) has overlooked the genus in his Catalogue of Insects.

Genus **Colpodia** Winn.

1853. *Colpodia*, Winnertz, *Linn. Entomol. Stett.*, VIII, p. 188.
 1908. *Colpodia*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 416.
 1913. *Colpodia*, Kieffer, *Gen. Ins.*, fas. 152, p. 268.
 1920. *Colpodia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 17.
 1925. *Colpodia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 140.
 1928. *Colpodia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 17.

This genus comprises about twenty species, mostly American. It is remarkable for its rather long wings and is easily recognised by the following characters: antennae with 12-16 segments; wings long and narrow, cross-vein at right angles to costa, fifth vein forked, sixth vein branches off from the fifth; claws usually simple; lamellae of ovipositor oval and feebly protractile; terminal clasp-segment short and swollen.

C. fletcheri Felt (59) was described from India. It falls between the American species *C. pratensis* Felt and *C. maculata* Felt in Felt's key (29) to species.

Genotype.—*Colpodia angustipennis* Winn. (By original designation).

Genus **Clinophena** Kieff.

1911. *Clinophena*, Kieffer, *Trans. Linn. Soc. London*, (2) Zool., XIV, p. 328.
 1911. *Holoneurus* (partim), Kieffer, *Trans. Linn. Soc. London*, (2) Zool., XIV, p. 328.
 1913. *Clinophena*, Kieffer, *Gen. Ins.*, fas. 152, p. 268.
 1925. *Clinophena*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 140.

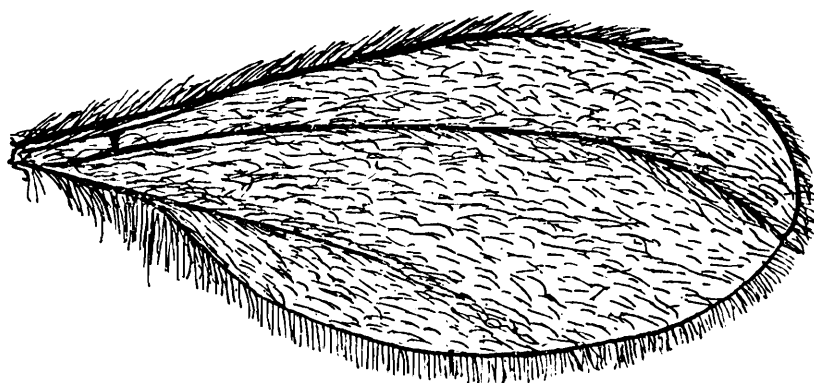
This small genus, with only one species, has not been previously recorded from India. It falls between *Colpodia* Winn. and *Paleocolpodia* Meun. in Felt's key (76) to genera. It resembles *Colpodia* Winn. in all characters except in the simple fifth vein not reaching the wing margin. It may be recognised by its long and narrow wings, with cross vein at right angles to costa and by its simple claws.

Genotype.—*Clinophena mahensis* Kieff.

Clinophena indica, sp. nov.

(Text-fig. 3.)

This new species is described from a male collected in the Eastern Himalayas.



TEXT-FIG 3.—*Clinophena indica*, sp. nov. Wing showing the fifth vein not reaching the posterior margin.

Male.—1.5 mm. long. Antennae as long as body, segments 14; first six segments swollen somewhat basally and apically, rest of the

segments uniformly sub-cylindrical; third segment with a stem one half the length of basal enlargement, which latter has a length about six times its middle diameter; fifth segment with a stem two-thirds the length of the basal enlargement, which latter has the apical swelling a little stouter than the basal; eighth and ninth segments sub-equal, with stems also sub-equal in length to the basal enlargements, which latter have lengths a little over one quarter their diameters; terminal segment cylindrical, elongated, with a length about four times its diameter and with a constriction near its apex. Palpi first segment with a length twice its diameter; second segment thrice the length of the first and somewhat more slender; third segment one-third shorter than the second and stouter than all the other segments; fourth sub-equal to third but somewhat more slender; mouth parts somewhat prolonged. Claws simple, short, almost bent at right angles. Pulvilli a little over half the length of the claws.

Holotype.—Male, partly dissected on slide. No. $\frac{979}{H6}$.

Type-locality.—Kurseong, Eastern Himalayas, 4700 ft. to 5000 ft. Coll. N. Annandale, 20.vi.1910.

Genus **Misocosmus** Kieff.

- 1912. *Epidosis (partim)*, Kieffer, *Spol. Zeyl.*, VII, p. 29.
- 1913. *Misocosmus*, Kieffer, *Bull. Soc. Nat. Hist. Metz.*, XXVIII, p. 55.
- 1913. *Misocosmus*, Kieffer, *Gen. Ins.*, fas. 152, p. 276.
- 1920. *Misocosmus*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 17.
- 1925. *Misocosmus*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 141.
- 1928. *Misocosmus*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 18.

This genus may be recognised by the following characters: palpi quadriarticulate; antennal segments 13; flagellate segments of male elongated and distinctly stemmed, with circumfila not produced into long bow-like loops; flagellate segments of female sessile; wings with three long veins, crossvein parallel with costa, fifth vein forked; claws simple, very small; pulvilli rudimentary; lobes of ovipositor very small.

Genotype.—*Misocosmus ceylanicus* (Kieff.).

Misocosmus ceylanicus (Kieff.).

- 1912. *Epidosis ceylanicus*, Kieffer, *Spol. Zeyl.*, VIII, p. 29.
- 1913. *Misocosmus ceylanicus*, Kieffer, *Gen. Ins.*, fas. 152, p. 276.
- 1920. *Misocosmus ceylanicus*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 17.
- 1928. *Misocosmus ceylanicus*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 18.

This species was originally referred to the genus *Epidosis* H. Loew and was described from midges collected at Peradeniya, Ceylon. It was later made the genotype of *Misocosmus* Kieff. Brunetti records that the type is in the Indian Museum, but only the labels are left and the insects are no longer available.

Genus **Dicroneurus** Kieff.

- 1894. *Epidosis (partim)*, Kieffer, *Ann. Soc. Entomol. France*, LXIV, p. 320.
- 1895. *Dicroneurus*, Kieffer, *Entomol. Nachr. Berlin*, XXI, p. 122.
- 1913. *Dicroneurus*, Kieffer, *Gen. Ins.*, fas. 152, p. 270.
- 1920. *Dicroneurus*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 16.
- 1925. *Dicroneurus*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 141.
- 1928. *Dicroneurus*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 18.

This genus is related to the preceding from which it may be distinguished by its denticulate claws. It may be recognised further by the capitate terminal clasp segment being as long as the basal clasp segment. The pulvilli are as long as the claws.

Genotype.—*Epidosis lineatus* (Kieff.) (Kieff.).

Dicroneurus indicus Kieff.

1913. *Epidosis indicus*, Kieffer, *Rec. Ind. Mus.*, IX, p. 200.
 1913. *Dicroneurus indicus*, Kieffer, *Gen. Ins.*, fas. 152, p. 270.
 1920. *Dicroneurus indicus*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 16.
 1925. *Dicroneurus indicus*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 18.

This species was first described under the genus *Epidosis* H. Loew from males taken at Kalighat. It was transferred to *Dicroneurus* in the *Genera Insectorum*. The type is not in the Indian Museum.

Genus **Camptomyia** Kieff.

1894. *Camptomyia*, Kieffer, *Ann. Soc. Entomol. France*, LXIII, p. 323.
 1913. *Camptomyia*, Kieffer, *Gen. Ins.*, fas. 152, p. 277.
 1915. *Camptomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 180, p. 179.
 1925. *Camptomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 142.
 1928. *Camptomyia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 18.

This genus comprises about twenty species, mostly from Europe. The midges of this genus breed in decaying vegetable matter. No genotype appears to have been designated.

This genus falls between *Tetradiplosis* Kieff. & Jorg. and *Dirhiza* H. Loew in Felt's key (76) to genera. It is separated from either by its dorsally recurved abdomen. It may be recognised by the following additional characters: Palpi quadriarticulate; antennal segments 16-32; third and fourth segments fused; circumfla in male peculiar, one-looped and sinuous; stems of male antennal segments long but not as long as the segments; stems in female not longer than one half the length of the sub-cylindrical basal enlargement. Wings with three long veins, cross-vein parallel with costa, third vein forming an arch and joining costa at the apex of wing, fifth vein forked. Terminal clasp segment fairly long, sometimes slender or somewhat swollen. Dorsal plate bilobed. Ovipositor basal lamellae biarticulate, terminal lamellae simple.

Key to species.

- | | |
|---|--------------------------|
| I. Antennal segments of female 21 | <i>C. ricini</i> Felt. |
| II. Antennal segments of female 24. | |
| A. Fifth antennal segment with a length two and half times its diameter, third palpal segment with a length five times its diameter | <i>C. morindae</i> Felt. |
| B. Fifth antennal segment with a length one-fourth its diameter, third palpal segment with a length about five times its diameter | <i>C. hibisci</i> Felt. |

Camptomyia ricini Felt.

1921. *Camptomyia ricini*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 23.
 1928. *Camptomyia ricini*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 18.

This species was described from midges bred from dried shoots of *Ricinus communis* Linn. at Coimbatore, South India. According to Felt

this species is typical of the genus. The type is in the New York State Museum.

I refer to this species a number of midges bred from dry, decaying fruit capsules of *Ricinus communis* Linn. at Tanjore, South India. Male 1 mm. long. Antennae one half longer than body and sparsely haired. Mesonotum reddish-brown. Scutellum and post-scutellum pale yellow. Abdomen yellow. Female about 2 mm. long. Antennae sparsely haired. Mesonotum brownish. Scutellum and post-scutellum yellow. Abdomen paler.

Camptomyia morindae Felt.

1926. *Camptomyia morindae*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser., IX*, p. 241.

1928. *Camptomyia morindae*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 18.

This species was described from midges bred from larvae found attacking the trunk of *Morinda tinctoria* Roxb. at Coimbatore, South India. The type is in the New York State Museum. This species is represented in Ramachandra Rao collection at Coimbatore.

I refer to this species a series of midges taken on leaves of *Morinda tinctoria* Roxb. at Tanjore, South India. The midges have been observed flying at dusk. Male 1.75 mm. long. Antennae longer than body and thickly haired. Mesonotum dark brown. Scutellum yellow. Abdomen dark yellowish-brown and thickly haired. Female a little shorter than male. Antennae three-fourth the length of body and thickly haired. Mesonotum reddish-brown. Scutellum and post-scutellum dirty yellowish. Abdomen yellowish.

Camptomyia hibisci Felt.

1926. *Camptomyia hibisci*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser., IX*, p. 241.

1928. *Camptomyia hibisci*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 18.

This species was described from midges bred from rotting stems of *Hibiscus* sp. at Coimbatore, South India. The type is in the New York State Museum. I have not come across this species.

Genus **Lopesiella** Tav.

1908. *Lopesiella*, Tavares, *Broteria*, VII, p. 145.

1913. *Lopesiella*, Kieffer, *Gen. Ins.*, fas. 152, p. 252.

1925. *Lopesiella*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 142.

1928. *Lopesiella*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 16.

This small genus, with only two species, is remarkable for having the antennae resembling those of the genus *Asphondylia* H. Loew, especially in the tortuous circumfili. Kieffer (111) is of the opinion that this genus should be included in the tribe Asphondylariae. Its characters, however, are quite distinctly marked and I am inclined to agree with Felt and retain it in the Porricondylariae.

The species of this genus may be recognised by the following characters: Palpi triarticulate; antennal segments 14, sessile in both sexes, second segment flattend, third segment with a length about four times its diameter and not fused with fourth, terminal segment with a

prolongation, circumfila tortuous as in *Asphondylia* H. Loew; wings with three long veins, fifth vein forked; claws long, not strongly curved, simple; pulvilli rudimentary.

Genotype.—*Lopesiella combreti* Tav.

***Lopesiella pollinae* Felt.**

1927. *Lopesiella pollinae*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser., X*, pp. 2-3.

1928. *Lopesiella pollinae*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 16.

Midges bred by Ramachandra Rao from galls of *Pollinia argentea* at Thaliparamba, Malabar, South India, were provisionally referred to this genus by Felt. Males of this species have not been noted so far. It is represented in Ramachandra Rao collection at Coimbatore.

Genus *Pruthidiplosis*, nov.

This new genus, named after Dr. Hem Singh Pruthi, is erected for a rather unique midge, which gives rise to corticose galls on flowers of *Mimusops hexandra* Roxb. Its characters are very striking and do not admit of its being referred to any known genus. At first sight this genus may be taken for one of the Itonididinae but the presence of the distinct cross-vein clearly indicates that it should be referred to this tribe.

It falls between *Allodiplosis* Kieff. and Jorg. and *Holoneurus* Kieff. in Felt's key (76) to genera. It resembles the former in its long-looped circumfila and forked fifth vein, but differs in its biarticulate palpi and simple claws. It resembles *Holoneurus* Kieff. in its obsolete sixth vein but differs in its forked fifth vein and simple claws. From the foregoing genus *Lopesiella* Tav. it may be distinguished by the biarticulate palpi, and long bow-loop circumfila.

The following are its diagnostic characters: Palpi biarticulate; antennal segments 14; flagellate segments of female cylindrical and moderately stemmed; flagellate segments of male binodose and long-stemmed; circumfila of male formed into moderately long, bow-like loops as in the tribe Itonididinae and in two even whorls as in the genus *Contarinia* Rond. Wings with three long veins; third vein with a distinct cross-vein nearly parallel with costa and apparently a continuation of third vein; fifth vein forked, distally with the branches very faint; sixth vein obsolete. Terminal clasp segment moderately long. Ovipositor short and bilobed.

Genotype.—*Pruthidiplosis mimusopsicola*, sp. nov.

To indicate the position of *Pruthidiplosis* in the series of genera with the cross-vein parallel or nearly so to the costa I give below a key revised from Felt (76).

I. Wings with three long veins, fifth vein forked, sixth a branch of fifth or wanting.

A. Circumfila not formed into long loops.

B. Circumfila formed into long loops.

1. Claws denticulate.

a. Palpi quadriarticulate

Lopesia Rubs.

b. Palpi uniarticulate

Allodiplosis Kieff. & Jorg.

2. Claws simple.

Palpi biarticulate

Pruthidiplosis, gen. nov.

II. Wings with three long veins, fifth vein simple, sixth vein obsolete.

A Claws denticulate.

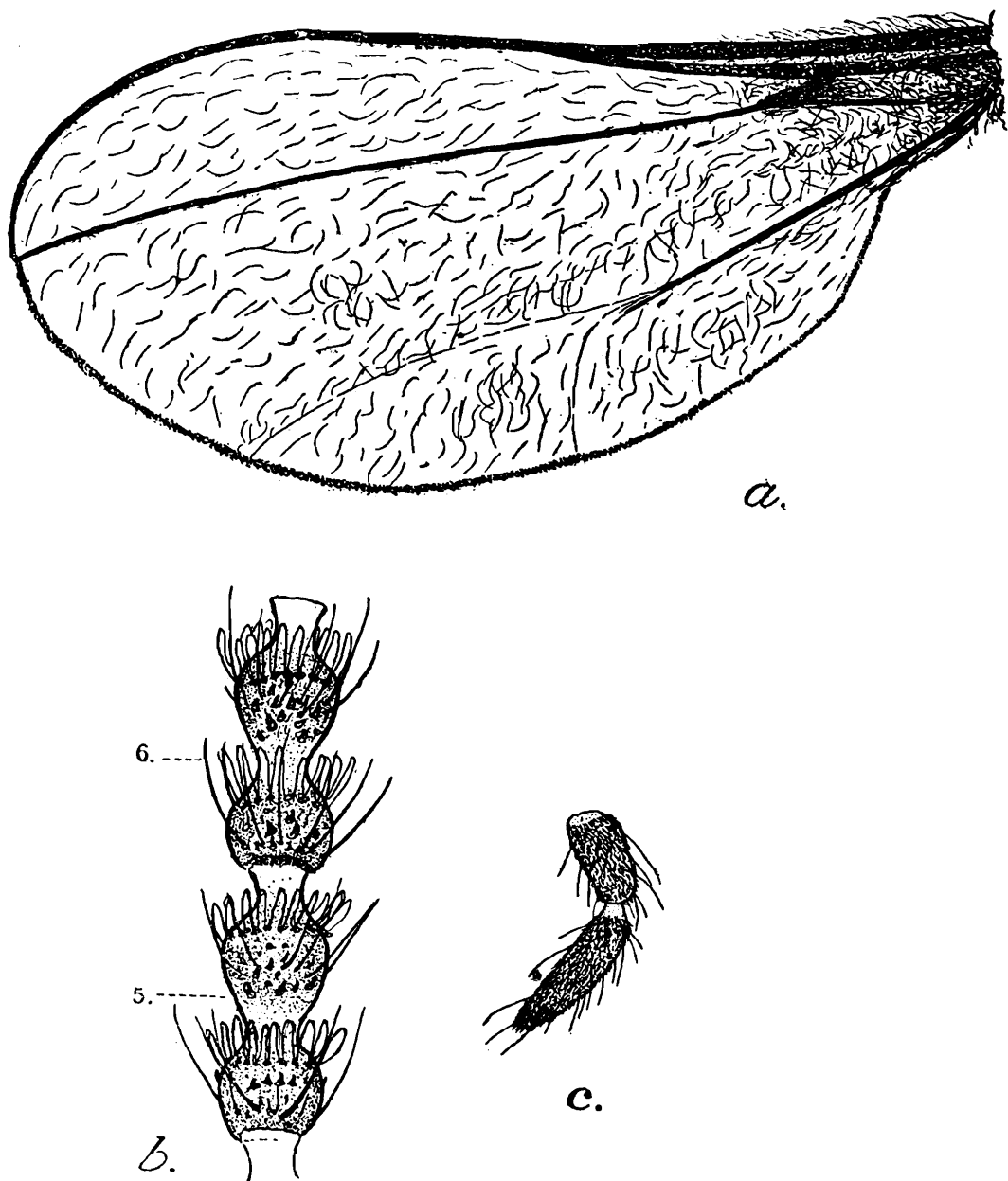
1. Claws as long or twice as long as pulvilli . *Holoneurus* Kieff.

2. Claws more than twice the length of pulvilli *Coccopsis* Meij.

***Pruthidiplosis mimusopsicola*, sp. nov.**

(Text-figs. 4, 5 & 6.)

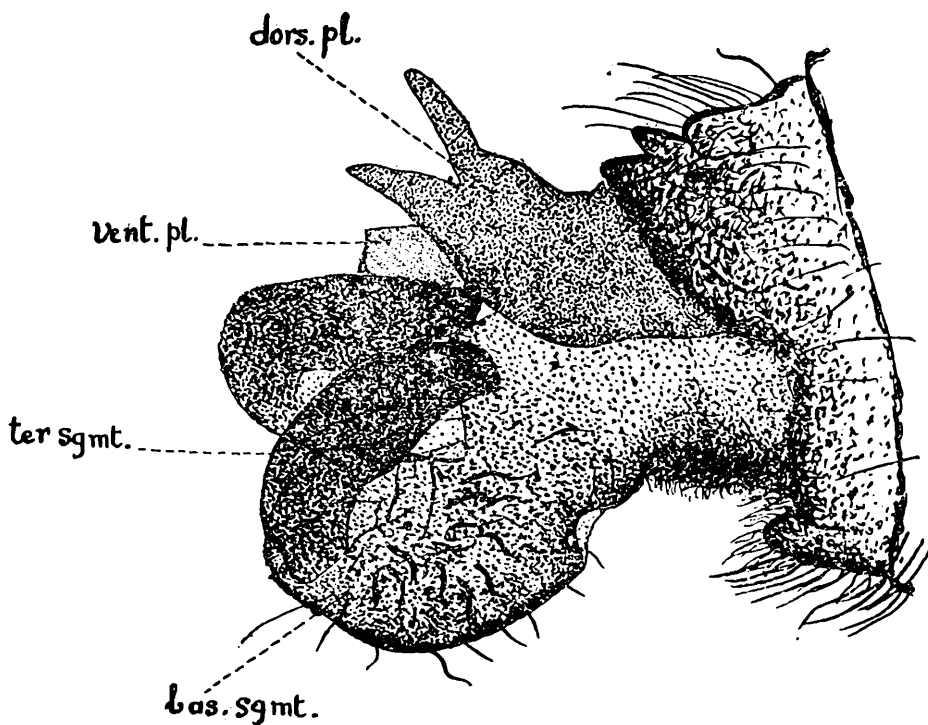
This midge attacks the flower buds of *Mimusops hexandra* Roxb., thus preventing the formation of normal fruits but producing fruit-like corticose galls, i.e., galls with a spongy inner substance and a hard shell-like outer rind.



TEXT-FIG. 4.—*Pruthidiplosis mimusopsicola*, sp. nov. a. wing; b. antennal segments of male; c. palpus.

Male.— 3 mm. long. Body dirty-brown in colour. Antennae two-thirds the length of body; segments 14; third segment with ovoid

enlargements ; fifth segment with stems about one-sixth and one-third the diameter of the basal and apical sub-globose enlargements respectively, circumfila loops of this segment as long as the stem on the basal enlargement and half the length of stem on the apical enlargement ; sixth segment with stems one-third and one-half the diameters of the basal and apical sub-globose enlargements respectively ; terminal segment with a stem one-sixth the length of segment and a little less than half the diameter of the enlargement, the obpyriform apical enlargement with a linear pyriform prolongation nearly equal to the diameter of the enlargement ; circumfila on all segments in two even whorls similar to those of the genus *Contarinia* Rond. but with the loops somewhat shorter. Palpi biarticulate ; first segment with a length one-fourth greater than its diameter ; second segment more slender, about twice the length of first and somewhat reduced towards its apex. Mesonotum brownish-black. Claws simple on all legs. Empodium a little longer than claws. Basal clasp segment of genitalia with numerous dark, stout, strongly chitinised, somewhat curved setae on both inner and outer surfaces. Terminal clasp segment with a length about five times its width, with the tip strongly chitinised and bluntly pointed.



TEXT-FIG. 5.—*Pruthidiplosis mimusopsicola*, sp. nov. Male genitalia ; *dors. pl.* dorsal plate ; *vent. pl.* ventral plate ; *ter. sgmt.* terminal clasp segment ; *bas. sgmt.* basal clasp segment.

Female.— 4 mm. long. Body bright reddish in colour. Antennae half the length of body ; segments 14, cylindrical ; third and fourth segments united, sub-equal, constricted in the middle, with stems roughly one-sixth the length of the enlargements ; fifth segment with a stem one-third the length of enlargement which latter has a length a little over twice its diameter ; sixth segment with a length one-fourth the length of the enlargement, which latter has a length twice its diameter ; twelfth segment with a stem a little less than one-fourth the length of

enlargement, which latter has a length less than twice its diameter; terminal segment one half longer than the one immediately preceding, with a constriction at its apical third; all segments with a thick basal whorl of setae as long as the enlargements and an apical whorl of setae a little shorter than the enlargements. First palpal segment with a length a little over twice its diameter and thickly setose; second segment a little over one half longer than the first, thickly setose and reduced towards the somewhat chitinised tip. Mesonotum dark brown. Scutellum black. Claws simple on all legs and a little longer than empodium. Ovipositor with the terminal lamellae rounded.

Pupae.—4.5 mm. long, stout, cylindrical and dark reddish in colour. Antennal horns (cephalic horns) serrated on the anterior side. The two small thoracic horns pointed backwards. Anal horns closely adpressed. Spiracles of third abdominal segment oval, somewhat larger than those of the others, which are circular. Pupation in galls.

Holo-co-types.—Male, on slide. No. $\frac{980}{H\ 6}$ and in spirit No. $\frac{1029}{H\ 6}$.

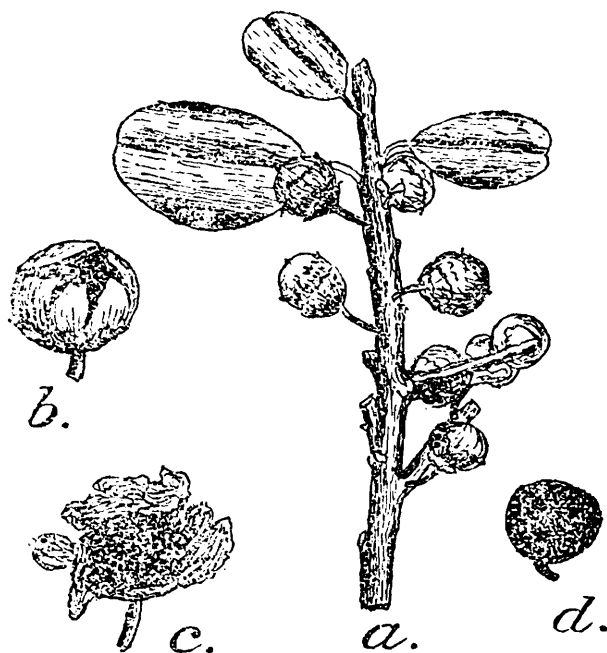
Allotype.—Female, in spirit. No. $\frac{981}{H\ 6}$.

Para-co-types.—Two males on slide. No. $\frac{982}{H\ 6}$.

Paratypes.—Males and females in spirit. No. $\frac{983}{H\ 6}$.

Type-locality.—A scrub-jungle near Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 18.xii.1932.

Galls.—These galls look very much fruits and as such indeed they have found their way to many herbaria. Their true nature cannot be detected except on minute examination.



TEXT-FIG. 6.—*Pruthidiplosis mimusopsicola*, sp. nov. Galls on flowers of *Mimosa hexandra* Roxb. a. a twig with galls; b. a mature gall about to dehisce, showing cracks in the scleroderm; c. old gall showing the exuvia of the midges projecting from the spongy substance; d. gall cut into two to show the larval cavities.

10-15 mm. in diameter. Regular, globose, rarely barrel-shaped or obpyriform; dark green and glabrous; dehiscent, acystiferous, with a solid, white, spongy inner substance and a hard outer rind—the scleroderm. They are borne on curved pedicels and are crowded towards the

tip of the stout, cylindrical twigs. Ovoid larval chambers are found in the spongy substance just below the scleroderm.

Really these galls are the flowers, with all the floral envelopes involved. The calyx is often persistent, accrescent and cupiform at the base of the gall; ordinarily the sepals, petals, stamens and style are found as minute, spine-like vestiges on the surface of the galls. When the galls mature, the scleroderm dehisces, exposing the pupae sticking out from the inner substance and thus facilitating easy escape later on of the adult midges.

Tribe LASIOPTERARIAE.

Genus *Lasioptera* Meig.

1818. *Lasioptera*, Meigen, *Syst. Besch. Europ. Zweifl. Insekt.*, I, p. 88.
 1818. *Diomyza*, Meigen, *Syst. Besch. Europ. Zweifl. Insekt.*, I, p. 89.
 1853. *Lasioptera*, Winnertz, *Beitr. einer Mon. Gallmuck.*, p. 191.
 1862. *Lasioptera*, Osten Sacken, *Mon. N. Amer. Dipt., Cecid.*, p. 175.
 1908. *Lasioptera*, Felt, *Bull. N. Y. St. Mus.*, No. 124, pp. 323-327.
 1913. *Lasioptera*, Kieffer, *Gen. Ins.*, fas. 152, p. 30.
 1918. *Lasioptera*, Felt, *Bull. N. Y. St. Mus.*, No. 198, p. 107.
 1920. *Lasioptera*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 8.
 1925. *Lasioptera*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 142.
 1928. *Lasioptera*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 1.

The genus *Lasioptera* Meig. comprises over one hundred and fifty species distributed all over the whole world. They are gall-making in their habits and attack both herbaceous and woody plants, among which grasses are often prominent. They generally produce galls on shoots, though sometimes galls are also produced on leaves. They have mostly been found in India on members of the natural order Cucurbitaceae. Some species may prove to be of economic importance in India.

The members of this genus are characterised by the presence of thickly scaled and closely approximated costa, sub-costa and third vein. They are characteristically coloured and the dorsum of their abdomen is often conspicuously ornamented by yellowish-white or silvery-white spots or markings. The ovipositor of some species has a number of stout, recurved chitinous hooks. They may be easily recognised by the following additional characters: Palpi quadriarticulate; antennal segments 16-33 in female and 16-22 in male, some species having equal number of segments in both sexes; third and fourth antennal segments fused or nearly so; wings with three long veins, third vein very near costa and uniting therewith at or before the basal half, very rarely beyond the basal third, fifth vein forked at some distance from its base; pulvilli well developed; ventral plate bilobed.

Genotype.—*Lasioptera albipennis* Meig.

Key to species.

- I. Abdomen dark brown or black.
 - A. Abdominal segments narrowly margined posteriorly with yellowish-white *L. eriochloa* Felt.
 - B. Abdomen dorsally with silvery-white sub-median spots.
 1. Antennal segments 18 in female *L. fluitans* Felt.
 2. Antennal segments 20 (2+18) *L. bryoniae* Schiner.
 3. Antennal segments 24 in female *L. falcata* Felt.
- II. Abdomen yellowish-brown *L. paniculi* Felt.

Lasioptera eriochloa Felt.

1926. *Lasioptera eriochloa*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, IX, p. 244.

1928. *Lasioptera eriochloa*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 1.

Felt erected this species for midges bred by Ballard from ear-heads of *Eriochloa polystachya* at Coimbatore, South India. The type is in the New York State Museum. This species is represented in Ramachandra Rao collection by one female, 1.2 mm. long. Mesonotum dark reddish-brown, abdomen dark brown, segments narrowly margined posteriorly with yellowish-white.

Lasioptera fluitans Felt.

1917. *Lasioptera fluitans*, Felt, *Entomol. News*, XXVIII, p. 73.

1920. *Lasioptera fluitans*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 9.

1928. *Lasioptera fluitans*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 2.

This species was described from midges bred by Ramachandra Rao from galls of *Panicum fluitans* at Coimbatore. The type is in the New York State Museum. This species may be recognised by the following characters: Female 1.5 mm. long; antennal segments 18; mesonotum dark brown; scutellum dark reddish-brown; abdomen black, with lunate sub-median, silvery-white spots on segments 1-5.

Lasioptera bryoniae Schiner.

1868. *Lasioptera bryoniae*, Schiner, *Novara Reise Dipt.*, p. 5, pl. i, fig. 2, 3.

1913. *Lasioptera bryoniae*, Kieffer, *Gen. Ins.*, fas. 152, p. 31.

1920. *Lasioptera bryoniae*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 9.

1928. *Lasioptera bryoniae*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 1.

This species was bred out of shoot galls of *Bryonia* sp. from Vellore in Madras Presidency. The description of the species is unfortunately faulty and I have not seen any specimens.

Lasioptera falcata Felt.

1919. *Lasioptera falcata*, Felt, *Philipp. Journ. Sc.*, XIV, p. 288.

1919. *Lasioptera falcata*, Ramakrishna, *Rep. Proc. Third Entomol. Meet., Pusa*, I, p. 324, pl. xviii, fig. a & b.

This species was described from a single female bred from stem galls of an unnamed Cucurbit from the Philippines. Midges bred from the well-known vine galls of Bitter gourd, *Momordica charantia* Linn., are also referred by Felt to this species. It is remarkable that this species occurs in such widely separated areas. It is reported to be very common at Coimbatore. The adult midge and its galls are figured by Ramakrishna Ayyar. I have collected it in various localities in South India.

Lasioptera paniculi Felt.

1920. *Lasioptera paniculi*, Felt, *Philipp. Journ. Sc.*, XVII, p. 232.

This species was described from the Philippines from midges bred from panicles of *Panicum carinatum* Presl. It is found in Ramachandra Rao's collection at Coimbatore with the label: Bred from ear-heads of *Panicum prostratum* Lamk., Y. R. Rao, Coimbatore. These midges were

evidently identified by Felt and there seems to be no doubt as to the occurrence of this species in South India. Senior-White does not mention this species in his catalogue.

***Lasioptera textor* Kieff.**

1905. *Lasioptera textor*, Kieffer, *Ann. Soc. Sc. Bruxelles*, XXIX, p. 155.
 1920. *Lasioptera textor*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 9.
 1928. *Lasioptera textor*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 2.

Kieffer erected this species for a midge bred from galls of *Polygonum molle*. The sex of the midge described and the type-location are not stated. The fact that the mouth parts are described as prominently prolonged casts doubt on the correctness of Kieffer's identification. It would appear to belong either to the genus *Clinorhyncha* H. Loew or *Ozirhynchus* Rond., but Kieffer's description is not detailed enough for deciding its exact position.

***Lasioptera longispatha* Kieff.**

1908. *Lasioptera longispatha*, Kieffer, *Marcellia*, V, p. 157.
 1920. *Lasioptera longispatha*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 9.

This species was erected by Kieffer from larvae taken from galls of *Camellia drupifera* at Kurseong, Eastern Himalayas. No adult is described. Larval characters, in the absence of a knowledge of their relationship to adult characters, are of doubtful value for taxonomic purposes.

***Lasioptera trilobata* Kieff.**

1908. *Lasioptera trilobata*, Kieffer, *Marcellia*, V, p. 157.

This species was also described by Kieffer from larvae inhabiting the galls of *Schima walchii* at Kurseong. No adults are described.

Genus *Prolasioptera* Kieff.

1913. *Prolasioptera*, Kieffer, *Bull. Soc. Hist. Nat. Metz.*, No. 28, p. 27.
 1913. *Prolasioptera*, Kieffer, *Gen. Ins.*, fas. 152, p. 33.
 1925. *Prolasioptera*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 143.

This genus, not previously recorded from India, was erected by Kieffer for midges closely approaching *Lasioptera* Meig. but departing from it in its triarticulate palpi. It falls between *Lasioptera* Meig. and *Neolasioptera* Felt in Felt's key (76) to genera. It may be distinguished from the latter by its forked fifth vein. Altogether about half a dozen species, mostly from Europe, have been described so far. The midges of this genus pupate in their galls. One new species from the Madras Presidency is described below.

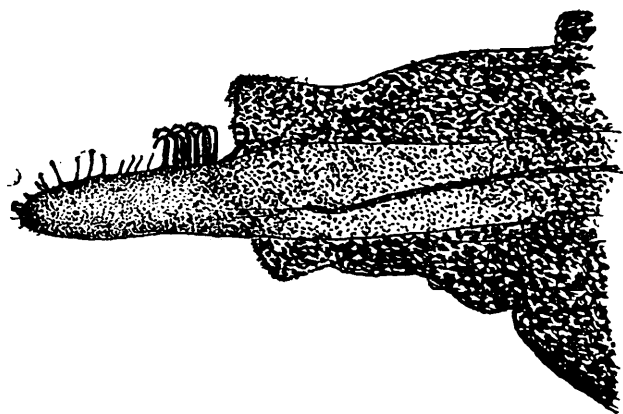
Genotype.—*Prolasioptera nivocincta* Kieff.

***Prolasioptera annandalei*, sp. nov.**

(Text-fig. 7.)

Female.—1 mm. long. Body yellowish-brown in colour. Antennae nearly half the length of body; segments 18; second segment subglobose; third segment somewhat stouter basally than apically, twice the length of second and more slender; fourth segment a little shorter,

somewhat more slender and more reduced towards the apex than third segment; fifth segment nearly uniform in thickness, sub-equal to fourth and one-fourth greater than its own diameter, very slightly constricted in the middle and with a very short stem; penultimate and terminal segments sub-equal, the former sub-pyriform, the latter pyriform, both with a length a little greater than their diameters. First palpal segment stouter apically than basally, with a length a little greater than its diameter; second segment one-half longer than first, slightly more slender, stout basally and slender apically and sparsely setose; third segment more slender and somewhat more thickly setose than second, twice as long, swollen and club-shaped beyond the basal half. Sub-median lines on the mesonotum scaled. Ovipositor with chitinous hooks from its one-fourth backwards.



TEXT-FIG. 7.—*Prolasioptera annandalei*, sp. nov. Ovipositor showing the dorsal row of chitinous hooks. (Highly magnified).

Holotype.—Female, on the same slide as the holotype of *Thurauia chilkaensis*, sp. nov. No. $\frac{984}{H\ 6}$.

Type-locality.—Barkuda Island, Chilka Lake, Madras Presidency, South India. Coll. N. Annandale.

Genus *Neolasioptera* Felt.

1908. *Neolasioptera*, Felt, *Bull. N. Y. St. Mus.*, No. 124, pp. 330-333.
 1913. *Neolasioptera*, Kieffer, *Gen. Ins.*, fas. 152, pp. 22-23.
 1918. *Neolasioptera*, Felt, *Bull. N. Y. St. Mus.*, No. 198, p. 171.
 1925. *Neolasioptera*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 143.

This American genus, with about forty species, is recorded here for the first time from India. It is closely related to the two preceding genera, *Lasioptera* Meig. and *Prolasioptera* Kieff., both of which it resembles in general characters and habits. It may be distinguished from them by its simple fifth vein. Antennal segments vary from 17-29 in female and 12-23 in male.

The midges of this genus give rise to shoot galls, chiefly on herbaceous plants and occasionally also on woody plants and grasses. Two new species from South India are described below.

Key to species.

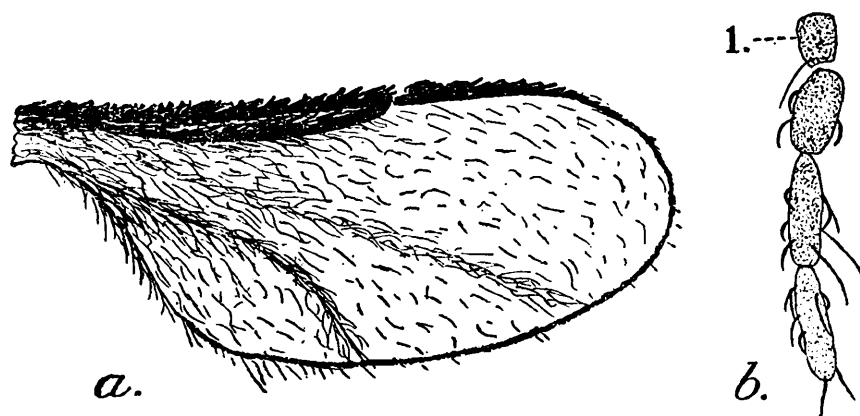
- | | |
|---|-----------------------------------|
| I. Abdomen black, palpi quadriarticulate, empodium as long as claws | <i>N. cephalandrae</i> , sp. nov. |
| II. Abdomen brown, palpi triarticulate, empodium a little longer than claws in hind legs and as long as claws in other legs | <i>N. crataevae</i> , sp. nov. |

***Neolasioptera cephalandrae*, sp. nov.**

(Text-figs. 8 and 9.)

This new species is described from midges bred from solid stem galls of *Cephalandra indica* Naud., which, though very common in India, does not appear to have been described so far.

Female.— 2 mm. long. Antennae less than one-fourth the length of body, segments 21; first segment obpyriform, with a length nearly equal to its diameter, second irregularly sub-globose, shorter and more slender than first, with a length a little less than its own diameter;



TEXT-FIG. 8.—*Neolasioptera cephalandrae*, sp. nov. a. wing; b. palpus.

third segment obpyriform, with a length one-fourth shorter than its diameter; fourth segment shortly sub-cylindrical, with a stem one-half the length of the basal enlargement; fifth segment cylindrical, with a length less than half its diameter and with a very short stem; terminal four segments somewhat stout basally; penultimate segment distinctly broadened at base; terminal segment of right antennae short, pyriform and with a length almost equal to its diameter; terminal segment of the left antennae relatively twice longer, coniform and slightly constricted in the middle. Palpi quadriarticulate and sparsely setose; first segment short, cylindrical; second segment short, stout, oblong-ovoid and with a length about twice as long as its diameter; third segment less than half the thickness of second and one-fourth longer; fourth segment a little longer and somewhat more slender than third. Mesonotum brown. Halteres deep flesh-coloured. Tarsi unicolourous. Claws unidentate and as long as empodium. Abdomen covered dorsally with black scales not fully reaching the edges of the side on the posterior margins of segments. Ovipositor one-seventh the length of body, flesh-coloured, terminal portion with a length over twice its diameter, densely covered all round the apex with long stigmatic setae, whose tips are somewhat curved and hook-shaped and with over ten stouter, longer, chitinous hooks basally.

Holotype.—Female, partly dissected in spirit. No. $\frac{985}{H 6}$.

Paratypes.—Four females, in spirit. No. $\frac{986}{H 6}$.

Type-locality.—A scrub-jungle near Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 15.vii.1933.

Other localities.—Coimbatore, Erôde, Vellore, Madras and Calcutta.



TEXT-FIG. 9.—*Neolasioptera cephalandrae*, sp. nov. Shoot galls of *Cephalandra indica* Naud.

Galls.—25-40 mm. long and 15-30 mm. thick. Regular, ovoid, fusiform or moniliform, local or sub-extensive, solid, hard, fleshy, tuberous swellings of the vine. Yellowish-white or pale green, glabrous; cystiferous, indehiscent and with numerous minute circular holes on the surface when old.

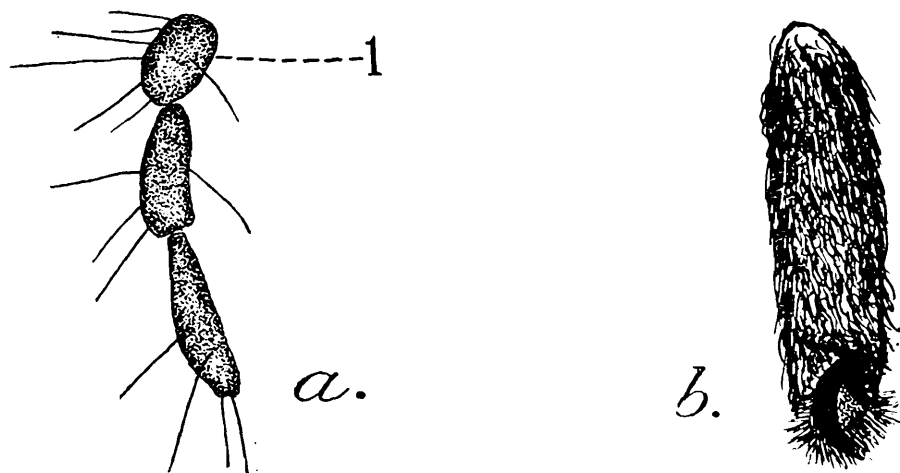
An extensive parenchyma surrounds the large, central, irregularly proliferating zone. Vascular bundles are scattered irregularly both in the parenchyma and the proliferating zone. Cysts are longitudinal and occur in the proliferating zone. The seat of cell proliferation appears to be the medulla of the stem.

Life-history.—Numerous eggs are laid close together on the young vines of *Cephalandra indica* Naud. The eggs hatch out on the fourth day and the maggots penetrate the stem and bore tunnels up and down in the medulla. The larvae continue to develop in the galls and reach maturity in four weeks. They then bore their way to the surface but do not make any hole. They pupate just beneath the epidermis in these cavities; this facilitates the easy escape of the adults, which emerge on the seventh day after the commencement of pupation. Just before the emergence of the adults, the pupae wriggle their way out, piercing the thin epidermis and project from the surface of the gall. The anterior end of the pupal case bursts and the adults escape leaving the exuvium sticking out from the holes. The larvae and pupae of the midges are very heavily parasitised by unknown Chalcid flies. There appear to be at least two generations in one year.

***Neolasioptera crataevae*, sp. nov.**

(Text-figs. 10 and 11.)

This new species is erected for a midge, which attacks the young flower buds of *Crataeva religiosa* Forst. and gives rise to woody galls, not observed by previous workers.



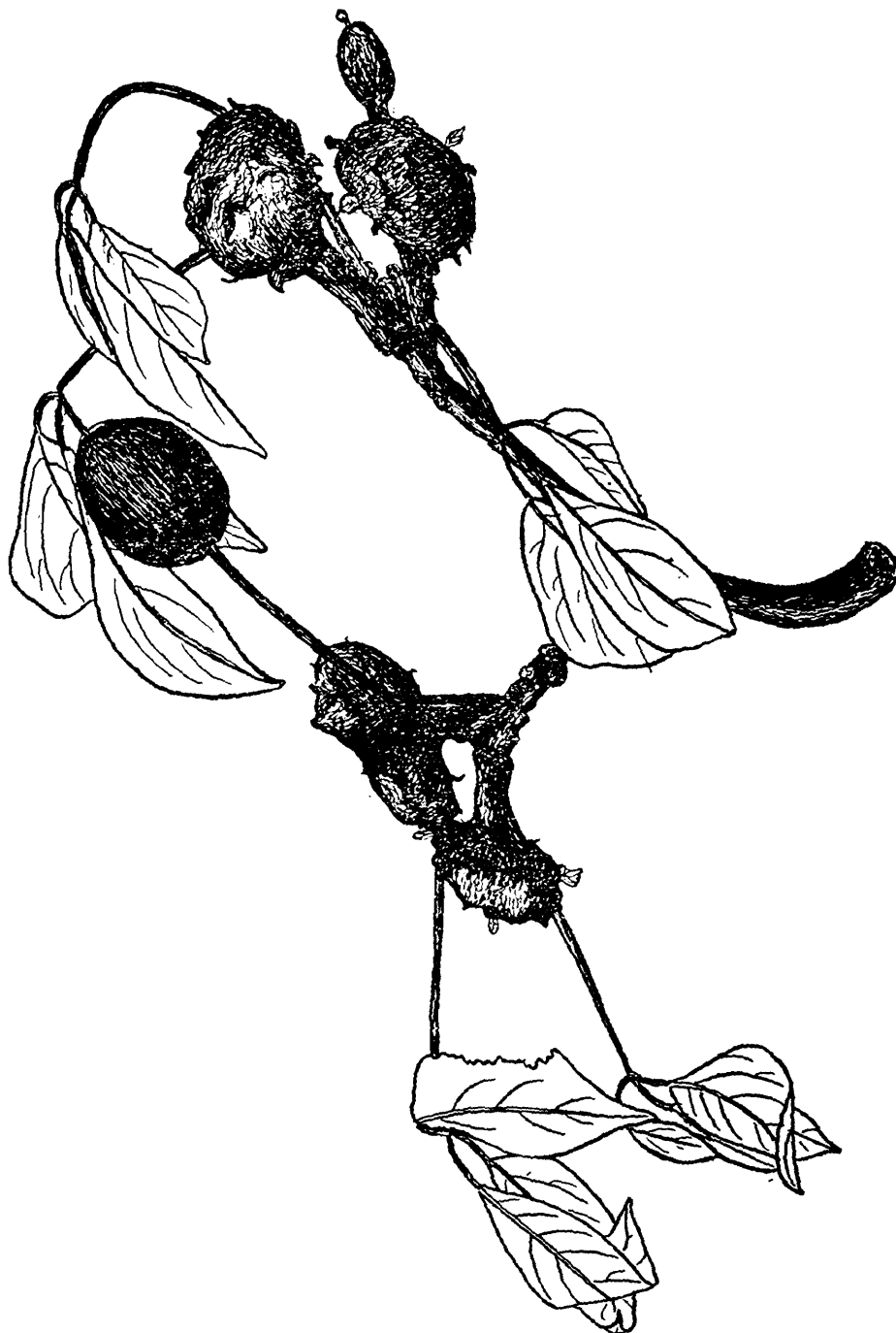
TEXT-FIG. 10.—*Neolasioptera crataevae*, sp. nov. a. palpus; b. fifth tarsal segment showing unidentate claw and empodium.

Female.—2 mm. long. Antennae one-fourth the length of body, segments 21; first segment broadly obconic, with a length equal to its apical diameter; second segment globose; third segment sub-globose; fifth segment shortly cylindrical, with a length a little greater than its diameter; penultimate segment with a length a little less than twice its diameter; terminal segments in both antennae short, pyriform and with lengths equal to their diameters. Palpi triarticulate and sparsely setose; first segment short, stout and ovoid; second segment with a length thrice its diameter and somewhat stout apically; third segment with a length roughly five times its diameter and a little longer than second, slender basally, rather stout in its apical half and truncate at the very tip. Mesonotum brown. Abdomen pale brown dorsally and yellowish-brown ventrally. Claws unidentate, a little

shorter than empodium and somewhat more sharply bent in hind than in other legs. Ovipositor with setae round apical half short and not stigmatic as in the foregoing species.

Holotype.—Female, in spirit. No. $\frac{987}{H\ 6}$.

Type-locality.—Grand Anicut Canal Bank, Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 19.vii.1933.



TEXT-FIG. 11.—*Neolasioptera crataevae*, sp. nov. Solid flower galls of *Crataeva religiosa* Forst.

Galls.—20-30 mm. in diameter. Regular, globose, generally flattened at the top, funnel-shaped at the base, solitary, clustered or sometimes compound, solid, hard, woody, indehiscent and cystiferous; yellowish-green or brownish-yellow, with reddish-brown spots; horizontal, thick, fleshy, flat out-growths basally, representing the sepals

and petals, and with more numerous short, conical or pyramidal, fleshy, recurved spinous eruptions above, representing the stamens.

Really the galls are the flowers with extensive cell proliferation involving the gynophore, calyx, corolla, stamens and sometimes the pistil also. The main seat of cell proliferation is the part of the flower stalk between the sepals and gynophore. The petals and sometimes the stamens revert to the primitive condition and tend to become small green leaves on the galls. The suppressed ovary and part of the gynophore immediately below it are sometimes found on the gall.

An irregular and broad ring of vascular bundles is embedded in a parenchyma of irregular cells.

Life-history.—The female midge lays eggs on the tender flower buds of *Crataeva religiosa* Forst. and the larvae hatching from them on the second day make their way into the vegetable tissues. As a result the flowers fail to open and in their places large, woody galls are formed. The larval period is presumably long, occupying well over two months. Pupation takes place in the galls and the pupal period is fifteen days. There appears to be only one generation in a year.

Genus *Stefaniola* Kieff.

1904. *Stefaniella* (*partim*), Tavares, *Broteria*, III, p. 293.

1913. *Stefaniola*, Kieffer, *Bull. Soc. Hist. Nat. Metz.*, XXVIII, p. 45.

1913. *Stefaniola*, Kieffer, *Gen. Ins.*, fasc. 152, p. 27.

1925. *Stefaniola*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 143.

This genus has not been previously recorded from India. It closely approaches *Stefaniella* Kieff. but is readily distinguished from it by its uniarticulate palpi and 11 antennal segments. According to Kieffer the first two flagellate antennal segments are fused together. Felt, however, places this genus in the series in which these segments are not fused. It falls between *Dibaldratia* Kieff. and *Salsolomyia* Tav. in Felt's key (76) to genera. As at present recognised, this genus is characterised by its obliquely truncate ovipositor dorsally having a row of hooks and by its small head well covered over by the mesonotum.

Genotype.—*Stefaniola salsolae* (Tav.).

Stefaniola bengalensis, sp. nov.

This new species is erected for a single female (?) in the collection of the Zoological Survey of India, Indian Museum. Except the antennae, part of wings and legs, the other parts are very badly damaged. The well-developed pulvilli and the 20 antennal segments are not strictly typical of the genus as defined by Kieffer. The uniarticulate palpi and the small head well under the mesonotum are strongly in favour of its being included in the genus as characterised by Felt. As it does not approach any other known genus so closely, I refer the midge, in spite of these variations, to this genus.

Antennal segments 20, moderately setose, third segment with a length a little greater than its diameter, fourth and fifth segments with lengths roughly equal to their diameters, terminal segment pyriform, with a length one-third greater than the basal diameter. Palpi uniarticulate, thickly scaled and with a length two and half times its

diameter. Claws simple, strongly curved. Empodium well developed and longer than claws.

Holotype.—Partly dissected on slide. No. $\frac{988}{H\ 6}$.

Type-locality.—Port Canning, Bengal. Museum Coll. 6.xii.1907.

Tribe DASYNEURARIAE.

Genus **Hallomyia** Kieff.

1912. *Hallomyia*, Kieffer, *Spol. Zeyl.*, VIII, p. 25.

1913. *Hallomyia*, Kieffer, *Gen. Ins.*, fas. 152, p. 106.

1920. *Hallomyia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 11.

1925. *Hallomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 144.

1928. *Hallomyia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 6.

This genus, with only one species, appears to be closely related to *Stomatosema* Kieff. from which it is distinguished by its 13 antennal segments and spotted wings. Palpi are quadriarticulate. Empodium half the length of claws. Third vein is united with costa beyond the apex of wing.

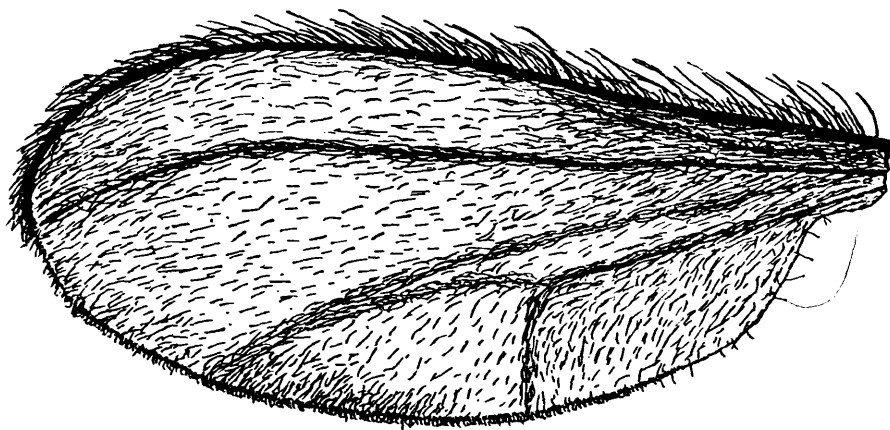
Genotype.—*Hallomyia iris* Kieff. (By original designation.)

Hallomyia iris Kieff.

(Text-fig. 12.)

1912. *Hallomyia iris*, Kieffer, *Spol. Zeyl.*, VIII, p. 25.

This species was described from Ceylon. The type-location is not stated. Brunetti records that three paratypes are in the Indian Museum. Except for one very badly damaged specimen, the other two have completely disappeared due to bad preservation. I have mounted (Slide No. $\frac{989}{H\ 6}$) this midge to prevent its further deterioration and figure its wing to show the third vein making an arch and uniting with costa



TEXT-FIG. 12.—*Hallomyia iris* Kieff. Wing.

beyond the apex of wing. The round spots on the wings described by Kieffer are not visible in the specimen. The head, showing the somewhat prolonged mouth parts and the terminal part of antennae, have been figured by Kieffer.

Genus **Trichoperrisia** Kieff.

1913. *Trichoperrisia*, Kieffer, *Rec. Ind. Mus.*, IX, p. 199.
 1913. *Trichoperrisia*, Kieffer, *Gen. Ins.*, fas. 152, p. 65.
 1920. *Trichoperrisia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 10.
 1925. *Trichoperrisia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 145.
 1928. *Trichoperrisia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 3.

This genus is distinguished from the foregoing by its third vein uniting with costa at or near the apex of wing, by its 18 antennal segments and by its claws being longer than pulvilli. A single species, *pipericola* Kieff., was described by Kieffer from midges bred from leaf galls of *Piper nigrum* at Peradeniya, Ceylon.

Genotype.—*Trichoperrisia pipericola* Kieff.

Genus **Dasyneura** Rond.

1840. *Dasyneura*, Rondani, *Sopra alcuni nuovi generi d'Insetti Ditteri*, p. 17.
 1840. *Dasyneura*, Rondani, *Nuov. Ann. Soc. Bologna*, (2) VI, p. 12.
 1908. *Dasyneura*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 340.
 1913. *Dasyneura*, Kieffer, *Gen. Ins.*, fas. 152, p. 86.
 1920. *Dasyneura*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 10.
 1925. *Dasyneura*, Felt, *Bull. N. Y. St. Mus.*, No. 145.
 1928. *Dasyneura*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 3.

This is the most typical genus of the tribe and includes about one hundred species, distributed all over the principal continental areas. The midges of this genus give rise to galls on fruits, buds and leaves. Many species are of considerable economic importance, due either to the injury they cause to cultivated plants or to checking the spread of weed pests. Only two species have so far been described from India.

The genus may be recognised by the following characters: Palpi quadriarticulate; antennal segments generally 14, circumfila not greatly produced; wings with three long veins not distinctly scaled, third vein uniting with costa well beyond the apex of wing and fifth vein forked; claws toothed on all legs; ovipositor long, sometimes longer than the body.

Genotype.—*Dasyneura obscura* Rond.

Key to species.

- | | |
|--|-----------------------------------|
| <p>I. Antennal segments 12, fifth segment with a length about two and a half times its diameter, third palpal segment with a length three times the second, mesonotum yellowish-brown</p> | <p><i>D. gossypii</i> Felt.</p> |
| <p>II. Antennal segments 14, fifth segment with a length about three-fourths greater than its diameter, third palpal segment one-half longer than second, mesonotum reddish-brown</p> | <p><i>D. mangiferae</i> Felt.</p> |

***Dasyneura gossypii* Felt.**

1916. *Dasyneura gossypii*, Felt, *Can. Entomol.*, XLVIII, p. 29.

This species is sometimes a minor pest of cotton. It infests the buds, causing them to wither and drop. It pupates in the withering buds.

Dasyneura mangiferae Felt.

1927. *Dasyneura mangiferae*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.* X, p. 1.

This species is recorded to have been bred from galls on flowers of *Mangifera indica* Linn. No description of the gall is given. I have not come across this midge.

Genus **Harpomyia** Felt.

1916. *Harpomyia*, Felt, *Can. Entomol.*, XLVIII, p. 40.
 1920. *Harpomyia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 10.
 1925. *Harpomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 146.
 1928. *Harpomyia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 3.

This small genus, with only one species, falls between *Arnoldia* Kieff. and *Neuromyia* Felt in the group of genera with quadriarticulate palpi in Felt's key (76). It is easily recognised by its greatly produced, sickle-shaped harpes. The following are additional characters: Antennal segments 12, flagellate segments sessile in both sexes; thorax and abdomen not plainly covered with scales; third vein united with costa near the apex of wing; terminal clasp segment swollen.

Genotype.—*Harpomyia indica* Felt.

Harpomyia indica Felt.

1916. *Harpomyia indica*, Felt, *Can. Entomol.*, XLVIII, p. 401.

The special interest of this species is its peculiar food habit. It is recorded to have been bred from larvae found in the lining of an old felt cap. Whether the larvae actually fed on the substance of the felt cap or on some form of fungus growth on it is not definitely stated. If it is hereafter proved that the maggots had actually been feeding on the felt cap, the species would have to be classed as a potential household pest.

Tribe OLIGOTROPHIARIAE.

Genus **Oligotrophus** Latr.

1758. *Tipula* (*partim*), Linne, *Syst. Nat.*, ed. 10, p. 588.
 1805. *Oligotrophus*, Latreille, *Hist. Crust. Ins.*, XIV, p. 288.
 1854. *Hormomyia* (*partim*), Winnertz, *Stett. Entomol. Zeit.*, XV, p. 322.
 1892. *Oligotrophus*, Rubsaamen, *Berl. Entomol. Zeit.*, XXXVIII, p. 376.
 1908. *Oligotrophus*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 368.
 1913. *Oligotrophus*, Kieffer, *Gen. Ins.*, fas. 152, p. 49.
 1920. *Oligotrophus*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 9.
 1925. *Oligotrophus*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 149.
 1928. *Oligotrophus*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 2.

This genus comprises a number of midges closely approaching *Dasyneura* Rond. and *Rhabdophaga* West. but differing in their simple claws on all legs. They may be recognised by the following characters: Palpi triarticulate; third and fourth antennal segments not fused; empodium twice as long as claws; ovipositor not chitinised, truncate and apically without any distinct pocket; terminal clasp segment apical and small.

Genotype.—*Oligotrophus juniperinus* (Linn.).

Only one species, *saligneus*, is known in the adult stage from India. The authorship of this species is not definitely known but is generally ascribed to de Niceville, but no description of this species has ever been published. Kieffer has erected a number of species on larval and pupal characters, but described no adults. The genus as a whole requires revision.

List of species.

- O. saligneus* de Niceville (?) (1903) *Ind. Mus. Notes*, V, p. 151 ; Lefroy, (1909) *Ind. Ins. Life*, p. 582, fig. 377.
O. indicus Kieff. (1908) *Marcellia*, VII, p. 152.
O. mangiferae Kieff. (1908) *Marcellia*, VII, p. 15.
O. quadrilobatus Kieff. (1908) *Marcellia*, VII, p. 151.
O. tenuispatha Kieff. (1908) *Marcellia*, VII, p. 150.

Genus **Panteliola** Kieff.

1869. *Cecidomyia* (*partim*), Osten Sacken, *Trans. American Entomol. Soc.*, II, p. 302.
 1893. *Rhopalomyia* (*partim*), Rubsaamen, *Berlin Entomol. Zeit.*, XXXVIII, p. 162.
 1905. *Rhopalomyia* (*partim*), Kieffer, *Ann. Soc. Sc. Bruxelles*, XXIX, p. 151.
 1913. *Panteliola*, Kieffer, *Bull. Soc. Nat. Hist. Metz.*, XXVIII, p. 49.
 1913. *Panteliola*, Kieffer, *Gen. Ins.*, fas. 152, p. 46.
 1920. *Panteliola*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 9.
 1928. *Panteliola*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 2.

This genus comprises about five species, most of which were originally referred to the genus *Rhopalomyia* Rubs. It is closely related to *Misospatha* Kieff., which it resembles in all characters, except in its biarticulate palpi.

Genotype.—*Panteliola hassi* (Kieff.).

Panteliola hassi (Kieff.).

1905. *Rhopalomyia hassi*, Kieffer, *Ann. Soc. Sc. Bruxelles*, XXIX, p. 151.
 1913. *Panteliola hassi*, Kieffer, *Bull. Nat. Hist. Soc. Metz.*, XXVIII, p. 49.

This species is recorded as having been bred from galls on the shoot of *Artemisia herba-alba*. It is erroneously described as a Bengal species, for it was collected at Tuticorin, South India.

Tribe ASPHONDYLARIAE.

Genus **Schizomyia** Kieff.

1889. *Schizomyia*, Kieffer, *Entomol. Nachr.*, XIV, p. 183.
 1908. *Schizomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 378.
 1913. *Schizomyia*, Kieffer, *Gen. Ins.*, fas. 152, p. 88.
 1916. *Schizomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 186, p. 102.
 1920. *Schizomyia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 10.
 1925. *Schizomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 151.
 1928. *Schizomyia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 4.

The midges of this genus breed in leaf, flower or fruit galls. Four species have so far been described from India. One new species is described below.

The genus is recognised by the following characters : Palpi quadri-articulate. Antennal segments 14, cylindrical, sessile or sub-sessile. Flagellate segments of male with whorls of long hairs and stout, raised

and highly convolute circumfili. Terminal antennal segments of female reduced and shortened. Terminal clasp segment of male genitalia unidentate. Basal clasp segment projects beyond the insertion of terminal clasp segment. Ovipositor aciculate, with a basal fleshy part but without dorsal pouch and lamellae. Ventral sclerite of seventh abdominal segment somewhat strongly chitinised. Larval breast-bone bidentate.

Genotype.—*Schizomyia galli* Kieff. (By original designation.)

Key to species.

Felt (29) has separated the species of this genus by the colour of their abdomen. As it is difficult to determine the colour of spirit specimens, I have used the more satisfactory character of the pulvilli in the following key. The two species, *incerta* and *indica* of Kieffer (105), described from larvae only, are not included in this key.

I. Pulvilli rudimentary.

A. Antennae three-fourths the length of body, fifth antennal segment with a length two and half times its diameter *S. maeruae* Felt.

B. Antennae as long as body, fifth antennal segment with a length four times its diameter *S. assamensis* Felt.

II. Pulvilli well developed, shorter than claws *S. acaciae*, sp. nov.

***Schizomyia maeruae* Felt.**

1926. *Schizomyia maeruae*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, IX, p. 243.

This species was bred by Ballard from galls on *Maerua arenaria* H. F. & T. at Coimbatore, South India. This species appears to be somewhat peculiar on account of the absence of chitinisation of the ventral sclerite of the seventh abdominal segment. It is probably associated with a cluster gall on the flowers of *Maerua arenaria* H. F. & T., which I collected at Tanjore, South India, but unfortunately no midges could be reared out of it.

***Schizomyia assamensis* Felt.**

1920. *Schizomyia assamensis*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 3.

This species was bred by Fletcher from galls on leaves of *Rubus assamensis* at Shillong, Assam, East India. It is remarkable on account of its thicklyhaired sub-median lines.

***Schizomyia acaciae*, sp. nov.**

(Plate VII, fig. 1.)

This new species is described from a single female bred from tomentose gall on leaves of *Acacia leucophloea* Willd. It is remarkable on

account of its heavily chitinated ventral sclerite of the seventh abdominal segment.

Female.—1 mm. long. Body dark brown and densely hairy. Antennae one-fourth the length of body, segments 14, fourth, fifth and sixth segments sub-equal, seventh a little shorter than sixth, terminal segment globose. First palpal segment broadly ovoid, stout and with a length about twice its diameter; second segment longer and more slender; third and fourth segments sub-equal and a little longer than second. Mesonotum black. Claws simple and slender. Pulvilli about half the length of claws. Ovipositor one-fifth the length of body. Ventral sclerite of seventh abdominal segment heavily chitinated.

Holotype.—Female, partly dissected on slide. No. $\frac{990}{H 6}$.

Type-locality.—A scrub-jungle near Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 15. vii. 1932.

Galls.—This new gall, for which the name tomentose gall has been proposed, is rather remarkable on account of its being formed by the cell proliferation and fusion of two adjacent leaflets on the same side of the pinna. It is thickly clothed with a brown tomentum.

8 mm. long and 5-6 mm. thick. Regular, simple, collective or compound; pyriform, shortly sub-cylindrical or hour-glass shaped, ventricose, externally bilobed; sessile or with two short petioles; solid, indehiscent uni- or bilocular and acystiferous. Alternate, opposite, scattered or crowded on the secondary rachis to the extent of about 30 galls per leaf. Covered with a dark yellowish-brown or reddish-brown tomentum on the surface and apically with a pair of short, narrow and oblong or broad, long and sagitate, dark green, foliaceous wings, which represent the normal apical portions of the leaflets.

There is a thick cortex of several layers of large, round or hexagonal simple parenchymatous cells, with chloropyll. The cells of the outermost layer of this cortex grow into the tomentose hairs. Palisade and spongy parenchymae of the normal leaflets are completely degenerated. Numerous groups of vascular bundles, resulting from the degeneration of veins, are arranged in the form of a broken ring, as in stems. This ring separates the cortex from the inner, white, annular, medulla of small proliferating cells. The central part is hollow and forms the cavity of the gall. Sometimes there are two such spaces in the medulla, representing the two cells of the gall.

Life-history.—Eggs are laid on the tender buds. Larvae hatch out from them on the third day. They lie in between two minute, closely applied leaflets and absorb nourishment from both of them. This occasions cell proliferation in the two leaflets, which soon swell out near the base and fuse together. The tomentum on the surface of the gall appears in about a week. The larval period is a long one and extends over two months. The pupation is in the galls and takes about five days. Before pupating, the larvae bore a hole to the outside, so as to facilitate the easy escape of the adult. There appear to be two generations, one in summer and another in rainy season. Pupae are parasitised by Hymenoptera through the holes made by the larvae for the escape of the adult midge.

Genus **Asphondylia** H. Loew.

1818. *Cecidomyia* (*partim*), Meigen, *Syst. Besch.*, I, p. 98.
 1850. *Asphondylia*, Herman Loew, *Diptera Beitrage*, IV, p. 21.
 1853. *Asphondylia*, Winnertz, *Linn. Ent.*, VIII, p. 187.
 1856. *Phyllophaga*, Rondani, *Dipt. Ital. Prodr.*, I, p. 199.
 1862. *Asphondylia*, Osten Sacken, *Mon. N. Amer. Dipt.*, I, p. 176.
 1863. *Cylindracera*, Lioy, *Atti. Inst. Veneto*, (3) IX, p. 503.
 1864. *Asphondylia*, Schiner, *Fauna Austriaca*, II, p. 395.
 1869. *Asphondylia*, Osten Sacken, *Trans. American Entomol. Soc.*, p. 209.
 1908. *Asphondylia*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 375.
 1913. *Asphondylia*, Kieffer, *Gen. Ins.*, fas. 152, p. 91.
 1913. *Monasphondylia*, Kieffer, *Gen. Ins.*, fas. 152, p. 95.
 1916. *Asphondylia*, Felt, *Bull. N. Y. St. Mus.*, No. 186, p. 144.
 1920. *Asphondylia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 10.
 1925. *Asphondylia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 151.
 1928. *Asphondylia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 4.

This is a large genus, with a world-wide distribution. It comprises medium- or large-sized, brown, red or black coloured midges, which breed by preference in leaf and flower galls. Seven Indian species of this genus have been described so far. Some of these species are likely to be of economic importance, such as the sesamum gall fly, *Asphondylia sesami* Felt, which often becomes a pest. Three new species are described below.

The genus is closely related to *Schizomyia* Kieff., which it resembles in its protractile, aciculate ovipositor and in the general structure of the antennae but differs in the lobed, dorsal pouch at the base of its ovipositor and in its palpi not being quadriarticulate. The midges of this genus may be recognised by the following characters: Palpi tri- bi- or rarely uniarticulate. Antennal segments 14, elongate, cylindrical and sessile; terminal segments of male slightly reduced; terminal segments of female greatly reduced, the last segment subglobose or sometimes even disc-shaped. Circumfila of female consist of two simple bands, one low basal band connected by a branch produced on one side of the segment with a low apical band. Circumfila of male very highly tortuous. Third vein united with costa near the apex of wing. Claws simple. Terminal clasp segment of male genitalia short, stout, swollen near the middle, uni- or bidentate and strongly chitinated apically. Ovipositor aciculate, protractile and with a lobed, dorsal pouch, not vesiculate basally, situated at the proximal end.

Genotype.—*Asphondylia sarothamni* (H. Loew).

Key to species.

I. Palpi biarticulate.

- A. Pulvilli shorter than claws . . . *A. morindae* Mani.
 B. Pulvilli as long as claws.
 1. Fifth antennal segment with a length
 about seven times its diameter in
 male and five times in female *A. sesami* Felt.
 2. Fifth antennal segment with a length
 about five times its diameter in
 female *A. utriculae*, sp. nov.
 C. Pulvilli as long as claws in fore and longer than
 claws in hind legs . . . *A. riveae*, sp. nov.

II. Palpi triarticulate.**A.** Pulvilli shorter than claws*A. lantanae* Felt.**B.** Pulvilli as long as claws.

1. Second and third palpal segments equal.

a. Mesonotum shiny black, sub-median lines thickly haired in female*A. osbeckiae* Senior-White.*b.* Mesonotum dark brown, sub-median lines sparsely haired in male*A. trichoecedarum*, sp. nov.

2. Second and third palpal segments unequal.

a. Terminal clasp segment unidentate*A. ipomoeae* Felt.*b.* Terminal clasp segment bidentate*A. pongamiae* Felt.**C.** Pulvilli longer than claws*A. phyllanthi* Felt.***Asphondylia morindae* Mani.**

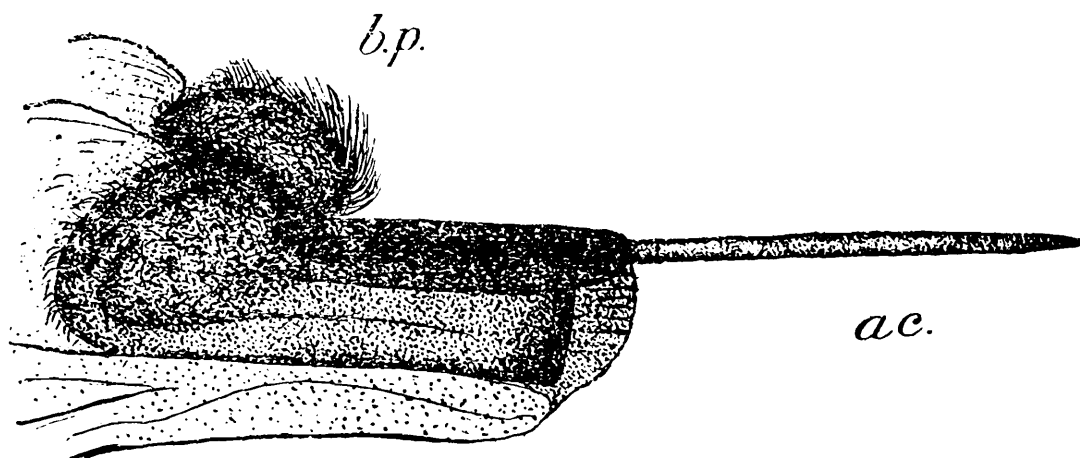
(Plate VII, fig. 2 and Text figs. 13 and 14).

1934. *Asphondylia morindae*, Mani, *Ann. Mag. Nat. Hist. London*, (10) XIII, pp. 134-137, figs. A and B.

This species attacks the inflorescence of *Morinda tinctoria* Roxb. and produces large, globose, fleshy galls, very closely resembling the normal fruits. Its galls may be distinguished from the true fruits of



TEXT-FIG. 13.—*Asphondylia morindae* Mani. Claws and related structures. (Highly magnified.)



TEXT-FIG. 14.—*Asphondylia morindae* Mani. Ovipositor ; *ac.* acicula ; *b.p.* basal pouch

Morinda by the absence of seeds and by the presence of maggots inside them. Though I have already given figures of the gall, I have not described it so far.

Galls.—There are three distinct varieties of this gall: solitary, compound and in clusters.

Solitary variety.—This type of gall is formed when one or two flowers in the inflorescence are attacked. The thalamus swells into globose, pyriform, fleshy galls about 20-30 mm. in diameter.

Clustered variety.—This type of gall is due to several flowers of the same inflorescence being attacked. Several globose, fleshy galls form and are found clustered on the top of the peduncle. Each gall is separate from the other and there is no fusion of the product of different flowers.

Compound variety.—In this type of gall almost all the flowers of the inflorescence grow very close together into galls, which fuse into one single, large, irregular mass. The galls of the individual flowers are not distinguishable, but their extent is marked out on the surface by green lines enclosing irregular areas, as in the case of the true fruits. This variety is very much larger than the other two and sometimes reaches 50 mm. in diameter.

All the varieties are solid, fleshy, acystiferous and indehiscent. Centres of cell proliferation are thalamus, base of corolla and calyx. Ovary and stamens are completely degenerated. Vascular bundles are scattered irregularly in a parenchyma of several layers of large, hexagonal cells.

Life-history.—Eggs are laid on the tender inflorescence. Maggots hatch from them on the second or the third day. They penetrate the young flower buds and bore their way down to the thalamus through the corolla. This occasions the formation of galls. The larval period is a long one and occupies about two and half months. Pupation takes place below the epidermis of the gall. Pupal period is nine days. Pupae are heavily parasitised by Chalcids.

***Asphondylia sesami* Felt.**

1916. *Asphondylia sesami*, Felt, *Can. Entomol.*, XLVIII, p. 31.

This midge infests the flowers, buds and fruits of *Sesamum indicum* Linn. and gives rise to wrinkled and twisted galls. Corolla and stamens degenerate and seeds fail to form. Fletcher (79) regards this species as a minor pest.

***Asphondylia utricularae*, sp. nov.**

(Plate VII, fig. 3.)

This new species gives rise to utricle or bladder-like galls on the ovary of *Dichrostachys cineria* W. & A. It is described from a single female bred from these galls.

Female.—2.5 mm. long. Antennae about three-fourths the length of body, segments 14; fifth segment with a length five times its diameter and somewhat thicker apically than basally; sixth segment with a length a little over three times its diameter and with a very short stem; seventh segment nearly equal to the sixth and with a stem a

little longer than that of the sixth ; twelfth segment with a length one-quarter greater than its diameter and a little less than three-fourths the length of eleventh ; thirteenth segment short, stout and with a length almost equal to its diameter ; terminal segment oblate, with a length one-fourth less than its diameter. Palpi biarticulate ; first segment short, stout, with a length two-fifths greater than its diameter and with a basal whorl of long slender setae and an apical whorl of shorter setae ; second segment over twice as long as the first and six times its own diameter, slender and setose beyond its basal fourth. Mesonotum dark brown. Scutellum setose. Abdomen sparsely setose. Claws sharply bent and as long as pulvilli.

Holotype.—Female, in spirit. No. $\frac{991}{H\ 6}$

Type-locality.—A scrub-jungle near Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 14. i. 1931.

Galls.—These galls, not recorded previously, are homologically the monocarpellary ovaries of the flowers in the spicate inflorescence.

10 mm. long and 5 mm. thick. Regular, globose or pyriform, sessile or sub-sessile, utricular, unilocular, indehiscent, free structures, crowded in large numbers towards the apical portion of the peduncle. Green, pubescent, sometimes villous ; basally cupiferous, apically caudate ; bladder tough, coriaceous and moderately thick. Large holes, with the exuvium projecting through them are found on old galls. Mechanical tissues are not developed in the bladder. Parenchymatous cells are increased. A single larva of the midge was found in the cavity of the gall.

The basal cup represents the atrophied calyx. Dried-up stamens are found as numerous brown hairs surrounding the galls. The apical tail is the style of the flower.

Life-history.—Not known in detail. Larval period appears to be short, and is presumably about fifteen to twenty days. Pupation takes place within the galls and takes five to six days. Hymenopterous parasites, chiefly Braconidae, were reared from the galls.

***Asphondylia riveae*, sp. nov.**

This new species gives rise to large spongy galls on the leaves of *Rivea hypocrateriformis* Choisy. The description is based on a somewhat mutilated male bred from the galls.

Male.—2 mm. long. Body dark brown. Antennae distal part broken ; third segment with a length five times its diameter ; fourth segment somewhat stouter and one-fourth shorter than third ; fifth segment with a length three times its diameter. Palpi biarticulate ; first segment short, stout, cylindrical and thickly setose ; second segment sub-fusiform, twice as long as first and thickly setose. Mesonotum black, sub-median lines thickly haired. Scutellum and post-scutellum black. Claws slightly bent in fore- and mid-legs and sharply bent in hind legs. Pulvilli as long as claws in fore legs and longer than claws in hind legs. Abdomen dark brown and moderately hairy. Genitalia black ; basal clasp segment sub-trapezoid, one and half times as long as broad and rather thickly setose ; terminal clasp segment sub-globose, unidentate and rather heavily chitinated.

Holotype.—Male, on slide. No. $\frac{992}{H\ 6}$

Paratypes.—Two males, in spirit. No. $\frac{993}{H\ 6}$

Type-locality.—A scrub-jungle, near Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 30. xii. 1928.

Galls.—75 mm. long and 20 mm. thick. Regular, globose, ovoid, ellipsoid or rarely irregular; pale or yellowish-green and sometimes mottled with brownish-red or violet, marked with a net-work of dark green; glabrous, very rarely verrucose, with circular holes on old ones; solid, white, spongy, acystiferous and indehiscent; dorsally ribbed, ventrally sulcate and narrowly alate, apically also alate.

Occasionally the galls are long, sub-cylindrical and bright yellow.

These galls are really the leaves and are formed by cell proliferation and fusion of the folded halves on either side of the midrib. The surface of the gall is the underside of leaves. The dorsal ridge represents the midrib, while the wings represent normal portions of the leaves.

The epidermis encloses a well developed palisade parenchyma of moderately long cells. This palisade is really formed out of the spongy parenchyma of the normal leaf. By gall formation the leaf is folded along the midrib on the upper side, thus enclosing the normal palisade. The normal spongy tissue appears on the outside of the gall and being exposed to rays of the sun, the cells lengthen out and take the shape and function of palisade cells. The normal palisade cells degenerate and become lost in the thick parenchyma in the interior of the gall. They lose their chlorophyll and cease functioning. The whole mass of the gall is made of large, irregular parenchymatous cells, with large air spaces between them. The veins of the leaf are not degenerated and may be found scattered irregularly in the parenchyma of the gall. Numerous larvae of the midge are found in the deep interior of the gall.

Life-history.—Numerous eggs are laid between the folds of the unopened leaves in the buds. Larvae hatch out on the fourth or fifth day. They attack the palisade surface of the leaf on either side of them. This occasions cell proliferation in the latter and the two portions are bound together. The larvae continue to develop in the galls thus formed for over three months and then pupate at various depths in the gall. Pupal period occupies about ten days. Before the adults emerge, the pupae wriggle their way through the spongy cells to the surface of the gall and with the help of the antennal horns pierce the epidermis, thus facilitating the escape of the adult midges. The larvae and pupae and presumably also the adults are very heavily parasitised by Chalcids. When larvae are parasitised, the gall remains very small and contorted. There is only one generation in the year. The midges appear to hibernate during the hot summer months and part of the rainy season. Galls appear from September to March.

***Asphondylia lantanae* Felt.**

1920. *Asphondylia lantanae*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 2.

This species breeds in the flowers of *Lantana indica* and *Lantana camara* in very large numbers. Ramachandra Rao (141) considers

this species as of very little value in the control of *Lantana*. This is partly due to the fact that the midges are very heavily parasitised by Chalcids, so that the midges do not appreciably reduce the seed production of *Lantana*. Recently, however, I (127) have observed that in the absence of the parasites, this species is able to control *Lantana* to an appreciable extent.

***Asphondylia osbeckiae* Senior-White.**

1920. *Asphondylia osbeckiae*, Senior-White, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, pp. 83, 107, pl. XV, fig. 1.

This species was described from a single female taken on the flower of *Osbeckia*, at Shillong, Assam. Senior-White describes the ovipositor as peculiar and his figure shows the terminal aciculate portion bent sharply at right angles to the basal part. This character and the structure of the circumfila described by Senior-White are not strictly typical of this genus, and presumably this midge may have to be referred to a new genus.

Senior-White describes the palpi as biarticulate disregarding the basal segment, which he is inclined to take as palpiger. The general view, however, is to describe the basal joint as the first segment. The palpi are thus in reality triarticulate, under which category I have placed this species in the key.

***Asphondylia trichoecedarum*, sp. nov.**

(Text-fig. 15.)

This new species gives rise to trichoecidia or hairy galls on the leaves of *Acacia leucophloea* Willd.

Male.—1 mm. long, dark yellowish-brown and moderately setose. Antennae as long as body; segments 14; fifth segment with a stem one-seventh the length of the enlargement, which latter has a length twice its diameter; sixth segment a little shorter than fifth; seventh segment as long as sixth; eleventh segment with a length twice its diameter and with a stem one-sixth the length of enlargement; twelfth segment as long as eleventh, a little more slender and with a longer stem; terminal segment with a length twice its diameter and evenly rounded at the tip. Palpi triarticulate; first segment stout, with a length a little over twice its diameter; second segment more slender, reduced towards apex, with a length four times its diameter; third segment stouter than the second and nearly as long. Mesonotum dark brown. Scutellum brown. Halteres fuscous yellow. Femur yellow. Tibia and tarsus darker. Claws simple as long as pulvilli. Genitalia fuscous-yellow basally and darker apically; terminal clasp segment spatulate, unidentate and shortly setose.

Holotype.—Male, partly dissected on slide. No. $\frac{994}{H\ 6}$

Type-locality.—A scrub-jungle near Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 31. viii. 1931.

Galls.—The galls of this species are formed by cell proliferation and the fusion of two adjacent, closely applied leaflets of the same side of

the secondary rachis on the pinna. They are small hairy balls greatly resembling the flower heads of the plant.

3 mm. in diameter. Regular, globose or pyriform; sessile, light brown, densely hairy; hard, solid, acystiferous, indehiscent, uni- or bilocular, apically bialate; free and solitary, paired or crowded on the pinna.



TEXT-FIG. 15.—*Asphondylia trichoecidarum*, sp. nov. Trichoecidia on leaves of *Acacia leucophloea* Willd.

The palisade and spongy parenchymae of the leaflets completely degenerated. Epidermal cells, derived from the spongy side of one leaflet and palisade side of another leaflet, converted into the hairy out-growths. Hairs brownish, villous, slightly tapering towards their tips and multicellular. Basal cells of the hairs colourless and full of protoplasm, terminal cells dead and brown. Below the epidermal layer a moderately broad parenchyma of hexagonal cells surrounds an inner circular zone of smaller, proliferating cells. The cells of the parenchyma contain chlorophyll and some of the outermost layers are modified into a somewhat short palisade tissue, though they are in reality derived from the spongy cells of the normal leaflets. Veins are scattered in the form of a ring in the parenchyma, as in the ordinary dicotyledonous stem.

***Asphondylia ipomoeae* Felt.**

1926. *Asphondylia ipomoeae*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, IX, p. 243.

This species was bred from galls on *Ipomea staphylina* R. & S. I refer to this species two midges bred by me from galls on buds and leaves of *Ipomea staphylina* R. & S. taken at Erode and Tanjore, South India. The galls have not been described so far. They are globose or pyriform, coriaceous, unilocular, greenish structures on the upper surfaces of leaves, always connecting together the two halves

of the leaves on either side of the midrib by a very slender pedicel. They are about 5-7 mm. in diameter.

***Asphondylia pongamiae* Felt.**

1921. *Asphondylia pongamiae*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 24.

This species was bred by Ramakrishna Ayyar from flower galls of *Pongamia glabra* Vent. The galls are described as globose, 1-2 mm. in diameter and with a thin shell. I have not come across this species.

***Asphondylia phyllanthi* Felt.**

1920. *Asphondylia phyllanthi*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 2.

This species is recorded to have been bred by Ramachandra Rao from shiny, globose galls on leaves and shoot of *Phyllanthus emblica* Linn. in Burma. It does not appear to occur in other parts of India.

Genus *Daphnephila* Kieff.

1905. *Daphnephila*, Kieffer, *Ann. Soc. Sc. Bruxelles*, XXIX, p. 144.

1913. *Daphnephila*, Kieffer, *Gen. Ins.*, fas. 152, p. 96.

1920. *Daphnephila*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 11.

1925. *Daphnephila*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 153.

1928. *Daphnephila*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 5.

This genus is recognised by its tri- or quadriarticulate palpi, bidentate and sub-apical terminal clasp segment and by its exerted, conical ovipositor with apical lobes or triangular plates. Kieffer (103) has described three species, *haasi*, *glandifex* and *lindrae*, from India. The location of types is not known.

Genotype.—*Daphnephila hassi* Kieff. (By original designation.)

Key to species.

- | | |
|--|----------------------------|
| I. Palpi triarticulate. | |
| A. Palpal segments equal | <i>D. lindrae</i> Kieff. |
| B. Palpal segments distinctly unequal | <i>D. haasi</i> Kieff. |
| II. Palpi quadriarticulate | <i>D. glandifex</i> Kieff. |

Tribe ITONIDIDINARIAE.

Sub-tribe BIFILA.

Genus *Indodiplosis* Felt.

1916. *Indodiplosis*, Felt, *Can. Entomol.*, XLVIII, p. 403.

1920. *Indodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 13.

1925. *Indodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 154.

1928. *Indodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 9.

This genus approaches *Erosomyia* Felt in its greatly lengthened wings and toothed claws on all legs but differs in its claws being unidentate. Only one species, *mangiferae*, has been described so far. It may be recognised by its eight circumfila loops.

Genotype.—*Indodiplosis mangiferae* Felt. (By original designation.)

Genus **Streptodiplosis** Felt.

1916. *Streptodiplosis*, Felt, *Can. Entomol.*, XLVIII, p. 405.
 1920. *Streptodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 13.
 1925. *Streptodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 154.
 1928. *Streptodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 9.

This is a small genus related to *Lobopteromyia* Felt, which it resembles in its broad wings, but is distinguished by the stems of the male antennal segments being longer than twice their diameters and by its convolute heavily chitinised harpes. From *Indodiplosis* it may be distinguished by its simple claws. The palpi are quadriarticulate. Wings of male are broadly rounded posteriorly and the costa is not thickened basally.

Only one species, *indica*, has been described from Wynaad, South India. It is recorded to have been bred from an undetermined plant infested by the scale-insect, *Mytilapis piperis* Green, on which it is presumably predaceous.

Genotype.—*Streptodiplosis indica* Felt. (By original designation.)

Genus **Thurauia** Rubs.

1899. *Thurauia*, Rubsaamen, *Wein. Entomol. Zeit.*, XVIII, p. 58.
 1913. *Thurauia*, Kieffer, *Gen. Ins.*, fas. 152, p. 175.
 1925. *Thurauia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 155.

This genus has not been previously recorded from India. It resembles *Streptodiplosis* Felt in its simple claws and costa not thickened basally but differs in the length of its wing exceeding its breadth. Palpi quadriarticulate. Ovipositor greatly produced and chitinised. One new species is described below.

Genotype.—*Thurauia aquatica* Rubs. (By original designation.)

Thurauia chilkaensis, sp. nov.

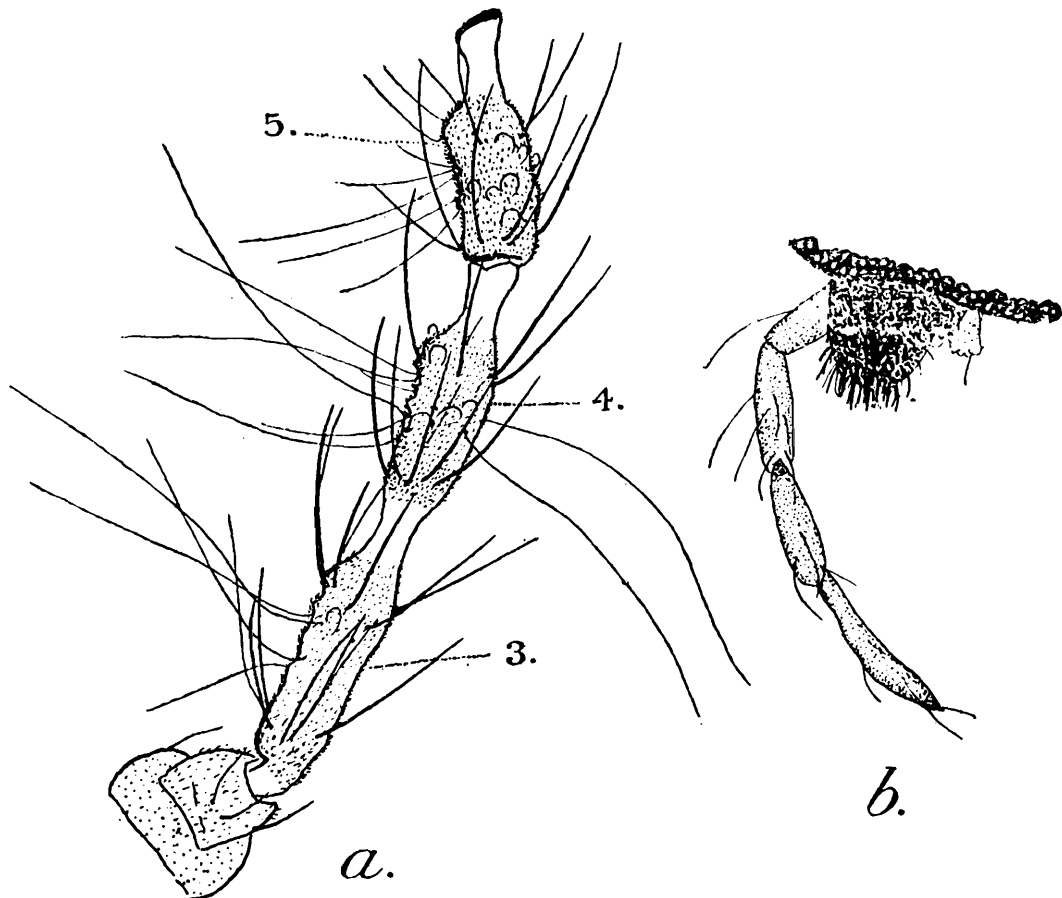
(Text-figs. 16 and 17.)

This new species is remarkable for its ovoviviparous habit, which has not previously been observed in adult gall midges.¹

Female.—2.5 mm. long. Body dark brown. Antennae half the length of body; segments 14; third and fourth segments fused, the former with a stem one-fourth the length of enlargement, which has a length four times its diameter, the latter segment three-fourths the length of third and with a stem one-half the length of enlargement; fifth segment with a stem three-fourths the length of enlargement, which latter has a length about twice its diameter; terminal segment with a length four times its diameter and with a constriction beyond the basal third. Palpi rather long, quadriarticulate; first segment with a length about four times its diameter; second segment one-half longer than first and nearly as stout; third segment as long as second, somewhat slender basally, sparsely setose; fourth segment one-third longer than third, reduced both basally and apically and sparsely setose. Mesonotum brown. Scutellum yellowish-brown. Claws simple and as

¹ Mani, M. S. *Current Science*, III, p. 109, (1934).

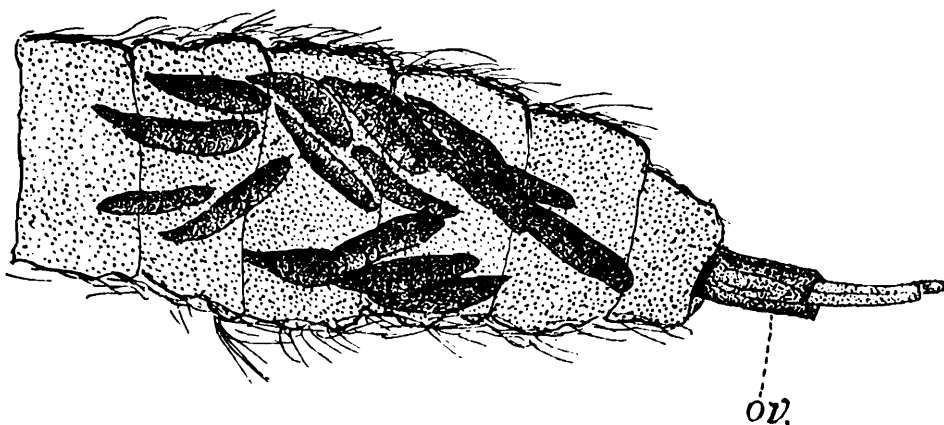
long as empodium. Abdomen yellowish and sparsely setose. Ovipositor about one-fourth the length of abdomen.



TEXT-FIG. 16.—*Thurauia chilkaensis*, sp. nov. a. antennal segments of female; b. palpus and mouth parts of female.

Holotype.—Female, on the same slide as the holotype of *Prolasioptera annandalei*, sp. nov., described above. No. $\frac{995}{H 6}$.

Type-locality.—Barkuda Island, Chilka Lake, Madras Presidency, South India. Coll. N. Annandale.



TEXT-FIG. 17.—*Thurauia chilkaensis*, sp. nov. Abdomen of female showing living larvae hatched inside.

Life-history.—After the pairing of the midges, eggs are fertilised, but are not deposited. Larvae hatched from them are retained and

nourished inside the abdominal cavity of the mother. The maggots are deposited after about twelve days on decaying vegetable matter. When freshly extruded, they are about 1 mm. long and yellowish-white in colour. Some of them are already in a far advanced state of development and immediately pupate. Others, however, feed on the decaying vegetable matter and pupate after a further period of development extending over a month. The adults emerge in about five days.

Genus **Endaphis** Kieff.

- 1896. *Endaphis*, Kieffer, *Bull. Soc. Entomol. France*, p. 383.
- 1911. *Endaphis*, Felt, *Entomol. News*, XXII, p. 128.
- 1913. *Endaphis*, Kieffer, *Gen. Ins.*, fas. 152, p. 171.
- 1920. *Endaphis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 8.
- 1925. *Endaphis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 155.
- 1928. *Feltodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 8.
- 1928. *Endaphis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 8.

Senior-White regards *Endaphis* Kieff. as a synonym of *Feltodiplosis* Kieff. *Endaphis* Kieff. is a genus of the sub-tribe Bifila, while the latter belongs to the sub-tribe Trifila. They are therefore widely separated and are not related to each other. The type of the genus is not *Feltodiplosis abdominalis*, as given by Senior-White, but *Endaphis perfidus* Kieff.

The midges of this genus are distinguished from those of *Thurawia* Rubs. by the wings being neither too broad nor too narrow. Palpi quadriarticulate. First antennal segment with a conspicuous dorsal tooth. Costa thickly scaled and not thickened basally. Terminal clasp segment sub-cylindrical. Dorsal plate roundly bilobed and shorter than ventral plate. Lamellae of ovipositor thick and long.

Only one species of this genus, *hirta*, is described by Felt (37) from India. It is recorded to have been bred from the scale-insect, *Dactylopius* sp., on *Mimusopa hexandra* Roxb. and is likely to prove a possible control of the scale-insect.

Genus **Contarinia** Rond.

- 1860. *Contarinia*, Rondani, *Atti. Soc. Sc. Nat. Milano*, II, p. 287.
- 1894. *Eudiplosis*, Kieffer, *Bull. Soc. Entomol. France*, LXIII, p. 28.
- 1894. *Stictodiplosis* (*partim*), Kieffer, *Bull. Soc. Entomol. France*, LVIII, p. 28.
- 1896. *Contarinia*, Kieffer, *Wein. Entomol. Zeit.*, XV, pp. 94, 98-99.
- 1900. *Contarinia*, Kieffer, *Ann. Soc. Entomol. France*, XLIX, p. 447.
- 1908. *Contarinia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 390.
- 1913. *Contarinia*, Kieffer, *Gen. Ins.*, fas. 152, p. 178.
- 1918. *Contarinia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 93.
- 1920. *Contarinia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 270.
- 1925. *Contarinia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 155.
- 1928. *Contarinia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 10.

This genus is of considerable economic importance and includes many injurious species. *C. pyrivora* Rond., a European species introduced into America about 1877, is reported to be highly injurious to pear in the New York State. *C. johnsoni* Sling similarly causes occasionally severe injury to Moore Grapes in America. In India, *C. andropoginis* Felt is likely to prove a pest under favourable conditions. About forty species of this genus, of which two are from India, have been described so far.

This genus is distinguished from *Endaphis* Kieff. by its unscaled costa and untoothed first antennal segment. According to original description this genus is characterised by the sub-equal nodes of its antennal segments, its two whorls of uniform circumfila and by its third vein interrupting costa at the apex of wing. Palpi quadriarticulate. Pulvilli shorter than claws. Ovipositor apparently aciculate. Dorsal and ventral plates bilobed.

Genotype.—*Contarinia loti* Rond. (By original designation.)

Key to species.

- I. Pulvilli nearly as long as the strongly curved claws, fifth antennal segment of male with stems equal to and one-half times greater than their diameters *C. caudata* Felt.
- II. Pulvilli nearly half the length of the slightly curved claws, fifth antennal segment with stems each one-quarter longer than their diameters *C. andropoginis* Felt.

***Contarinia caudata* Felt.**

1920. *Contarinia caudata*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 4.

This species is recorded to have been bred from ear-heads of *Apluda varia* Hack and *Andropogon schaeanthus* at Coimbatore, South India. I refer to this species a series of midges bred by me from galls on *Andropogon contortus* at Tanjore, South India. It is a reddish-brown midge about 2-2.5 mm. long., with the scutellum and post scutellum of male yellowish-brown. It is represented in Ramachandra Rao collection.

***Contarinia andropoginis* Felt.**

1921. *Contarinia andropoginis*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 25.

This species attacks the ear-head of *Andropogon sorghum* (*cholan*) in South India. I refer to this species four midges bred by me from *cholan* taken at the Borstal School Farm, Tanjore, South India. The midges are relatively smaller, dark or dark yellowish-brown with the scutellum also concolourous.

Genus *Stictodiplosis* Kieff.

1894. *Stictodiplosis*, Kieffer, *Bull. Soc. Entomol. France*, LXIII, p. 28.

1913. *Stictodiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 183.

1920. *Stictodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 13.

1925. *Stictodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 155.

1928. *Stictodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 10.

This genus is closely related to *Contarinia* Rond., from which it is distinguished by its spotted wings. About a dozen species, mostly from Europe, have been described so far. One species, *pulcherima*, was described by Kieffer (106) from India.

Genotype.—*Stictodiplosis nubilipennis* Kieff. (By original designation.)

Genus **Procontarinia** Kieff. & Cecc.

1903. *Procontarinia*, Kieffer & Ceconi, *Marcellia*, V. p. 135.
 1913. *Procontarinia*, Kieffer, *Gen. Ins.*, fas. 152, p. 183.
 1920. *Procontarinia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 13.
 1925. *Procontarinia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 155.
 1928. *Procontarinia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 10.

This genus is also closely related to *Contarinia* Rond., from which it is distinguished by the basal triangular lobe on its basal clasp segment and by the semicircular ventral piece on its short ovipositor. The only species of this genus, *matteiana* Kieff. & Cecc., was described from India.

Genotype.—*Procontarinia matteiana* Kieff. & Cecc.

Genus **Dentifibula** Felt.

1907. *Contarinia (partim)*, Felt, *Bull. N. Y. St. Mus.*, 110, p. 132.
 1908. *Dentifibula*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 389.
 1911. *Dentifibula*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 51.
 1913. *Dentifibula*, Kieffer, *Gen. Ins.*, fas. 152, p. 174.
 1918. *Dentifibula*, Felt, *Bull. N. Y. St. Mus.*, No. 202, p. 129.
 1920. *Dentifibula*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 13.
 1925. *Dentifibula*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 157.
 1928. *Dentifibula*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 9.

This genus was erected by Felt for midges closely related to *Contarinia* Rond., but differing in their triarticulate palpi and conspicuous, triangular apical process on their basal clasp segment. Third vein united with costa before the apex of wing. Claws simple, strongly curved and as long as pulvilli.

About half a dozen species, most of which appear to be zoophagous, have been described so far. Two species, *ceylanica* and *obtusilobae*, were described by Felt (58) from Ceylon.

Genotype.—*Dentifibula viburni* (Felt).

Genus **Myricomyia** Kieff.

1900. *Myricomyia*, Kieffer, *Ann. Soc. Entomol. France*, LXIX, p. 470.
 1913. *Myricomyia*, Kieffer, *Gen. Ins.*, fas. 152, p. 185.
 1925. *Myricomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 157.

This small genus, with only two species, has not been previously recorded from India. It is distinguished from *Dentifibula* Felt by the absence of apical triangular process on the basal clasp segment. Terminal clasp segment is stout and twice as long as its diameter. Ventral plate is truncate or nearly so. One new species is described below.

Genotype.—*Myricomyia longipalpis* Kieff. (By original designation.)

Myricomyia pongamiae, sp. nov.

(Text-fig. 18.)

This new species attacks the shoot of *Pongamia glabra* Vent. and gives rise to large, woody galls on them.

Male.—2 mm. long. Body dark brown. Antennae lost. Palpi triarticulate; first segment short, sub-globose; second segment stout and with a length twice its diameter; third segment with a length about four times its diameter and basally as stout as the second and

apically reduced to an acutely pointed, cone-shaped tip; both the second and third segments with numerous long setae. Claws as long as pulvilli and slightly curved in fore-legs and shorter than pulvilli and sharply bent in mid and hind legs. Basal clasp segment boat-shaped and with a length about twice its breadth in the middle. Terminal clasp segment somewhat longer than twice its diameter and somewhat bent at the strongly chitinised apex. Dorsal plate shorter than ventral plate and deeply bilobed, lobes broadly elliptic.

Female.— 2.5 mm. long. Body dark brown, densely hairy. Antennae half the length of body, segments 14; fifth segment with a stem one-third the length of enlargement, which latter has a length about thrice its diameter; terminal segment with a length over twice its diameter and with a prolongation one-third the length of enlargement. Palpi triarticulate; first segment with long setae; second segment sub-globose; third segment fusiform, with a length thrice its diameter, more slender than second and with a long slender setae apically. Mesonotum black, sub-median lines naked. Claws simple and a little longer than twice the length of empodium. Ovipositor retractile, one-fifth the length of body and sparsely clothed with long setae.



TEXT-FIG. 18.—*Myricomyia pongamiae*, sp. nov. Solid stem galls of *Pongamia glabra* Vent.

Holotype.— Male, partly dissected on slide. No. $\frac{996}{H\ 6}$.

Allo-co-types.— Three females on slide. No. $\frac{997}{H\ 6}$.

Paratypes.— Both females and males in spirit. No. $\frac{1030}{H\ 6}$.

Type-locality.— A scrub-jungle, near Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 2.ii.1931.

Other localities.—Marina, Madras.

Galls.— The galls are local or extensive tumescence of branches, rachides and mid-ribs of leaves. They have not been described so far.

10-20 mm. in diameter. Regular, globose, pyriform, fusiform or irregular, extensive, moniliform, flexuose; greenish-yellow or brownish-yellow, glabrous when young and tubercular and punctate when old; solid, lignose, cystiferous and indehiscent. Cysts longitudinal. The epidermis surrounds a relatively large parenchymatous cortex of large cells. The cortex is separated from an inner medulla by the annular cystiferous zone, in which cysts and vascular bundles are arranged alternately. In older galls the medulla dries up leaving a large hollow space.

Life-history.— Eggs are laid on the tender shoots. The larvae hatching from them bore their way into the stem and, on reaching the vascular bundles, proceed either up or down. This occasions gall formation. The larval period is a long one and extends over two months. Pupation is in the galls just below the epidermis and takes about four or five days. There appear to be two generations in one year.

Sub-tribe *TRIFILA*.

Genus *Clinodiplosis* Kieff.

- 1894. *Clinodiplosis*, Kieffer, *Feuille Juenes Nat.*, XXIV, p. 121.
- 1896. *Clinodiplosis*, Kieffer, *Wein. Entomol. Zeit.*, XV, pp. 93, 96.
- 1911. *Clinodiplosis*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 54.
- 1913. *Clinodiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 237.
- 1918. *Clinodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 202, pp. 177-179.
- 1920. *Clinodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 16.
- 1925. *Clinodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 162.
- 1928. *Clinodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 15.

This genus comprises about a dozen species. No adult form of this genus has as yet been described from India; but Kieffer (105) described three species, *nodifex*, *artemisiarum* and *cellularis*, from larval forms only.

Palpi quadriarticulate. Antennal segments 14, circumfila regular and not greatly produced. Claws toothed on fore and mid legs and simple on hind legs. Basal clasp segment not bilobed and without a spine. Terminal clasp segment fusiform and not dilated. Ventral plate elongate and apically emarginate. Dorsal plate deeply bilobed and triangularly emarginate.

Genotype.—*Clinodiplosis cilicrus* Kieff. (By original designation.)

Genus *Oribremia* Kieff.

- 1913. *Oribremia*, Kieffer, *Rec. Ind. Mus.*, IX, p. 199.
- 1913. *Oribremia*, Kieffer, *Gen. Ins.*, fas. 152, p. 194.
- 1920. *Oribremia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 14.
- 1925. *Oribremia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 162.
- 1928. *Oribremia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 11.

This genus is distinguished from *Clinodiplosis* Kieff. by its apically rounded ventral plate and deeply and narrowly divided dorsal plate.

The only species of this genus, *multifida*, was described by Kieffer (1913) from midges taken in the Kumaon Hills, Western Himalayas. The type location could not be traced.

Genotype.—*Oribremia multifida* Kieff.

Genus **Mycodiplosis** Rubs.

1853. *Diplosis (partim)*, Winnertz, *Linn. Entomol. Stett.*, VIII, p. 267.
 1895. *Mycodiplosis*, Rubsaamen, *Entomol. Nachr.*, XXI, p. 186.
 1896. *Mycodiplosis*, Kieffer, *Wein. Entomol. Zeit.*, XV, pp. 92-95.
 1897. *Mycodiplosis*, Kieffer, *Synop. Cecid. Europ. Algerie*, p. 28.
 1908. *Mycodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 400.
 1910. *Mycodiplosis*, Rubsaamen, *Zeit. Wissenschaft. Insektenbiol.*, XV, p. 289.
 1911. *Mycodiplosis*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 54.
 1913. *Mycodiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 241.
 1918. *Mycodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 202, p. 179.
 1920. *Mycodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 16.
 1925. *Mycodiplosis*, Felt., *Bull. N. Y. St. Mus.*, No. 257, p. 162.
 1928. *Mycodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 16.

This genus comprises numerous small, light brown or yellowish midges, which breed on various fungi. The genus is recognised by the following characters : Palpi quadriarticulate ; antennal segments 14, circumfila regular or nearly so, without greatly produced loops, middle circumfila of male not short ; third vein united with costa beyond the apex of wing ; claws unidentate on fore-legs and simple and slightly curved on mid and hind legs.

Genotype.—*Mycodiplosis conioophaga* (Winnertz). (By original designation.)

Mycodiplosis indica Felt.

1920. *Mycodiplosis indica*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 5.
 1928. *Mycodiplosis indica*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 16.

This is a small, reddish or reddish-brown midge breeding on spores of the rust fungus, attacking cambu, *Pennisetum typhoideum* Gertn. The antennae are twice the length of body in male and nearly as long as body in female. Mesonotum is thickly clothed with yellowish hairs in male. I refer to this species numerous maggots found on leaves of *cambu* with rust disease on the Borstal Farm, Tanjore, South India.

Genus **Schizobremia** Felt.

1926. *Schizobremia*, Felt, *Entomol. Month. Mag., London*, LXII, p. 183.
 1928. *Schizobremia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 16.

This genus appears to fall between *Mycodiplosis* Rubs. and *Diadiplosis* Felt. It resembles the former in its strongly curved, unidentate claws on fore and mid legs and simple claws on hind legs, but differs in its triarticulate palpi and third vein united with costa at the apex of wing. It resembles the latter in its triarticulate palpi but differs in its strongly bent claws and relatively longer ventral plate. Only two species, of which one is Indian, have been described so far.

As no genotype has so far been indicated, I designate *S. formosana* Felt as the type of the genus *Schizobremia* Felt.

Schizobremia malabarensis Felt.

1927. *Schizobremia malabarensis*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, X, pp. 1-2.

This is a small yellowish midge with the antennae about three-fourths the length of body. It breeds on the mealy bug, *Pseudococcus virgatus*, in South Malabar. Felt provisionally referred the midge to this genus.

Genus **Diadiplosis** Felt.

1911. *Diadiplosis*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 54.
 1913. *Diadiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 240.
 1918. *Diadiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 202, p. 204.
 1920. *Diadiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 14.
 1925. *Diadiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 162.
 1928. *Diadiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 16.

This genus was erected by Felt for midges closely related to *Myco-diplosis* Rubs., but with triarticulate palpi. Claws are not sharply bent. Terminal clasp segment is not greatly produced. Ventral plate short and broad.

Of the two Indian species, *coccidivora* Felt, was described from Ceylon. The species, *indica* Felt, was taken at Pusa. It breeds on the scale-insects, *Phenococcus hirsutus* of Mulberry and *Pseudococcus corymbatus*.

The genotype is *D. cocci* Felt and not *D. coccidivora* Felt, as given by Senior-White.

Key to species.

- | | |
|--|-----------------------------|
| I. Circumfila loops 8, stems of fifth antennal segments equal, abdomen yellow | <i>D. coccidivora</i> Felt. |
| II. Circumfila loops 10, stems of fifth antennal segments unequal, abdomen reddish-brown . | <i>D. indica</i> Felt. |

Genus **Xiphodiplosis** Felt.

1915. *Xiphodiplosis*, Felt, *Journ. N. Y. Entomol. Soc.*, XXIII, p. 180.
 1920. *Xiphodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 16.
 1925. *Xiphodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 162.
 1928. *Xiphodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 17.

This genus is related to *Diadiplosis* Felt, from which it is distinguished by its greatly produced terminal clasp segment being equal to the basal clasp segment. Ventral plate is longer than dorsal plate, moderately broad and rounded apically. Palpi triarticulate. The only species of this genus, *fulva*, is described by Felt from Ceylon.

Genotype.—*Xiphodiplosis fulva* Felt.

Genus **Arthrocnodax** Rubs.

1895. *Arthrocnodax*, Rubsaamen, *Wein. Entomol. Zeit.*, XIV, p. 189.
 1896. *Arthrocnodax*, Kieffer, *Wein. Entomol. Zeit.*, XV, p. 92.
 1897. *Arthrocnodax*, Kieffer, *Synop. Cecid. Europ. Algerie*, pp. 29.
 1908. *Arthrocnodax*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 403.
 1911. *Arthrocnodax*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 57.
 1913. *Feltodiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 154.
 1913. *Arthrocnodax*, Kieffer, *Gen. Ins.*, fas. 152, p. 155.
 1920. *Feltodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 12.
 1925. *Arthrocnodax*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 163.
 1928. *Arthrocnodax*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 8.

This genus comprises numerous small, yellowish midges, with a zoophagous habit. It is distinguished from *Xiphodiplosis* Felt by its simple claws on all legs. Palpi quadriarticulate. Antennal segments with lengths less than their diameters and with short circumfla. Third vein united with costa before the apex of wing. Pulvilli as long as claws. Felt believes *Feltodiplosis* Kieff. to be identical with *Arthrocnodax* Rubs. Two species, *ruthurfordi* and *walkeriana*, were described by Felt (36) from Ceylon.

Genotype.—*Arthrocnodax vitis* Rubs. (By original designation.)

Genus **Microdiplosis** Tav.

1908. *Microdiplosis*, Tavares, *Broteria*, VII, p. 155.

1913. *Microdiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 210.

1925. *Microdiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 163.

This genus, not previously recorded from India, comprises minute midges breeding in galls of *Acarina*. It is related to *Arthrocnodax* Rubs., which it resembles in its simple claws on all legs, quadriarticulate palpi and pulvilli equal to claws, but differs in the relatively longer stem of its flagellate antennal segments and relatively longer circumfla. Third vein united with costa near or at the apex of wing. Ventral plate slender, emarginate, apically enlarged and longer than dorsal plate. Kieffer (111) describes the pulvilli as rudimentary but I find them well developed, though short.

Genotype.—*Microdiplosis zambensis* Tav. (By original designation.)

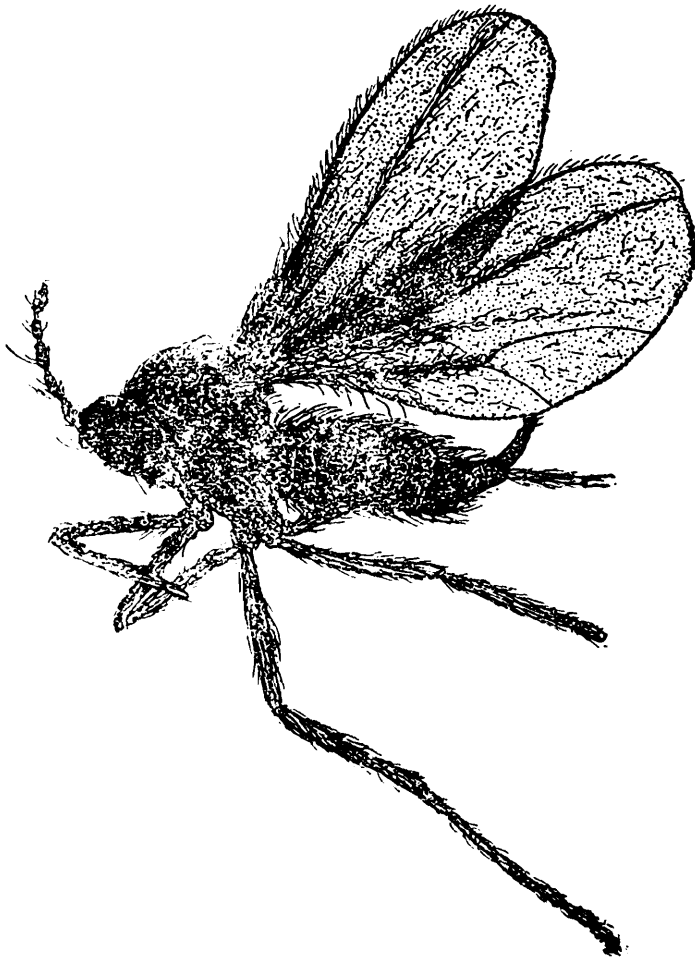
Microdiplosis pongamiae, sp. nov.

(Text-figs. 19 and 20.)

This species was bred from the polypoid galls on the leaflets of *Pongamia glabra* Vent. along with the mite, *Eriophyes cheriani* Masee. I refer to this species a series of midges bred by Annandale from the polypoid galls taken at Chilka Lake and now in the collection of the Zoological Survey, Indian Museum.

Male.—1 mm. long. Body yellowish. Antennae one-fourth longer than body; segments 14; first segment broadly obpyriform, deeply excavated apically, with a length three-fourth its diameter; second segment irregularly sub-globose, with a length a little greater than its diameter; third segment with the apical enlargement stouter than the basal, stems sub-equal; fourth segment united with third and a little longer, basal stem with a length about one half the diameter of the basal enlargement, apical stem with a length over one half the diameter of the apical enlargement; fifth segment sub-equal to third, apical enlargement lengthened out both basally and apically, stems sub-equal. Palpi quadriarticulate; second segment short, globose; third segment ovoid, one and half times as long as second and equally stout; fourth segment twice the third. Mesonotum yellowish-brown. Claws simple on all legs, somewhat sickle-shaped, about as long as empodium. Basal clasp segment irregularly triangular, with a length about twice its breadth at the base. Terminal calsp segment swollen basally, slightly and

evenly curved distal portion with a length five times its diameter, minutely bidentate at apex.



TEXT-FIG. 19.—*Microdiplosis pongamiae*, sp. nov. Female showing the head partially covered over by the thorax.

Female.— 0.75 mm. long. Body dirty yellowish-brown, thickly haired. Antennae three-fourths the length of body; segments 14; second segment ovoid, with a length one half greater than its diameter; third segment fused with the fourth, with a stem one-fifth the length of the cylindrical enlargement, which latter has a length two and half times its diameter; fourth segment a little shorter than third and with a stem one-fourth the length of enlargement; fifth segment a little shorter than fourth, with a stem one-half the length of the enlargement; stems of other flagellate segments gradually increase in length; stem of penultimate segment transparent, one-third the length of the enlargement. Palpi quadriarticulate; first segment short, ovoid; second and third segments sub-equal, each with a length about four times its diameter; fourth segment a little shorter and more slender than third. Mouth parts somewhat prolonged. Thorax distinctly produced over the head. Mesonotum dark brown. Claws bent at right angles, with rudimentary pulvilli. Ovipositor long, partially retractile; terminal lobes with a length three times the breadth.

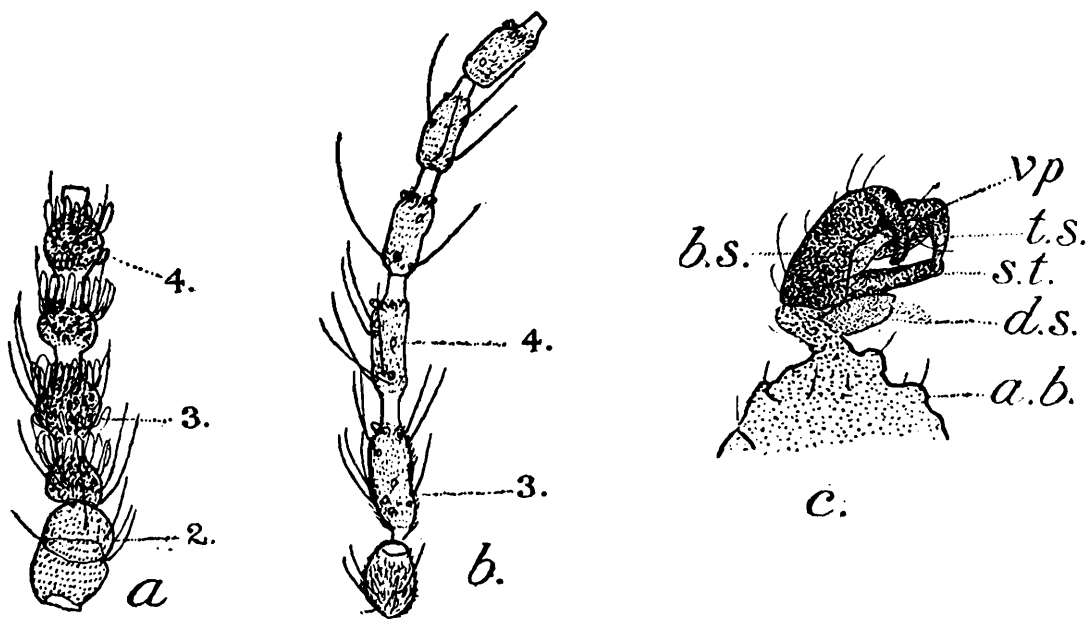
Holotype.— Male, in spirit. No. $\frac{998}{H\ 6}$.

Allotype.— Female, on slide. No. $\frac{999}{H\ 6}$.

Paratypes.— Both males and females, in spirit. No. $\frac{1000}{H\ 6}$. On slides Nos. $\frac{1001}{H\ 6}$ and $\frac{1031}{H\ 6}$.

Homotypes.— (N. Annandale coll.) in spirit. No. $\frac{1002}{H\ 6}$.

Type-locality.— A scrub-jungle near Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 17.vii.1933.



TEXT-FIG. 20.—*Microdiplosis pongamiae*, sp. nov. a. antennal segments of male; b. antennal segments of female; c. male genitalia; a. b. abdomen; b. s. basal clasp segments; d. s. dorsal segment; s. t. style; t. s. terminal segment; v. p. ventral plate.

Other localities.— Coimbatore, Vellore, Madras, Chilka Lake Islands, and Calcutta.

Galls.— The polypoid galls were believed by Cherian to be produced by the mite, *Eriophyes cheriani* Masee. Further investigations (126), however, have shown that both this mite and the new species of midge described above are responsible for its formation. Neither of them alone produce such galls.

10 mm. long, 5 mm. thick. Regular, obovoid or obliquely obpyriform, polyp-like, hollow, pedicelled galls on the upper surface of the leaflets. Simple or compound, unilocular, acystiferous and indehiscent. Cavity communicates with the outside by a narrow passage through the pedicel. Greenish or dark-greenish, glabrous or rarely pubescent or tomentose on the outside and with numerous granulations and eri-neums on the inner side. Palisade and spongy parenchymae of leaflets completely degenerated into broad, horse-shoe shaped, undifferentiated parenchyma. There is an apparent increase of vascular bundles and fibrous tissues in the gall.

Life-history.—Not known in detail. Earlier stages not studied. Larvae live in company with the mites and feed on the plant tissues. Pupal period is variable with seasons, occupying only about three days in dry weather and more than a week in wet weather. There are apparently many generations in one year.

Genus **Cecidomyiella** Del Guer.1918. *Cecidomyiella*, Del Guerico, *Bibl. Agr. Cologne*, p. 247.1925. *Cecidomyiella*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 163.

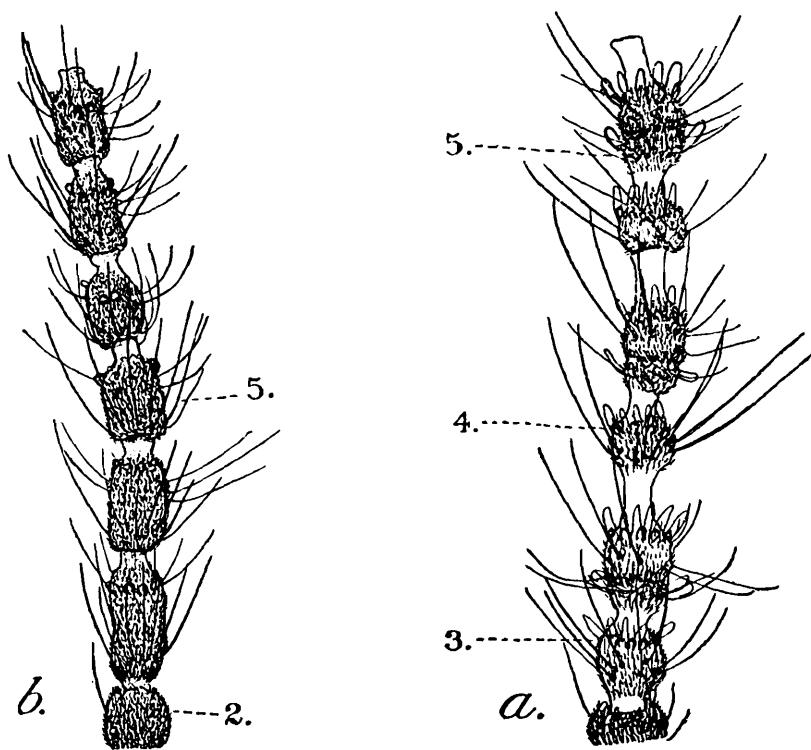
I am recording this genus for the first time from India. It is closely related to *Microdiplosis* Tav., from which it is distinguished by the relatively longer stems of its flagellate antennal segments. The lobes of the divided dorsal plate are long, triangular and shorter than ventral plate. The new species described below is referred to this genus.

Cecidomyiella crataevae, sp. nov.

(Text-figs. 21 and 22, plate VII, figs. 4 and 5.)

This new species produces leaf-bud galls on *Crataeva religiosa* Forst.

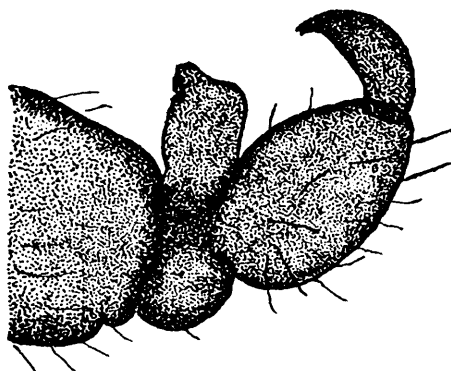
Male.— 1.25 mm. long. Body yellowish-brown. Antennae a little longer than body, segments 14; third segment fused with the fourth, stems one-fourth and three-fourths the length of basal and apical enlargements respectively, apical enlargement somewhat constricted about its basal fourth; fourth segment with stems one-third and three-fifths the enlargements, basal enlargement sub-globose, apical enlargement sub-cylindrical, slightly constricted in the middle, with a length over one half greater than its diameter; ninth segment with stems equal to and three-fourths the enlargements; terminal segment with a stem a little longer than basal sub-globose enlargement, apical enlargement



TEXT-FIG. 21.—*Cecidomyiella crataevae*, sp. nov. *a.* antennal segments of male; *b.* antennal segments of female.

distinctly swollen in the middle. Palpi quadriarticulate; first segment very short, stout; second segment stout, cylindrical and with a length twice its diameter; third segment one-half longer and more slender than second; fourth segment sub-equal to third and sparsely setose.

Mesonotum brown. Claws simple and as long as pulvilli. Basal clasp segment broadly and roundly triangular, with a length a little less than twice the breadth and sparsely setose. Terminal clasp segment short, stout, slightly curved, strongly chitinised and bidentate apically. Dorsal plate with a rounded apex, emarginate and longer than the ventral plate.



TEXT-FIG. 22.—*Cecidomyiella crataevae*, sp. nov. Male genitalia.

Female.—1 mm. long. Body bright orange. Antennae as long as body, segments 14, with a basal whorl of long and an apical whorl of shorter setae ; third segment with a stem one-seventh the length of the cylindrical enlargement, which latter has a length twice its diameter ; fifth segment with a stem about one-fourth the length of enlargement, which latter has a length one-fourth greater than its diameter ; terminal segment with a length four times its diameter and somewhat reduced towards the apex. Palpi quadriarticulate ; first and second segments short and slender ; third segment a little longer and stouter ; fourth segment very stout and much longer than the rest, sparsely covered with short setae. Pulvilli longer than claws in fore-legs and as long as claws in hind legs. Ovipositor half the length of body.

Cotypes.—Males and females, partly dissected on slides. Nos. $\frac{1003}{H\ 6}$ and $\frac{1032}{H\ 6}$.

Paratypes.—Males and females in spirit. No. $\frac{1033}{H\ 6}$.

Type-locality.—A scrub-jungle near Tanjore, Madras Presidency, South India. Coll. M. S. Mani, 7.vii.1933.

Other localities.—Medical College Grounds, Madras.

Galls.—The galls are homologically leaf buds, leaflets or out-growths from the cortex of the shoot.

5-15 mm. in diameter. Irregular, globose or pyriform, local or extensive, free or compound ; lobed, solid, fleshy, succulent, tubercular, yellowish-green or yellowish-white on the surface and greenish within, with narrow irregular spaces. When cut, the gall presents the appearance of a ruminated endospermous seed. Larvae are found in the spaces between the lobes. The substance consists entirely of simple parenchyma with all the veins intact and scattered in the parenchyma. Centres of cell proliferation are parenchyma of leaves and cortex of young stems.

Life-history.—Eggs are laid on the tender leaf buds and maggots hatch out on the second or the third day. They attack the developing

buds and thus occasion the formation of galls. Larval period is about two weeks, at the end of which the scarlet-red maggots creep out of the gall and wander on the surface of the plant for a time and finally drop to the ground. They burrow into the soil to a depth of about one to two inches, where they pupate in small oval, silken-lined chambers. At this time they appear to be very sensitive to light, as any exposure retards their development. Pupal period takes about three days, at the end of which the adults escape from the soil. There are several generations in the year.

Genus **Chrysodiplosis** Kieff.

- 1911. *Chrysodiplosis*, Kieffer, *Trans. Linn. Soc., London*, XIV, p. 318.
- 1913. *Chrysodiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 145.
- 1920. *Chrysodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 12.
- 1925. *Chrysodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 163.
- 1928. *Chrysodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 7.

This genus is recognised by its quadriarticulate palpi, finely denticulate antennal hairs and dense yellowish hairs on the thorax. Wings rather densely brown-haired, with clear spots, costa scaled black, third vein united with costa before the apex of wing. Claws simple on all legs.

Genotype.—*Chrysodiplosis pulchericornis* Kieff.

Chrysodiplosis squamatipes Kieff.

- 1912. *Chrysodiplosis squamatipes*, Kieffer, *Spol. Zeyl.*, VIII, p. 28.
- 1920. *Chrysodiplosis squamatipes*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 12.

I refer to this species one badly damaged midge in the Indian Museum collection bearing the label : Peradeniya, Ceylon. It is presumably one of the paratypes mentioned by Brunetti.

Genus **Plutodiplosis** Kieff.

- 1912. *Plutodiplosis*, Kieffer, *Spol. Zeyl.*, VIII, p. 27.
- 1913. *Plutodiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 166.
- 1920. *Plutodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 12.
- 1925. *Plutodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 164.
- 1928. *Plutodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 9.

This small genus is distinguished from *Chrysodiplosis* Kieff. by its third vein united with costa beyond the apex of wing and by its one or more produced loops of circumfila. Palpi quadriarticulate. Wings yellow with black spots. Legs thickly scaled and spotted. Pulvilli as long as claws. The only species of this genus, *magnifica*, was described by Kieffer (109) from Ceylon.

Genotype.—*Plutodiplosis magnifica* Kieff. (By original designation.)

Genus **Raodiplosis** Felt.

- 1920. *Raodiplosis*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 6.
- 1925. *Raodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 165.
- 1928. *Raodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 14.

This genus was erected by Felt for midges bred by A. G. Rao from Mango in Thaton, Burma. It is related to *Caryomiya* Felt and *Macrodiplosis* Kieff., but differs in its very narrow wings, having a length four

times its breadth, in the relatively longer stem of its flagellate segments and in its ovipositor having a length one-third that of the abdomen. Only one species, *orientalis*, has been described so far.

Genotype.—*Raodiplosis orientalis* Felt. (By original designation.)

Genus **Androdiplosis** Felt.

1915. *Androdiplosis*, Felt, *Journ. N. Y. Entomol. Soc.*, XXIII, p. 182.

1920. *Androdiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 16.

1925. *Androdiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 165.

1928. *Androdiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 15.

Basal flagellate antennal segments of female plainly binodose. Pulvilli as long as claws. Ovipositor short and without a conspicuous process on the lobes.

The only species of this genus, *coccidivora*, was described by Felt from Ceylon, and the description is based on a female specimen.

Genus **Diplecus** Kieff.

1912. *Coprodiplosis (partim)*, Kieffer, *Spol. Zeyl.*, VIII, p. 29.

1913. *Diplecus*, Kieffer, *Bull. Nat. Hist. Soc. Metz*, XXVII, p. 55.

1913. *Diplecus*, Kieffer, *Gen. Ins.*, fas. 152, p. 201.

1920. *Diplecus*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 14.

1925. *Diplecus*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 165.

1928. *Diplecus*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 11.

This genus is distinguished from *Androdiplosis* Felt by its rudimentary pulvilli. The type in the Indian Museum is badly damaged.

Genotype.—*Diplecus inconspicuus* (Kieff.). (By original designation.)

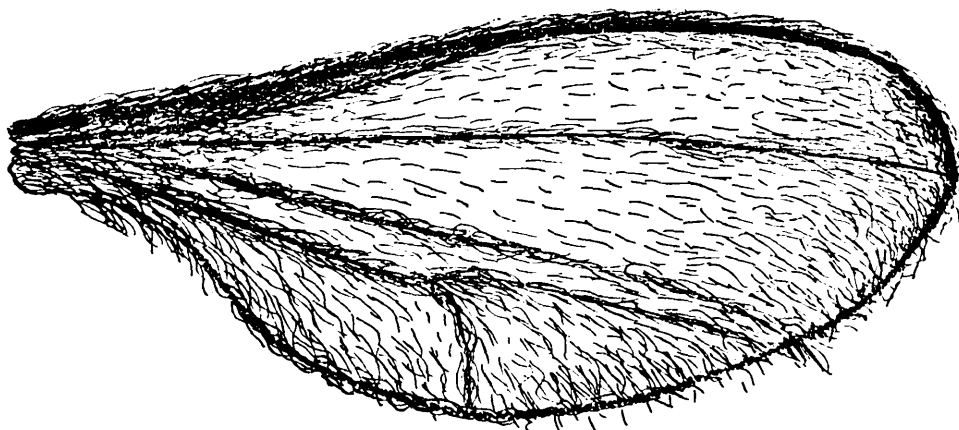
Diplecus inconspicuus (Kieff.).

(Text-fig. 23.)

1912. *Coprodiplosis inconspicuus*, Kieffer, *Spol. Zeyl.*, VIII, p. 29.

1913. *Diplecus inconspicuus*, Kieffer, *Bull. Nat. Hist. Metz*, XXVII, p. 55.

This is a small reddish coloured species described from Ceylon. Fragments of a single midge, apparently a paratype, were found with



TEXT-FIG. 23.—*Diplecus inconspicuus* (Kieff.). Wing of male.

the label : *Coprodiplosis inconspicuus* Kieff., Peradeniya, Ceylon, Ind. Museum. In order to prevent its further deterioration, I have mounted

it in Canada balsam (Slide No. $\frac{1004}{H6}$). Female 1 mm. long. Claws short and without a distinct empodium.

Genus **Orseoliella** Kieff.

1909. *Orseolia (partim)*, Kieffer and Massalongo, *Marcellia*, VIII, p. 125.
 1912. *Orseoliella*, Kieffer, *Marcellia*, XI, p. 231.
 1913. *Orseoliella*, Kieffer, *Gen. Ins.*, fas. 152, p. 152.
 1920. *Orseoliella*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 15.
 1925. *Orseoliella*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 167.
 1928. *Orseoliella*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 7.

This genus is distinguished from *Orseolia* Kieff. and Mass., to which it is related, by its quadriarticulate palpi and five loops of circumfila on the flagellate antennal segments of female. Third vein united with costa beyond the apex of wing. Claws simple on all legs and not sharply bent at right angles. Pulvilli a little longer than claws. Basal clasp segment lobed, lobes basal and obtuse. Ventral plate long, broad and broadly rounded apically.

Genotype.—*Orseoliella javanica* (Kieff.). (By original designation.)

Key to species.

- I. Antennae three-fourths the length of body, pulvilli a little longer than claws *O. apludae* Felt.
 II. Antennae as long as body, pulvilli as long as claws *O. graminis* Felt.

Orseoliella apludae Felt.

1920. *Orseoliella apludae*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 8.

This is a large midge which breeds in galls of the grass, *Apluda varia* Hack. Mesonotum reddish-brown in both sexes. Abdomen yellowish in male and reddish-brown in female.

Orseoliella graminis Felt.

1921. *Orseoliella graminis*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 22.

This is a slightly larger species than the above. It gives rise to galls on *Andropogon squarrosus* Linn.

Genus **Lestodiplosis** Kieff.

1884. *Lestodiplosis*, Kieffer, *Bull. Soc. Entomol. France*, LXIII, p. 280.
 1894. *Coprodiplosis*, Kieffer, *Fuelle Jeunes Nat.*, XXIV, p. 84.
 1894. *Hemidiplosis*, Kieffer, *Ann. Sc. Nat.*, I, p. 9.
 1908. *Lestodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 407.
 1910. *Lestodiplosis*, Rubsaamen, *Zeit. Wissen. Insektenbiol.*, XV, p. 285.
 1911. *Lestodiplosis*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, pp. 59-60.
 1913. *Lestodiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 195.
 1920. *Lestodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 14.
 1925. *Lestodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 167.
 1928. *Lestodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 11. ;

This genus comprises numerous small to medium-sized, yellowish or brownish, zoophagous midges. They feed on the larvae of other

Itonids, Mycetophilids, Xylophagids, etc. A number of species are also inquilines in different midge galls.

The genus is recognised by the triangular lobe at the base of the slender basal clasp segment. Dorsal plate short, deeply and triangularly emarginate, lobes narrow, parallel and broadly rounded. From the typical *Lestodiplosis* Kieff. the sub-genus *Coprodiplosis* Kieff. is separated by its hyaline wings, which, however, is not a reliable character.

One species of this genus, *ceylanicus*, was described by Kieffer (109) from Ceylon.

Genotype.—*Lestodiplosis alternans* Kieff. (By original designation.)

Genus **Pachydiplosis** Kieff.

1913. *Pachydiplosis*, Kieffer, *Bull. Nat. Hist. Soc. Metz.*, XXVIII, p. 108.

1913. *Pachydiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 224.

1920. *Pachydiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 15.

1925. *Pachydiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 169.

1928. *Pachydiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 14.

Felt (76) places this genus between *Plemeliella* Sitn. and *Itonida* Meig. in the series with dorsal plate not incised. I find, however, that this genus more closely approaches *Styracodiplosis* Tav. (172) in its deeply and roundly incised dorsal plate, with broadly rounded lobes and in its moderately short, stout, terminal clasp segment but differs in the same not being dentate or serrate. The genus would thus be more correctly placed with *Styracodiplosis* Tav.

Pachydiplosis is distinguished from *Lestodiplosis* Kieff. by its unspotted wings and basal clasp segment not conspicuously lobed. It is distinguished from *Itonida* Meig. by its relatively shorter terminal clasp segment, longer conical ovipositor and by the dorsal plate.

About half a dozen species, most of them previously referred to *Clinodiplosis* Kieff., have been described so far. Kieffer described two Indian species.

Genotype.—*Pachydiplosis apricanus* Kieff. (By original designation.)

Partial key to species.

- I. Pulvilli shorter than claws
- II. Pulvilli as long as claws

P. oryzae (Wood-Mason) Mani.
P. ceylanicus (Kieff.).

Pachydiplosis oryzae (Wood-Mason) Mani.

(Text-figs. 24, 25 and 26.)

1881. *Cecidomyia oryzae*, Wood-Mason in Riley, *Amer. Naturalist*, p. 149.

1890. *Cecidomyia oryzae*, Cotes, *Ind. Mus. Notes*, I, p. 103.

1921. *Pachydiplosis oryzae*, Felt, *Mem. Dept. Agric. Ind.*, *Entomol. Ser.*, VII, p. 16.

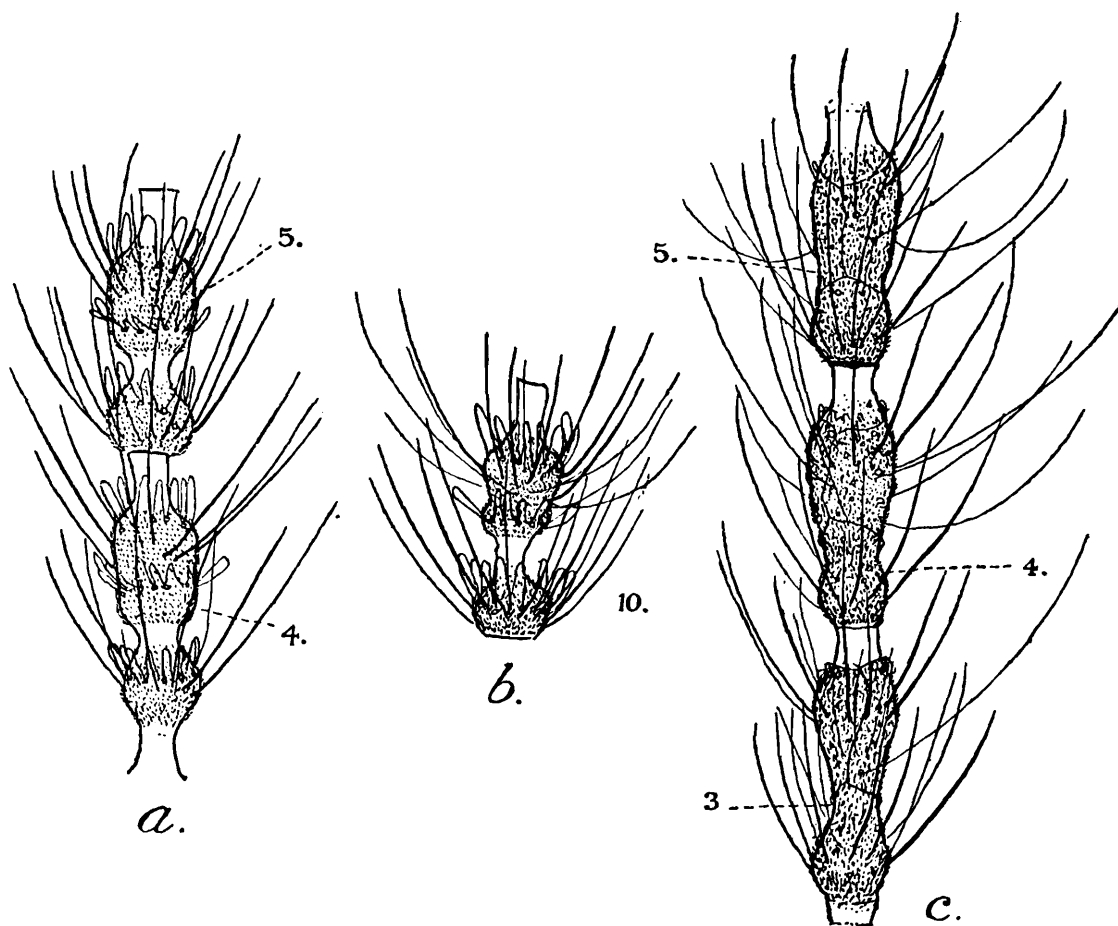
1928. *Pachydiplosis oryzae*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 14.

This midge was first observed on paddy by Wood-Mason (187), who proposed for it the name *Cecidomyia oryzae*, but published no description. Subsequently Felt (72) identified the midge bred from the "silver-shoot" galls of paddy at Coimbatore as belonging to the genus *Pachydiplosis* Kieff. and assuming that it was identical with Wood-Mason's *Cecidomyia oryzae*, called it *Pachydiplosis oryzae* (Wood-Mason),—but

did not publish any description. I describe the midge below, and have retained the name in view of the fact that it is well-known to workers on this group.

The following description is based on midges in Ramachandra Rao's collection, kindly placed at my disposal by Dr. T. V. Ramakrishna Ayyar, Government Entomologist, Agricultural College and Research Institute, Coimbatore.

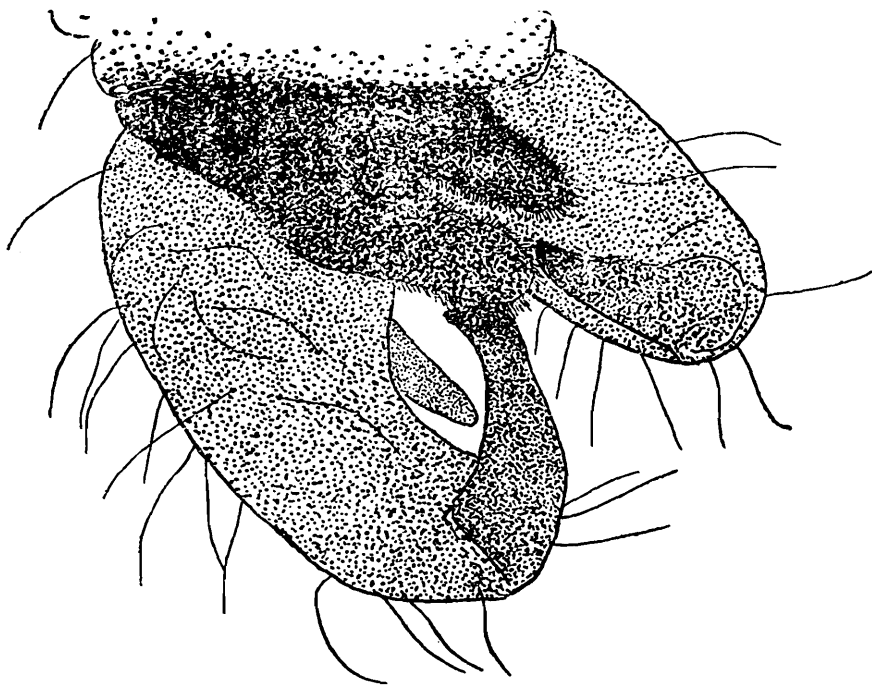
Male.— 3 mm. long. Body yellowish-brown, sparsely haired. Antennae dark reddish-brown, thickly haired, nearly equal in length to the body, segments 14; third segment with stems one-fifth and one-half the lengths of the basal and apical enlargements, basal enlargement broadly ovoid, with a length nearly equal to its diameter, apical enlargement sub-globose, with a length about twice its diameter; fourth segment fused with third, sub-equal, stems one-fifth and one-half the basal globose and apical sub-cylindrical enlargements; fifth segment a little shorter than fourth, stems two-thirds and one-half the basal and apical enlargements; tenth segment with a basal stem three-fourths the length of basal globose enlargement and with an apical stem two-thirds the length of the apical sub-cylindrical enlargement, which latter is conspicuously constricted at its basal one-third; penultimate segment with a basal stem sub-equal to the basal globose enlargement and an apical



TEXT-FIG. 24.—*Pachydiplosis oryzae* (Wood-Mason) Mani. a.b. antennal segments of male; c. antennal segments of female.

stem one-half the length of apical enlargement, which latter is distinctly stouter apically than basally and has a length about twice its diameter;

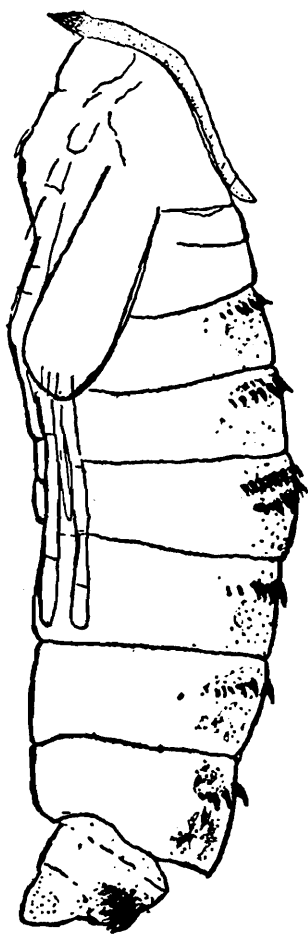
terminal segment sub-cylindrical, with a length twice its diameter and with a prolongation a little less than half its length. Palpi quadriarticulate, short, sparsely setose; first segment short, stout, broader than long; second segment nearly as long as first but more slender; third segment a little longer and more slender than second; fourth segment nearly equal to third, somewhat stouter and less setose, tip broadly and evenly rounded. Mesonotum brown, sub-median lines sparsely haired. Scutellum dirty yellowish-brown, post-scutellum darker. Halteres, stem light yellowish, head greyish-brown. Legs densely hairy and dark brown. Claws simple on all legs, evenly and slightly curved. Pulvilli half the length of claws. Abdomen brownish-yellow, sparsely setose. Genitalia pale brown, somewhat thickly setose; basal clasp segment with a breadth at the base half the length and a breadth at the apex one-fourth the length, swollen basally and moderately setose; terminal clasp segment about half the length of the basal clasp segment, rather thickly swollen at the base, somewhat curved beyond the basal half, sparsely setose and strongly chitinised apically; dorsal plate deeply and broadly bilobed, lobes reddish-brown, thickly and shortly setose, with a length twice the breadth, evenly and broadly rounded apically.



TEXT-FIG. 25.—*Pachydiplosis* (Wood-Mason) Mani. Male genitalia.

Female.—3.5 mm. long. Body bright reddish-brown, thickly haired. Antennae dark brown, moderately thickly haired, about half the length of body, segments 14; third segment with a stem one-ninth the sub-cylindrical, distinctly binodose enlargement; fourth segment about three-fourth the length of third, with which it is fused, stem one-sixth the length of enlargement, which latter is constricted at its basal one-fourth; fifth segment nearly equal to fourth, stem about one-quarter the length of enlargement; ninth segment with a stem about one-third the length of the cylindrical enlargement, which latter has a length

about two and half times its diameter. Palpi quadriarticulate, sparsely setose; first segment short, stout; second segment with a length four times its diameter; third nearly equal to second; fourth stouter and a little longer than third, broadly and evenly rounded apically. Mesonotum dull reddish-brown at the sides and brownish-black between the sub-median lines, which are thickly haired. Scutellum reddish-brown, post-scutellum dark reddish-brown. Legs brownish and sparsely setose. Claws simple on all legs, diverging and somewhat curved at very tip only. Pulvilli half the length of claws but project beyond them. Abdomen bright reddish-brown in fresh and dark reddish-brown in older specimens, moderately setose. Ovipositor short, conical, terminal lobes of lamellae with a length two and half times its greatest width, sparsely setose.



TEXT-FIG. 26.—*Pachydiplosis* (Wood-Mason) Mani. Exuvium of female showing a transverse row of spines on the dorsum of the abdomen.

Exuvium of female.—5 mm. long. Antennal horns (cephalic horns) strongly chitinised and acutely pointed but not serrate anteriorly. Wing cases touch the posterior margin of the second abdominal segment. Hind legs reach but do not touch the posterior margin of the fifth abdominal segment. Dorsum of abdomen with transverse rows of stout, short, posteriorly recurved, strongly chitinised spines near the anterior margin. Dorsum of first segment without spines; second segment with an anterior rudimentary and a posterior well-developed row;

third segment with two well-developed rows of alternating spines ; rest of the segments up to the last but one similar ; the penultimate segment with spines longer, more slender and more acutely curved than on all the other segments. Spines on the sides of the segment shorter than those on the middle.

Holotype.— Male, partly dissected on slide. No. $\frac{1005}{H\ 6}$

Allotype.— Female, partly dissected on slide. No. $\frac{1006}{H\ 6}$

Paratypes.— One male and one female on pins. Nos. $\frac{1007}{H\ 6}$ and $\frac{1008}{H\ 6}$

Type-locality.— Coimbatore, Madras Presidency, South India, Coll. Y. R. Rao, 28.vii-9.viii. 1916.

Remarks.— This midge gives rise to long, tusk-shaped, white or pale brown, hollow galls on the shoot of the paddy plant and prevents the formation of the earheads ; it is the cause of the disease popularly called *anakomban*. The damage is often very extensive. It occurs almost throughout South India and to some extent in Bengal. The Proctotrypid parasite, *Platygaster oryzae* Cam. (Hymenoptera) sometimes effectively checks the spread of this pest, but no really effective control measure is known. The grass *Ophiurus corymbosus* is supposed to be an alternative food plant for this midge. Cotes (16) records that Wood-Mason believed this midge to be ovoviviparous.

***Pachydiplosis ceylanicus* (Kieff.).**

1902. *Clinodiplosis ceylanicus*, Kieffer, *Spol. Zeyl.*, VIII, pp. 26-27, fig. 3.

1913. *Pachydiplosis ceylanicus*, Kieffer, *Gen. Ins.*, fas. 152, p. 224.

1928. *Pachydiplosis ceylanicus*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 14.

This is a somewhat smaller species of brownish-red colour. It was described by Kieffer from Ceylon. The type is lost. Five very badly damaged females, apparently paratypes, were found in the Indian Museum with the label : *Clinodiplosis ceylanicus* Kieff., Peradeniya, Ceylon, 3-x-10. To prevent further deterioration, I have mounted them in Canada balsam (Slide No. $\frac{1009}{H\ 6}$).

According to Kieffer, this species is related *P. graminicola* (Kieff.), which has been recorded from South India and Ceylon.

Genus *Itonida* Meig.

1800. *Itonida*, Meigen, *Nouvelle Classification*, p. 19.

1803. *Cecidomyia*, Meigen, *Illegers Magazine*, II, p. 261.

1850. *Diplosis*, Herman Loew, *Dipt. Beitr.*, IV, p. 20.

1862. *Diplosis*, Osten Sacken, *Mon. N. American Dipt.*, I, p. 76.

1895. *Cryptodiplosis*, Kieffer, *Bull. Soc. Entomol. France*, LXIV, p. 194.

1897. *Diplosis*, Kieffer, *Synop. Cecid. Europ. Algerie*, p. 41.

1908. *Cecidomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 412.

1908. *Itonida*, Hendel, *Verhandl. zool-bot. Ges. Wein.*, LVIII, p. 49.

1910. *Cecidomyia*, Rubsaamen, *Zeit. Wiss. Insekt.*, XV, p. 286.

1911. *Itonida*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 61.

1913. *Cecidomyia*, Kieffer, *Gen. Ins.*, fas. 152, p. 211.

1913. *Itonida*, Kieffer, *Gen. Ins.*, fas. 152, p. 258.

1920. *Cecidomyia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 15.

1921. *Itonida*, Felt, *Bull. N. Y. St. Mus.*, Nos. 231, 232, pp. 175-208.

1925. *Itonida*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 169.

1928. *Cecidomyia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 13.

1928. *Itonida*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 17.

This is the oldest genus of the family and was erected by Meigen in 1800. At first it included all the other genera now referred to the

family. As at present recognised, it comprises over fifty two species, most of which are American. It is believed that the midges of this genus breed in leafy tissues. Two species have been described so far from India.

This genus is related to *Pachydiplosis* Kieff. but is distinguished by its terminal clasp segment equal to basal clasp segment and by its relatively longer, lobed ovipositor. Felt (73a) summarises the characters of this genus as follows: Palpi quadriarticulate; antennal segments 14, flagellate antennal segments of male binodose, nodes distinctly unequal, circumfila well developed; sub-costa united with costa before the basal third; third vein united with the margin of wing well beyond the apex, fifth vein united with posterior margin of wing at the basal third, costa interrupted behind its union with the third vein; claws simple on all legs and shorter than pulvilli; dorsal and ventral plates rather deeply bilobed; ovipositor long and stout, with long, narrowly oval terminal lobes, distinctly contracted basally.

Genotype.—*Itonida pini* (De Geer).

Key to species.

- I. Antennae as long as body in female and one half longer than body in male, fifth antennal segment of female with stem three-fourths the length of enlargement *I. penniseti* Felt.
- II. Antennae shorter than body in female and as long as body in male, fifth antennal segment of female with stem one-third the length of enlargement *I. seminis* Felt.

Itonida penniseti Felt.

1920. *Itonida penniseti*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 9.

This is a medium-sized midge attacking the grasses *Pennisetum cenchroides* Rich. and *P. alopecuroides* Steud. Male abdomen yellowish, first segment reddish-brown. Female abdomen brown. I refer to this species numerous midges found breeding in *P. cenchroides* Rich. at Tanjore.

Itonida seminis Felt.

1921. *Itonida seminis*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 26.

This species attacks the ear-heads of *Pennisetum typhoideum* Gertn. (*cambu*). The female of this species is somewhat larger than that of the preceding species. The abdomen is orange coloured. This species is likely to prove a serious pest under favourable conditions.

Genus *Xylodiplosis* Kieff.

1853. *Diplosis* (*partim*), Winnertz, *Linn. Entomol. Stett.*, VIII, p. 276.

1895. *Xylodiplosis*, Kieffer, *Bull. Soc. Entomol., France*, LXIV, p. 193.

1913. *Xylodiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 226.

1925. *Xylodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 169.

I am recording this genus here for the first time from India. It is referable to the tribe Porricondylariae but is provisionally placed in the Itonididinae by Felt. Kieffer based the description of the genotype on the male only, the female being unknown, I have come

across both sexes of another new species of this genus from Castle Rock, which I describe below under the name *X. kempi*.

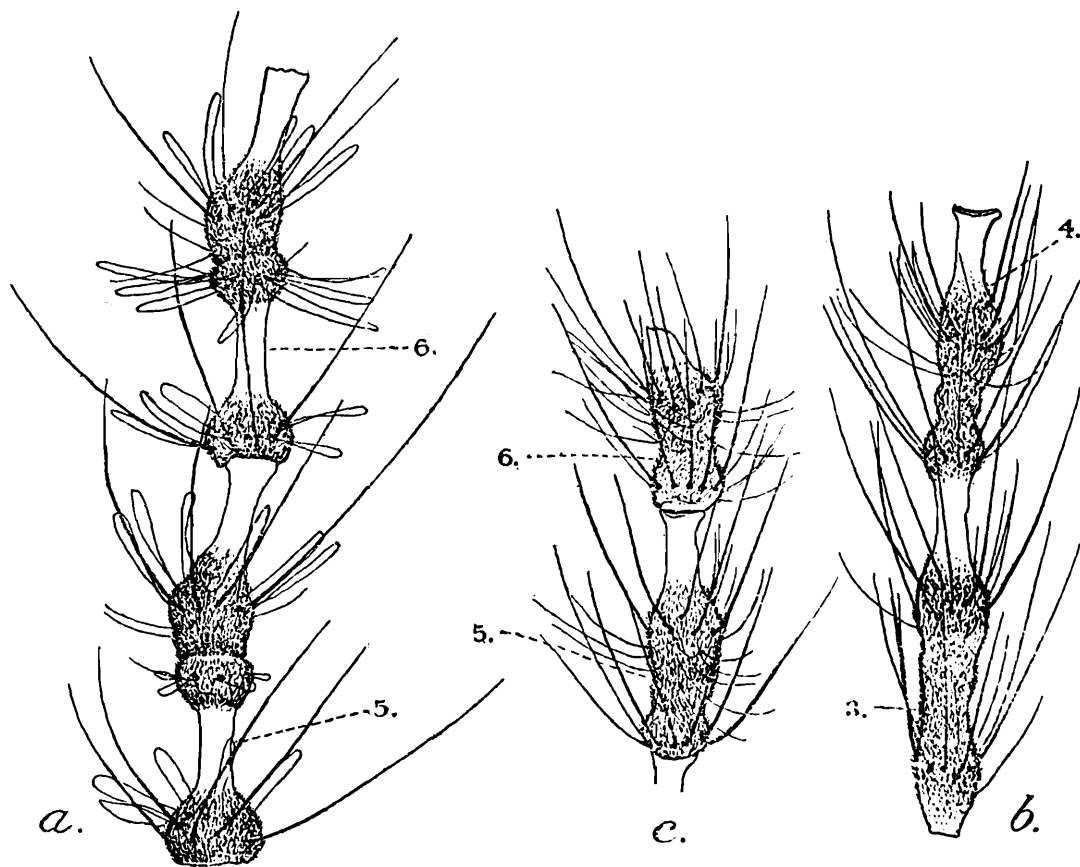
Palpi quadriarticulate. Antennal segments 14, binodose, stems unequal; circumfila well developed, regular, loops as long as or longer than enlargements. Claws simple on all legs, twice the length of pulvilli. Cross-vein present but not well developed. Ovipositor very long, sometimes longer than body. Dorsal plate of male genitalia short, triangular and heavily chitinised; basal clasp segment long and oval; terminal clasp segment short, triangular, curved and broad basally.

Genotype.—*Xylodiplosis praecox* (Winn.). (By original designation.)

***Xylodiplosis kempi*, sp. nov.**

(Text-figs. 27 and 28.)

Male.—Badly mutilated. Body dark brown, densely hairy. Fourth antennal segment (?) with stems equal to and three-fourths the lengths of enlargements, basal enlargement globose, apical enlargement subcylindrical, with a length about twice its diameter and constricted in the middle; fifth antennal segment with stems one half greater than and equal to enlargements, apical enlargement constricted at its basal



TEXT-FIG. 27.—*Xylodiplosis kempi*, sp. nov. *a.* antennal segments of male; *b.c.* antennal segments of female.

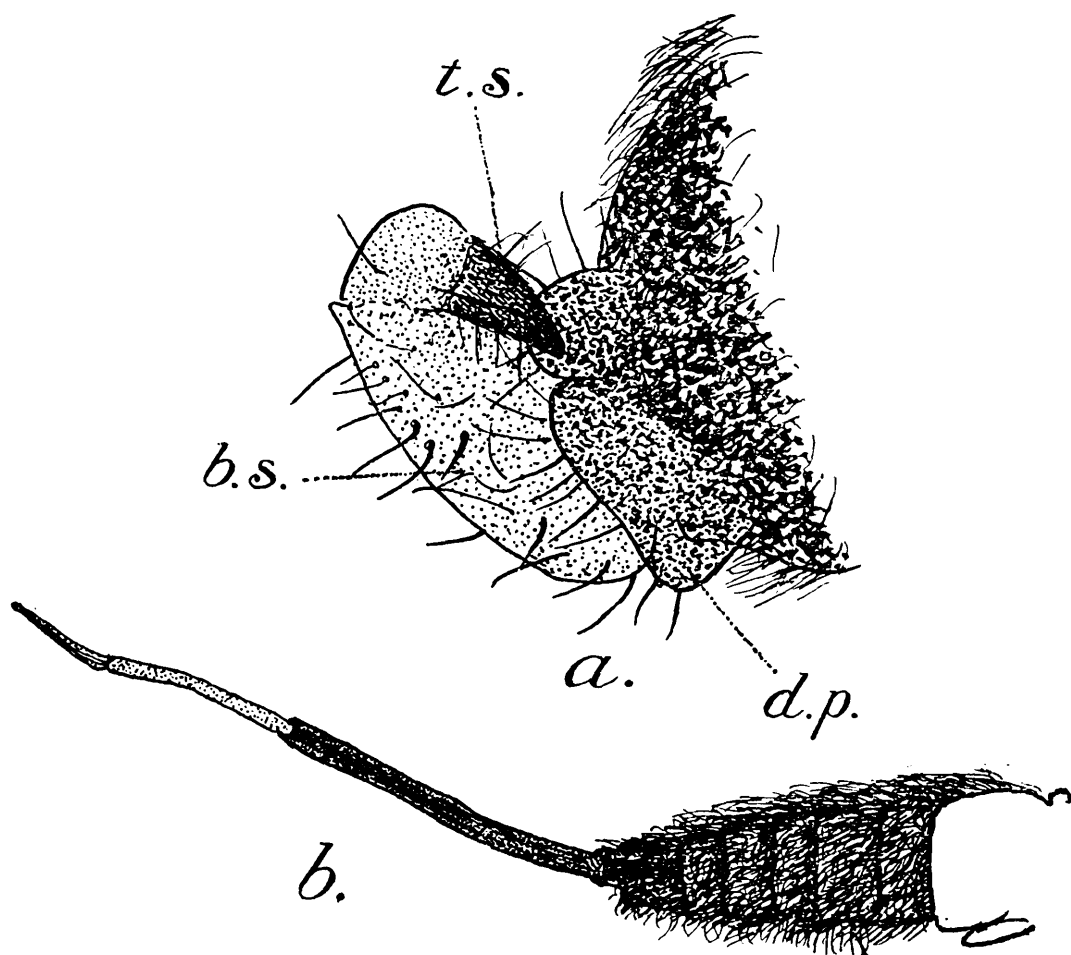
fourth. Genitalia yellowish-brown; basal clasp segment long, oval and setose; terminal clasp segment short, triangular, curved, broad

basally, somewhat chitinated and sparsely setose ; dorsal plate short, triangular and heavily chitinated.

wemale.— 2 mm. long. Body reddish-brown, densely hairy. Terminal part of antennae broken. Third segment with a stem a little less than one-third the length of enlargement, which latter is thickened both basally and apically ; fourth segment united with third, stem about half the length of enlargement, which latter has a basal globose thickening and an apical fusiform thickening, the constriction in the middle being narrower than that in the third segment ; fifth segment a little shorter than fourth, with a stem three-fourths the length of enlargement, which latter has a globose basal and an obpyriform apical swelling. Mesonotum brown. Scutellum yellowish-brown. Abdomen dark reddish-brown. Pulvilli about half the length of claws. Ovipositor reddish in colour and longer than body.

Holotype.— Female, on slide. No. $\frac{1010}{H\ 6}$.

Allotype.— Male, badly mutilated and partly dissected, on the same slide as the holotype. No. $\frac{1011}{H\ 6}$



TEXT-FIG. 28.—*Xylodiplosis kempī*, sp. nov. a. male genitalia ; d.p. dorsal plate, v.p. ventral plate, t.s. terminal clasp segment, b.s. basal clasp segment ; b. female genitalia showing the long ovipositor, part of which is still inside the abdomen.

Type-locality.— Castle Rock, North Kanara District, Bombay Presidency. Coll. S. Kemp, 11-26.x.1916.

Genus **Hormomyia** H. Loew.

1818. *Cecidomyia* (*partim*), Meigen, *Syst. Besch.*, I, p. 94.
 1850. *Hormomyia*, Herman Loew, *Dipt. Beitr.*, IV, pp. 20, 31.
 1861. *Angelinia*, Rondani, *Atti Soc. Ital. Sc. Milano.*, II, p. 290.
 1908. *Hormomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 124, p. 387.
 1911. *Hormomyia*, Felt, *Journ. N. Y. Entomol. Soc.*, XIX, p. 57.
 1913. *Hormomyia*, Kieffer, *Gen. Ins.*, fas. 152, p. 137.
 1920. *Hormomyia*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 271.
 1921. *Hormomyia*, Felt, *Bull. N. Y. St. Mus.*, Nos. 231-232, p. 209.
 1925. *Hormomyia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 170.
 1928. *Hormomyia*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 6.

Prior to 1921 there was great confusion regarding the diagnosis and type of this genus. After an examination of all the available literature, Felt designated *Cecidomyia crassipes* Meig. as the type. He summarises the characters of this genus as follows :

Palpi tri-, bi-, or sometimes uniarticulate. Antennal segments 15-27 in male and 14 or more in female, flagellate segments of female strongly constricted. Wings generally long and narrow, third vein united with the costa at or beyond the apex. Mesonotum greatly produced over the head. Claws stout, long, evenly curved and generally simple. Pulvilli often reduced in male. Basal clasp segment stout. Terminal clasp segment obtuse and with a somewhat rudimentary spur. Dorsal plate broadly emarginate. Ventral plate short and broad. Terminal lobes of ovipositor broad.

Key to species.

- I. Wings normal, *i.e.*, long and narrow and reaching to two-thirds the length of abdomen *H. ischaemi* Felt.
 II. Wings very short, *i.e.*, less than one-fourth the length of body *H. subaptera* Felt.

Hormomyia ischaemi Felt.

1920. *Hormomyia ischaemi*, Felt, *Pusa Bull.*, No. 89, p. 46.
 1920. *Hormomyia ischaemi*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 271.
 1928. *Hormomyia ischaemi*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 6.

This is a dark brown or dark reddish-brown species, which produces galls on *Ischaemum pilosum* Hack. Felt believes that *Oligotrophus ischaemi* Kieff. is probably identical with this species, which I am inclined to doubt.

Hormomyia subaptera Felt.

1926. *Hormomyia subaptera*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, IX, p. 224.

This is a smaller midge with relatively very short wings. Felt has only provisionally referred it to this genus.

Genus **Dyodiplosis** Rubs.

1899. *Hormomyia* (*partim*), Rubsaamen, *Biol. Central-blatt.*, XIX, p. 602.
 1912. *Dyodiplosis*, Rubsaamen, *Zeit. Wiss. Insektenbiol.*, VIII, p. 49.
 1913. *Dyodiplosis*, Kieffer, *Gen. Ins.*, fas. 152, p. 205.
 1920. *Dyodiplosis*, Brunetti, *Rec. Ind. Mus.*, XVII, pp. 14, 271.
 1921. *Dyodiplosis*, Felt, *Bull. N. Y. St. Mus.*, Nos. 231-232, p. 208.
 1925. *Dyodiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 170.
 1928. *Dyodiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 12.

This genus is distinguished from *Hormomyia* H. Loew by the thorax being not much produced over the head to two moderately long circumfila on the flagellate antennal segments of female and by the truncate ventral plate. Third vein united with costa well beyond the apex of wing. Basal clasp segment unarmed, style not expanded apically and not strongly chitinised at the sides. Ovipositor short.

Seven Indian species, breeding in grasses, were described by Felt : *generosi* (58), *andropoginis*, *cornea*, *fluvialis* (63), *indica*, *monticola* and *plumosa* (72).

Genotype.—*Dyodiplosis arenaria* (Rubs.). (By original designation.)

Genus **Lowiola** Kieff.

- 1875. *Diplosis (partim)*, Loew Franz, *Verh. zool.-bot. Ges. Wein.*, XXV, p. 20.
- 1896. *Lowiola*, Kieffer, *Miscell. Entomol.*, p. 5.
- 1913. *Lowiola*, Kieffer, *Gen. Ins.*, fas. 152, p. 206.
- 1920. *Lowiola*, Brunetti, *Rec. Ind. Mus.*, XVII, p. 15.
- 1925. *Lowiola*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 172.
- 1928. *Lowiola*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 13.

Palpi triarticulate. Antennal segments without any unusual processes, circumfila loops as long as or longer than enlargements. Third vein united with costa beyond the apex of wing. Basal clasp segment not distinctly lobed, dorsal plate deeply and narrowly incised, ventral plate narrowly emarginate. Ovipositor moderately long, lamellae deeply bilobed.

Felt (58) described one Indian species, *costata*, from Ceylon.

Genotype.—*Lowiola centaurae* (H. Loew.).

Genus **Orseolia** Kieff. & Mass.

- 1902. *Orseolia*, Kieffer & Massalongo, *Marcellia*, I, p. 56.
- 1913. *Orseolia*, Kieffer, *Gen. Ins.*, fas. 152, p. 151.
- 1925. *Orseolia*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 173.
- 1928. *Orseolia*, Senior-White, *Cat. Ind. Mus.*, pt. 15, p. 7.

This genus is related to *Orseoliella* Kieff. but differs in its biarticulate palpi. Stems of first flagellate antennal segment of male have a lateral tooth near its middle. Claws simple on all legs. Dorsal plate narrowly incised. Ventral plate longer and rounded apically.

The genotype, *cynodontis* Kieff. and Mass., has been recorded by Kieffer (111) from Ceylon and by Felt (72) from South India. It breeds in various species of *Cynodon*.

Genus **Horidiplosis** Felt.

- 1920. *Horidiplosis*, Felt, *Mem. Dept. Agric. Ind., Entomol. Ser.*, VII, p. 10.
- 1925. *Horidiplosis*, Felt, *Bull. N. Y. St. Mus.*, No. 257, p. 175.
- 1928. *Horidiplosis*, Senior-White, *Cat. Ind. Ins.*, pt. 15, p. 7.

Palpi uniarticulate. Antennal segments 14 in both sexes, circumfila not doubled. Wings hyaline. Claws simple on all legs. Dorsal plate deeply, broadly and roundly emarginate. Ventral plate broadly emarginate. Ovipositor stout and with a length about two-thirds that of the abdomen.

The type, *H. fici* Felt, is a dark, reddish-brown or yellowish species, with long tapering palpus, and breeds in pustule-like galls on leaves of *Ficus infectoria* Linn.

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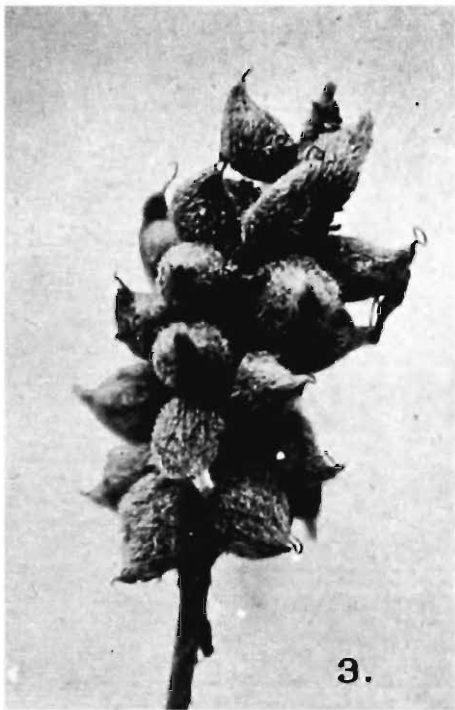
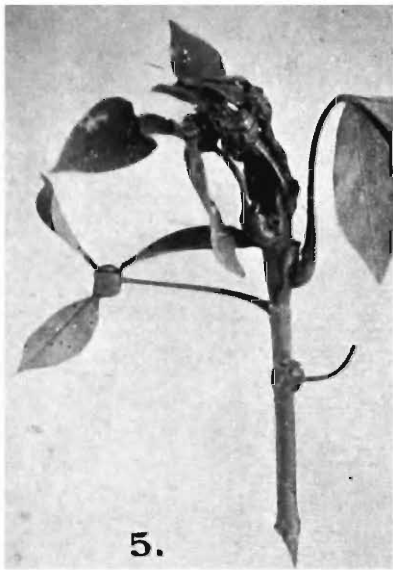
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EXPLANATION OF PLATE VII.

- FIG. 1.—*Schizomyia acaciae*, sp. nov. Tomentose galls on the leaflets of *Acacia leucophloea* Willd.
- FIG. 2.—*Asphondylia morindae* Mani. Clustered variety of the solid galls on the inflorescence of *Morinda tinctoria* Roxb.
- FIG. 3.—*Asphondylia utriculae*, sp. nov. Utricular galls on the ovary of *Dichrostachys cineria* W. & A.
- FIG. 4.—*Cecidomyiella crataevae*, sp. nov. Fleshy galls on the leaflets of *Crataeva religiosa* Forst.
- FIG. 5.—*Cecidomyiella crataevae*, sp. nov. Leaf bud galls.



Indian Midge Galls.

ON SOME SAWFLIES (HYMENOPTERA: TENTHREDINIDAE)
FROM THE INDIAN MUSEUM, CALCUTTA.

By RENÉ MALAISE, *Stockholm*.

I am very grateful to the authorities of the Zoological Survey of India, Indian Museum, Calcutta, for sending me, at my request, a very interesting collection of sawflies, mainly from the Himalayas, for study. Since writing up the report I had an opportunity of studying the types of sawflies, described by Cameron and Smith, preserved in the British Museum (Natural History), London, Hope Collection, Oxford, and the Indian Museum, Calcutta, and the changes in synonymies, etc., rendered necessary by this study are incorporated in the present report.

Tribe TENTHREDININI.

Genus **Pëus** Konow.

Pëus pannulosus Konow.

One ♀, from Darjeeling, alt. 7,000 ft., June-July, 1916; E. Brunetti.

Genus **Dipteromorpha** Kirby.

Dipteromorpha spinosa (Cameron).

Two ♀, from Pashok, Darjeeling District, alt. 4,500—5,000 ft., 26-v—14-vi-1916; F. H. Gravely.

My study of the type of *Tenthredo spinosa* Cameron has convinced me that it is identical with the species later described as *Dipteromorpha dentisterna* Rohwer; similarly *D. spinifera* Mocsary is the same as *Tenthredo fentoni* Kirby.

Genus **Metallopëus**, gen. nov.

The new genus *Metallopëus* belongs to the Tribe Tenthredinini, and is closely allied to the genera *Tenthredo* Linn. (= *Tenthredella* Rohwer) and *Pëus* Konow.

The nervation of the wings is identical with that of the genus *Tenthredo*. The antennae may be shorter than the thorax and longer than the abdomen, but always strongly taper towards the apex and are mostly somewhat compressed. The scutellum and the mesopleurae are always pyramidally raised, the latter generally bear a dorso-ventral carina, which runs to the apex of the pyramidal tubercle and is then continued to the meso-sternal thorns; these thorns are only rarely absent. Head behind the eyes in ♀ angulately enlarged, strongly carinate behind; supra-antennal tubercles strongly prominent; clypeus very big, truncate or nearly so at the apex, supra-clypeal furrow entirely absent. The first abdominal segment is divided in the middle by a

furrow which is wanting in the genus *Pëus*. The sub-apical tooth of the claws is always much longer and stouter than the apical. Head, thorax and abdomen always with a strong, bright metallic lustre.

Genotype.—*Tenthredo clypeata* Cam.

I refer to this genus *Tenthredo aericeps* Konow, *T. coccinoceros* Wood, *T. clypeata* Cam., *T. coerulea* Cam., *Pëus cupriceps* Konow, *P. splendidus* Konow and three undescribed species. The genus seems to be restricted to the higher ranges of the South-Asiatic mountains, at altitudes between 6,000—13,000 ft. The author has seen specimens of different species from Kashmir, Himalayas, Tibet, Assam, North Burma and Sze-Chuan (China); it has also been reported from Formosa.

***Metallopëus clypeata* (Cam.)**

Two ♀, from Simla, W. Himalayas, alt. 6,000 ft., 6-viii-1918 and 9-ix-1918; E. Brunetti.

Genus *Tenthredo* Linn.

I consider the genus *Tenthredella* Rohwer to be a synonym of the Linnaean *Tenthredo*.

***Tenthredo opacifrons*, sp. nov.**

Reddish yellow, upper surface of scape, pedicel and flagellum of antennae and hind tibiae and tarsi black; apex of middle tarsi and that of abdomen, chiefly above, blackish brown (the dark colour of the abdomen may be due to putrefaction). Wings, venation, costa and stigma reddish yellow, apex of both wings strongly infuscated, in the fore wings from a strongly marked straight line through the very apex of stigma.

Head distinctly narrowed and strongly carinated behind eyes. Post-ocellar area nearly quadrate, as long as wide, sloping from the raised middle carina to the rather deep, lateral furrow on either side. Antennal and inter-antennal furrows distinct, but not the post-ocellar and circum-ocellar. Middle foveae large but rather shallow, extending from between the antennae to middle ocellus and the feebly marked supra-antennal pit. Frontal area raised but not prominent. Supra-antennal tubercles absent; the margin of the antennal pit raised into a carina resulting in a rather narrow furrow between the antennae. Entire upper surface of head opaque; finely punctured, punctation denser on and around frontal area; orbits behind eyes and face below antennae smooth and strongly shining. Supra-clypeal furrow distinct; clypeus semi-circularly incised with obtusely rounded lateral teeth. Labrum almost rounded or somewhat pointed. Antennae slender, longer than abdomen, distinctly compressed; third and fourth joints subequal. Pronotal angles and mesonotum very minutely punctured; scutellum and its appendage with scattered punctures, former pyramidally raised to a rather sharp point. Mesopleurae strongly granulate, also pyramidally raised, with a strong but short carina at apex. Mesosternum shining, smooth with short, flattened thorns, hind metatarsus shorter than all the succeeding tarsal joints. Claws cleft, sub-apical

tooth much longer and stronger than apical. Length 14 mm. ♀ unknown, but should be similar to the ♂.

2 ♂, from Pashok, Darjeeling District, alt. 4,000 ft., 26-v-16—14-vi-1916; F. H. Gravely.

Holotype No. $\frac{850}{3}$ in the collections of the Zoological Survey of India (Indian Museum), Calcutta. *Paratype* in the author's Collection in Stockholm.

The new species is closely allied to *T. xanthoptera* Cam. and *T. lepcha* Cam., but in addition to other characters is easily separated from both the species by the punctured and not smooth frontal area.

***Tenthredo xanthoptera* Cam.**

I have examined the type of *T. vitalisi* Turner and have no doubt about its being synonymous with *T. xanthoptera*.

T. xanthoptera is known from Dehra Dun District, U. P.; Shillong, Khasia Hills, Assam; Burma; Tonkin and Laos. In the collection before me there are 4 ♂, 5 ♀, collected from Kalimpong, Pashok and Gopaldhara, Darjeeling District.

***Tenthredo lepcha* Cam.**

1 ♂, 2 ♀, from Pashok and Kalimpong, Darjeeling District.

***Tenthredo lepcha* var. *annandalei* Rohwer.**

3 ♀, from Kalimpong and Gopaldhara, Darjeeling District.

T. annandalei was described as distinct species, but I have failed to find any differences between it and *T. lepcha*. It, however, has pale hind femorae, and brownish, not black, hind tibiae; I am, therefore, of opinion that it should be regarded as a colour variety of *T. lepcha*.

The condition in reference to var. *birmensis* Rohwer (*gribodoi* Konow nec Costa) is also similar. The punctation of the mesopleurae is somewhat stronger in the only specimen available—a co-type of *gribodoi* Konow kindly sent to me for comparison by Mr. Runar Forsius—but, as none of the specimens from Darjeeling have the punctation constant or exactly similar to that of *T. lepcha*, I consider this to be a variable character for the species.

The abovementioned species and varieties occur in the same place and in nature it would be almost impossible to distinguish them one from the other. When carefully examined with a microscope, they can be distinguished with the help of the following key:—

I. Mesosternum with distinct, flattened thorns; mesopleurae strongly, pyramidally raised.

1. Sub-apical tooth of claws shorter than apical; upper surface of head shining, not punctured (Distribution: Mussooree, U. P.; Darjeeling District, Bengal; Sikkim; Assam; Burma; Laos, and Tonkin)

T. xanthoptera Cam. (*vitalisi* Turner).

2. Sub-apical tooth of claws much longer than apical; upper surface of head dull, distinctly punctured (Distribution: Darjeeling District)

T. opacifrons, sp. nov.

II. Mesosternal thorns absent; mesopleurae smooth, shining, with only a few more or less distinct punctures, apex not strongly elevated, blunt; sub-apical tooth of claws longer and stouter than apical.

1. Limit of infuscated apex of fore-wing concave; a median, longitudinal, serrated, black band along entire length of abdomen except at apex (Distribution: Burma)

T. lepcha Cam. var. *birmensis* Rohwer (*gribodoi* Konow).

2. Basal limit of infuscated spot of fore-wing straight; only upper and lower surface of apex of abdomen black.

A. Hind legs with femorae, tibiae and tarsi quite black (Distribution; Darjeeling District, Sikkim)

T. lepcha Cam. (*typica*).

B. Hind femorae reddish yellow, tibiae more or less brown, tarsi black (Distribution: Nepal, Bhutan, Sikkim, Darjeeling District)

T. lepcha var. *annandalei* Rohwer.

***Tenthredo spinigera* Konow var. *hedini* Malaise.**

3 ♂, 3 ♀, from Phagu, Kufri, Simla District; alt. 7,000—9,000 ft.; N. Annandale and B. Chopra.

The description of *hedini* as a variety of *T. spinigera* Konow was included in a paper which is being printed in *Arkiv för Zoologi*, Stockholm, but I am now inclined to consider it as a distinct species.

***Tenthredo clavicornis* Konow.**

2 ♂, 1 ♀, from Pashok, Darjeeling District; alt. 2,500 ft.; F. H. Gravely.

***Tenthredo cretata* Konow.**

2 ♂, 2 ♀, from Pashok, Darjeeling District; alt. 2,500 ft.; F. H. Gravely and E. Brunetti.

***Tenthredo indica* Cam.**

1 ♀, from Simla; alt. 6,000 ft.; 1-viii-1918; E. Brunetti.

***Tenthredo clepsydra*, sp. nov.**

Black with light yellow markings. Head black; the very wide inner and hind orbits upto middle of eyes; on the upper orbital area a nearly rectangular spot on either side of the post-ocular area, which is connected with the hind-orbits through a very fine yellow line running half way between the eye and the hind carina of the head, and basal part of antennae yellow; narrow apical margin of clypeus and an area in its middle, which is sometimes absent, blackish. Antennae black at base and apex; apex of 3rd, entire 4th, 5th and base of 6th joint yellow. Thorax black; major part of upper angles and a spot on the lower angle of pronotum, tegulae, angulate part of middle lobe of mesonotum, scutellum and its appendage but not the limit between them, postscutellum, upper half of mesopleurae and a large spot on the

sides of metusternum yellow. Abdomen black with a distinct bluish tinge; 1st segment, with the exception of a small black spot in the middle at the base, yellow, 2nd-6th tergites on either side with a big, rounded yellow spot, a similar spot in the middle of the corresponding sternites; the yellow spots of the tergites are separated from one another by hour-glass shaped black markings, which together appear as a double-toothed saw along the middle of the abdomen—the name of the species is in reference to the hourglass-shaped black marks of the tergites. Legs yellow, base of all coxae and femorae black, apex of tibiae and in the anterior pair of legs a line running from the apex of tibiae upwards yellow. Wings hyaline, fore-wings near apex somewhat infuscated, nervures and apex of stigma dark brown, base of stigma and costa brown.

Head quite smooth, strongly shining, strongly narrowed behind eyes and distinctly carinated in this region. Post-ocular area less than $\frac{1}{4}$ as wide as long; lateral and post-ocular furrows very sharp and rather deep, former as deep as antennal furrows. The antennal furrows with the post-ocular furrow and a shallow one above the antennal tubercles form the boundaries of the nearly quadrate frontal area; from the frontal corners of the quadrate two fine but distinct furrows run to behind the middle ocellus and unite with one another—inside each of the furrows is a blunt ridge diverging downwards from the ocellus. Supra-antennal tubercles distinct, prominent at the base of antennae but less marked backwards and abruptly cut off behind by the furrow bounding the frontal area described above; between the tubercles is a deep furrow with a low, blunt median carina at its bottom. Supra-clypeal furrow shallow but distinct. Clypeus hardly convex, semi-circularly incised at apex, with rounded lateral teeth. Labrum nearly circular. Antennae longer than abdomen, hardly thickened before apex, distinctly compressed, 3rd joint slightly longer than 4th. Mesonotum extremely minutely and densely punctured, opaque. Anterior half of rounded scutellum smooth, shining; posterior half and appendages with few, scattered punctures. Middle of mesopleurae only slightly obtusely raised, densely but not strongly punctured; area round the elevation hardly punctured, with a distinct lustre. Mesosternum without thorns. Abdomen shining. Claws cleft; apical tooth a little longer than sub-apical. Length of ♀ 13-15 mm. ♂ unknown.

2 ♀, from round Pashok, Darjiling District; alt. 5,000 ft.; F. H. Gravely.

Holotype No. $\frac{851}{H 8}$ in the collections of the Zoological Survey of India (Indian Museum), Calcutta; *Paratype* in the collection of the author.

This new species is closely allied to *T. indica* Cam. and *T. xanthopus* Cam., but differs in the sculpture of the head and colour; the colour of the abdomen of *T. clepsydra* is just the reverse of that of *T. xanthopus*.

Genus *Allantus* Panzer-Jurine.

Tenthredo Rohwer nec Linn. is, in my opinion, a synonym of *Allantus* Panzer-Jurine.

Allantus himalayensis Radoszkovsky.

2 ♀, from the Simla Hills—Kufri to Phagu, alt. 8,000—9,000 ft., and Phagu alt. 9,000 ft., 18-v-1916; N. Annandale and S. W. Kemp. The first of the two specimens on which the following description is based, has been returned to the Indian Museum, Calcutta, while the second is retained for the author's collection. 1 ♀, from Kanakas, Chakrata, United Provinces; Forest Research Institute, Dehra Dun Coll. 1 ♀, from Killanmarg, Kashmir, alt. 10,500 ft., 15-vii-1931, T. B. Fletcher (Brit. Mus. Coll.).

From Smith's poor figure and description of *simillimus*, I was of opinion that his species is synonymous with Radoszkovsky's *himalayensis* and this view was confirmed by examination of Smith's type. As I have not examined Radoszkovsky's type, but have identified the species from his description and very poor coloured sketch, I give below a description of my material. It may, however, be noted that my specimens agree with Smith's type of *simillimus* in all respects.

Head generally black. Clypeus and labrum black to reddish brown, former with two and latter with one large, light yellow spots at base. Mandibles with base lighter, middle region more reddish yellow. Antennae black, scape lighter in colour, pedicel and 3rd joint near the base more reddish yellow. Thorax generally black; upper and lower angles of pronotum light yellow; tegulae reddish yellow; scutellum quite black or usually with two, rarely confluent, light yellow spots; metasternum light yellow on both sides. Abdomen black with light yellow transverse bands; the bands are present on the first tergite and rather wide ones all round 4th and 5th segments, 3rd and 6th segments have a narrower hind margin, 7th - 9th tergites similarly have yellow hind margins and these together form a yellow spot near the tip of the abdomen. Legs reddish yellow; coxae, trochanters and larger part of femorae black, rest mainly on the under side reddish; sometimes the hind femorae are quite black, but in other specimens the reddish colour is more prominent; both the darker and light forms have the anterior edge of front femorae and tibiae more or less striped with light yellow. Wings yellowish, hyaline; radial and frontal half of cubital cells infumated dark brown, discoidal cell less strongly infumated; venation nearly black, costa and stigma reddish yellow.

Head distinctly enlarged behind eyes with a distinct carina behind, strongly and densely punctured or granulated. Post-ocellar area flat, nearly twice as wide as long, in front and on both sides distinctly marked off by rather fine and not too deep furrows; inter-ocellar furrow present. Pentagonal area hardly raised, rather indistinct; supra-antennal tubercles strongly raised with a deep, wide and flat-bottomed depression between them; tubercles about three times longer than wide. Supraclypeal furrow absent, area finely striated longitudinally. Malar space shorter than pedicel. Clypeus nearly flat, with a few scattered punctures, shining; at the apex deeply, rectangularly incised and with rather sharp, but rounded lateral teeth. Labrum pentagonal, with rounded angles. Antennae stout, little longer than thorax and distinctly thickened before apex; lengths of 3rd and 4th joints 7:4. Pronotum and mesonotum strongly and densely punctured, shining background

distinguishable between single punctures; mesopleurae granulated, posterior side of scutellum with dense and distinct and anterior side with confluent, shallow and indistinct punctulation; scutellum roundly raised, at the very apex with a shallow, longitudinal furrow; mesopleurae somewhat flattened, pyramidally raised, with truncate apex. First tergite of abdomen smooth, shining, following tergites comparatively strongly striated, quite dull. Apical teeth of claws longer than sub-apical. Length of ♀ 10·5—11·5 mm. ♂ unknown.

***Allantus indica* Kirby.**

Black with yellow markings. Clypeus, base of mandibles, a minute spot at base of labrum in ♀, and entire labrum in ♂, upper angles and a spot near base of pronotum (but not the tegulae), yellow; there is also a large yellow spot on meta-sternum. Antennae black. Abdomen very differently coloured in ♂ and ♀. In ♀ the first six segments have yellow belts along the hind margins alternating with about as wide black rings, apex of abdomen above with a big yellow spot extending over the middle of last three tergites. Except for quite yellow genitalia, the underside of abdomen in ♂ has yellow transverse belts as in ♀, but hind margins of first and fourth tergites only are belted with yellow; 5th-8th tergites are yellow in the middle and have extremely narrow yellow marginal rings. Legs black; entire front side of first two pairs of legs in both sexes yellow, hind legs black; in ♀ apex of coxae, but in ♂ the front side of trochanters and of the basal portion of femorae also yellow. Wings, hyaline, fore-wings with a dark-brown infuscated shadow along the middle from the base to the apex, most prominent over the second cubital and both the radial cells, hind-wings only along the light-brown stigma less dark; nervures dark brown.

Head narrowed behind the eyes, coarsely punctured with large punctures, well separated by even and shining background. Front area and supra-antennal tubercles hardly raised, bordering antennal furrows very shallow; post-ocellar area sharply defined, $1\frac{1}{2}$ times as wide as long, with the bordering lateral, posterior and inter-ocellar furrows sharp and rather deep; area as also entire head distinctly margined behind; supra and inter-antennal furrows very shallow, bottom of the latter in the middle somewhat roundly raised. Clypeus large, evenly rounded, at the apex roundly emarginated. Malar space shorter than pedicel. Antennae shorter than thorax, from fourth joint strongly thickened before apex, 3rd joint twice as long as 4th. Mesopleurae roundly bulging; mesosternum without thorns; almost smooth; scutellum nearly flat; rest of thorax with punctures as on head, but the punctures are fewer and towards the sides and front of mesonotum gradually disappear. Abdomen not visibly striated, strongly shining. Sub-apical teeth of claws distinctly larger, but only little longer than apical. Length 12-13 mm.

One ♀ labelled "Pashok, Darjeeling District, alt. 2,500 ft. 26-v—14-vi-1916, F. H. Gravely" from the collections in the Indian Museum, Calcutta. I have also examined one ♂ labelled "Sikkim, alt. 4,000 ft., April 1894, C. T. Bingham" in the British Museum collection.

This species apparently comes very near to *A. largifasciatus* Konow, from Sikkim, but according to Konow's description differs in the following points: The head is not narrowed behind the eyes; the post-ocellar area is as long as wide; the antennae are as long as the thorax and the first abdominal segment; the scutellum is raised as a cushion; length 15-16 mm. The sculpture of the head and thorax described as "capite et mesonoto crassius et sparsius, mesopleuris densius punctatis" is somewhat uncertain.

The statement of Enslin that *A. dudgeoni* Cam. is a synonym of *largifasciatus* Konow led the present author to describe the above species as new, but after studying Cameron's description and the types in the British Museum (Nat. Hist.), London, the supposed new species was found to be a synonym of *indica* Kirby. The types of *dudgeoni* Cam. were found to agree closely with *indica* Kirby, though the colouration of the ♂ and the ♀ is dissimilar.

***Allantus salvazii*, sp. nov.**

Back above, dirty whitish yellow below and with a semi-circular light spot in the middle of 4th tergite. Antennae, head above the indistinct supra-clypeal furrow and on hind orbit to just below level of lower ocellus, the pronotum except the large upper and lower angles; meso- and metanotum and meso-sternum black. Mesopleurae light except for a black spot just under the wing; tegulae, frontal half of scutellum and two triangular spots on its appendage lighter. Abdomen black above, lighter below and on the sides. Wings hyaline, hardly darkened towards the apex, intercostal field distinctly light brown; costa, stigma and nervures dark brown, nearly black.

The ♂ is somewhat differently coloured. The infra-antennal area, the mesosternum and the frontal half of the meso-pleurae are lighter, but the scutellum and its appendage are quite black. The semi-circular light spot in the middle of the 4th tergite of the ♀ is, in the only available ♂, changed to an arrowhead-shaped spot over the 4th and 3rd tergites; in the middle of the 5th tergite there is also a faint indication of a light spot.

Head narrowed behind eyes, distinctly margined behind; frontal area and its nearest surroundings finely and inside the area densely punctured, rest strongly shining. Post-ocellar area wider than long (4:3), in the middle with a distinct, shallow and longitudinal depression. Inter- and post-ocellar furrows equally sharp; lateral ones a little sharper and deeper. Frontal area distinctly raised, from the ocelli to the base of the antennae even, in the middle a little excavated. Malar space shorter than pedicel. Clypeus large, rounded and convex; at the apex the incision is roundly pentagonal with a flat bottom, lateral teeth obliquely truncate with rounded angles. Labrum as long as wide, rounded. Antennae of ♀ shorter than head and thorax, distinctly thickened before the apex; length of 3rd and 4th joints as 7:4; in the ♂ longer than abdomen, nearly filiform, length of 3rd and 4th joints as 4:3. Mesonotum densely and finely punctured, mesopleurae, if at all, with very minute, scattered punctures, shining, in the middle rounded to pyramidally raised; mesosternal thorns absent; scutellum a little

raised, rounded, frontal half hardly, the remainder densely and rather strongly punctured, punctures shallow, confluent. Abdomen strongly shining with very faint, hardly visible striation. Apical teeth of claws longer than sub-apical. Length 9-10 mm.

One ♂ and 3 ♀, the type, allotype and one paratype ♀ from Tonkin, Chapa, 20-v—1-vi-1916, R. V de Salvaza; one paratype ♀ labelled "W. Himalayas, Simla, alt. 6,000—7,000 ft., jungle, viii—ix-1925, B. Chopra"

Type ♀, an allotype ♂ belong to the British Museum (Nat. Hist.), London; the Simla paratype belongs to the Indian Museum, Calcutta, Regd. No. $\frac{852}{H3}$; one paratype in the author's private collection.

I have associated this species with the name of the collector Mr. R. Vitalis de Salvaza.

Allantus felderi Radoszkovsky.

This is apparently a widely distributed and common species.

One ♂ and 4 ♀, all captured by N. Annandale and S. Kemp in the Simla Hills, Kufri to Phagu, alt. 8,000—9,000 ft., 18—21-v-1916.

A study of the types in the Indian Museum, Calcutta, has confirmed the author's view that *terminalis* Smith, *multicolor* Smith and *albipictus* Konow are all synonymous with *A. felderi* Radoszkovsky.

Allantus opposita (Smith).

One ♂, from "Round about Mussoorie, United Provinces"; 15-vi—1-vii-1930; B. Chopra. 3 ♀, from Simla, Western Himalayas; alt. 6,000 ft.; 26-vii—12-viii-1918; E. Brunetti.

These specimens have been compared with one ♀, received in exchange from the British Museum, belonging to the type-series of *Fethalia nigra* Cam. The first abdominal segment is divided along the middle and the "blotch" of Cameron is not, as he stated, absent. Cameron's *nigra* is a typical *Allantus* (*Tenthredo*) and is in no way related to the genera *Pēus* Konow or *Jermakia* Jak., as Rohwer supposed (*Rec. Ind. Mus.* XI, 1915, p. 46). I have adopted the earlier specific name *opposita* Smith for the species, as after studying Smith's type in the Indian Museum, Calcutta, I found that Cameron's *nigra* does not differ from it in any characters.

I give below a key of the Indian species of the genus *Allantus* which I have studied.

- I. Mesosternum with sharply pointed, somewhat flattened thorns; scutellum, viewed laterally, strongly raised and usually sharply pointed.
 - A. Scutellum viewed from behind quite truncate or obtusely rounded, sometimes a little pointed; head and thorax strongly punctured.
 - i. Scutellum, viewed laterally, rounded or obtusely pointed, frontal half usually quite white, sometimes black; ventral surface of head and body yellowish white; dorsal surface of abdomen distinctly bluish, under surface and 3rd tergite more or less white. Head

between eyes and post-ocular area with big, dense punctures; hardly shining. Thorax finely but densely punctured. Wings clear, uniformly hyaline. (Distribution: At altitudes up to 11,000 ft. in Kashmir, Himalayas, Assam, Burma and South China)

A. felderi Radoszkovsky.

- ii. Scutellum strongly flattened, in lateral view sharp, posteriorly quite truncate, somewhat emarginated at apex. Head with long black hairs; head and thorax strongly and densely punctured, supra-antennal tubercles distinct. 3rd tergite and whole body black, sometimes hind margins of 1st, 4th, 5th and 9th tergites yellow. Hind femorae and tibiae usually red, sometimes quite black. Frontal borders of wings, especially both radial cells, strongly infuscated. (Distribution: Kashmir)

A. providus Smith.

B. Scutellum, viewed from behind, very sharply pointed, its apex raised to a thorn-like tip.

- i. Clypeus roundly emarginated, with a small tooth in the middle of the emargination; abdomen and rest of body black, without bluish tinge. Abdomen shining, tergites without distinct striations. Head and thorax finely but densely punctured, quite dull. (Distribution: Himalayas)

A. opposita Smith.

- ii. Clypeus roundly emarginated, without tooth in middle. Abdomen with a distinct bluish tinge; tergites striated. Smaller species. (Distribution: Sikkim and Tibet at alt. 12,000—16,000 ft.)

A. inguinalis Konow.

II. Mesosternum without thorns; scutellum generally flat, or if raised, only rounded or obtuse, never sharply pointed.

A. Front margin of fore-wings distinctly infuscated, at least the radial cell; antennae short, distinctly thickened before apex.

B. Head greatly enlarged behind eyes, trapezoid in dorsal view; head and thorax strongly and densely punctured; supra-antennal tubercles raised; abdominal segments generally black with narrow, light yellow hind margins, 2nd segment always and sometimes 3rd quite black. Scape, pedicel, tegulae reddish yellow; two yellow spots on clypeus and one on pronotum, two small, confluent yellow spots on scutellum; metasternum light yellow. (Distribution: Kashmir, Western Himalayas to Chakrata, United Provinces)

A. himalayensis Radoszkovsky.

BB. Head narrowed behind eyes.

C. Head and thorax with large, well separated punctures; background between punctures even and shining; all abdominal segments polished and strongly shining (all those of the ♀ have the apical half yellow; the ♂ has only the apical third of the 1st and the 4th tergite yellow, the other tergites in the ♂ only very narrowly in the middle with an indication of a yellow margin). Mouth-parts, upper angles of pronotum and metasternum

yellow, body otherwise black. (Distribution : Tropical parts of Darjeeling District and Sikkim, alt. 2,500—4,000 feet, in the Eastern Himalayas)

A. indica (Cameron).

CC. No smooth unpunctured spaces between punctures on head and thorax.

D. Supra-antennal tubercles strongly raised, about as high as long, strongly sloping backwards; 3rd-6th abdominal segments quite red, other segments black. Hind femorae and tibiae red; head and thorax black, strongly and densely punctured; labrum and front side of the front legs white. ♀ unknown. (Distribution : Kashmir, Simla).

E. Corners of pronotum, the very apex of scutellum, a spot on meta-sternum and the hind margin of 1st abdominal tergite white

A. incognitus Bingham
(forma typica).

EE. No white on thorax or abdomen

A. incognitus Bingham var.
balobateus Rhw.

DD. Supra-antennal tubercles not strongly raised; under-side of abdomen and hind femorae always black.

i. Head and thorax quite densely and rather finely punctured, every puncture distinct and deep, surface dull; 4th tergite above with very wide, reddish yellow hind margin; 1st tergite on each side with a minute light yellow spot and in the middle with reddish yellow narrow hind margin; 2nd and 3rd tergite quite black; the hind margins of the two or three last tergites and sometimes the sides of the 5th, the tegulae and hind pronotal angles reddish yellow; a yellow spot on mesosternum, in ♂ the mouth-parts light yellow, in ♀ black, only the base of the mandibles reddish yellow. (Distribution : Assam)

A. odynerinus, sp. nov.

ii. Head and most of mesonotum densely punctured, punctures confluent but not deep; with distinct, sometimes strong lustre; meso-pleurae and scutellum distinctly punctured; pronotal angles, tegulae and a spot in the middle of the 8th tergite always reddish yellow; colour of the mouth-parts and of scutellum varying from black to yellow; at the base of the 3rd, 4th and 5th tergites a very narrow strip of yellow colour most prominent at the sides; rest of thorax and abdomen black. (Distribution : Assam, Himalayas)

A. trochanteratus Cameron.

AA. Fore-wings not infuscated; head never enlarged behind eyes.

a. Malar space twice as long as pedicel; antennae except for 3rd joint light yellow, flagellum hardly enlarged before the apex; abdomen twice as long as thorax; scutellum strongly, pyramidally raised. Head and thorax rather densely and extremely minutely punctured; except for a narrow strip of mesopleurae the whole under-side

of the animal very light yellow. 3rd antennal joint; a big spot between the eyes; meso- and meta-notum with the exception of the scutellum, its appendage and post scutellum black. 3rd and 9th tergites quite light, all others with very big, nearly quadrate basal spots, leaving only the narrow, in the middle somewhat triangularly widened hind margins light yellow. (Distribution: Himalayas, Chakrata, U. P., alt. 7,000 feet).

A. beesoni, sp. nov.

b. Malar space only as long as the pedicel; antennae black.

i. Entire head and thorax uniformly, strongly and densely punctured; under-side of animal except the mouth-parts and the metasternum, black; 1st, 3rd, 4th and 5th tergites with equally wide, light yellow hind margins; pronotal angles light yellow; frontal half of the scutellum and legs, except coxae and trochanters, yellowish red. (Distribution: Kashmir)

A. kashmirica, sp. nov.

ii. Mesopleurae and head, except round ocelli, nearly unpunctured, strongly shining; mesonotum and the pentagonal area minutely and rather densely punctured; upper part of mesopleurae, and in ♀ mesosternum, black; otherwise the whole under-side light yellow; above black, pronotal angles, tegulae, frontal half of scutellum, sides of its appendage and a nearly semi-circular big spot in the middle of the 4th tergite light yellow. (The ♂ has the scutellum and its appendage quite black and the light spot in the middle of the abdomen above is triangular and extends from the 4th tergite over to the 3rd). Antennae of ♀ much shorter than abdomen, distinctly thickened before apex; in ♂ nearly filiform and longer than abdomen. (Distribution: Tonkin and Simla in the Himalayas)

A. salvazii, sp. nov.

Genus *Macrophya* Dahlbom.

Macrophya tenuicornis Rohwer.

3 ♂, 4 ♀, all from between Pashok and Kalimpong, Darjeeling District, alt. 600—4,500 ft., 24-iv—10-v-1915 and 2-v—14-vi-1916; F. H. Gravely.

Macrophya regia Forsius.

One ♀ of this brilliant species is labelled: "Kalimpong, Darjeeling district, E. Himalayas, 4,500 24-iv—10-v-1915, F. H. Gravely."

The origin of this species was hitherto most uncertain. The only known ♀ occurred in a collection with the label "probably from China, otherwise possibly from Sumatra"

Genus **Pachyprotasis** Hartig.

Pachyprotasis maesta, sp. nov.

Black; two spots on clypeus, base of mandibles; supra-clypeal area; wide lower, hind and inner orbits up to half the eyes light yellow; from that point the inner orbits continue with a very narrow strip to the upper corner of the eye and grows from here a trifle wider continuing to the posterior corner of the post-ocular area. Labrum reddish yellow, antennae quite black. Sides of pronotum and base of tegulae margined with yellow. A spot near front margin of mesopleurae, a strip along middle of scutellum and most of its appendage; entire postscutellum and in the paratype a very minute spot or point on each lateral corner of the middle of scutellum and most of its appendage; entire postscutellum and in the paratype a very minute spot or point on each lateral corner of the middle lobe of mesonotum; the upper part of metasternum and most of metapleurae light yellow. 2nd-7th abdominal segments all around with yellow hind marginal rings, dorsally very narrow, less so ventrally; dorsally only the 3rd-5th marginal rings complete. The base of saw-sheath and most of 9th tergite yellow. Legs reddish; all coxae black, their apices and trochanters yellow. Apices of all femorae and four frontal tibiae and tarsi striped with black behind. Hind legs more prominent reddish brown, very apex of hind tibiae and a line on hind tarsae black. Wings nearly quite clear, nervation, costa and stigma brownish black.

Head behind eyes narrowed and margined with rather big, scattered punctures, strongly shining between the punctures. Post-ocular furrow absent; the area, therefore, seems longer, measured from the ocelli is $1\frac{1}{2}$ times wider than long. Lateral furrows hardly depressed, only marked as very fine, hardly visible, curved and forwardly converging lines. Frontal area missing, supra-antennal pit round and rather sharp. Clypeus convex, with a few large but shallow and indistinct punctures, at the apex rectangularly incised. Labrum truncate. Antennae longer than the abdomen, flagellum tapering slightly from the middle; 3rd joint a trifle longer than 4th. Mesonotum evenly, but not densely punctured; punctures and shining areas between them distinct; mesopleurae strongly and rather densely punctured with opaque lustre. Punctures on scutellum less distinct than on mesonotum. Tergites in the middle not or hardly emarginated, strongly shining. Saw-sheath normal for the genus. Hind basi-tarsus a trifle longer than all the following joints. Claws cleft, both teeth equally long, but sub-apical a little stouter. Length 7-8 mm. ♂ unknown.

2 ♀, both from Darjeeling, alt. ca. 7,000 ft., the *type* in the Indian Museum; Regd. No. $\frac{858}{H3}$, 6-v-1917 and the *paratype*, 23-v-1917; E. Brunetti, in the author's collection.

In my key (*Entom. Tidskrift*, Stockholm 1931, p. 133) this species comes near *P. versicolor* Cam. or *P. variegata* Fall., but does not agree

with either of them. It differs from *versicolor* in having a smooth unpunctured head. In *variegata* the punctation on the mesopleurae is much more obliterated and confluent and there is a distinct lustre, but the head, owing to a minute punctuation between the bigger and also confluent punctures, is not so strongly, if at all, shining. Both species are also differently coloured.

Pachyprotasis versicolor Cam.

This species differs from all the known species of the genus *Pachyprotasis* in the highly raised supra-antennal tubercles which produce a deep and in cross-section triangular furrow between the antennae. These latter also are much longer than those of any known species of the genus, being longer in both sexes than the whole body.

11 ♂, 3 ♀, all from Darjeeling, alt. ca. 7,000 ft., 23-29-v-1917, E. Brunetti; one ♂ labelled "Pashok, Darjeeling distr., alt. 4,000 ft., 26-v-1914, F. H. Gravely"

A single ♂ and a ♀ both from Darjeeling collected by E. Brunetti apparently represent two new species, but the author does not think it advisable to describe new species based on single specimens in such a variable genus as *Pachyprotasis*.

Genus **Siobla** Cameron.

Siobla punctata Cameron.

7 ♂, all labelled "Darjeeling, alt. ca. 7,000 ft., vi—vii-1916; E. Brunetti"

Genus **Laurentia** A. Costa.

Laurentia punjabica, sp. nov.

Black; labrum, very narrow inner margins of eyes, an elongated spot on upper hind orbits, narrow margin of pronotum, tegulae and posterior half of meta-epimerae white; 4th-6th abdominal segments red above and below; legs reddish; all coxae and most of four front trochanters black, hind trochanters more or less light yellow; apex of hind tibiae and apical $\frac{3}{4}$ or tarsi infuscated to black; antennae black; wings hyaline, venation, costa and stigma blackish brown.

Hind wings of ♀ with only one closed middle cell—the cubital; ♂ with two; lanceolate cell petiolate. Clypeus rounded or angularly but not deeply emarginate. Labrum short, rounded or obtusely pointed. Inner margins of eyes straight, not emarginate, distinctly converging towards mouth. Malar space hardly longer than diameter of an ocellus. Supra-antennal tubercles absent. Hind margin of head below and along orbits rounded, not carinated, above with a distinct, though not strong, angulate carina. Antennae as long as abdomen, stoutly filiform, neither compressed nor tapering towards apex; scape and pedicel roundly conical; both little longer than apical width; pedicel shorter than scape. Neither scutellum nor mesopleurae pyramidally raised. 1st abdominal tergite divided along the middle. Hind coxae not

elongated, femoræ not reaching the apex of abdomen. Hind basitarsus shorter than all succeeding tarsal joints together. Claws without basal lobe, apex cleft; sub-apical tooth stronger and normally longer than apical.

Head enlarged behind eyes, then strongly narrowed; surface covered with fine, irregular wrinkles, not quite opaque, but lustre not strongly marked. Post-ocellar area $2\frac{1}{2}$ times wider than long; lateral furrows very deep, parallel; post-and inter-ocellar furrows equally fine, rather deep; antennal furrows shallow. Frontal area hardly raised, but distinct. Supra-antennal pit large, shallow, more or less distinctly continued as wide but shallow middle fovea to central ocellus; no longitudinal furrow between base of antennae. Clypeus large, with right-angled teeth; supra-clypeal furrow deep but not sharp. 3rd antennal joint $\frac{1}{8}$ — $\frac{1}{3}$ longer than 4th. Thorax nearly smooth, strongly shining with almost indistinct fine puncture; limit between scutellum and its appendage marked by large punctures; two or three indistinct puncture on middle of scutellum; rest of scutellum, its appendage and post-scutellum quite polished, strongly shining. Abdominal tergites smooth, not striated. Length of ♀ 7-8 mm.

Holotype ♀ from Dal above Dharmsala, Punjab, alt. 5,500 ft., 31-v-1926; S. L. Hora, in the Indian Museum, Calcutta, Registered No. $\frac{853}{H3}$. *Paratype* labelled Phagu-Kufri, Simla Hills; alt. 9,000—8,000 ft., N. Annandale and S. Kemp; in the author's collection.

In the females of the genus *Laurentia* A. Costa, there are in the hind-wings generally two closed middle cells, as in the males, but the character is not apparently quite stable and I am, therefore, not separating *L. punjabica*, sp. nov. with a single closed middle cell in the hind-wing of ♀ into a distinct genus. The new species described above also differs in the malar space being hardly longer than the diameter of an ocellus whereas in other species it is twice as long; the clypeus is also not truncate but rounded or angularly but not deeply emarginate.

I have also examined an unidentified ♂ in the collection of the Indian Museum, Calcutta, from the Yarkand collection.

Tribe SELANDRIINI.

Genus **Darjilingia**, nov.

Belongs to the tribe Selandriini and is related to the genera *Taxonus* Htg., *Parasiobla* Ashm. and *Ametastegia* A. Costa.

Fore-wings with 2 radial and 4 cubital cells, 2nd and 3rd about equal in length or 3rd a little longer; each with a recurrent vein; basal vein joins sub-costa shortly before the origin of cubitus and runs parallel to the first recurrent vein; nervellus reaches discoidal cell about basad of the middle; lanceolate cell with an oblique cross-vein joining the brachium at an angle of about 60°. Hind-wings without closed middle cells and without surrounding nervures; lanceolate cell not petiolate. Body elongated. Head a little wider than thorax, with protuding eyes and strongly narrowed behind them. Inner margins of eyes nearly parallel. Malar space distinct, hardly shorter than the diameter of an

ocellus. Clypeus slightly convex, very widely and deeply emarginated, with the lateral teeth usually sharp and protuding; labrum big and flat, obtusely angulated at apex. Antennae nearly as long as the whole body, scape twice as long as wide, oval somewhat wider than pedicel; pedicel roundly triangular, hardly wider than long; flagellum equally thick, but distinctly compressed; 3rd joint as long as or $\frac{1}{4}$ shorter than 4th, in ♂ equal to 5th; in ♀ longer. Antennal organs absent. The mesopleurae without presternae. Hind basi-tarsus as long as all the succeeding tarsal joints; all of them are slightly, but distinctly compressed. Claws with big, flattened basal lobe and a sub-apical tooth, which is much longer than apical.

Genotype.—*Darjilingia gribodoi* (Konow).

***Darjilingia gribodoi* (Konow).**

One ♂ captured at Darjeeling, Eastern Himalayas, alt. ca. 7,000 ft., 6-vi-1917; E. Brunetti.

Taxonus gribodoi was supposed to be from Borneo, but a large number of sawflies supposed to have been captured in Borneo by Gribodoi have later proved to have come from Burma.

A redescription of the species based on the specimen from Darjiling is given below.

Black; clypeus, labrum, supra-clypeal triangle, last three antennal joints, margin of pro-notum, a spot on scutellum, upper fourth and an oval spot near the hind margin of mesopleurae, meta-pleurae and four apical joints of the hind tarsi yellowish white; three basal joints of antennae, tegulae, legs and most of abdomen reddish yellow to light reddish brown; base of coxae, two basal abdominal segments and hind metatarsi black; abdominal segments above with indications of dark-brown bands; wings clear, apical half hyaline; venation, costa and stigma dark brown.

Head, thorax and abdomen smooth and strongly shining; hind orbits margined below and behind, but not above. Post-ocellar area convex, in ♂ nearly twice as wide as long, in ♀ quadrate or slightly longer than wide (in type of *T. pulchripes* Cam.), with deep sub-parallel or slightly curved lateral furrows that do not reach hind margin; post-ocellar furrow distinct and angulated. Frontal area indistinct. Supra-antennal pit big and deep, continued upwards to the middle ocellus as a shallow, but distinct middle fovea. Antennal furrows shallow, but distinct and complete; supra-clypeal furrow sharp and deep. Scutellum slightly convex. Length 6 mm.

Since the preparation of the above manuscript I have examined the type of *Taxonus pulchripes* Cam. 1899, and find that it is a synonym of *gribodoi* Konow. The type of *pulchripes* is labelled "Khasia Hills, Assam"

Genus *Indostegia*, nov.

The genus *Indostegia* belongs to the tribe Selandriini and is closely allied to *Parasiobla* Ashm., *Ametastegia* A. Costa, *Indotaxonus* Malaise and the above described new genus *Darjilingia*.

The venation of the wings is as in *Darjilingia*, but the cross-vein of the lanceolate cell is more oblique, joining the brachium at an angle of 35-40°. Except for the post-ocellar area the head has a distinct hind margin and frontal area. Hind orbits as wide as maximal width or facette eye. Inner margins of eyes parallel, malar space is long, $1\frac{1}{2}$ times as long as the diameter of an ocellus. Clypeus slightly convex, at the apex very widely and deeply incised, with sharp, somewhat depressed lateral teeth as in *Taxonus agrorum* Fall. Labrum large, flat, and shining. Antennae as long as the entire animal; flagellum, except for the three basal joints, very strongly flattened and tapering towards apex; scape $1\frac{1}{2}$ times longer than wide, oval, with truncate apex, $1\frac{1}{2}$ times wider than the pedicel; pedicel as long as wide at apex. Mesopleural episternae without presternae. Hind basi-tarsi hardly flattened, as long as all succeeding joints. Claws nearly cleft, sub-apical tooth a trifle shorter than apical; basal lobe very minute, but distinct (as in the genus *Parasiobla* Ashm.).

Genotype.—*Indostegia apicicornis*, gen. et sp. nov.

***Indostegia apicicornis*, sp. nov.**

Reddish brown; labrum, 7th and 8th antennal joints, margin of pro-notum, all trochanters with apex of coxae and utmost base of femorae and hind tarsi yellowish white. A spot covering frontal area, 4th-6th and 9th antennal joints, centre of the meso-notal middle-lobe, metathorax, including appendage of scutellum, postscutellum and base of all coxae black; inside of femorae, especially the hind ones, first abdominal segment and the sawsheath blackish. The ground colour of the abdomen is light reddish yellow, but this colour is covered with very dark brown spots and bands so that it is only visible as fine lines between the segments, on the sides of 2nd to 5th tergites and in the middle of the basal sternites. Wings hyaline; venation dark brown; costa and stigma brown, sub-costa between stigma and connecting point to the base of the cubital vein yellowish white.

Head and mesonotum smooth and shining. Maximum width of the head over and behind eyes equal. Post-ocellar area convexly raised, as long as wide, lateral furrows deep, hardly curved and nearly parallel. Post-ocellar furrow distinct, angulated, at the very angle interrupted by a minute middle-carine, which does not reach the middle of the area. Antennal furrows complete. Frontal area distinct, below surrounded by a blunt wall, that extends down between the antennae and encloses the rather large supra-antennal pit. Supra-clypeal furrow deep; clypeus densely punctured, opaque. 3rd, 4th and 5th antennal joints about equal and 9th longer than 8th. Scutellum nearly flat, the limit between it and the appendage marked with big punctures, the appendage and at least the hind part of scutellum with very shallow and feeble, wrinkled punctures. Lateral parts of pronotum finely wrinkled, but mesopleurae very coarsely, rather reticulately punctured. Meso-sternum and the abdominal segments quite smooth and strongly shining. Length 9 mm.

One ♀, holotype from Darjeeling, Himalayas, alt. 7,000 ft.; 2-vi-1917; E. Brunetti.

Holotype in the collection of the Zoological Survey of India (Indian Museum), Calcutta ; Regd. No. $\frac{854}{H3}$.

Genus **Stromboceros** Konow, s. lat.

Stromboceros sikkimensis, sp. nov.

Black with a bluish tinge ; utmost apex of femorae and front side of tibiae of four front legs, apical third of coxae, and more or less the trochanters of hind legs in ♀ the basal $\frac{3}{4}$ of tibiae and of tarsi, in ♂ only basal half of tibiae white. Wings clear, against the apex somewhat hyaline, nervation, costa and stigma brownish black. First abdominal segment in ♀ with distinct, the following segments in both sexes with indistinct white margins and in ♀ the 7-9 tergites in the middle with big triangular, whitish membranous blotches.

Head and thorax quite smooth and strongly shining. Head strongly narrowed behind eyes, lower half strongly carinated, the upwardly diminishing carina obliterated above middle of eyes. Hardly convex post-ocellar area narrowing forwards, behind as wide as long, post-ocellar furrow absent, but lateral ones fine and rather deep, strongly curved forwards, behind not reaching nearly angularly broken hind margin. Circum-ocellar furrow distinct, inter-ocellar much shallower. In ♀ pentagonal area flat and distinct, but hardly so in ♂. Supra-antennal pit large and round, from above nearly surrounding a minute tubercle. Antennal furrows nearly obsolete, but on each side and a little above supra-antennal pit each furrow deepens into a round pit, as large as the supra-antennal. Supra-clypeal area small, nearly quadrate, furrow fine, but distinct. Clypeus in the middle with an angularly raised, transverse ridge, at the apex depressed and very shallowly, somewhat angularly, emarginated, nearly truncate. Labrum is small and roundly angulated. Malar space short, but distinct, about as long as half the diameter of an ocellus. Inner margins of eyes nearly parallel, hind orbits not specially wide. Antennae longer than thorax and head together, but shorter than abdomen, flagellum from middle strongly tapering towards apex, in both sexes with antennal organs. 3rd and 4th joints sub-equal, pedicel sub-conical, distinctly longer than its apical width ; scape more rounded, larger than the pedicel and about twice as wide. Antennae with very short, black pile, but especially in ♂ there is at the very apex of the flagellar joints a pointed, minute brush of longer hairs which make the flagellum look somewhat serrate. Thorax and abdomen with scutellum and mesopleurae normal. Saw-sheath seen from above sharp-pointed, triangular, apical angle of about 40°. Hind basi-tarsus distinctly longer than all the succeeding joints. Claws without basal lobe, at the apex cleft, with the hardly shorter sub-apical tooth behind the apical. Length of ♀ 8.5 mm., ♂ 7 mm.

One ♀ *Holotype*, from Singhik, Sikkim, alt. 5,000 ft. ; Maj. R. W. G. Hingston ; in the collection of the British Museum (Nat. Hist.), London.

2 ♂, both from Darjeeling, E. Himalayas, alt. ca. 7,000 ft., 6-vi-17 ; E. Brunetti.

The ♂ *allotype* returned to the Zoological Survey of India (Indian Museum), Calcutta, Regd. No. $\frac{855}{H3}$; the *paratype* in the author's collection.

This new species is very like *Neostromboceros* Rhw. (*Stypoza* Enderl.), but the claws of that genus have a large basal lobe and the sub-apical tooth is stronger and usually longer than the apical one. In this and other respects this new species comes near to *Stromboceridea jacobsoni* Fors. and to some South-American *Stromboceros* Knw., s. lat. The author hopes to be able to undertake a revision of the genus *Stromboceros* in the near future, and it is likely that *S. jacobsoni* Fors. and the above described species will, as a result, have to be separated in a distinct genus if characters can be found to distinguish them from some of the South American forms.

Genus *Malachiella*, nov. ¹

The genus *Malachiella* belongs to the tribe Selandriini. The nervation of the wings is very like that of *Heptapotamius* Mal.², but the cross-vein of the lanceolate cell is much more oblique and the 3rd cubital cell, at least along the cubitus, is as long as the 2nd. The nervellus is just basad of the middle of the discoidal cell. The eyes are very prominent and the head, which is rounded, therefore, becomes narrower behind the eyes; the hind margin of the head is not visible. Between the very deep and wide, straight and parallel lateral furrows the post-ocellar area is strongly convex and wider than long. Antennal furrows are wide and shallow. The frontal crest is missing. The inner margins of the eyes are strongly convergent. The malar space is distinct and not quite as long as the diameter of an ocellus. The clypeus is rather long, only $\frac{1}{4}$ wider than long; in the middle deep, semi-circularly incised with two prominent, rather sharp teeth. The labrum is flat. The antennae are stout, hardly longer than head and thorax together, distinctly compressed, hardly widened at all before the apex. The scape is twice as long as wide; wider than the pedicel; this latter one a little longer than wide, the 3rd joint also a little longer than the 4th. No presternae are distinguishable. The hind basi-tarsus is as long as all the succeeding joints. The claws are divided, the sub-apical tooth being much shorter than the apical; the basal lobe is distinguishable only after dissection.

Genotype.—*Malachiella rufithorax*, gen. et sp. nov.

Malachiella rufithorax, sp. nov.

Black; pro- and meso-notum, tegulae, scutellum and upper part of mesopleurae dark red. Trochanters, especially the hind ones, dirty white. All knees and the front-side of the anterior tibiae light brown, remainder of the legs more or less dark brown to black. Basal half of wings clear, apical half hyaline or light infuscated; veins, stigma and costa brownish black.

Minutely punctured, shining. Post-ocellar area, if taken to the abrupt end of the lateral furrows, twice as wide as long, otherwise quadrate. Post-ocellar furrow hardly visible, inter-ocellar deep, sharp.

¹ Named in honour of Herr N. Mallach, Berlin.

² The description of *Heptapotamius* Mal. is being published in the *Entom. Tidskrift, Stockholm*,

Pentagonal area raised, but not very distinct. From the lower ocellus extends downwards a shallow furrow ending in the punctiform supra-antennal pit, bordered on both sides by obtuse ridges reaching from this pit nearly to the lower ocellus. Supra-clypeal furrow distinct. Thorax normal. Scutellum rather flat. Sawsheath rather long, seen from above narrow. Length ♀ 7—7.5 mm., ♂ unknown.

4 ♀, from Himalayas and Assam; the type from Darjeeling, alt. 7,000 ft.; 10-vi-17, E. Brunetti; the paratypes from Simla, alt. 6,000—7,000 ft., jungle, VIII-IX-25, B. Chopra; Shillong, Assam; vi-1903; R. Turner.

The *type* belongs to the Indian Museum, Calcutta, Regd. No. $\frac{856}{H3}$, the *paratypes* are in the British Museum (Nat. Hist.), London, and in the private collection of the author.

Tribe BLENNIOCHAMPINI.

Genus **Tomostethus** Konow.

I consider *Eutomostethus* Ensl. to be a sub-genus of *Tomostethus* Konow.

Tomostethus (Eutomostethus) assamensis Rohwer.

13 ♂, 13 ♀, all from Darjeeling, alt. 7,000 ft., 26-v—8-vi-1917; E. Brunetti.

Tribe ARGINI.

Genus **Cibdela** Konow.

Cibdela janthina Klug.

One ♂, 3 ♀ labelled "Above Tura, Garo Hills, Assam, alt. 3,500—3,900 ft., 15-vii—30-viii-1917; S. Kemp"

Genus **Pampsilota** Konow.

Pampsilota sinensis Kby., forma **typica**.

2 ♂, 1 ♀. Both ♂ were taken together with the colour-form *nigriceps* Rhw. "Above Tura, Garo Hills, at. 3,500—3,900 ft., 15-vii—30-viii-1917; S. Kemp"; the ♀ is labelled "Marianbari, Tea Estate near Pankhabari, alt. ca. 5,000 ft., E. Himalayas, 25-ii-1928; Gopi Ram".

Pampsilota sinensis Kby. var. **nigriceps** Rhw.

3 ♂, 2 ♀. Both ♀ and one ♂ labelled "Above Tura, Garo Hills, alt. 3,500—3,900 ft.; 15-vii—30-viii-1917; S. Kemp"; one ♂; "Kalimpong, Darjeeling distr., alt. 4,500 ft., 24-iv—10-v-1915; F. H. Gravely"; one ♂: "Balasan Forest, alt. ca. 400—500 ft., E. Himalayas; 3-iii-28; Gopi Ram".

In addition to the above material I have before me specimens from Sikkim, Tonkin, China and Java. I have also studied the types in the British Museum, London (except that of *microcephala* Voll.). All those from Java, 2 ♂ and 3 ♀ which were reared from cocoons, but from

different places, resemble each other in sculpture, but not in colour, size or nervation, and are easily distinguished from all the continental specimens. As *P. microcephala* Voll. was described from Java, I consider the Javanese insects to belong to that species. The ♀ from China has the clypeus at the apex nearly truncate, and the 3rd cubital cross-vein distinctly S-formed, so that the 3rd cubital cell is nearly $\frac{1}{2}$ longer on the radius than on the cubitus. Usually the difference is much less and the cross-vein is curved in a simple arc. The two ♂ from the Garo Hills were probably taken at the same time, but one of them has the 2nd cubital cell longer than the 3rd and the cross-vein interstitial, but the other has the 3rd longer and the veins not interstitial. Exactly the same condition is to be seen in the two ♀ from Java, that emerged on the same date and also in two reared ♂ from another lot, from the same island. The cross-veins cannot, therefore, be considered as a reliable distinguishing character in this genus, certainly not more than the colour and the size.

The three Asiatic species may be distinguished as follows :—

- I. Supra-clypeal area roundly raised, distinctly flattened in middle, the flattened space of a pentagonal form and nearly opaque. Saw-sheath seen from above not shorter than basal width. (Distribution : Java)
 - P. microcephala* Vollenhoven.
 - a. Head, mesosternum, scutellum, metathorax, back of abdomen and saw-sheath bluish black, other parts of thorax red, and of abdomen reddish yellow
forma *typica*.
 - b. ♀ Thorax red, only the very tip of scutellum and the boundary line between mesopleuræ and mesosternum infuscated; abdomen as in forma *typica*
var. *rufinus*, nov.
 - c. ♂ Bluish black, only in under half of notum and upper apex of mesopleuræ with reddish colour breaking through
var. *melanis*, nov.
- II. Supra-clypeal area evenly, roundly raised, not flattened in middle; smooth, shining. Head, mesosternum and major part of legs black.
 - A. Saw-sheath of ♀ elongated, each half seen from above nearly twice as long as basal width; thorax red, only mesosternum black.
 - i. Abdomen reddish yellow, without any black colouring. (Distribution : Assam, China)
P. sinensis Kirby. (forma *typica*).
 - ii. Abdomen black above, otherwise as in forma *typica*. (Distribution : Himalayas, Assam, Burma; China)
P. sinensis var. *nigriceps* Rohwer.
 - B. Saw-sheath short; each half, when seen from above, as long as basal line. Post-ocellar furrow distinct. Base of abdomen above and most of scutellum black.
 - i. Mesonotum and mesopleuræ red; abdomen reddish yellow, tergites almost all black above. (Distribution : China)
P. interstitialis Cameron. (forma *typica*).
 - ii. Thorax quite black; only basal abdominal tergites black. (Distribution : Tonkin)
P. interstitialis var. *euterpe* Turner.

Genus **Arge** Schrenck.**Arge praesternalis**, sp. nov.

Metallic deep blue; thorax red, metathorax, scutellum, mesosternum and the under third of mesopleurae bluish. Antennae and palps black. Fore-wings strongly, hind-wings less infuscated, with a violet tinge. Nervation, costa and stigma black. Legs metallic deep-blue.

Head behind the eyes strongly widened, then rounded, not margined. Post-ocellar area nearly twice as wide as long, lateral furrows hardly visible, post-ocellar furrow distinct, area raised a little, but not reaching the level of ocelli. Inter- and circum-ocellar furrows very fine, but distinct. Supra-antennal pit semi-circular, large. Just below the middle ocellus is another equally large and round, but very much shallower pit. High and sharp inter-antennal ridges are most elevated between the antennae and are nearly parallel, only converging very little from that point upwards and downwards; upwards they hardly reach beyond the supra-antennal pit, but do not meet below and extend to $\frac{1}{3}$ of the distance from the base of the antennae to the bottom of the clypeal emargination. Under-face roundly raised but not carinated, clypeus with minute, scattered punctures. The missing supra-clypeal furrow marked with very minute, longitudinal wrinkles. Apex of clypeus comparatively deeply, roundly incised. Antennae hardly longer than thorax; scape conical; pedicel sub-cylindrical, a little shorter than scape, apical half of the flagellum strongly flattened, $\frac{1}{4}$ before the apex at least twice as high as thick. Thorax and abdomen quite smooth and strongly shining. Mesopleurae along pro-notum from parapterum down, with a furrow separating off a narrow, but distinct prae-sternum, which becomes a little wider downwards. Saw-sheath, seen from above, rounded, shell-like. Length 13 mm.

One ♀, from Tura, Garo Hills, Assam, alt. 1,200—1,500 ft., 15-vi—15-vii-1917; S. Kemp. *Type* in the Indian Museum; Regd. No. $\frac{857}{H\ 3}$.

Superfamily SIRICIDAE.

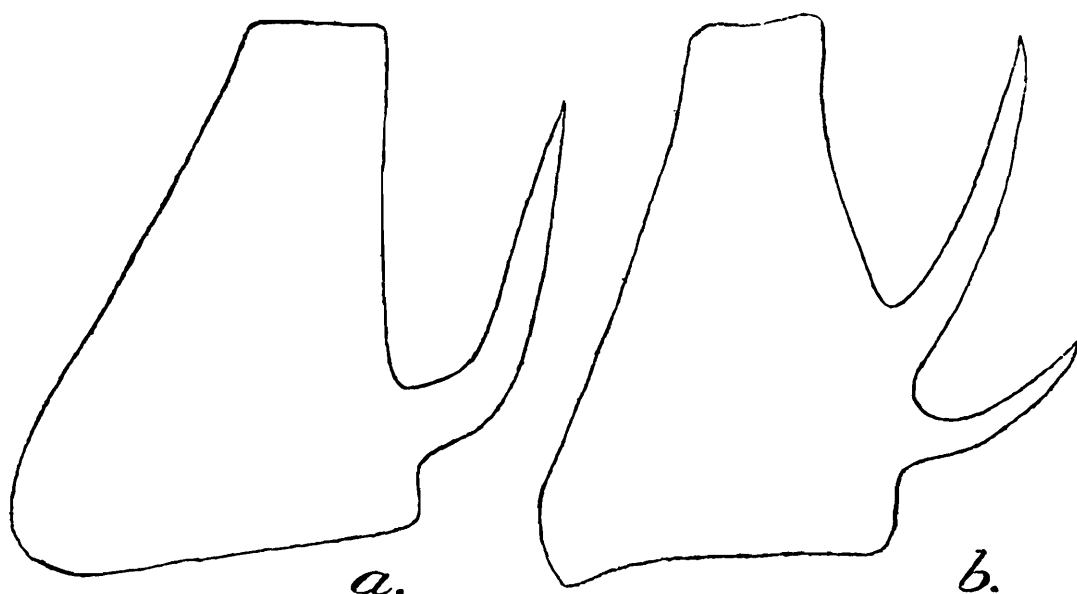
Genus **Paururus** Konow.**Paururus juvenis** (Linn.).

2 ♂ labelled "Kohala, alt. 2,000 ft., Murree Sub-divn., Punjab, Sta. 34, 30-ix-1928; H. S. Pruthi"

ON A NEW SUB-SPECIES OF *PHRYNICHOSARAX COCHINENSIS* GRAVELY (PEDIPALPI : TARANTULIDAE).

By K. BHASKARAN NAIR, B.A., *Department of Zoology, Science College,
Trivandrum.*

Phrynichosarax cochinensis was recorded by Gravely in 1915, from the jungles on the lower slopes of the Western Ghats in Cochin and also from the hills near Trichur. All the localities from which the species was then collected are situated in one comparatively small area, but even in this area slight variations were noticed. In August, 1933 I collected two specimens belonging to this species from Kallar, 30 miles to the east of Trivandrum and about 2,000 ft. above sea level. Later I was able to get many more specimens from the same locality and also from the Mookunni Hill (842 ft.) near Trivandrum. They were found in damp places adhering to the under surface of stones and fallen timber. All these specimens showed a marked variation from the typical form. They possessed two conspicuous spines along the dorsal margin of the finger of the arm. I have since examined a large number of specimens and found that this character is constant. Of the two spines the distal



Fingers of *Phrynichosarax cochinensis* Gravely and *P. cochinensis* var. *bispinosus*, nov.

a. *Phrynichosarax cochinensis* Gravely (after Gravely).

b. *Phrynichosarax cochinensis* var. *bispinosus*, nov.

one is longer, about twice as long as the proximal one. The larger spine is bent slightly parallel to the length of the finger. On account of this difference between my specimens and the type, the former may, as was kindly suggested to me by Dr. F. H. Gravely in a letter, be regarded as belonging to a local race for which I propose the sub-specific name *bispinosus*, nov.

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FURTHER NOTES ON CRUSTACEA DECAPODA IN THE INDIAN MUSEUM.

VI.—ON A NEW DROMIID AND A RARE OXYSTOMOUS CRAB FROM THE SANDHEADS, OFF THE MOUTH OF THE HOOGHLY RIVER.

By B. CHOPRA, D.Sc., *Zoological Survey of India, Calcutta.*

(Plate VIII.)

Since the publication of my paper on the Dromiacea and Oxystomata of the Sandheads¹ four additional specimens referable to these two orders have been found mixed with some other crabs. Two of these specimens belong to species² that are already known to occur commonly in this area, and, therefore, deserve no special mention; the other two are remarkable, one as a representative of a new genus, and the other on account of the rarity of the species to which it has been assigned.

I take this opportunity to acknowledge once again the generous help that the members of the Bengal Pilot Service have been giving unstintingly to the Indian Museum from a very long time past, in the way of bringing valuable material from the mouth of the Hooghly River—an area that has long been known to be of an exceptional zoological interest.

Tribe DROMIACEA.

Family DROMIIDAE.

Genus *Conchoedromia*, nov.

The new genus may be briefly defined as under :—

Carapace elongate, longer than broad, hardly tomentose, well areolated, with regions distinct and grooves well impressed.

Front cut into three teeth; middle one on lower plane than the side ones. Antennal flagella shorter than carapace.

Palate somewhat demarcated from epistome. External maxillipeds operculiform, but having a somewhat pediform cast on account of the coarseness of flagellum and the comparatively slight expansion of merus; maxillipeds not completely closing buccal cavern.

Chellipeds subequal, stouter than legs.

Last two pairs of walking legs subdorsal in position; third pair shorter than preceding ones, but stouter, with huge talon-like dactyli. Fourth legs very greatly reduced, with their minute dactyli ending in long setae.

¹ Chopra, *Rec. Ind. Mus.* XXXV, pp. 25-52 (1933).

² These two specimens have been identified as *Conchoecetes artificiosus* (Fabr.), and *Dorippe fackhino* (Herbst). Both these species are fairly common at the Sandheads, vide Chopra, *op. cit.*, pp. 28 and 50, 51.

Abdomen consisting of seven free segments, without any distinct platelets between the last two segments; terminal segment in male rather long.

Genotype.—*Conchoedromia alcocki*, sp. nov.

Although I have included *Conchoedromia* in the family Dromiidae, the genus possesses a number of characters that are not usually met with in this family. The elongate carapace with well-marked grooves, the superficially pediform maxillipeds and the absence of small plates between the last two abdominal somites are some of the characters that are peculiar to the Homolodromidae, but that the present genus cannot be included in this family is indicated by the fact that, among other characters, the antennal flagella are short, the first two legs are very much shorter, the third are longer and the fourth are far more reduced than is usually the case in the Homolodromidae. Within the Dromiidae, *Conchoedromia* appear to combine the characters of *Cryptodromia* and *Conchoecetes*, in addition to having some characters peculiar to itself. The general shape is that of a *Cryptodromia*; the areolated carapace, practically without any tomentum but with the grooves deeply impressed, and the chelipeds and some of the, more or less nodular, legs show a superficial resemblance to *C. ebalioides*¹ Alcock and *C. gilesii* Alcock¹. The third pair of legs, on the other hand, though shorter than the two preceding pairs, are as stout, and end in huge talon-like dactyli; these are very similar to those seen in members of the genus *Conchoecetes*. The fourth legs show a greater reduction than is usually met with in either of these two genera. Further, the shape of the external maxillipeds and the absence of plates between the last two abdominal somites are also characters that are not present either in *Cryptodromia* or in *Conchoecetes*.

***Conchoedromia alcocki*, sp. nov.**

(Plate VIII, figs. 1-6.)

The carapace is hardly tomentose, and there are only a few hairs on the borders of some of the leg joints.

The carapace (Plate VIII, fig. 1) is elongate, roughly pentagonal in shape, with the front rather prominently projecting and the posterior border slightly curved. It is longer than broad, the greatest breadth being about five-sixths of the length. The surface is closely covered with minute granules, and is conspicuously areolated. The individual areolae are well separated from one another. The cervical and the "branchial" grooves are distinct.

The front is moderately prominent, is grooved along the median line, and is cut into three pointed teeth, of which the middle one is on a lower level than the others. In one specimen the middle tooth is larger than, and projects beyond, the lateral teeth, while in the second example it is distinctly smaller.

¹ Alcock, *Cat. Ind. Decapod Crust.*, Part 1, pp. 53-55, pl. iii, figs. 12, 13 (1901).

The upper orbital border is very oblique and is minutely serrulate. The inner supra-orbital tooth of the higher *Brachyura* is represented by a small dentiform process. The outer orbital angle is not pronounced.

The lateral borders of the carapace are serrulate and are very prominently cut in about the middle. The antero-lateral borders are practically straight and are without any teeth, but a row of minute teeth belonging to the outer border of the sub-hepatic region is visible beyond the antero-lateral border. At its posterior end the antero-lateral border bulges out in a somewhat acute prominence, and the incision of the lateral border of the carapace, referred to above, is formed by the postero-lateral border meeting this bulge well on the inside. The postero-lateral borders are regularly convex and are more strongly serrulate than the antero-lateral. The posterior border is slightly curved.

The lower wall of the common orbito-antennular fossa (Plate VIII, figs. 2 and 3) is, as usual, formed by the basal antennular joint, the basal antennal joint and the sub-orbital lobe. The sub-orbital lobe is rather small and has its free margin beset with minute teeth. The two freely movable basal joints of the antenna have the usual shape, and the second joint is produced at its antero-external angle. The flagellum is considerably shorter than the carapace. The eyes have short thick stalks and the corneae are dark pigmented.

The third pair of maxillipeds (Plate VIII, figs. 3 and 4) do not completely cover the buccal cavern, and on account of the moderate expansion of the ischium and merus, and the coarseness of the flagellum have a superficially pediform appearance. The inner borders of the ischium and merus are serrulate and hairy, while there are patches of minute tubercles on their exposed surface.

The chelipeds (Plate VIII, fig. 5) are more massive than the walking legs and are subequal. They are a little longer than the carapace. The outer and upper surface of all the joints is sparsely covered with minute tubercles. All the borders of the arm are cristiform and sharply denticulate, and the upper border is somewhat raised. The wrist is nodular, and its borders and those of the palm are minutely serrate and sharply cristiform. The teeth near the distal end of the inner border of the wrist are more prominent than the others, and there is a slanting row of minute, rounded tubercles on its upper surface. The palm is swollen and has some indistinct rows of tubercles on its upper and outer surface. The margins are sharply cristiform and minutely dentate, and there is a prominent nodule near the junction of the movable finger. The latter is strongly arched, and its upper border is dentate and somewhat hairy. The dactylus is distinctly longer than the upper border of the palm, and its pointed tip fits into a notch in the tip of the fixed finger. The latter is short and stumpy and both the fingers are armed with teeth along their inner margins.

The first two pairs of walking legs are long, the first being only a little longer than the chelipeds. The margins of the different segments are somewhat serrate. There is a small nodule on the carpus near its distal end, and a small rounded tubercle at the junction of the propodus

and dactylus. The dactylus is long, lanceolate and somewhat curved, and is serrate along the anterior and hairy along both the margins. The borders of the other segments are also sparsely hairy. The merus is not appreciably expanded along its upper border. The third legs are shorter than those of the two preceding pairs, but are markedly stouter. Their segments are short and stumpy, almost nodose, and the large talon-like dactylus works against a prominent cupped and toothed projection near the proximal end of the posterior border of the propodus. The dactylus is strongly curved and its inner border is somewhat serrate and hairy. The fourth legs (Plate VIII, fig. 6) are very greatly reduced, and like those of the third pair are subdorsal in position. Their minute dactyli end in five or six long setae. The borders of the other segments are minutely serrate and are beset with long hairs.

The abdomen in the male consists of seven distinct segments, the last of which is rather long and has its free terminal margin profusely hairy. There are no distinct platelets between the last two segments. The first segment is, as usual, produced laterally, and the first five segments show a distinct convexity along the middle line.

The spirit specimens are pale-whitish in colour and have no distinctive markings.

The larger of the two specimens, which is figured on plate VIII, figs. 1 and 2, has a carapace length of 6.2 mm., while the greatest breadth is 5.2 mm. The other example is 5.6 mm. long and 4.7 mm. broad. They are both males.

Type-specimen.—C 1689/1, Zoological Survey of India (*Ind. Mus.*).

Locality.—The two male specimens on which the foregoing description is based were collected by officers of the Bengal Pilot Service on board the Pilot vessel "Lady Fraser" at Sandheads, off the mouth of the Hooghly River in February, March 1928. The depth of water in this area is about 20 fathoms, and the bottom for the most part consists of soft ooze-like mud, with patches of sand and shells here and there. The specimens are without any protecting shells on their backs.

Tribe OXYSTOMATA.

Family LEUCOSIIDAE.

Genus *Actaeomorpha* Miers.

Actaeomorpha morum Alcock.

1896. *Actaeomorpha morum*, Alcock, *Journ. As. Soc. Bengal* LXV, pp. 172, 173, pl. viii, fig. 3 and *Illust. Zool. "Investigator"*, pl. xxvii, fig. 4.

A single female example of this apparently rare species has been collected at the Sandheads. It has a carapace length of a little over 10 mm., and is about 12.5 mm. broad. It is possibly immature.

The Sandheads specimen agrees in every particular with Alcock's description and figures of this species, as also with the two examples on which he based the description. The species is very easily recognised by its strongly convex carapace, studded with pearl-shaped vesiculous

granules, having a broad, sculptured marginal ring from which the different regions of the carapace are completely isolated. The regions are further isolated from one another by broad channels. The chelipeds, legs and other parts of the body agree exactly with Alcock's excellent description of the species.

Actaeomorpha morum was hitherto known only from two female specimens obtained by the R. I. M. S. S. "Investigator" off the Ganjam coast, in the Bay of Bengal at a depth of 28-30 fathoms. The present record from off the mouth of the Hooghly River does not materially extend the range of the species. The depth of water at this place is above 20 fathoms, and it is likely that the bottom at the exact spot from which the specimen was taken consists of sand, perhaps mixed with shells. All the other species of the genus are also known to live on beds of corals, shingle or sand and shells.

The species of the genus *Actaeomorpha* are for the most part restricted to the Indo-Pacific area, though one species extends to the Kermadec Island in the South Pacific. On the west the genus goes up to the east coast of Africa¹. Ihle² has enumerated the species so far known and has given notes on their distribution. All the species are more or less rare.

The Sandheads specimen is registered in the books of the Zoological Survey as under :—

C 1691/1	Sandheads, mouth of the	"Lady Fraser" Nov. 1923	1 ♀
	River Hooghly.		

The colour of the present specimen, in spite of its long immersion in spirit, is still light orange on the dorsal surface with the ventral surface whitish. There are two barnacles attached to the dorsal surface of the carapace.

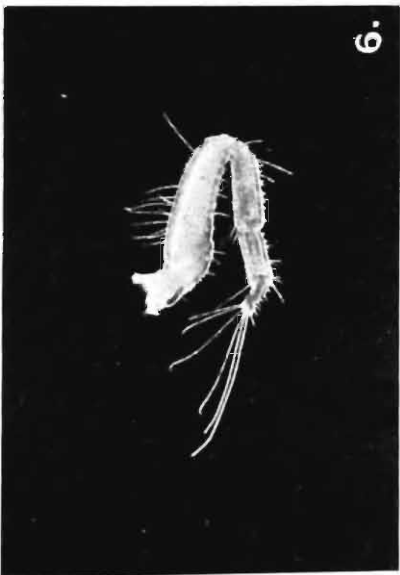
¹ Stebbing, *Ann. Durban Mus.* II, pp. 272, 273 (1920).

² Ihle, *Siboga Exped. Rep.* XXXIX b², pp. 308, 309 (1918).

EXPLANATION OF PLATE VIII.

Conchoedromia alcocki, gen. et sp. nov.

- FIG. 1.—Dorsal view of the type-specimen : $\times 5$.
FIG. 2.—Ventral view of same : $\times 5$.
FIG. 3.—Ventral view of anterior part, further enlarged : $\times 8$.
Antennal flagellum of one side is missing.
FIG. 4.—Ventral view of third left maxilliped : $\times 10$.
FIG. 5.—Left cheliped, further enlarged : $\times 10$.
FIG. 6.—Fourth right leg, further enlarged : $\times 12$.



Conchoedromia alcocki, gen. et sp. nov.

THE SYSTEMATIC POSITION OF HAMILTON'S SPECIES OF GOBIOID FISHES FROM THE GANGES.

By SUNDER LAI. HORA, D.Sc., F.R.S.E., F.A.S.B., Assistant Superintendent, Zoological Survey of India, Calcutta.

As is fully realised by all ichthyologists interested in the Indian fauna, the specific validity of a number of species described by Hamilton (once Buchanan) in his "Gangetic Fishes"¹ is not finally established. Hamilton published his monumental work in the absence of a great many of his drawings and several volumes of his manuscript notes, and, in consequence, the published descriptions of several species are defective while it has been a matter of considerable difficulty to identify the species that are not figured. This defect has been removed partially by the publication of Hamilton's manuscript drawings², but considerable work yet remains to be done for defining precisely the specific limits of several species. The difficulty is augmented by the fact that Hamilton, as pointed out by me in 1929, preserved no specimens, and in the absence of such material, his drawings are the only indications we possess of the different species described in the "Gangetic Fishes". To straighten this tangle, the only course open is to secure topotypes (specimens from type-locality), but here again it has to be taken into consideration that in places the configuration of the country has changed considerably since Hamilton's time: this was indicated³ in the case of the type-locality of *Amblyceps mangois* (Ham. Buch.). It is fortunate, however, that Hamilton left comprehensive notes regarding the localities, local names and the dates of his original descriptions in a volume of "Original Notes concerning the Gangetic Fishes," which is now preserved in the Library of the India Office in London.

While working on the brackish water fauna of the Gangetic Delta, the Gobioid fishes attracted my special attention on account of the great structural and biological adaptations exhibited by them. During several visits to Uttarbhag, a trading village on the *Piali Nadi* in the 24-Parganas, a large collection of Gobioid fishes was made, and, when sorting out the material, it was observed that almost all the forms described by Hamilton from the estuaries of the Ganges were represented in it. As the material came from the type-locality (*vide infra*) and as in recent years two species of Hamilton had been redescribed under new names, it seemed to me desirable to publish my observations on the systematic position of Hamilton's species of Gobioid fishes from the Ganges.

Sewell⁴, in his recent study of the fauna of the Salt Lakes, Calcutta, has pointed out that "for several years past there has been a steady

¹ Hamilton, *An Account of the Fishes found in the River Ganges and its branches* (Edinburgh: 1822).

² For location of published drawings see Hora, *Mem. Ind. Mus.* IX, pp. 182-191 (1929).

³ Hora, *Rec. Ind. Mus.* XXXV, p. 612 (1933).

⁴ Sewell, *Rec. Ind. Mus.* XXXVI, p. 46 (1934).

change in the conditions existing in and the general character of some of the rivers in Lower Bengal, and these changes have had a profound effect on the Salt Lakes and the associated streams and thus indirectly on the general character of the fauna of certain areas." There is no doubt that since Hamilton's time considerable changes have occurred in the geography of the Gangetic Delta, especially of the area in the neighbourhood of Calcutta. It is known that though Hamilton entered the service of the Honourable East India Company as an Assistant Surgeon on the Bengal Establishment on 26th September, 1794, he actually took up residence in Bengal in the later half of 1796, when, on his return from Burma, he was posted to Luckipoor (Lakhipur or Lakshmipur), 23 miles from the headquarters of the present district of Noakhali in South-Eastern Bengal and in the time of the East India Company a flourishing centre of the weaving industry. He lived at Puttahaut, not far from the Padma River (The Meghna) and about six miles north of Luckipoor, from the later half of 1796 to a considerable part of 1798. Buchanan began to take interest in fishes at Puttahaut and had actually made a few observations, when he was transferred in the beginning of October 1798 to Baruipur in the 24-Parganas about 18 miles from Calcutta. Till the commencement of 1800, Buchanan, while stationed at Baruipur, drew up the descriptions and had drawings made of the fishes of the area, mostly estuarine. The result of his studies up to the beginning of 1800 are embodied in the manuscript entitled "*Piscium Bengalae inferioris Delineationes septuaginta octo*",¹ which is now preserved in the library of the Asiatic Society of Bengal. Buchanan's investigation of brackish water fishes was interrupted from the beginning of 1800 to the middle of 1814, but in 1814, when he was posted as Superintendent of the Royal Botanical Garden, he resumed his interest and described several estuarine fishes from the Hooghly River and connected pools below Calcutta and from the Calcutta Salt Water Lakes. With the possible exception of one species of Gobioid fishes, the remaining were obtained by Buchanan during his residence at Puttahaut, Baruipur or Calcutta. The table on the opposite page shows the provenance and dates of the original descriptions, the local names, up-to-date scientific names, etc., of Gobioid fishes described in his "*Gangetic Fishes*". The species marked with an asterisk (*) in the table are described in the 1800-manuscript and, therefore, must have been obtained by Buchanan during his stay at Puttahaut and Baruipur.

Of the 16 species enumerated in the table, descriptions of 8 species are to be found in the 1800-manuscript; while five of the species were obtained by Buchanan during his tenure as Superintendent of the Royal Botanical Garden. One species—*Gobius gutum*—was described during his survey of the Rungpur and Purnea districts, but regarding this he remarks in the "*Gangetic Fishes*" that "this fish I found in the lower parts of the Padma or Padma River, which Major Rennell calls the Great Ganges". Presumably the specimens on which he based his description were sent to him from the lower part of the Padma River.

Since Hamilton's discovery of *Gobius gutum*, it has never been found again and, therefore, regarded as a doubtful species by ichthyologists.

¹ Hora, *Journ. As. Soc. Bengal* (N. S.), XXVII, pp. 123-135, 1931 (1933).

Scientific Name in "Gangetic Fishes".	Habitat in "Gangetic Fishes".	Local Names in "Original Notes".	Date and place of original description.	Up-to-date Scientific Name.
* <i>Gobioides rubicundus</i> , p. 37, pl. v, fig. 9.	Estuaries of the Ganges	<i>Laal Chaangooaa</i> ; <i>Lal Ghagra</i> , Calcutta.	?	<i>Taenioides rubicundus</i> (H. B.).
* <i>Gobioides ruber</i> , p. 38. (Hora 1929, pl. xviii, fig. 2).	Estuary below Calcutta	<i>Lal Chenggo</i>	Calcutta, 4th November, 1814.	<i>Trypauchen vagina</i> (Bl. & Schn.).
* <i>Gobius bato</i> , p. 40, pl. xxxvii, fig. 10.	Estuaries of the Ganges	<i>Bhato</i> , Luckipore; <i>Goole</i> and <i>Chaungooaa</i> , Calcutta.	?	<i>Apocryptes bato</i> (H. B.).
* <i>Gobius changua</i> , p. 41, pl. v, fig. 11.	Estuaries of the Ganges	<i>Chaungooaa</i>	?	<i>Pseudapocryptes lanceolatus</i> (Bl. & Schn.).
* <i>Gobius viridis</i> , p. 42, pl. xxxii, fig. 12.	Estuaries of the Ganges	<i>Chaungooaa</i>	?	<i>Scartelaos viridis</i> (H. B.).
* <i>Gobius plinianus</i> , p. 45, pl. xxxv, fig. 13.	(Described as the most common species.)	<i>Dāns</i> and <i>Hona Meno</i> , Calcutta.	?	<i>Boleophthalmus boddarti</i> (Pall.).
<i>Gobius septemradiatus</i> , p. 46	?	<i>Doag Dans</i> and <i>Dawis</i>	?	<i>Periophthalmus schlosseri</i> (Pall.).
* <i>Gobius novemradiatus</i> , p. 47, pl. ii, fig. 14.	?	<i>Daans</i>	?	<i>Periophthalmus schlosseri</i> (Pall.).
* <i>Gobius tredecemradiatus</i> , p. 48	?	<i>Doag Dans</i> and <i>Dawis</i>	?	<i>Periophthalmus schlosseri</i> (Pall.).
<i>Gobius gutum</i> , p. 50. (Hora 1929, pl. xiv, fig. 7).	Lower parts of the Padma or Padma river.	<i>Gutum baliya</i>	Padma river, 4th September, 1809.	<i>Glossogobius giuris</i> (H. B.) (Pug-headed and abnormal form).
* <i>Gobius giuris</i> , p. 51, pl. xxxiii, fig. 15.	Ponds and fresh water rivers of the Gangetic provinces.	<i>Pookhoreeaa</i> <i>Baaleeaa</i> , <i>Pukhoriya baliya</i> and <i>ghiyuri</i> .	?	<i>Glossogobius giuris</i> (H. B.).
<i>Gobius sadanundio</i> , p. 52 (Hora 1929, pl. xviii, fig. 3).	Estuaries near Calcutta	<i>Sadanundi bele</i>	Botanical Garden, 13th January 1815.	<i>Stigmatogobius sadanundio</i> (H. B.).
<i>Gobius chuno</i> , p. 53. (Hora 1929, pl. xiv, fig. 6).	Estuary below Calcutta	<i>Chānō</i>	Botanical Garden, 18th January, 1815.	<i>Gobiopterus chuno</i> (H. B.) (= <i>Micrapocryptes fragilis</i> Hora).
<i>Gobius nusus</i> , p. 54 (Hora 1929, xiv, fig. 5).	River below Calcutta	<i>Thutkuri bēlē</i> and <i>Nūnī bele</i> .	Botanical Garden, 18th January, 1815.	<i>Ctenogobius nusus</i> (H. B.) (= <i>Gobius alcockii</i> Annandale).
* <i>Cheilodipterus culius</i> , p. 55, pl. v, fig. 16.	Ponds and ditches of Bengal	<i>Nucli</i> , <i>Kuli Beliya</i>	?	<i>Eleotris fusca</i> (Bl. & Schn.).
<i>Cheilodipterus butis</i> , p. 57 (Gray 1838, II, pl. xciii, fig. 3).	River below Calcutta	<i>Bhutī bēlē</i>	Botanical Garden, 13th January, 1815.	<i>Rutis butis</i> (H. B.).

In the description of the fish, Hamilton referred to its close similarity with *G. giurus*. A careful study of the figures¹ and descriptions of the two species has shown that the former may be an abnormal form of the latter, which is a very widely distributed species of India and is adapted to live under varying conditions of salinity, etc. According to Hamilton, the principal features in which *G. gutum* differs from *G. giurus* are (i) 13 rays in the pectoral fin of *G. gutum* as against 22 rays in that of *G. giurus*, (ii) head small and narrower than the body in *G. gutum*, while it is wider than the body in *G. giurus* and (iii) the lower jaw shorter than the upper in *G. gutum* and *vice versâ* in *G. giurus*. A comparison of the figures also shows that the chief differences lie in the form and structure of the head which, in my opinion, are due to the pug-headed condition of *G. gutum*. The smaller number of rays in the pectoral fin is probably another abnormal feature. It seems likely, therefore, that *G. gutum* was described from an abnormal pug-headed specimen of *G. giurus*.

To verify this surmise a photographic copy of the original drawing of *G. gutum* was sent to the Collector of the Noakhali district with a request that any information and specimens of *Gutum baliya*, if available, may kindly be obtained. In reply the Collector sent seven specimens and remarked that a fish locally known as *Gutum Baliya*—“is available in this district in abundance” All the seven specimens sent by the Collector are *Glossogobius giurus*, and now there seems no doubt that *G. gutum* and *G. giurus* should be regarded as conspecific.

There are two species, *G. septemradiatus* and *G. tredecemradiatus*, about which no definite information exists, but there can be hardly any doubt that Buchanan obtained them while stationed at Calcutta, as the forms are abundant in the estuaries. Moreover, these forms are conspecific with *G. novemradiatus* and all the three names are synonymous with *Periophthamodon schlosseri*, a species very variable in regard to the number of spines in the first dorsal fin (0—15). I have obtained specimens of all the species referred to above from the neighbourhood of Calcutta and especially from Uttarbhag, which is situated about 5 miles to the south-east of Baruipur. In the “Original Notes”, the Luckipore name of only one species is mentioned and in the “Gangetic Fishes”, *G. gutum* is definitely stated to have been collected from the Padma River, so it may be reasonable to presume that at Puttahaut Buchanan became familiar with only two species of Gobioid fishes.

I include here a short summary of the changes in the configuration of the areas near Puttahaut and Baruipur. Rennell's map (1780-1790) shows “the Meghnā flowing past Lakhipur, then an important factory of the East India Company, sweeping in a steady curve round the south-west of the district and passing some five miles south of the present station of Naokhali, and then inclining slightly northward on to the mouth of the Feni where it flowed some two miles south of Companyganj”². Hooker found in 1850 that Meghnā was moving gradually to the west, and the tide rose about 14 feet. With regard to the configuration of the area near Lakshmipur, the Collector of Noakhali informs me that

¹ For a figure of *G. gutum* see Hora, *Mem. Ind. Mus.* IX, pl. xiv, fig. 7 (1929).

² Webster, Eastern Bengal and Assam District Gazetteers. Noakhali, p. 7 (1911).

“ an area of about 4 or 5 miles to the south of Lakshmipur has, of late, been diluviated and new chars, viz., Char Ramani Mohan and Char Martin, etc., have been formed, thus diverting the course of the Meghnā River near Lakshmipur to flow by the south side of Char Ramani Mohan.”

In the old days, Baruipur used to be a big trading centre and was situated on the banks of the Adiganga, a tidal creek. Now the bed of Adiganga is represented by a series of freshwater tanks and there is no brackish water in the immediate neighbourhood of the place, but it is likely that 136 years ago, when Buchanan was living at Baruipur, there were brackish water pools in the bed of the Adiganga near Baruipur. Uttarbhag is now a big fishing centre and lot of fish from this place are sold daily in the Baruipur market and it is likely that Buchanan may have also obtained his specimens from neighbouring places. Under these circumstances, the specimens from Uttarbhag can be regarded without any hesitation as topotypes of the species described by Buchanan during his stay at Baruipur.

In view of the above remarks, the forms listed above are referable to 13 species, all of which are well-known though two of these—*Gobiopterus chuno* and *Ctenogobius nusus*—have become familiar in literature under taxonomically unsound names. The remaining eleven species are known to be widely distributed in the seas and estuaries of India, Burma, Malay Archipelago and of countries further east.

In the following pages, therefore, the systematic position of Hamilton's two little known species is discussed.

***Gobiopterus chuno* (Ham. Buch.).**

1822. *Gobius chuno*, Hamilton, *Gangetic Fishes*, p. 53.

1923. *Micrapocryptes fragilis*, Hora, *Mem. Ind. Mus.* V, p. 751.

1929. *Gobius chuno*, Hora, *Mem. Ind. Mus.* IX, pl. xiv, fig. 6 (Ms. drawing of Hamilton-Buchanan reproduced).

1931. *Gobiopterus fragilis*, Koumans, *Pre. Rev. Genera Gobioid Fish.*, p. 32.

Gobiopterus chuno was described by Hamilton-Buchanan from “ the estuary below Calcutta ”, and a reference to the “ Original Notes ” shows that the species was discovered by him in January 1815 while stationed at the Royal Botanical Garden. *Chuno* is a name collectively employed for small species of fish and prawns in Calcutta and there is no doubt that in the specific name reference is made to the small size of the fish and to its diaphanous colouration. Judging according to the present day standard, Hamilton's description of the species is inadequate and it is greatly to be regretted that he had not access to the figure of the species when he published its description in the “ Gangetic Fishes ” In these circumstances, it is not surprising that no notice has been taken of this species by any ichthyologist ; even Day omitted to refer to it in his monumental work on the “ Fishes of India ”

In 1923, I described a small, transparent Goby from the Chilka Lake and the Baliaghata Canal near Calcutta. It was so remarkable that a new genus was proposed for its accommodation, and its close affinity to *Gobius brachypterus* Bleeker was indicated. Unfortunately, I missed to note at the time that Bleeker had already proposed a separate genus

Gobiopterus for his *G. brachypterus*. Kouman has now directed attention to this omission and after an examination of a cotype of my species—*Micrapocryptes fragilis*—has referred it to *Gobiopterus*.

A careful study of the description and figure of Buchanan's *Gobius chuno* shows that, in all the points noted by Buchanan in his short description, it agrees very closely with the transparent Goby described by me, and I have no doubt that the two are conspecific. The most salient feature, however, is the character of the teeth, but, with the appliances available to Buchanan, he was unable to determine their nature and remarked that "The structure of the *teeth* in such a minute animal cannot be readily ascertained, although these organs evidently exist." The principal features in which the two descriptions agree are :—

- i. Small size.
- ii. Diaphonous colouration with black dots.
- iii. Oblique and upturned mouth with the lower jaw longer than the upper.
- iv. Forward position of the eyes.
- v. Five short rays in the first dorsal fin, and seven to eight rays in the second dorsal.
- vi. Occurrence in the estuaries near Calcutta.

Besides these, there are several other minor points of agreement also.

Gobiopterus consists of small pelagic species which correspond in habits with the European transparent Gobies of the genera *Aphia* and *Crystallogobius*. So far as I am aware, *Gobiopterus* is represented by three forms, *G. brachypterus* Bleeker¹ from the Grati Lake in Java. *G. chuno* from the Chilka Lake and the Salt Lakes, Calcutta, and *G. sp.*² from the Talé Sap, Siam. It is significant that all the three forms are known from brackish water lakes and in the Chilka Lake *G. chuno* was found in the main area where the specific gravity of the water varied from 1.0020 to 1.0080. The salinity of the other pieces of water in which *Gobiopterus* lives is not known.

The alimentary canal of *G. chuno* is a broad simple tube ; it is somewhat dilated in the region of the stomach and is about one-third the total length of the fish. An examination of the stomach contents has shown that the fish feeds on Copepods and other planktonic crustacea. Thus from its structure, colouration and feeding habits, the fish seems to be a true pelagic species. The structure of the pelvic fins, as a long funnel-like tube, also shows that these fins are not used for adhesion as is the case in a majority of the other Gobioid fishes.

Ctenogobius nunus (Ham. Buch.).

1822. *Gobius nunus*, Hamilton, *Gangetic Fishes*, p. 54.

1876. *Gobius nunus*, Day, *Fish. India*, p. 297.

1906. *Gobius alcockii*, Annandale, *Journ. As. Soc. Bengal* (N. S.), II, p. 201, 1 fig.

1923. *Ctenogobius alcockii*, Hora, *Mem. Ind. Mus.* V, p. 744.

1928. *Ctenogobius alcockii*, Hora, *Rec. Ind. Mus.* XXX, p. 37.

1929. *Gobius nunus*, Hora, *Mem. Ind. Mus.* IX, pl. xiv, fig. 5 (Ms. drawing of Hamilton-Buchanan reproduced).

¹ Bleeker, *Nat. Tijdschr. Ned. Ind.* IX, p. 401 (1855).

² Hora, *Mem. As. Soc. Bengal* VI, p. 495. fig. 7 (1924).

This is the smallest of the Indian Gobies and was described by Hamilton from "the river below Calcutta". In his "Original Notes", the description of this species is dated 18th January 1815, when Buchanan was stationed at the Royal Botanical Garden. Among other characters, Hamilton noted that *C. nunus* "has six irregular black belts, one passing through the eye, a second on the gill-covers, the third at the pectoral fins, the fourth at the vent fin, the fifth behind the second back fin, and the sixth at the end of the tail". It was also noted that "the first back fin contains six undivided rays." The species remained undetermined for a long time and it appears that Cuvier and Valenciennes and Günther considered the original description inadequate for the specific recognition of the species and, therefore, did not include it in their systems of classification. Day, who had access to Buchanan's manuscript drawings in the library of the Asiatic Society of Bengal, redescribed this species from a small specimen "captured by the late Dr. Stoliczka in a freshwater stream, near Moulmein" and thus extended its range from Hooghly to Burma. The description of its colouration agrees very closely with that given by Buchanan, but its dorsal fin formula " $D\ 5\frac{1}{9}$ " is different. Unfortunately, Day did not figure this small species nor directed attention in his description to its manuscript drawing in Buchanan's collection of drawings in the Asiatic Society of Bengal. No one seems to have taken notice of this species after Day.

In 1906, Annandale described a new species *Gobius alcockii* from a large number of specimens obtained at Port Canning in brackish water and at Calcutta in fresh water. Annandale's description of the colour of his species is identical with that given by Hamilton and Day for *G. nunus*, and in other particulars also the two species appear to be conspecific. According to Annandale, the dorsal fin formula is " $D\ 5\ \frac{1}{8-7}$ ", but in the large number of specimens examined by me I have always found six undivided rays in the first dorsal. Annandale added a note on the breeding habits of the fish and remarked on the large size of the eggs in *G. nunus*.

In 1907, Annandale¹ recorded "*G. alcockii*" from a tank at Rajshahi, 150 miles north of Calcutta. In 1923, it was recorded by me from the Chilka Lake where it is very common all over the lake. It was also pointed out that the first dorsal fin contains 6 spines and not 5 as described by Annandale. In 1928, the range of the species was extended both towards the east and the west by recording it from Rangoon and Puri on the Ganjam Coast. In 1929, when I published the manuscript drawing of Buchanan's *Gobius nunus*, the great similarity between it and Annandale's *G. alcockii* struck me and later researches have confirmed the view then formed. It is abundantly clear to me now that the two species are identical.

Ctenogobius nunus is very common in brackish water ponds and pools in the neighbourhood of Calcutta and it is always found among vegetation where its banded colouration and absolutely transparent caudal fin makes it inconspicuous. So far as I have been able to ascertain, it feeds on planktonic crustacea or animal and vegetable growths on the

¹ Annandale, *Rec. Ind. Mus.* I, pp. 41-42 (1907).

stems of water plants. Its alimentary canal is a broad simple tube with the stomach portion dilated and slightly bent in its posterior half. The alimentary canal is less than one-third the length of the fish. The specimens collected late in December and early in January were found to be fully ripe. The species does not seem to grow to more than 18 mm. in total length, and is thus one of the smallest living vertebrates.

C. nunus is found among vegetation both in fresh and brackish waters, but usually it does not live far from tidal influence. Its occurrence at Rajshahi and in Calcutta tanks, however, shows that it is fully acclimatised to fresh water existence. In the Chilka Lake the species was obtained from the main area as well as the outer channel and from waters the specific gravity of which varied from 1.0075 to 1.028250.

C. nunus has not been found so far in flowing water.

NOTES ON INDIAN THYSANOPTERA WITH DESCRIPTIONS OF NEW SPECIES.

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(Plate IX.)

This paper is a supplement to the writer's last three papers¹ on Indian Thysanoptera; it includes notes on fifteen species of which five appear to be new to science and three other forms are new to the Indian region. The material includes collections made by the writer and his fellow workers at Coimbatore, Mr. T. B. Fletcher, till lately Imperial Entomologist, Pusa, Mr. C. C. Ghosh, the Burma Entomologist, Professor D. S. Chowdhry of Cawnpore and Professor Jhaveri of the Poona Agricultural College. The writer's thanks are hereby tendered to all these gentlemen for the help received. He is also thankful to Dr. Priesner for examining his specimens and offering suggestions and criticisms.

The following is a list of the species :—

1. *Hemianaphothrips palmae*, sp. nov.
2. *Pseudodendrothrips ornatissimus* Schm.
3. *Parthenothrips dracaenae* H.
4. *Heliothrips indicus* Bag.
5. *Thrips florum* Schm.
6. *Taeniothrips chaetogastra*, sp. nov.
7. *Panchaethrips indicus* Bag.
8. *Ecacanthothrips fletcheri*, sp. nov.
9. *Liothrips dampfyi* Ky.
10. *Haplothrips inquilinus* Pr.
11. *Trybomiella ramakrishnae* Ky.
12. *Karnyothrips nigriflavus*, sp. nov.
13. *Androthrips coimbatorensis*, sp. nov.
14. *Mallothrips indica* Ramkr.
15. *Cercothrips (Gigantothrips) tibialis* Bag.

TEREBRANTIA.

1. *Hemianaphothrips palmae*, sp. nov.

Macropterous female.—Length 1.30 to 1.43 mm. Head yellowish brown, thorax brown with margins of pterothorax rather dark, prothorax light yellowish and the abdomen dark brown. Ocelli large and clear, with red pigment. Legs uniform pale yellow. Feelers pale yellow with the second joint lightly fuscous and with a distinct brown patch on the distal portion of sixth joint; the following distal joints are also dark. Wings distinctly transparent at basal area, light greyish fuscous

¹ *Journ. Bombay Nat. Hist. Soc.* XXXIV, pp. 1029-1040 (1931); *Rec. Ind. Mus.* XXXIV, pp. 277-279 (1932); *Indian Forest Records, Ent. Ser.*, XX (4), pp. 1-12 (1934).

beyond. Eyes large and bulging out. Head broader than long and shorter than prothorax, with no spines or bristles. Cheek distinctly arched and finely serrate but with no bristles; the front margin of vertex very broadly triangular. The vertex is finely transversely striated. Antennal joints: 1st cup-shaped and 2nd elongate oval, longer than first with a seta on it, 3rd and 4th subequal, narrow at base, 5th slightly shorter, all the three broader towards apex, 6th almost as long as 3rd, but broader than the latter, 7th and 8th very short, almost equal and of the same breadth throughout, 9th narrower and slightly longer than 7th or 8th. The partition between 6th and 7th not very clear in some specimens and it is possible that it is only a groove dividing the 6th into two parts. Mouth cone short and bluntly pointed extending just into the middle of prosternum. Prothorax large, as long as head, broader than long, the front margin straight, the sides sharply arched and the base at the junction of the pterothorax conspicuously rounded; it is unarmed. Legs comparatively short, stout and unarmed. Abdomen elongate, much longer than head and thorax together, bluntly pointed at apex. Basal segments with fine transverse striations, 7th and 8th with a sharp lateral spine on each posterior angle, 9th with a transverse row of six long and sharp bristles, the last segment with a similar row of four shorter bristles. Wings extending to 6th abdominal segment. Fore-wing with minute setae along both the veins and a conspicuous curved bristle at costal apex; first vein with five or six setae beyond the basal transparent portion and two distal ones, 2nd with a dozen setae. Fringes long and well developed.

Macropterous male.—1.100 mm. long. Body elongated and more slender than female. General colour similar but with the dark colour of abdomen and margins of thorax deeper in some specimens. Wings extend to tip of abdomen. Apex of abdomen with a pair of conspicuous curved bristles, one on each side. The penultimate segment with two long bristles on each side and a group of short spines at the central region. The four middle segments show a transparent naked transverse patch at the middle, characteristic of some male thrips.

Measurements of type female.—Head: length 0.132 mm., breadth 0.154 mm.; prothorax: length 0.132 mm., breadth 0.220 mm.; pterothorax: length 0.308 mm., breadth 0.297 mm.; abdomen: length 0.792 mm., broadest across 5th and 6th segments. Total length 1.364 mm.

Measurements of antenna.—1st joint 15 μ , 2nd 40 μ , 3rd 70 μ , 4th 55 μ , 5th 55 μ , 6th 65 μ , 7th 10 μ , 8th 10 μ , 9th 20 μ .

Habitat and Locality.—Collected by the author on the flower heads of Date palm (*Phoenix dactylifera*); found in company with *Adiheterothrips jambudvipae*, Ram. on the banks of the Tungabhadra river at Tungabhadra and Siruguppa in the Bellary district.

Described from about ten females and three or four males.

This is the first Indian record of this genus erected by Priesner in 1925 as a subgenus of *Anaphothrips*, Uzel. The most important structural feature of the genus is its three jointed antennal style (antenna 9-jointed). This feature and the characteristic coloration mark it out as a distinct species.

2. *Pseudodendrothrips ornatissimus* Schmutz.

1913. *Pseudodendrothrips ornatissimus*, Schmutz, *Sitz. Akad. Wiss. Wien.* CXXII, p. 998.

Habitat and Locality.—Found as a pest on the shoots of mulberry (*Morus*), Mandalay, Burma (C. C. Ghosh Coll. T. V. R. No. 266). The insect in this material, though appearing at first glance like a *Sericothrips*, agrees in most respects with Schmutz's type described in 1913 from material collected from Ceylon on *Macrocarpus integrifolia*. The structure of the antennae in the present material is similar to the Ceylonese form with the peculiar division of the distal joints; the transverse groove in joint six is clearer than the partition between joints six and seven, and Schmutz appears evidently to have mistaken the boundaries of the joints. The insect is a small (about 1.000 mm. in length) golden yellow species with bright red ocelli, whip-like antennae, short and unarmed head and fairly long greyish wings.

3. *Parthenothrips dracaenae* Heeger.

1854. *Parthenothrips dracaenae*, Heeger, *Sitz. Akad. Wiss. Wien.* XIV, p. 365.
1902. *Parthenothrips dracaenae*, Hinds., *Proc. U. S. Nat. Mus.* XXVI, p. 176.

Habitat and Locality.—A dozen females (no males) collected by the writer on wild *Solanum* and *Tecoma jasminoides*, Nilgiris, 7,500 ft. (T. V. R. Nos. 290 and 316); this is the first record of this well known species in Asia. Differs from Schmutz's *P. octarticulata* recorded from Ceylon in the structure of the antennae and the colour of the fore-wings. This insect appears to enjoy a very wide distribution since it has been noted previously in different parts of Europe, North America and Australia. Dr. Priesner thinks that my specimens are somewhat paler than the European form. There is a detailed description of this insect in Hinds' paper referred to above.

4. *Heliothrips indicus* Bagnall.

1913. *Heliothrips indicus*, Bagnall, *Ann. Mag. Nat. Hist.* (8), XII, p. 291.
1928. *Heliothrips indicus*, Ramakrishna, *Ent. Mem. Dept. Agri. India* X, p. 254.

Habitat and Locality.—On ganja (*Cannabis sativa*), Coimbatore, (T. V. R. Coll.); on Sannhemp flowers, Pusa (P. V. Isaac Coll.). On Date flowers, Siruguppa, Bellary (T. V. R. Coll.). This is a common Indian black thrips found occasionally as a pest on groundnut and other field crops.

5. *Thrips florum* Schmutz.

1913. *Thrips florum*, Schmutz, *Sitz. Akad. Wiss. Wien.* CXXII, p. 1003.
1928. *Thrips florum*, Ramakrishna, *Ent. Mem. Dept. Agri. India*, X, p. 261.
1932. *Thrips florum*, Ramakrishna, *Rec. Ind. Mus.* XXXIV, p. 277.

Habitat and Locality.—On Rose flowers, Poona, (T. N. Jhaveri Coll.). This is one of the commonest of the Indian species of thrips (a reddish brown form) and is found on a variety of plants in S. India. Found often in company with different species of *Haplothrips*.

6. *Taeniothrips chaetogastra*, sp. nov.

Macropterous female. About 1.400 mm. long. General colour yellowish to yellowish brown. Head and thorax yellowish brown, abdomen and legs of a pale whitish yellow, legs with a slightly darker hue than abdomen. Fore-wings uniform grey, setae dark, fringes grey and hind wings of a lighter shade with the central longitudinal vein grey. Eyes black, ocelli with pinkish pigment. Antennal joints excepting the first which is pale whitish, are of a uniform dark grey colour. The prothoracic and abdominal bristles dark. Head broader than long, fore margin arched, surface of head near junction of prothorax with irregular transverse striae. A pair of conspicuous dark bristles in front of the posterior ocelli, genae slightly arched with two or three very short transparent setae along each. Antenna, first joint stout and cup-shaped with short seta towards apex, 2nd joint narrow at base and gradually widening towards apex with three or four sharp setae, 3rd joint narrow and more or less constricted at the base, widest at centre and then narrowing towards apex with two or three bristles and a forked trichome towards apex, the color is deeper at centre and lighter towards each apex, 4th joint similar in all respects to 3rd though slightly shorter and the bristles are conspicuous in both; 5th joint narrow at base and widening towards apex, having a distinctly lighter colour at apex, 6th joint almost as long as 4th, elongate oval, broader at base and narrowing towards 7th joint but broadly connected with it, the extreme apex has a lighter hue, 7th very small, 8th an elongated cone longer than 7th and with two or three transparent setae at apex. Mouth cone broadly pointed and reaching middle of prosternum. Prothorax, somewhat broader than long, sides arched; a pair of dark conspicuous bristles found at each posterior angle. In addition, the hinder margin has a row of four spines situated between the pair at each angle and of these the two in the middle are conspicuous and almost as long as the ones at each angle, the one at each side is smaller. The surface of the prothorax is also fringed with several small setae. Pterothorax almost as broad as long, very slightly arched at the sides; on the median region there is a group of spines and of these, the middle two are conspicuous. The two hinder pairs of legs are slightly longer than the front pair and all the legs are profusely fringed with short bristles, especially the tibiae. The wings are well developed and reach the 8th abdominal segment, the setae along the veins and the costal margin are dark brown. The upper vein has a basal series of 7 or 8, then there is a long blank and then there are two towards the apex; the lower vein has a regular series of 13 or 14 in an uninterrupted line; the second of this series is opposite to the last of the basal series of the upper vein; the costal margin has about 24 to 26 bristles, one long curved one at apex; fringes rather scanty and found chiefly along hind border. The hind wing shows a distinct narrow grey longitudinal median vein. Abdomen elongate, very slightly longer than head and thorax together, broadest at base and gradually narrowing towards tail end; the anal end is not sharply pointed. Each of the abdominal segments has a transverse row of 8-10 short setae on its ventral side. The dorso-lateral margins of the segments are finely transversely rugulose. Posterior margin of 9th segment with a transverse

row of six conspicuous long dark bristles, one pair towards each side and one on the median dorsal region; the last segment has a transverse row of four long pre-apical bristles of the same type; there are also two long bristles, one on each side of the median line anterior to the transverse row of bristles.

Measurements of type.—Head: length 0.121 mm., breadth 0.154 mm.; prothorax: length 0.165 mm., breadth 0.198 mm.; pterothorax: length 0.286 mm., breadth 0.275 mm.; abdomen 0.704 mm. Total length 1.342 mm.

Measurements of antenna.—1st joint 35 μ , 2nd 45 μ , 3rd 65 μ , 4th 60 μ , 5th 43 μ , 6th 58 μ , 7th 10 μ , 8th 20 μ .

Described from a unique female specimen collected by the author on flowers of Persian Nim, Coimbatore, in company with *Dolichothrips indicus*, Hood-Pr. T. V. R. No. 29 x, September 1923.

The insect is well provided with bristles and setae all over the body, near the ocelli, on the prothorax, and especially on the abdominal segments; and it is, therefore, named *T. chaetogastra*. It does not appear to be any of the species described till now.

7. *Panchaetothrips indicus* Bagnall.

1912. *Panchaetothrips indicus*, Bagnall, *Rec. Ind. Mus.* VII, p. 257.

1928. *Panchaetothrips indicus*, Ramakrishna, *Ent. Mem. Dept. Agri. India* X, p. 273.

Habitat and Locality.—One solitary female from cotton flower collected by the writer's brother T. V. Subramania Ayyar, Mysore Entomologist, from Bobbur, Mysore, (T. V. R. No. 370). The well known hosts of this insect noted so far have been Turmeric and Arrow-root plants in S. India and Banana in N. India. It was also found once on *Haemelia patens* in Coimbatore. This genus with its only known species is unique and confined to India as far as we know.

TUBULIFERA.

8. *Ecacanthothrips fletcheri*, sp. nov.

Macropterous female.—Length 2.75 mm. General colour dark greyish brown. Fore tarsi, fore tibiae, the tip of the fore femoral spine yellowish, the middle and hinder tibiae at base and apex and their tarsi yellowish tinged with grey brown. Antennal joints 1 and 2 of same colour as head; third along the outer margin and the basal portion of 4th, 5th and 6th yellowish, 7th and 8th dark grey. Head longer than broad and longer than prothorax; cheeks sub-parallel with three strong tubercles each giving rise to a short sharp bristle along each cheek; the postocular bristle on each side very long projecting forwards beyond the eye. Third antennal joint with double row of sense cones. Ocelli with reddish pigment. Eyes large, oval, placed almost near the anterior margin of vertex. Prothorax rhomboidal with one forwardly directed transparent bristle at each anterior angle and one at each posterior angle. Front legs strongly developed; femur stout with a strong straight tooth at middle of inner margin, tibia narrow at base and curved along inner margin, the latter with three short but conspicuous tubercular

projections towards the apex; tarsus with one strong tooth at base. There are a few short and strong bristles at the basal region of outer margin of femur and coxa. Hind legs normal with a few small bristles on outer margin of femora. Pterothorax stout, longer and broader than prothorax. Wings extending to 7th abdominal segment; forewing with the basal spines long, transparent and knobbed, its apex with 22 duplicate hairs. Abdomen elongate, oval, longer than head and thorax together, the segments with spines at posterior lateral angles. Tube rather stout and shorter than head or prothorax with very short and feeble bristles at tip.

Measurements of type.—Head length 0.374 mm.; prothorax length 0.264 mm.; tube length 0.242 mm.; pterothorax length 0.440 mm.; abdomen length 1.650 mm. Total length 2.75 mm.

Measurements of antenna.—1st joint 1.75 μ , 2nd 2.75 μ , 3rd 3.145 μ , 4th 4.170 μ , 5th 5.160 μ , 6th 6.125 μ , 7th 7.85 μ , 8th 8.65 μ .

In Priesner's recent synopsis of the species of this genus the insect comes near *Bryanti obscurata*, from Borneo, but differs from it chiefly in the colouring and length of antennal joints.

Described from one specimen caught at light in Pusa (T. B. Fletcher Coll.—T. V R. No. 267).

9. *Liothrips dampfyi* Karny.

1914. *Liothrips dampfyi*, Karny, *Verh. Zool. Bot. Ges. Wien.* LXIV, p. 58.

Habitat and Locality.—On *Tamarix gallica*, Cawnpore, (D. S. Chowdhry Coll.—T. V R. No. 264). This insect was first described by Karny from the same host plant in Egypt and is a new record for India. In general form the insect appears more like a *Gynaikothrips* than a *Liothrips* and Dr. Priesner who examined the specimens is also of that opinion.

10. *Haplothrips inquilinus* Priesner.

1921. *Haplothrips inquilinus*, Priesner, *Traub.* II, p. 4.

1928. *Haplothrips inquilinus*, Ramakrishna, *Mem. Dept. Agri. India* X, p. 292.

Habitat and Locality.—On *Mallotus philippinensis*, Taliparamba, Malabar (T. V R. Coll.) with a *Liothrips* sp. Originally described from Java, and there are previous records on *Mimusops elengi* and *Eugenia jambolana* in South India.

11. *Trybomiella ramakrishnai* Karny.

1926. *Trybomiella ramakrishnai*, Karny, *Mem. Dept. Agri. India* IX, p. 218.

Habitat and Locality.—In flowers of Lupin and other hill plants, Ketti, Nilgiris, 5,000 ft. (T. V R. No. 391). Previously collected from *Chrysanthemum* flowers in Coimbatore, and Sandal in Salem District.

12. *Karnyothrips nigriflavus*, sp. nov.

Macropterous female.—Length 1.75 to 2.0 mm. General colour bright yellow and dark brown. Head, prothorax, the first antennal joint, base and inner margin of 2nd joint and the tube dark brown; ocelli with

some red pigment. The legs and rest of the body bright yellow except the ventral tips of the legs and the 7th and 8th joints which are lightly tinged with dark brown; the abdomen in some specimens shows irregular darkish diffused pigment. Wings light flavous almost transparent. Head longer than broad, fore-margin broadly triangular. Sides sub-parallel, slightly corrugated but not armed. Postocular bristle small and inconspicuous. Antennal joints 1 and 2 short and cup-shaped, 2nd longer than 1st and constricted at base, 3-5 subequal narrow at base and broadening towards apex, 6th broadest at apex and slightly shorter, 7th elongate and of same breadth throughout and 8th a long cone with an apical bristle. Mouth cone broadly rounded reaching just the middle of the prosternum. Prothorax as long as head but broader, the postero-lateral bristles medium sized and knobbed. Fore femur short and stout. Tarsal tooth curved and small; wings extending to 5th abdominal segment and the fore-wings with 2 to 5 duplicate hairs at apex. Abdomen elongated and much longer than head and thorax together. The wing retaining spines well developed in each of the proximal segments and the posterior pair curved and approximating each other at the median line. The spines at the posterior angles of the segments well developed, especially those on the 9th segment; and the bristles at the tip of tube longer than the tube. Tube short with slender long setae at apex which are longer than it.

Measurements of type female.—Head: length 0.187 mm., breadth 0.132 mm.; prothorax: length 0.154 mm., breadth 0.242 mm.; pterothorax length 0.308 mm.; tube length 0.132 mm. Total length 1.848 mm.

Measurements of antenna.—1st joint 30 μ , 2nd 40 μ , 3rd 50 μ , 4th 55 μ , 5th 50 μ , 6th 40 μ , 7th 45 μ , 8th 30 μ .

Macropterous male.—Length 1 to 1.25 mm. Shorter than female but similar in color and all other features.

Described from numerous specimens (T. V. R. No. 269a) collected on Bamboo in Coimbatore with *Veerabahuthrips bambusae*, Ramkr., and *Androthrips coimbatorensis* described below. Closely allied to *Karnyothrips melaleucus* Bagnall but differs in the colour of the different parts.

13. *Androthrips coimbatorensis*, sp. nov.

Macropterous female.—Length 1.5 to 1.7 mm. General colour uniform pale to dark greyish brown with parts of head, thorax and legs suffused with very pale yellowish tinge, head, post abdominal segments and tube of a slightly darker tinge. First two joints of antenna of a slightly deeper grey than other joints, the middle ones, 3-5 of a lighter hue than the apical joints 7 and 8. Ocelli with red pigment. Wings with very light grey infumation. The fore femora have the outer margin broadly dark grey with the rest of it pale yellowish, fore tibia also of a lighter pale yellowish colour. Middle and hind legs pale greyish. Head longer than broad, broadest just behind eyes, the front margin slightly drawn forwards into a broad triangular process, ocelli with red pigment, clear and well placed forwards; postocular bristle half as long as eye and projecting over eye, cheeks sub-parallel and not armed; mouth cone

broadly pointed, reaching middle of prosternum. Antenna, 1st joint short and stout, 2nd longer and cup-shaped, 3 to 7 subequal, narrow at base and broadening towards apex, 6 and 7 almost of same breadth throughout, 8th a broad cone. Prothorax shorter than head with medium sized bristles at post lateral angles and a row of 5 or 6 long ones at its base where it joins pterothorax. In the fore legs the femur is very stout and incrassated with a conspicuous conical tubercle at base of inner margin, the tibia with a broad projection at apex of its inner margin and the tarsus with a long curved tooth at base. Wings slightly narrow at middle and extending to 6th abdominal segment. Fore-wing with 5 duplicate hairs at apex. 3 basal spines clear. Abdomen elongate with sides always parallel, not broader than pterothorax. the wing retaining spines, well developed. Tube shorter than head or prothorax, with long cilia at apex. 9th segment with 4 long bristles at post margin, 2 on each side ; there are small ones between these two.

Measurement of type.—Length 1.628 mm.

Male.—Length 1.232 mm.; shorter than female ; similar in other respects.

Described from a few specimens collected on bamboo in Coimbatore with *Karnyothrips nigriflavus*, n. sp., and *Veerabahuthrips bambusae*, Ramkr. ; appears different from the species noted before from India, viz., *A. flavipes*, Schm. and *A. ramachandrai*, Ky., especially in the colour of the fore femora, wing hairs and armature of fore femora.

14. *Mallothrips indica* Ramakrishna.

1928. *Mallothrips indica*, Ramakrishna, *Ent. Mem. Dept. Agri. India* X, p. 308.

Habitat and Locality.—In *Eugenia jambolana* fruits, Cawnpore (D. S. Chowdhry Coll.—T. V. R. No. 263). The species was first described as the type species of a new genus by the writer from material collected in leaf galls of the same plant (*Eugenia*), in Marudamalai hills, Coimbatore, 1,500 ft.

15. *Cercothrips (Gigantothrips) tibialis* Bagnall.

1921. *Gigantothrips tibialis*, Bagnall, *Ann. Mag. Nat. Hist.* (9) VII, p. 364.

1926. *Gigantothrips tibialis*, Karny, *Ent. Mem. Dept. Agri. India* IX, p. 239.

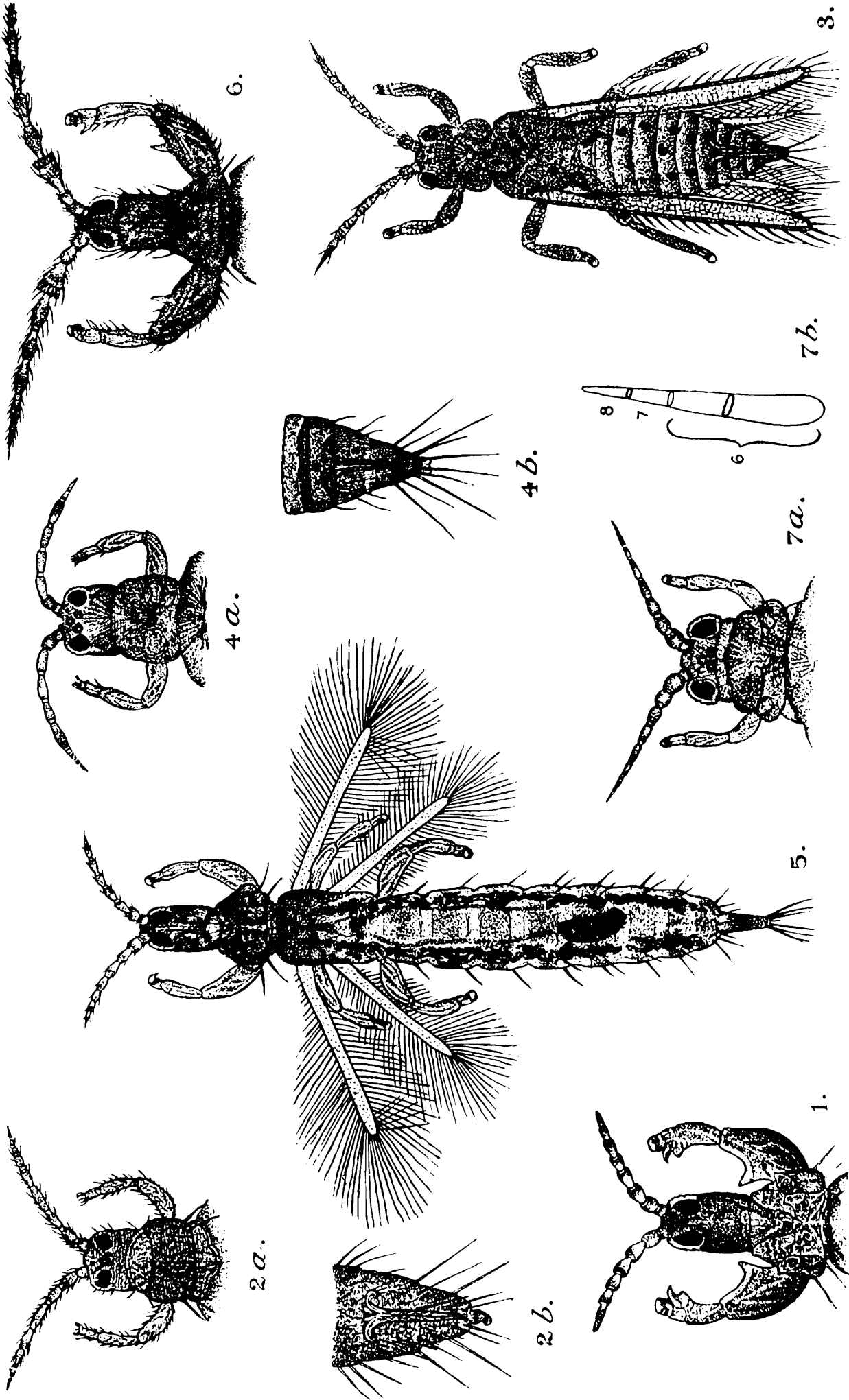
1929. *Gigantothrips tibialis*, Ramakrishna, *Ent. Mem. Dept. Agri. India* X, p. 311.

Habitat and Locality.—This giant thrips was recently found in numbers on a wild shrub near the Tungabhadra river Siruguppa (C. S. Balasubramaniam Coll.—T. V. R. No. 388.) The species was originally described from Ceylon by Bagnall and later collected from South India on the same plant (*Careya arborea*) as in Ceylon and noted in the writer's memoir on Indian Thysanoptera. This species, according to the characters given by Hood and in the opinion of Karny and Priesner has to come under Hood's genus *Cercothrips* (p. 73, *Insec. inscit. Washington*, VII, 1919) and is different in generic characters from *Gigantothrips* Z.

EXPLANATION OF PLATE IX.

INDIAN THYSANOPTERA.

1. *Androthrips coimbatorensis*, sp. nov. Fore part of body.
2. a. *Taeniothrips chaetogastra*, sp. nov. Head.
b. *Taeniothrips chaetogastra*, sp. nov. Abdomen ♀.
3. *Parthenothrips dracoenae*, H.
4. a. *Hemianaphothrips palmae*, sp. nov. Head.
b. *Hemianaphothrips palmae*, sp. nov. Abdomen ♀.
5. *Karnyothrips nigriflavus*, sp. nov. ♀.
6. *Ecacanthothrips fletcheri*, sp. nov.



Indian Thysanoptera.