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VII. NOTES ON CRUSTACEA DECAPODA IN THE INDIAN MUSEUM.

VIII. THE GENUS *ACETES*, MILNE-EDWARDS.

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of India.*

In attempting to determine a large collection of Decapod Crustacea recently made by Dr. Annandale in Japan, China and Lower Siam, I found it impossible to come to a satisfactory decision regarding the identity of a species of *Acetes*, and it was only after examining the series of unidentified specimens in the Indian Museum that any definite conclusion was reached. It is with the results of this examination that the present short paper is concerned.

In the first of his classical memoirs on the genus *Sergestes* Dr. Hansen remarked,¹ "Of *Acetes* 2 species are known (one of which has not been examined since 1837), but we possess 6 species, the distinctive characters of which are very curious; it is, however, impossible to give a good idea of the species. . . without a considerable number of figures." Twenty years have elapsed since this statement was made, but Dr. Hansen has unfortunately not made any further contribution to the subject. Although two additional species have been described, their characters are very imperfectly known and no fresh account of *A. indicus*, the species for which Milne-Edwards founded the genus *Acetes*,² has appeared. *Acetes indicus* has indeed been several times recorded from various localities, but it is, I believe, quite impossible to recognize the species from the original description: all definite specific records are therefore open to doubt.

The collection in the Indian Museum is not so rich as that in the University of Copenhagen, but comprises four distinct forms; three of these—all occurring in Indian waters—are in my opinion to be referred to known species, to *A. indicus*, Milne-Edwards, *A. japonicus*, Kishinouye, and *A. erythraeus*, Nobili; the fourth, obtained in Borneo, is undescribed. One described species, *A. americanus*, Ortmann,² is not represented in the collection.

The four forms examined show the closest affinity with one another and all agree in the complete suppression of the last two pairs of peraeopods—the character on which Milne-Edwards established the genus.

¹ Hansen, *Proc. Zool. Soc. London*, 1896, p. 937.

² Ortmann, *Decap. Schizop. Plankton-Exped.*, p. 39, pl. ii, fig. 2 (1893).

In distinguishing the species the most important indications are those derived from adult males. The form of the petasma is a most reliable and satisfactory guide and, according to my observations, an absolute criterion of specific identity, while good characters are also to be obtained from the sexual modifications of the external flagellum of the antennule. In three of the four species the ultimate segment of the antennular peduncle of the male is always elongated to a very remarkable degree, a great contrast existing in this respect between the two sexes. It is curious that this very striking feature has not hitherto been noticed. In the fourth species (*A. erythraeus*) the ultimate peduncular segment, in the vast majority of specimens examined, is short in both sexes; but in four males of small size from the vicinity of Penang, it is elongated as in the other species. The specific identity of these individuals is proved beyond doubt by the structure of the petasma. It seems, therefore, that in *A. erythraeus* the males are dimorphic; but it is very strange that no males with a long peduncle occur among several hundreds of specimens from other localities.

The sexual characters of the female are more difficult to observe, but the third thoracic sternite offers distinctive characters in each species; in *A. japonicus* its structure differs widely from that of any of the allied forms.

The species may also be distinguished by characters other than sexual, and these, though for the most part less convenient, are useful in the determination of females and young individuals.¹ Such characters are to be found in the proportions of the eye, in the form of the second segment of the antennular peduncle, in the ultimate segment of the third maxillipede, in the presence or absence of a tooth on the inner margin of the basis of the third pereopods, in the external border of the outer uropod and in the telson.

It is evident from the collection in the Indian Museum that two species are often found together. In such cases, and when the specimens are numerous, identification is a tedious process, for each individual must be separately and carefully examined.

Kishinouye was mistaken in supposing that the species can be determined by the number of teeth on the rostrum; in the forms I have examined the rostrum is almost identical in structure. This is also true of the tothing and sculpture of the carapace. The proportionate lengths of the segments of the third maxillipedes and legs afford only very slight differences, and I have not been able to find any distinctions in the number or size of the branchiae.

The species of *Acetes* are usually found gregariously, swimming in great numbers in mid-water or near the surface. They are apparently only met with in coastal waters; they occur near

¹ The petasma is, however, sufficiently developed for accurate identification in specimens less than half the maximum length attained by the species.

the shore in the open sea, and are frequently common in estuaries and backwaters. They are often found where the water is of low salinity, and occasionally in places where it is quite fresh, but penetrate little if at all beyond the reach of tidal influence. The species are fished commercially both in India and Japan, the small size of the individuals being evidently compensated by the great abundance in which they are taken.

In life the greater part of the body is probably transparent in all the species, but the cornea is black, and in one species at least there are red markings on the uropods. The precise distribution of the red pigment is perhaps different in different species, but on this point nothing precise is known. The only notes I possess on the colouration of living examples relate to specimens of *A. japonicus* collected in Mormugao Bay in Portuguese India, my description agreeing exactly with that given by Kishinouye. Dr. Annandale's notes on individuals caught in the Tale Sap in Lower Siam indicate an almost precisely similar colouration, but his collection contains both *A. indicus* and *A. japonicus*, and it is not clear to which of the two species the description refers.

The four species may be recognised by the following characters:—

- I. Ciliated and non-ciliated portions of external border of outer uropod separated by a small but distinct tooth; terminal segment of 3rd maxillipede not divided into sub-segments; 3rd thoracic sternite of female not produced backwards as a large plate.

- A. Telson reaching beyond middle of inner uropod, its apex pointed, without spinules; a single clasping spine on external antennular flagellum of male.

1. A tooth at distal end of inner margin of basis of 3rd peraeopods; 2nd segment of antennular peduncle fully three times as long as broad; petasma without membranous coupling folds, its internal lobe strongly expanded at its proximal end, the distal portion terminating simply ...

indicus, Milne-Edwards.

2. No tooth on basis of 3rd peraeopods; 2nd segment of antennular peduncle of female not more than two and a half times as long as broad; petasma with a pair of folded coupling membranes armed with hooks, internal lobe little expanded proximally, its distal portion terminating in two large pointed processes ...

erythraeus, Nobili.

- B. Telson not reaching beyond middle of inner uropod, its apex truncate with a spinule on either side; two clasping spines on external antennular flagellum of male [petasma without membranous coupling folds, its internal lobe very strongly expanded and conspicuously emarginate proximally, the distal portion terminating simply] ...

insularis, sp. nov.

- II. Ciliated and non-ciliated portions of external border of outer uropod not separated by a tooth; terminal segment of 3rd maxillipede divided into three sub-seg-

ments; 3rd thoracic sternite of female produced backwards as a large plate, the posterior edge of which is free and emarginate [external antennular flagellum of male with two clasping spines; petasma without membranous coupling folds, its internal lobe not expanded proximally, the distal portion with bulbous termination and with a large process on its outer side]

... *japonicus*,
Kishinouye.

In *A. erythraeus*, as already noted, the males are dimorphic, a form with a short antennular peduncle, resembling that of the female, being apparently by far the more abundant of the two. In the other three species only one type of male—a form with the ultimate segment of the peduncle greatly elongated—is known to occur.

The four species agree in the following particulars:—

The rostrum is exceedingly short and projects very little beyond the frontal margin of the carapace. It is, however, rather strongly elevated and terminates in a sharp point, behind which are two teeth, the foremost much the smallest. The anterior margin is almost vertical and is sinuous or concave.

The carapace is as long as, or rather longer than the first two and a half abdominal somites; it bears conspicuous post-orbital and hepatic spines. The cervical groove is obsolete and no trace of it exists on the dorsum of the carapace. The upper limit of the branchial region is defined posteriorly by a blunt longitudinal ridge.

The inner antennular flagellum is very long and in both sexes shows the curious flexure described in detail by Kishinouye.

The antennal scale is broadest at the base and is from 3·6 to nearly 4 times as long as wide. The outer margin is rather strongly convex and terminates in a small tooth that reaches almost to or a trifle beyond the distal end of the lamella.

The mandibular palp consists of three segments, the basal one being exceedingly small and inconspicuous. The propodus of the second maxillipedes is a trifle longer than the merus; the carpus is from two-thirds to three quarters its length and is fully three times the length of the dactylus.

The third, fourth and fifth segments of the third maxillipedes are more or less equal in length, while the fifth is from 1·25 to 1·4 times as long as the sixth.¹

The first three peraeopods increase successively in length, the third pair reaching almost or quite as far as the third maxillipedes. In the first pair the merus is about as long as the chela; the latter segment being from 1·2 to 1·4 times the length of the carpus. In this pair of limbs, at the distal end of the carpus and at the

¹ The proportionate lengths of the segments appear to show minor specific characters. In *A. japonicus*, *A. erythraeus* and *A. insularis* the third segment is almost equal to, or a little longer than the fifth, whereas in *A. indicus* the former is decidedly shorter than the latter. In *A. erythraeus* the third and fourth segments, taken together, are 1·3 times the length of the fifth and sixth, in *A. insularis* and *A. japonicus* 1·2 times and in *A. indicus* ·94 to 1·1 times.

proximal end of the propodus, there is (in both sexes and in all four species) a patch of short barbed spinules, which, when the segments are flexed, forms a sort of grasping organ.

The merus and carpus of the second pair are about equal in length¹; the carpus is from 1.1 to 1.3 times as long as the chela. In the third peraeopods the merus is a little shorter than the carpus and a little longer than the chela. The carpus is from 1.3 to 1.4 times the length of the chela. In the male, in the position normally occupied by the fourth pair of legs, there are two bluntly pointed and forwardly directed processes.

The branchiae resemble those found in the genus *Sergestes* and do not appear to afford any specific differences in the four forms under consideration. The formula is:—

	vii	viii	ix	x	xi	xii	xiii	xiv
Podobranchiae ...	ep.	1+ep.	...	...	...	...	...	...
Arthrobranchiae ...	...	...	...	...	...	...	...	...
Pleurobranchiae ...	...	...	1	1	1	1	1	...

This formula agrees with that given by Ortmann² except that a small podobranch is present at the base of the second maxilliped. This branchia is perhaps absent in the Atlantic species that Ortmann examined.

Arranged according to length, the order of the abdominal somites is 6, 4, 1, 3, 5, 2; the sixth is about twice the length of the fifth and its greatest breadth is from 1.6 to 2.0 times its length. The sixth somite is provided with a single very small spinule, placed dorsally on the posterior margin. The telson is sulcate above and is much shorter than the inner uropod.

Genus *Acetes*, Milne-Edwards.

1830. *Acetes*, Milne-Edwards, *Ann. Sci. nat., Paris*, XIX, p. 350.

1837. *Acetes*, Milne-Edwards, *Hist. nat. Crust.*, II, p. 429.

Acetes indicus, Milne-Edwards.

(Text-figs. 1a, b, 2a, 3a, 4a, 5c, 7a.)

1830. *Acetes indicus*, Milne-Edwards, *Ann. Sci. nat., Paris*, XIX, p. 351, pl. xi, figs. 1-9.

1837. *Acetes indicus*, Milne-Edwards, *Hist. nat. Crust.*, II, p. 430.

? 1852. *Acetes indicus*, Dana, *U.S. Explor. Exped., Crust.*, I, p. 608.

? 1890. *Acetes indicus*, Walker, *Journ. Linn. Soc., Zool.*, XX, p. 112.

? 1893. *Acetes indicus*, Henderson, *Trans. Linn. Soc., Zool.* (2), V, p. 452.

? 1905. *Acetes indicus*, Pearson, *Ceylon Pearl Oyster Rep.*, IV, p. 75.

¹ The merus is a shade longer than the carpus in *A. japonicus* and *A. erythraeus*, a trifle shorter than the carpus in *A. indicus* and *A. insularis*.

² Ortmann, *Decap. Schizop. Plankton. Exped.*, p. 39 (1893).

Except for the fact that fig. 9 of his illustrations shows a tooth on the outer margin of the external uropod—a character which indicates that the species is not the same as Kishinouye's *A. japonicus*—there is nothing in Milne-Edwards' description to indicate the precise identity of the form he examined. His material was, however, obtained from the mouth of the Ganges, in which, so far as I am aware, only one species exists, though three occur in the Bay of Bengal. The principal specific characters are as follows:—

The eye is longer than in the other species and is a little more than one-third the length of the carapace. The stalk is rather more slender than usual and its length, in proportion to that of the cornea, is greater.

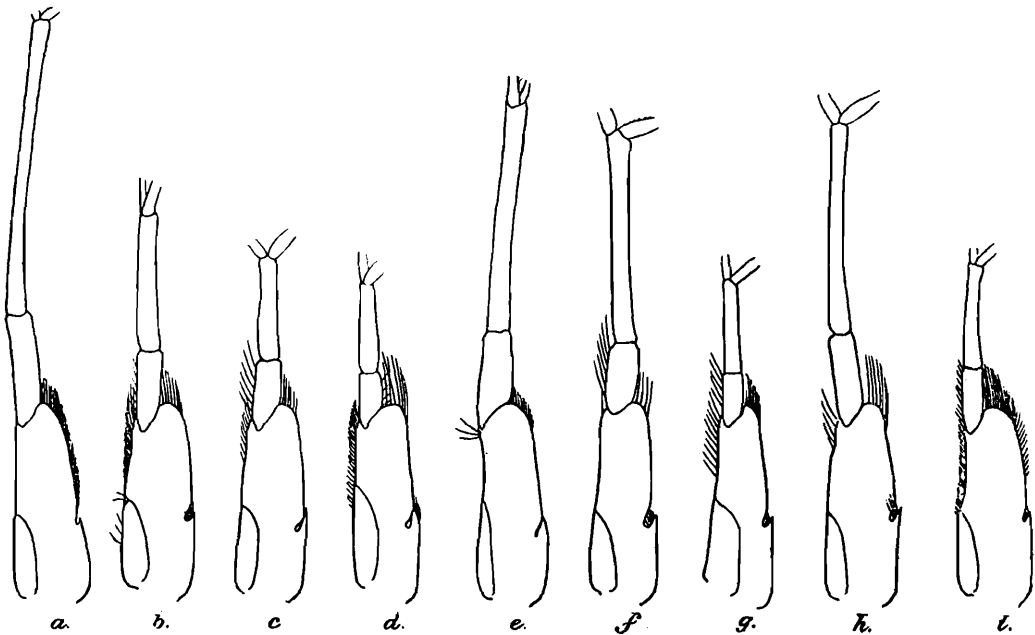


FIG. 1.—Right antennular peduncle in dorsal view.

- | | |
|--|---------------------------------|
| a. <i>Acetes indicus</i> , ♂. | f. <i>Acetes insularis</i> , ♂. |
| b. " " ♀. | g. " " ♀. |
| c. <i>Acetes erythraeus</i> , "low" ♂. | h. <i>Acetes japonicus</i> , ♂. |
| d. " " ♀. | i. " " ♀. |
| e. " " "high" ♂. | |

The basal segment of the antennular peduncle in the female is about the same length as that of the two distal segments combined; the second segment is from 3 to $3\frac{1}{2}$ times, and the third segment from 6 to $6\frac{1}{2}$ times as long as broad (text-fig. 1b). In the male the second segment is sometimes more slender than in females, but the ultimate segment is always greatly elongated, much longer than the first, and from 10 to 14 times as long as broad (text-fig. 1a).

The outer antennular flagellum of the male bears a single large clasping spine, with finely serrate inner margin; on the segment opposite the tip of this spine there is a group of 5 to 7 close-set spinules. The two basal segments of the flagellum are unusually long (text-fig. 2a).

The third maxillipedes, when extended forwards, reach a little beyond the tips of the third pereopods and, in the female, much beyond the end of the antennular peduncle. The ultimate segment is not divided into sub-segments. The basal segments of the third maxillipedes and pereopods are proportionately stouter than in

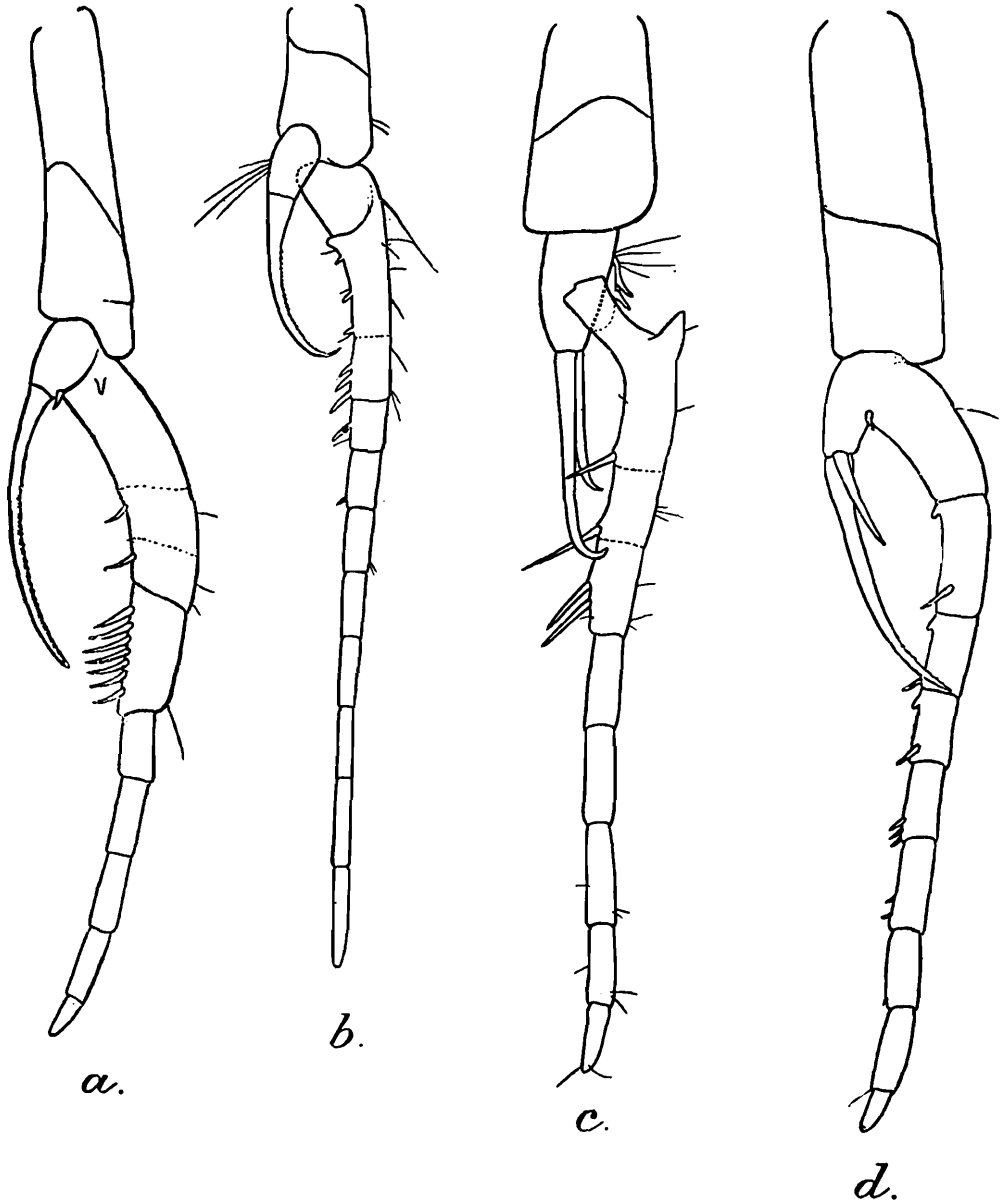


FIG. 2.—Outer antennular flagellum of male.
a. Acetes indicus. *c. Acetes insularis.*
b. Acetes erythraeus. *d. Acetes japonicus.*

other species, and the setae with which the limbs are clothed are longer and more numerous.

The basis of the third pereopod bears a large tooth on its inner margin close to the insertion of the ischium (text-fig. 3*a*), a character not found in any of the other three species.

The third thoracic sternite of the female is very deeply channelled longitudinally, the channel being continued backwards on

to the anterior portion of the fourth sternite. The anterior margin of the third sternite is deeply sunk and transverse or slightly concave. Behind the inner angles of the coxae of the third legs there is, on either side, a conspicuous tubercle (text-fig. 3a).

Between the bases of the first pleopods, both in males and females, there is a large procurved tooth.

The outer lobe of each half of the petasma (that is to say the portion nearest the pleopod) is more or less crescentic in shape with the antero-external border strongly thickened; the shape of this portion is similar in all four species. The internal lobe is characteristic in form. At its proximal end it is truncate, much expanded externally and with a small process at its inner angle. Its distal portion is without any large processes, such as are found in certain allied species, and appears to consist of a central style surrounded by a thick coating, rather uneven in outline; its surface has a sort of honey-combed appearance, due to the presence of numerous small pits, each of which contains a modified hooklet (text-fig. 4a).

The telson reaches well beyond the middle of the inner uropod and is rather sharply pointed at the apex (text-fig. 5c). The angular termination of the lobe at the proximal end of the infero-lateral margin is placed decidedly nearer the base than the apex.¹

The ciliated and non-ciliated portions of the external border of the outer uropods are separated by a prominent tooth. In adults the proximal non-ciliated part is from 1.1 to 1.3 times the length of the ciliated part (text-fig. 7a); in young individuals the proportionate length of the former is rather greater.

Acetes indicus is the largest of the four species; full grown females, measured from the tip of the rostrum to the tip of the telson, reach a length of about 40 mm.

The specimens examined are from the following localities:—

$\frac{97.02}{10}$	Panvel Creek, Bombay	...	J. Caunter.	Many.
$\frac{97.03}{10}$	Market at Ennur, near Madras	...	N. Annandale.	Several.
$\frac{35.25-6}{7}$	Coconada, Madras Pres.	...	G. W. Wicks.	Two.
$\frac{97.04}{10}$	Pratapnagore, Lower Bengal	...	Mus. Collr.	Few.
$\frac{97.16}{10}$	Near Mud Point, R. Hugli, Gangetic delta	...	T. Southwell.	Few.
$\frac{97.05}{10}$	Matla R., Gangetic delta	...	J. T. Jenkins.	Two.
$\frac{97.07}{10}$	Bassein R. estuary, Burma	...	'Investigator.'	Many.
$\frac{97.10}{10}$	Haingyi I., off Bassein R.	...	"	One.
$\frac{97.08}{10}$	S. of Purian Pt., Burma	...	"	Many.
$\frac{97.06}{10}$	Mouth of Rangoon R., Burma	...	"	Several.
$\frac{34.30}{10}$	Green I., Amherst, Tennasserim	...	"	Many.
$\frac{97.09}{10}$	Mergui Archipelago, 11°28' N., 98°36' E.	...	"	Few.
$\frac{97.11}{10}$	Mergui Archipelago, 12°0' N., 98°20' E.	...	"	Several.
$\frac{97.12}{10}$	Tale Sap, Gulf of Siam	...	N. Annandale.	Several.

¹ As in *A. erythraeus*. text-fig. 5a.

In several of these localities the species was undoubtedly obtained in brackish water, the lowest specific gravity of which I have a definite record being 1.0015 (corrected) in the case of certain specimens from the Tale Sap. On the other hand the records from Coconada, Green I. and the Mergui Archipelago indicate that the species also occurs in the open sea near land.

A. indicus was found in company with *A. japonicus* in the Tale Sap and in the Mergui Archipelago, and with *A. erythraeus* at Ennur.

The distribution of the species, as far as at present known, may be summarised as,—Bombay, Bay of Bengal and Gulf of Siam. The characters mentioned by Milne-Edwards being insufficient to determine the species with any exactitude, the records by Dana, Walker, Henderson and Pearson are open to doubt. Even if accepted, they would not indicate any marked increase in our knowledge of the distribution of the species.

Acetes erythraeus, Nobili.

(Text-figs. 1c-e, 2b, 3b, 4b, 5a,d, 7b.)

1905. *Acetes erythraeus*, Nobili, *Bull. Mus. d'Hist. nat., Paris*, p. 394, text-fig. 1.

1906. *Acetes erythraeus*, Nobili, *Ann. Sci. nat., Paris* (9), IV, p. 23, pl. i, figs. 5, 5a-f.

The eyes are not quite so long as in *A. indicus*, being only about one-third the length of the carapace; the stalk is also stouter and, proportionately to the length of the cornea, rather shorter.

The basal segment of the antennular peduncle of the female is about 1.3 times the length of the two terminal segments combined; the second segment is decidedly stouter than in *A. indicus*, the length being not more than $2\frac{1}{2}$ times the greatest breadth; the third segment is from 4 to $4\frac{1}{2}$ times as long as wide (text-fig. 1d). In males a well-marked dimorphism appears to exist in respect of the proportions of the peduncular segments. In four small males from Penang, otherwise practically indistinguishable from the rest of the specimens in the collection, the ultimate segment is greatly elongated, precisely as in *A. indicus*. The second segment in these examples is about 3 times as long as broad, while the third is longer than the first and about $9\frac{1}{2}$ times as long as broad (text-fig. 1e). All the other males in the collection differ widely from the Penang individuals and from the males of any of the other three species, the antennular peduncle bearing a close resemblance to that of the female. In such specimens the basal segment is from 1.1 to 1.3 times the length of the two following, the second segment is from 2 to $2\frac{1}{4}$ times and the third from 4 to nearly 5 times as long as broad (text-fig. 1c).

The outer antennular flagellum of the male closely resemble that of *A. indicus*, and possesses only one clasping spine; the two basal segments are, however, shorter. In the males from Penang

the tip of the large spine is opposed by a group of 5 spinules, exactly as in *A. indicus*; in the others, as shown in text-fig. 2b, only 2 or 3 spinules occur in this position. The segment immediately in front of that bearing the clasping spine bears an angular lobule.

The third maxillipedes, when stretched forwards, reach about as far as the third peraeopods, and extend to the end of the antennular peduncle. There is no tooth on the inner border of the basis of the third peraeopods.

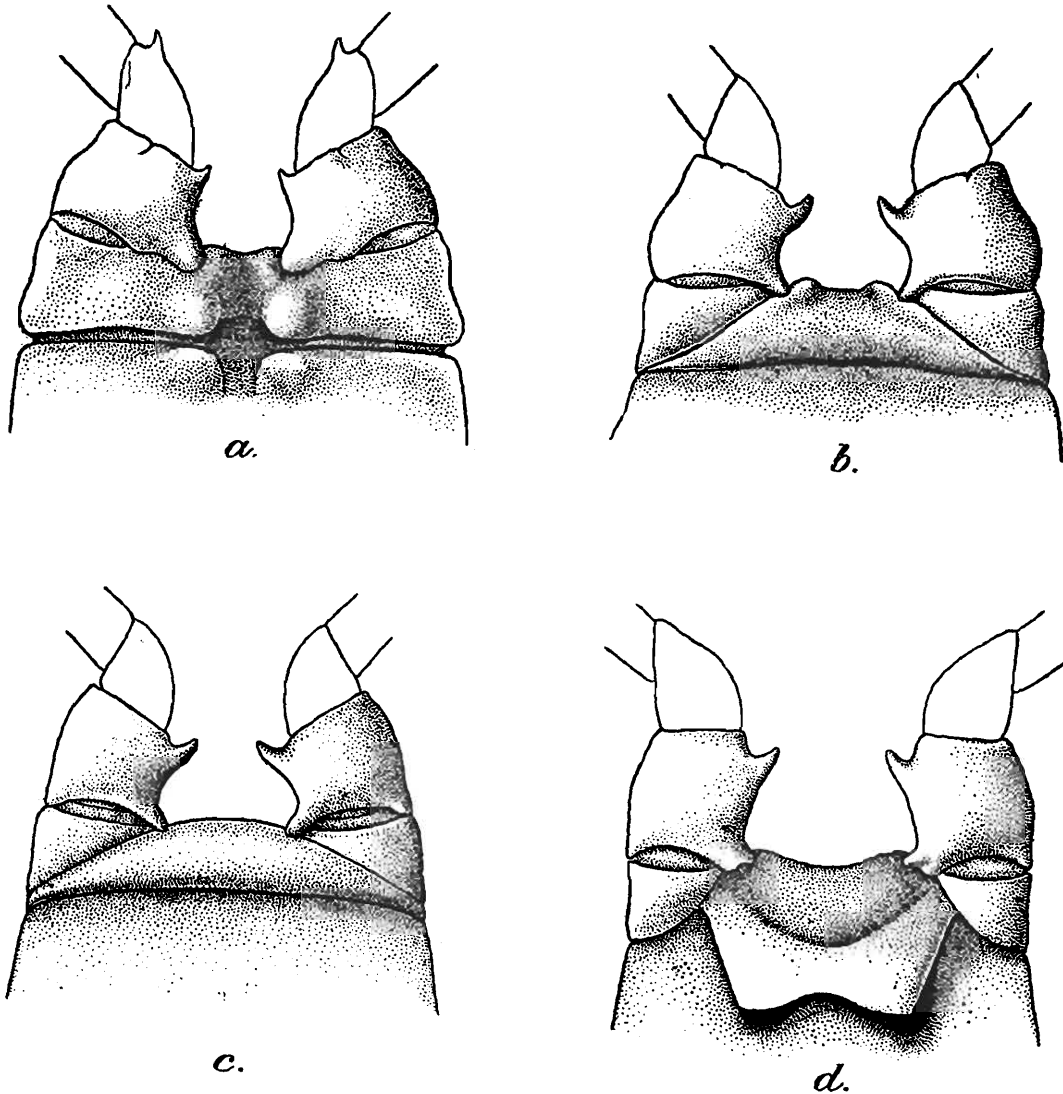


FIG. 3.—Third thoracic sternite and basal segments of third peraeopods of female.

a. *Acetes indicus*.
b. *Acetes erythraeus*.

c. *Acetes insularis*.
d. *Acetes japonicus*.

The third and fourth thoracic sternites of the female show only faint traces of the deep longitudinal channel found in *A. indicus* and the former does not possess the pair of tuberculiform eminences present in that species. The third sternite is broadly triangular in shape; its anterior margin is elevated and is concave in the middle with a small rounded lobe on either side (text-fig. 3b).

As in *A. indicus* there is in both sexes a large hooked tooth between the bases of the first pleopods.

The petasma differs from that of any other species examined in the possession of a pair of folded membranes on the anterior surface. The free edge of each is furnished with a series of minute hooks, by means of which the two halves of the petasma are coupled. The internal lobe is truncate and slightly concave at its proximal end, but is not broadly expanded as in *A. indicus*. The distal portion of the same lobe terminates in two large pointed processes with their apices directed obliquely outwards. The inner of these processes is larger and broader than the other and bears on its anterior surface two large falcate spines (text-fig. 4*b*).

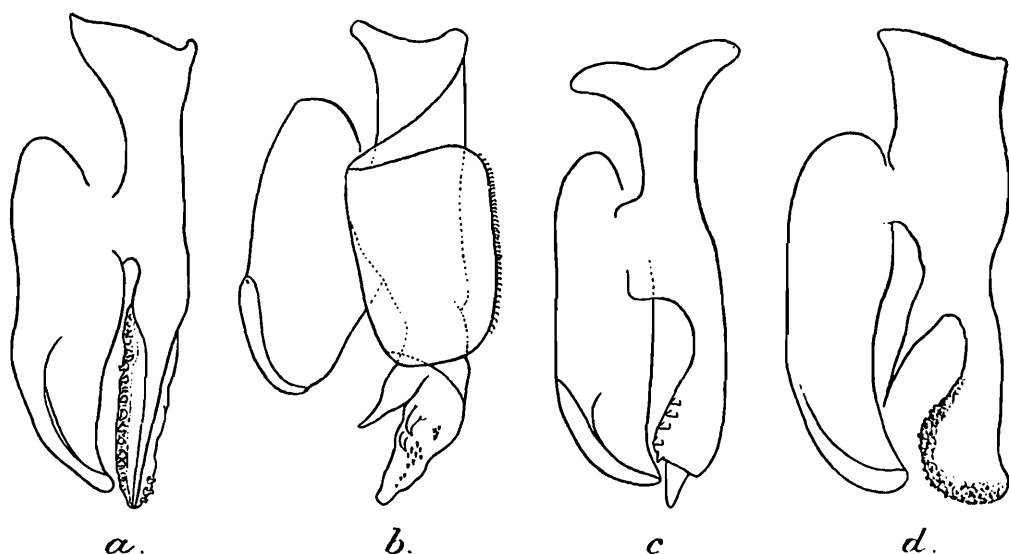


FIG. 4.—Right half of petasma, seen from in front.

a. *Acetes indicus*.

c. *Acetes insularis*.

b. *Acetes erythraeus*.

d. *Acetes japonicus*.

The telson resembles that of *A. indicus*, but the tip is not quite so sharply pointed (text-figs. 5*a*, *d*).

The ciliated and non-ciliated portions of the external border of the outer uropod are separated by a small tooth. The non-ciliated portion in adults is from 1.5 to 1.7 times the length of the ciliated part (text-fig. 7*b*), a proportion differing considerably from that found in *A. indicus*.

This species is smaller than *A. indicus*, large females being not more than 28 mm. in length. The males from Penang are only 14 mm. in length, whereas those from other localities may reach 20 mm.

The occurrence of dimorphic males in this species is a feature of considerable interest, but further information is necessary before the phenomenon can be profitably discussed: it is unfortunate that such a small number of specimens are available from Penang. The case does not appear to be one of seasonal sexual dimorphism, for the males from Penang, all of which are of the

“high” form, were caught in the month of February, whereas those of the “low” form, exclusively obtained in other localities were obtained in the months of January, February, March and April.

Acetes erythraeus was described by Nobili from the Red Sea; the specimens in the Indian Museum are from the following localities:—

$\frac{96.95}{10}$	Market at Ennur, near Madras...	N. Annandale.	Few.
$\frac{96.96}{10}$	Backwater at Vizagapatam, Madras Pres. ...	S. Kemp.	Many.
$\frac{96.97-9}{10}$	Puri, Orissa Coast ...	{ N. Annandale, J. Caunter & S. Kemp.	Many.
$\frac{97.00}{10}$	Mouth of the Prai R., opposite Penang ...		
$\frac{97.01}{10}$	Patani R., below town of Patani, Siamese Malay States ...	N. Annandale.	Four.
		„	Few.

The specimens from the Patani river were found in water that was fresh at the time of their capture, but in a situation subject to tidal influence. Those from Puri were found in the open sea in water having a specific gravity of about 1.0260 (corrected).

The distribution of the species, so far as known, may be given as,—Red Sea, west side of Bay of Bengal, Penang, Gulf of Siam.

Acetes insularis, sp. nov.

(Text-figs. 1f, g, 2c, 3c, 4c, 5b, e, 7c.)

The eyes are about one-third the length of the carapace and do not differ in any marked degree from those of *A. erythraeus*.

The basal segment of the antennular peduncle of the female is about $1\frac{1}{2}$ times the length of the two ultimate segments combined; the second segment is about $3\frac{1}{2}$ times, and the third from $4\frac{3}{4}$ to 5 times as long as broad (text-fig. 1g). In the male the second segment is rather stouter than in the female, not more than $2\frac{1}{2}$ times as long as broad. The third is greatly lengthened, longer than the first and from 9 to 10 times as long as broad (text-fig. 1f).

The outer antennular flagellum of the male bears two clasping spines in place of the single one found in *A. indicus* and *A. erythraeus*; one spine is larger than the other, and the inner margins of both are smooth. The two basal segments of the flagellum are short. There is also a curious apparatus not met with in any of the other three species. The segment in advance of that which bears the two large spines bears, on the side remote from the spines, a large angular process pointing backwards and, on the same side, behind the proximal end of the same segment are two small spinules with their tips directed forwards. Judging from their appearance these structures form a subsidiary clasping apparatus that comes into action when the main grasping organ is opened to its fullest extent. The segments opposite the tips of

the large spines bear one or two long spinules near their distal ends (text-fig. 2c).

The external maxillipedes reach barely to the end of the second segment of the antennular peduncle and are slightly exceeded in length by the third peraeopods. There is no tooth on the inner margin of the basis of the latter pair of limbs.

The third thoracic sternite of the female is broadly triangular in shape; it is not grooved longitudinally and the anterior margin is elevated and more or less transverse (text-fig. 3c). The characters are difficult to see owing to the small size of the species.

The large procurved tooth found in *A. indicus* and *A. ery-*

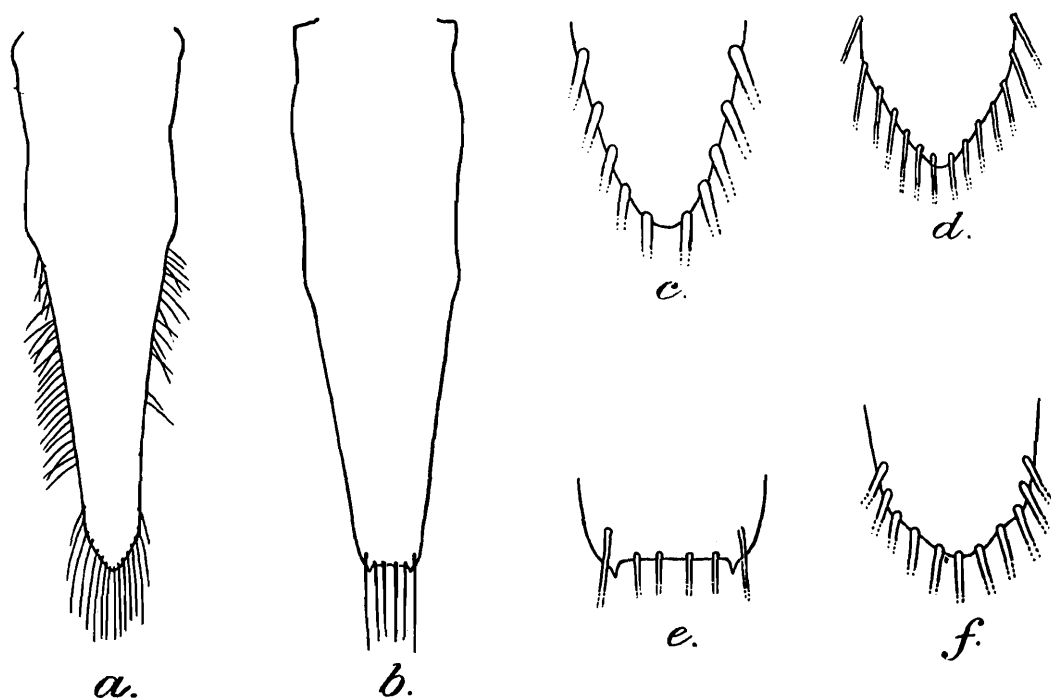


FIG. 5.--Telson in dorsal view.

a. *Acetes erythraeus*.

b. *Acetes insularis*.

Apex of telson in dorsal view.

c. *Acetes indicus*.

e. *Acetes insularis*.

d. *Acetes erythraeus*.

f. *Acetes japonicus*.

thraeus between the bases of the first pleopods is replaced by a small bluntly pointed process.

The internal lobe of the petasma is very greatly expanded at its proximal end, both internally and externally, and the posterior border is conspicuously emarginate. The distal portion somewhat resembles that of *A. indicus*, but is more swollen. At the tip there is a single great conical tooth and near the outer edge a series of 5 or 6 modified teeth (text-fig. 4c).

The telson is characteristic. It is shorter than in either of the two preceding species and reaches barely to the middle of the inner uropod. The angular termination of the lobe at the proximal end of the infero-lateral margin is placed midway between the base and the apex, whereas it is situated much nearer the base in the

two preceding species (*cf.* text-figs. 5*a* and *b*). The tip is truncate, straight or very slightly convex, and bears on either side a small tooth (text-fig. 5*e*). Occasionally one or other of these teeth is missing.

The ciliated and non-ciliated portions of the external border of the outer uropod are separated by a small tooth. In adults the non-ciliated part is from 1.2 to 1.4 times the length of the ciliated part (text-fig. 7*c*).

Acetes insularis is a small species, large females not exceeding 18 mm. in length.

The collection contains specimens from one locality only:—

$\frac{9714.6}{10}$	Mouth of Rajang R., Sarawak,			
	Borneo	...	...	Mus. Collr. Many.

The types bear the number 9714/10 in the register of the Zoological Survey of India.

Acetes japonicus, Kishinouye.

(Text-figs. 1*h*, *i*, 2*d*, 3*d*, 4*d*, 5*f*, 6, 7*d*.)

1905. *Acetes japonicus*, Kishinouye, *Annot. Zool. Japon.*, V, p. 163, text-figs.

The eyes resemble those of the two preceding species but are rather shorter, a little less than one-third the length of the carapace.

The basal segment of the antennular peduncle of the female is about $1\frac{1}{5}$ times the length of the second and third segments combined; the second segment is fully 3 times and the third $5\frac{1}{2}$ times as long as broad (text-fig. 1*i*). In the male the proportions of the second segment are about the same; the third segment is greatly lengthened as in *A. indicus* and *A. insularis*; it is longer than the basal segment and at least 10 times as long as broad (text-fig. 1*h*).

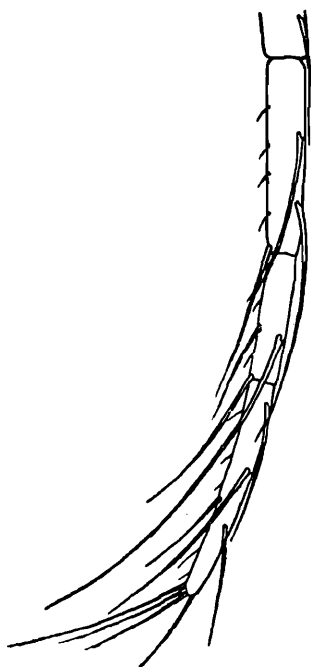


FIG. 6.—*Acetes japonicus*.
Terminal segment of outer
maxillipede.

The outer antennular flagellum of the female resembles that of *A. insularis* in the possession of two clasping spines, but does not bear the additional apparatus found in that species. One of the two clasping spines is very much longer than the other and is feebly serrate on its inner margin near the apex. The segments opposite the tips of the clasping spines each bear a small blunt process at the proximal end and one or two short spinules distally (text-fig. 2*d*).

The external maxillipedes do not reach quite so far forwards as the third peraeopods and extend to, or a little beyond the apex of the antennal scale. The terminal segment of the external maxillipede differs from that of all the other species in being divided into three sub-segments; of these the middle one is the shortest and the last the longest (text-fig. 6). There is no tooth on the inner margin of the basis of the third peraeopods.

The third thoracic sternite of the female is altogether peculiar; it projects backwards from the base of the third legs in the form of a large plate, posteriorly overlying the fourth sternite. It is slightly depressed in the middle line, its lateral edges are posteriorly convergent and its distal margin, which is free, and in consequence easily visible in lateral view, is conspicuously emarginate (text-fig. 3*d*).

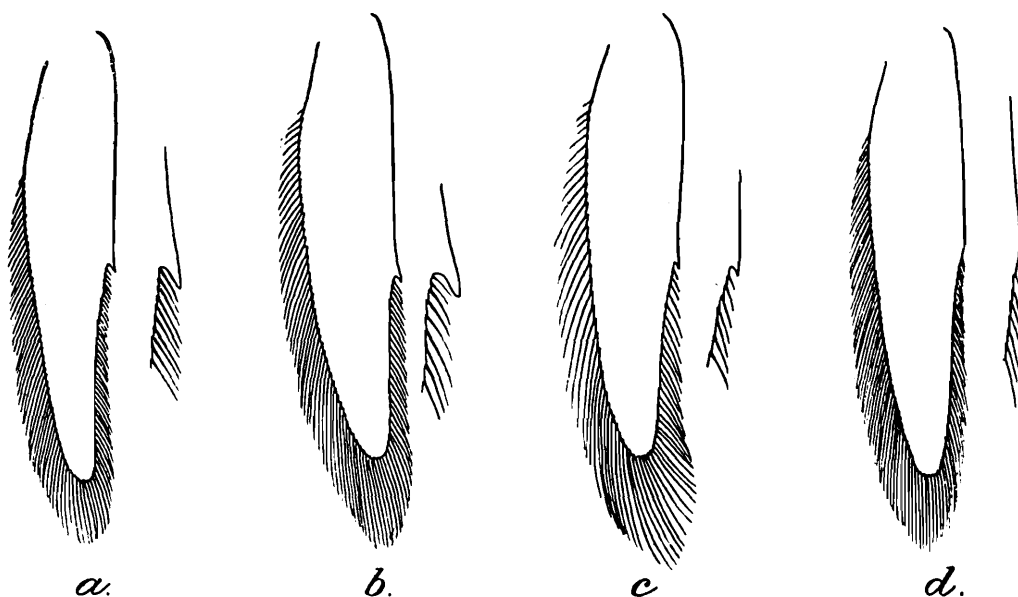


FIG. 7.—Outer uropod, with portion of external margin more highly magnified.

a. *Acetes indicus*.

b. *Acetes erythraeus*.

c. *Acetes insularis*.

d. *Acetes japonicus*.

The large-hooked tooth found in *A. indicus* and *A. erythraeus* between the bases of the first pleopods is replaced, as in *A. insularis*, by a small pointed process.

The internal lobe of the petasma is truncate at its proximal end and scarcely at all expanded. The distal portion is bulbous at the tip and set with numerous minute hooklets; on its outer side it bears a large process usually terminating in a long and very fine point (text-fig. 4*d*). The length of this pointed process is variable; sometimes it reaches to the end of the lobe to which it is attached, while occasionally it terminates abruptly with a blunted apex.

The sixth abdominal somite, in lateral view, is a little more slender than in the other species, its length being usually twice its greatest depth.

The telson resembles that of *A. erythraeus* and *A. indicus*, but the tip is rounded rather than pointed (text-fig. 5f). I have not been able to detect the pair of small teeth mentioned by Kishinouye, but the outer corners of the apex are sometimes a little angular.

The external border of the outer uropod differs from that of all the other three species in the complete absence of the tooth between the ciliated and non-ciliated portions. In adults, moreover, the latter part is a little longer than the former, the reverse being the case in the other forms (text-fig. 7d). In very young specimens the proportions are rather different, the non-ciliated part being equal to, or even a trifle longer than the ciliated part.

Large specimens reach a length of about 26 mm.

Acetes japonicus was described by Kishinouye from the Inland Sea of Japan and from Korea. Specimens in the Indian Museum are from the following localities:—

$\frac{9684.5}{10}$	Mormugao Bay, Portuguese India	...	S. Kemp.	Many.
$\frac{9686}{10}$	Kilakarai, Ramnad dist., S. India	...	„	Three.
$\frac{9694}{10}$	Ennur backwater, near Madras	...	N. Annandale.	Three.
$\frac{9687.9}{10}$	Mergui Archipelago, 11°17'—11°28'N., 98°29'—98°36' E	...	Investigator.'	Several.
$\frac{9690}{10}$	Patani R., below town of Patani, Siamese Malay States ...	...	N. Annandale.	Six.
$\frac{9691}{10}$	Tale Sap, near Singgora, G. of Siam	...	„	Many.
$\frac{9692}{10}$	From market, Osaka, Japan	...	„	Many.
$\frac{9693}{10}$	Niigata, Japan ...	...	?	Several.

In the Patani river the species was found in fresh water, but in a situation subject to tidal influence; in Mormugao Bay it was taken in water of specific gravity 1.0165 (corrected), while at Kilakarai it was obtained in pure sea water in the vicinity of a coral reef.

The species was found in the Mergui Archipelago and in the Tale Sap in company with *A. indicus*, and in the Patani river with *A. erythraeus*.

The known distribution may be summarised as,—W. and S. coasts of India, lower parts of Bay of Bengal, Gulf of Siam, Korea, Japan.



VIII DIPTERA OF THE SIMLA DISTRICT

By E. BRUNETTI.

INTRODUCTORY NOTE.

Mr. Brunetti has asked me to prefix an introductory note to his paper, which is based on the collections of the Indian Museum (Zoological Survey of India) and of the Imperial Agricultural Institute at Pusa. We have to thank Mr. T. Bainbrigge-Fletcher, Imperial Entomologist, for co-operation in the matter.

The term "Simla District" is not used in any precise geographical or political sense but merely to indicate localities in and at the base of the Himalayas near Simla whence specimens are available. The chief localities are Dharampur (alt. 5,000 ft.)¹, Kasauli (6,300 ft.), Simla (7,000 ft.), Phagu (9,000 ft.), Theog (8,000 ft.), and Matiana (8,000 ft.). The last three are on the Tibet-Himalayan road.

Most of these localities are, therefore, at considerable, but none at very great altitudes. It is important to remember that the Simla Himalayas, at any rate from 7,000 feet upwards, and also to a large extent at lower altitudes, lie practically in the Palaearctic Region. Such plants as the edelweiss flourish by the roadside, with roses, dandelions and primulas; and many of the butterflies are no more at most than races of those with which we are familiar in England. There are no tropical forests, but pine-woods and bare hillsides. It is, I think, important that this fact should be emphasized in dealing with an Indian district so remote in every way from what, in Europe, naturalists would attribute to India.

A large part of the material on which Mr. Brunetti has worked was collected by myself from year to year in the month of May, while I was on duty at Simla as a member of the Board of Scientific Advice, and the spring fauna is, therefore, better represented than that, which is probably richer, of the monsoon rains and early autumn. In the present state of our knowledge of the Indian Diptera, it is advisable to do no more than glance at certain of the groups of Brachycera, for example, the Muscinae Verae, the Asilidae and many of the Acalyptrata. A few conspicuous species may be safely identified, but the majority are best left unnamed until the different forms can be investigated, family by family, from different countries or at any rate from large areas. Much still remains to be done also among the Nemocera. Kiefler has been able merely to touch the fringe of the Chironomidae, and of the other families, which for the most part reach their adult stage in the wet season, Mr. Brunetti is not in a position to examine much material. The Mycetophilidae in particular are very imperfectly represented in collections, whilst the Cecidomyidae are quite unknown. This of course is through no fault of Mr. Brunetti, to whom we are indebted for by far the greater part of such knowledge as we possess of the Indian Diptera.

N. A.

Family MYCETOPHILIDAE.

Subfamily SCIARINAE.

Sciara indica, Walk.

Ins. Saund. Dipt., pt. V, p. 419.

Phagu, 21-V-16. Occurs at several Himalayan localities and as far south as Siliguri. It is conspicuous by the reddish or

¹ These altitudes are merely approximate.

yellowish side stripe on the abdomen, which is sometimes broken up into spots.

Sciara luteiventris, Brun.

Faun. Brit. Ind. Dipt., 1. 129.

Below Phagu, a unique ♀, 12-v-09.

Sciara rufithorax, Wulp.

For description see Brunetti, *Faun. Brit. Ind. Dipt.*, p. 128.

Simla, x-08 (*F. M. Howlett*).

Sciara setilineata, Brun.

Faun. Brit. Ind. Dipt., p. 138.

Simla, 10-v-09. Occurs also at Darjiling.

Sciara hirtilineata, Brun.

Faun. Brit. Ind. Dipt., p. 142.

Below Phagu, 12-v-09; Simla, 10-v-09.

Sciara nigripennis, Brun.

Faun. Brit. Ind. Dipt., p. 131.

Simla, x-08 (*F. M. Howlett*).

Sciara longipennis, Brun.

Faun. Brit. Ind. Dipt., p. 143.

Valley of the Sutlej River, below Simla, 6-v-10.

Sciara flavofemorata, Brun.

Faun. Brit. Ind. Dipt., p. 130.

Several of both sexes from Simla, x-08 (*F. M. Howlett*).

Sciara flaviseta, Brun.

Faun. Brit. Ind. Dipt., p. 144.

A unique ♀ from Simla, 10-v-09.

Sciara evanescens, Brun.

Faun. Brit. Ind. Dipt. p. 147.

Simla, 9-v-04.

Sciara parallela, Brun.

Faun. Brit. Ind. Dipt., p. 147.

A single ♂ from Simla, 9-v-09.

There are yet two or three small and obscure undetermined species of *Sciara* from the Simla District.

Subfamily **MACROCERINAE**.**Macrocera alternata**, Brun.

Faun. Brit. Ind. Dipt., p. 52.

Simla, x-08 (*F. M. Howlett*). One ♀ ; the dark bands on the 2nd and 3rd segments cover the whole hinder half of each segment.

Macrocera brunnea, Brun.

Faun. Brit. Ind. Dipt., p. 53, pl. i, fig. 5.

Phagu, 12-v-09.

Macrocera inconspicua, Brun.

Faun. Brit. Ind. Dipt., p. 54.

Simla, x-08 (*F. M. Howlett*). Three ♂ ♂.

Subfamily **CEROPLATINAE**.**Platyura limbata**, nom. nov.

For *P. marginata*, mihi (preocc. Mg. 1804).

Simla, x-08 (*F. M. Howlett*).

Platyura rufescens, Brun.

Isoneuromyia rufescens, Brunetti, *Faun. Brit. Ind. Dipt.*, App. p. 559.

Simla, 20-vii-11. I accept Mr. Edward's opinion (in litt.) that *Isoneuromyia* is not distinct from *Platyura*.

Subfamily **SCIOPHILINAE**.**Mycomyia bifascipennis**, Brun.

Faun. Brit. Ind. Dipt., p. 72.

Simla, x-08 (*F. M. Howlett*). The large basal dark patch on the wing in this specimen is interrupted at its middle, so as to form a smaller basal spot and a median stripe composed of two oblong spots placed diagonally, one above the other ; the upper one reaching from the costa, across the tip of the basal cell nearly to the upper branch of the 5th longitudinal vein ; the lower spot

is placed immediately below the upper one and is joined at the wing margin to the subapical dark band. In typical specimens, the large basal spot covers about one-third of the wing.

Mycomyia trilineata, Brun.

Faun. Brit. Ind. Dipt., p. 75.

Simla, 10-v-09 (*N. Annandale*); x-11 (*F. M. Howlett*), sweeping roadsides and in dense woods near the Dhobi Ghat.

Mycomyia indefinita, Brun.

Faun. Brit. Ind. Dipt., p. 76.

Simla, x-11, sweeping roadsides. This species is very near *trilineata* and may possibly be identical with it.

Mycomyia indica, Brun.

Faun. Brit. Ind. Dipt., p. 76.

Simla and Phagu, 10—12-v-09.

Subfamily MYCETOPHILINAE.

Leia winthemi, Lehm.

For description v. Brunetti, *Faun. Brit. Ind. Dipt.*, p. 97.

Simla, 25-iv-07, 5-v-07; 10-v-09; Matiana, 28—30-iv-07, also occurs at Naini Tal, Darjiling, Manipur, Sumatra, Europe and North America.

Leia nigricoxa, Brun.

Greenomyia nigricoxa, Brunetti, *Faun. Brit. Ind. Dipt.*, p. 87, pl. ii, fig. 8; pl. iii, fig. 9.

Leia spathulata, *id.*, *loc. cit.*, p. 101.

Phagu, 3-v-07, a single specimen.

Leia nigra, Brun.

Faun. Brit. Ind. Dipt., p. 101.

Simla, 9-v-09.

Leia arcuata, Brun.

Faun. Brit. Ind. Dipt., p. 99.

Simla, x-08 (*F. M. Howlett*). In this specimen the hind femora are quite blackish except for a broad pale band just beyond the middle. In typical specimens the legs are wholly yellowish.

Rhymosia flavolimbata, Brun.

Faun. Brit. Ind. Dipt., p. 103.

Simla, x-03 (*F. M. Howlett*).

Allodia nigrofasciata, Brun.

Faun. Brit. Ind. Dipt., p. 108.

Simla, 10-v-09 ; Kufri, 8,000 ft., May. Also occurs at Dehra Dun.

Exechia basilinea, Brun.

Faun. Brit. Ind. Dipt., p. 113, pl. ii, fig. 12.

Simla, x-08 (*F. M. Howlett*). Four specimens.

Mycetophila cinctiventris, Brun.

Faun. Brit. Ind. Dipt., p. 115.

Simla, 10-vii-09 (*N. Annandale*) ; x-08 (*F. M. Howlett*).

Mycetophila 4-fasciata, Brun.

Faun. Brit. Ind. Dipt., p. 115, pl. ii, fig. 13.

Simla, 10-v-04, a unique ♂

Mycetophila suffusa, Brun.

Faun. Brit. Ind. Dipt., p. 117.

Simla, 10-v-09, a single ♀

Mycetophila himalayensis, Brun.

Faun. Brit. Ind. Dipt., p. 117.

Simla, 10-v-09. Also occurs at Naini Tal.

Mycetophila binotata, Brun.

Faun. Brit. Ind. Dipt., p. 118.

Simla, 10 v-09 (*N. Annandale*) ; 8-x-11 (*F. M. Howlett*), on cow-dung. This species may possibly be synonymous with *himalayensis*. The form *binotata* also occurs at Darjiling and Manipur.

Delopsis brunettii, Edw.

D. collaris, Brunetti, *Faun. Brit. Ind. Dipt.*, p. 119.

Mr. Edwards changes the name¹ of this species to *brunettii*, as *Mycetophila collaris*, Ender., proves to be a *Delopsis*.

¹ *Ann. Mag. Nat. Hist.* (8) XII, p. 55 (1913).

Family BLEPHAROCERIDAE.

Blepharocera indica, Brun.*Rec. Ind. Mus.* IV, p. 316.*Faun. Brit. Ind. Dipt.*, p. 156, fig. 15.

Phagu, 12—15-v-00. Dr. Annandale found this species not uncommon on bathroom windows in Phagu dak bungalow.

Family BIBIONIDAE.

Subfamily BIBIONINAE.

Crapitula melanaspis, Wied.

For description see Brunetti, *Faun. Brit. Ind. Dipt.*, p. 161 (*Pleciomyia melanaspis*).

Theog, 27-iv-07. Occurs freely in the Himalayas, also in Siberia, China and Japan.

Plecia indica, Brun.*Faun. Brit. Ind. Dipt.*, p. 165.

Theog, 27-iv-07. Also occurs at Mussoorie, Darjiling, Nepal, Manipur and other places.

Plecia fulvicollis, F.

For description see Brunetti, *Faun. Brit. Ind. Dipt.*, p. 163.

Kalka, base of Simla Hills, 2,400 ft., 18-vii-11.

Plecia impostor, Brun.*Rec. Ind. Mus.* VII, p. 446.

Simla, 2 ♂♂, 2 ♀♀; x-08 and x-11 (*F. M. Howlett*). In bad condition but evidently this species. I described this species as possessing antennae of only nine joints, but though this is true of the ♂ the last joint being very small (though distinctly larger in one specimen), the ♀, on closer inspection, is found to possess eight flagellar joints, with a trace (in one antenna only) of a very minute apical additional joint, which however may only be apparent, caused by a stricture in the 8th joint.

Plecia dilatata, sp. nov.

♂ This is a species in every way resembling *Crapitula melanaspis*, Wied. (= *Pleciomyia dilatata*, *mihi*), but with the strict venation of *Plecia*.

It also naturally closely resembles *Plecia impostor* but differs in having a 12-jointed antenna, the last joint much narrower than the penultimate but distinctly longer and quite obvious. Also the hind tibiae are distinctly gradually dilated on the apical half

and the hind tarsi are distinctly incrassate. The hind legs in *C. melanaspis* ♂ are similar, but in *P. imposter* there is no trace of any thickening of either tibia or metatarsus.

Two ♂♂, one not in very good condition, from Simla, x-11 (F. M. Howlett). Type presented to the British Museum by Mr. T. B. Fletcher, the co-type in the Pusa collection.

***Bibio johannis*, L.**

For description v. Brunetti, *Faun. Brit. Ind. Dipt.*, p. 174.

Matiana, 28—30-iv-07; Theog, 2-v-07. Common in Europe.

***Bibio obscuripennis*, Meij.**

Bijd. tot. de Dierk., XVII, p. 86.

Brunetti, *Faun. Brit. Ind. Dipt.*, p. 170.

Matiana, 28—30-iv-07, near flowering crabapple trees, on which however they did not settle. Apparently common at many places in the Himalayas: Nepal; N E. Burmese Frontier; Naini Tal. I took it freely at Darjiling, 16-x-05.

***Bibio abdominalis*, Brun.**

Rec. Ind. Mus. IV, p. 276.

Phagu, 11-v-09. A conspicuous species, as the abdomen is wholly black in the ♂ and reddish yellow in the ♀

***Bibio discalis*, Brun.**

Rec. Ind. Mus. IV, p. 278.

Phagu, 11-v-09. Two ♀♀, taken between Kufri and Phagu, 18—21-v-16 (N Annandale and S. Kemp), may be a variety or a closely allied species. The antennal scape, palpi, proboscis, thorax and scutellum are all wholly black, the wings distinctly brownish, the costa darker, the stigma dark brown, conspicuous. There are no pale anterior and side margins to the thoracic dorsum.

***Bibio hortulanoides*, Brun.**

Rec. Ind. Mus. IV, p. 274.

Kufri to Phagu, 8,000-9 000 ft., 18-v-16. Very near *B. hortulanus*, a common species in Europe. The ♂ is black and the ♀ reddish, as in *abdominalis*.

***Dilophus graciosus*, Big.**

Four. Asiat. Soc. Bengal, LIX, p. 265.

Brunetti, *Faun. Brit. Ind. Dipt.*, p. 178.

Simla, x-08 and x-11 (F. M. Howlett); Theog, 2-v-07; Phagu, 11-v-09; also occurs in the plains, at Darjiling and Upper Burma

and probably Yunnan in South China. It has been taken "at light."

Subfamily *SCATOPSINAE*.

Scatopse nigronitida, Brun.

Rec. Ind. Mus. IV, p. 281.

Dharampur, 5,000 ft., 14-v-08, "on trunks of trees" (*N. Annandale*).

Family *SIMULIIDAE*.

Simulium indicum, Becher.

Four. Asiat. Soc. Bengal, LIII, p. 199.

Brunetti, *Faun. Brit. Ind. Dipt.*, p. 191.

Simla, 24-iv-07. Occurs in Mussoorie, Darjiling, Sylhet, the Khasi Hills, and Manipur, probably the most widely distributed species of the genus in India. It is a vicious "biting" fly.

Simulium senile, Brun.

Rec. Ind. Mus. IV, p. 288.

Phagu, 8-v-07, a unique ♂.

Simulium aureohirtum, Brun.

Rec. Ind. Mus. IV, p. 287.

Simla, x-1911, both sexes not uncommon. Occurs also in Assam and Bombay.

Family *CHIRONOMIDAE*.

Subfamily *CERATOPOGONINAE*.

Ceratopogon (s.g. *Prohelia*) *decipiens*, Kieff.

Mem. Ind. Mus. II, p. 182, pl. xi, fig. 10.

Simla, 10-v-08, a single ♂.

Culicoides montivagus, Kieff.

Mem. Ind. Mus. II, p. 188, pl. viii, fig. 3.

Simla, 11-v-08.

Subfamily *TANYPINAE*.

Tanypus himalayae, Kieff.¹

Rec. Ind. Mus. VI, p. 333.

Barogh, 10-v-10.

¹ Kieffer has described his species of *Tanypus* under the inadmissible generic name of *Pelopia*.

Tanypus oriplanus, Kieff.

Rec. Ind. Mus. VI, p. 125, ♂ (*Isoplastus*).
Loc. cit., IX, p. 161, ♀

Simla, 25-iv-07. Only a single pair were known, and the ♂ is now apparently lost.

Tanypus riparius, Kieff.

Rec. Ind. Mus. VI, p. 332.

Barogh, 10-v-10, a unique specimen.

Tanypus saltatrix, Kieff.

Rec. Ind. Mus. VI, p. 330.

Simla, 9-v-10, "in numbers at dusk, males aerial dancing" (*N. Annandale*).

Subfamily *CHIRONOMINAE*.**Metriocnemus callinotus**, Kieff.

Rec. Ind. Mus. VI, p. 175.

Simla Hills, 25-iv-07, a unique ♂.

Metriocnemus fusiger, Kieff.

Rec. Ind. Mus. VI, p. 348.

Simla, 12-v-08.

Camptocladius monticola, Kieff.

Rec. Ind. Mus. VI, p. 346.

Simla, 11-v-08. The unique type, a ♀, reduced to a fragment.

Rhopalocladius himalayae, Kieff.

Rec. Ind. Mus. VI, p. 347.

Barogh, 10-v-10. Type completely destroyed.

Orthocladius (s.g. *Trichocladius*) **anomalus**, Kieff.

Rec. Ind. Mus. IX, p. 124.

Valley of Sutlej River, below Simla, 6-v. Also occurs at Darjiling.

Chironomus polius, Kieff.¹

Rec. Ind. Mus. VI, p. 339.

Kasauli, 16-v-08.

¹ Kieffer has described his species under the inadmissible generic name of *Tendipes*.

Chironomus nepalensis, Kieff.*Rec. Ind. Mus.* VI, p. 339.

Simla, 11-v-08. Also occurs in Nepal.

Chironomus stictogaster, Kieff.*Rec. Ind. Mus.* VI, p. 341.

Simla, 12-v-08.

Family **PSYCHODIDAE**.Subfamily **PHLEBOTOMINAE**.**Phlebotomus major**, Annand.*Rec. Ind. Mus.* IV, p. 46, pl. v, fig. 4; pl. vi, fig. 4.Simla, July (*N. Annandale*).Subfamily **PSYCHODINAE**.**Psychoda bengalensis**, Brun.*Rec. Ind. Mus.* II, p. 370.

Simla, v-08 (*N. Annandale*); x-08 (*F. M. Howlett*); Phagu, 11-v-09; Barogh, 10-v-10; Dharampur, 13-v-08; Kasauli, 15-v-08. The commonest of the Indian species, extending all over the plains, and to Ceylon and Burma.

Psychoda nigripennis, Brun.*Rec. Ind. Mus.* II, p. 376.

Simla, 10-v-08 (*N. Annandale*); x-1911 (*F. M. Howlett*); Phagu, 11-v-09; Kasauli, 15-v-08. Common in Calcutta and many parts of the plains.

Psychoda hirtipennis, Brun.*Rec. Ind. Mus.* IV, p. 300.Simla, x-08, one specimen (*F. M. Howlett*).**Pericoma spinicornis**, Brun.*Rec. Ind. Mus.* II, p. 378, ♂.*P. appendiculata*, Brunetti, *l.c.*, p. 379, ♀

Simla, May; Phagu, 11-v-09 (*N. Annandale*); x-11 (*F. M. Howlett*). Also occurs at Naini Tal, Darjiling and Siliguri. The sexes originally described by me as two species with the suggestion that they probably represented a single species.

***Pericoma margininotata*, Brun.**

Rec. Ind. Mus. II, p. 381.

***P. margininotata* var. *bella*, Brun.**

Pericoma bella, Brun., *Rec. Ind. Mus.* II, p. 383.

Simla, 25-iv-07; 11-v-08; 9—10-v-09; Phagu, 11—15-v-09; 18—21-v-16. The variety *bella* appears commoner than the typical form.

***Pericoma metatarsalis*, Brun.**

Rec. Ind. Mus. IV, p. 305.

Simla, 9 and 12-v-09; Phagu, 11-v-09.

***Pericoma mixta*, Brun.**

Rec. Ind. Mus. IV, p. 306.

Simla, 6-v-09, a unique ♀

Family CULICIDAE.

***Anopheles barianensis*, James & Liston.**

Anoph. Mosq. India, 2nd Ed., p. 76.

Christophers, *Ind. Four. Med. Res.* III, p. 489.

Simla and Kasauli, up to 6,000 and 8,000 ft. Occurs at Murree and elsewhere.

***Anopheles turkhudi*, Liston.**

Ind. Med. Gazette, XXXVI, p. 441.

Kasauli, breeding freely in small pools at 4,000 ft., and found in bungalow at 6,000 ft. Also occurs at Murree and elsewhere.

***Anopheles simlensis*, James & Liston.**

Anoph. Mosq. India, 2nd Ed., p. 41 (*Patagiamyia*).

Kasauli. Also occurs at Murree.

***Culex mimeticus*, Noe.**

Bull. Ent. Soc. Ital., XXXI, p. 240.

Theog, May 2nd, a single specimen, identified by Dr. Annandale.

Family DIXIDAE.

***Dixa montana*, Brun.**

Rec. Ind. Mus. IV, p. 265.

Simla, 10-v-09; Barogh, 10-v-10; Phagu, 11-v-09

Dixa maculipennis, Brun.*Rec. Ind. Mus.* IV, p. 266.

Matiana, 28—30-iv-07. Also found at Darjiling.

Dixa bifasciata, Brun.*Rec. Ind. Mus.*, IV, p. 269.

A single ♀ from Phagu, 12-v-09.

Family TIPULIDAE.

Subfamily TIPULINAE.

Tipula brunnicauda, Brun.*Faun. Brit. Ind. Dipt.*, p. 332.

Simla, 11-v-08; Theog, 13-v-09. Occurs in the Gahrwal District, Western Himalayas, also.

Tipula griseipennis, Brun.*Faun. Brit. Ind. Dipt.*, p. 321.

Matiana, 28—30-iv-07. Described first from the Gahrwal District.

Subfamily LIMNOBIINAE.

Dicranomyia pulchripennis, Brun.*Faun. Brit. Ind. Dipt.*, p. 376, pl. vii, fig. 8; pl. xi, fig. 2.

Simla, x-08. Also common at Mussoorie, Darjiling, the Kumaon District and other localities, easily recognised by the prettily marked wings.

Geranomyia vinaceobrunnea, Brun.*Rec. Ind. Mus.* VI, p. 274.Simla, x-08 (*F. M. Howlett*). A unique ♀**Limnobia triangularis**, Brun.*Faun. Brit. Ind. Dipt.*, p. 406.A unique ♀ from Barogh, 10-v-10, taken at the edge of a small stream (*N. Annandale*).**Rhipidia antennatus**, Brun.*Ceratostephanus antennatus*, Brun., *Rec. Ind. Mus.* VI, p. 272.,, ,, *Id.*, *Faun. Brit. Ind. Dipt.*, p. 407, pl. xi fig. 17.

Simla, a unique ♂, 24-iv-07.

Another specimen of *Rhipidia* in bad condition except that the antennae being well preserved proves it to belong to this genus from Simla, x-08 (*F. M. Howlett*).

***Antocha indica*, Brun.**

Faun. Brit. Ind. Dipt., p. 426, pl. viii, fig. 12.

Phagu, 12-v-09; Theog, 2-v-97. Also found at Kurseong and on the Assam-Bhutan Frontier.

***Rhypholophus pulcher*, Brun.**

Faun. Brit. Ind. Dipt., p. 442, pl. viii, fig. 16.

Phagu, 11-v-09. Also occurs at Naini Tal.

***Molophilus inconspicua*, Brun.**

Faun. Brit. Ind. Dipt., p. 444.

Simla, 12-v-09. Also occurs at Kurseong and at various localities in Travancore State, South India.

***Erioptera grandior*, Brun.**

Faun. Brit. Ind. Dipt., p. 456, pl. viii, fig. 18.

A single ♀ from Simla, 10-v-09.

***Gonomyia flavomarginata*, Brun.**

Faun. Brit. Ind. Dipt., p. 472.

Simla, 12-v-08. Also occurs at Darjiling and Kurseong.

***Symplecta punctipennis*, Mg.**

Syst. Besch. Europ. Dipt. I, p. 147, pl. v, figs. 2, 3, 7.
Brun., Faun. Brit. Ind. Dipt., p. 486, pl. ix, fig. 15.

Matiana, 28—30-iv-07. Also not uncommon at Darjiling and in many parts of Europe.

***Claduroides fascipennis*, Brun.**

Rec. Ind. Mus. VI, p. 289.
Faun. Brit. Ind. Dipt., p. 505, pl. x, figs. 7, 8.

Phagu, 12-v-09. It has been also taken at Darjiling and Kurseong.

***Claduroides sordida*, Brun.**

Rec. Ind. Mus. VI, p. 290.

Simla, 10-v-09; 12-v-09. Also occurs at Kurseong

Trichocera ocellata, Walk.*Ins. Saund. Dipt.* pt. V, p. 433.Brun., *Faun. Brit. Ind. Dipt.*, p. 510.

A single ♀ from Theog, 2-v-07, has been always regarded by me as this species, though no actual corroboration of identity has been possible.

Trichocera punctipennis, Brun*Faun. Brit. Ind. Dipt.*, p. 511, pl. x, fig. 13.

Simla, 23—25-iv-07, tolerably common.

Rhaphidolabis indica, Brun.*Faun. Brit. Ind. Dipt.*, p. 519, pl. x, fig. 15.

Theog, 27-iv-07; Matiana, 28—30-iv-07; Phagu, 18—21-v-16.

Rhaphidolabis fascipennis, Brun.*Claduroides fascipennis*, Brun., *Rec Ind. Mus.* VI, p. 289.

Phagu, 12-v-09. Occurs also at Darjiling, Kurseong and in the Kumaon District.

Rhaphidolabis sordida, Brun.*Claduroides sordida*, Brun., *Rec Ind. Mus.* VI, p. 290.,, ,, *Id.*, *Faun. Brit. Ind. Dipt.*, p. 506.

Simla, 10-v-09; 12-v-09. Also occurs at Kurseong.

Eriocera nepalensis, Westw.*Caloptera nepalensis*, Westw., *Ann. Soc. Ent. France*, IV, p. 681.*Pterocosmus velutinus*, Walk., *List. Dipt. Brit. Mus.* pt. I, p. 79.For description v. Brun., *Faun. Brit. Ind. Dipt.*, p. 543.

Dharampur, 5,000 ft., 6—8-v-07.

Family RHYPHIDAE.**Rhyphus fenestralis, Scop., var. indicus, Brun.***Rec. Ind. Mus.* IV, p. 261.

Simla, 24-iv-07; 10-v-09; Matiana, 28—30-iv-07. Also common at Darjiling and Kurseong; it extends to Manipur, Assam. Usually taken on windows of houses and out-houses.

Rhyphus divisus, Brun.*Rec. Ind. Mus.* IV, p. 263.*Faun. Brit. Ind. Dipt.*, p. 557, pl. xii, fig. 7.

Phagu, 12-v-06. An immature specimen is probably this species, which occurs not uncommonly at Darjiling, Kurseong, and Gangtok.

Family STRATIOMYIDAE.

Subfamily BERINAE.

Chorisops tibialis, Mg.

Syst. Besh. II, p. 3, pl. xii, fig. 8 (*Beris*).

Verrall, *British Flies*, V (Stratiomyidae, etc.), p. 214.

Kufri to Phagu, 8,000-9,000 ft., 21-v-16.

This European species was first recorded by me as occurring in India (*Rec. Ind. Mus.* VII, p. 456, 1912) on a specimen taken by Mr. Imms of the Forest Research Institute, in the Kumaon District, 28-v-12.

Subfamily SARGINAE.

Sargus metallinus, F.

For description see Wied., *Ausser Zweifl. Ins.* II, p. 36.

Pinjore, Patiala State, 17-vii-11; Simla, x-11 (*F. M. Howlett*).

Family TABANIDAE.

Subfamily PANGONINAE.

Corizoneura longirostris, Hardw.

Trans. Linn. Soc. Lond., XIV, p. 135, pl. vi, figs. 5, 6.

Ricardo, *Rec. Ind. Mus.* IV, p. 365.

Kasauli, 6,300 ft. (*Christophers*).

Subfamily TABANINAE.

Tabanus orientis, Walk.

List Dipt. Brit. Mus. pt. I, p. 152.

Ricardo, *Rec. Ind. Mus.* IV, p. 195, pl. xiv, fig. 18 (front view of head).

Simla, 7,000 ft. (*K. T. Pease*); 8-v-10 (*N. Annandale*); Mashobra, Simla Hills, 7,000 ft., 1909 (*K. T. Pease*).

Tabanus excelsus, Ricardo.

Ann. Mag. Nat. Hist. (8) XI, p. 543.

Mashobra, Simla Hills, 7,000 ft.

Therioplectes subcallosus, Ricardo.

Rec. Ind. Mus. IV, p. 227.

Mashobra, Simla Hills, 7,000 ft. (*K. T. Pease*).

Theriopectes hirtus, Walk.*Ins. Saund. Dipt.*, p. 52.Ricardo, *Rec. Ind. Mus.* IV, p. 228.

Mashobra, Simla Hills, 7,000 ft., 1909 (*K. T. Pease*); Phagu, 18—21-v-16; 11-v-09; Kufri, 11-v-09; Kufri to Phagu, 18-v and 21-v-16; Simla, 16-v-09.

Family BOMBYLIDAE.

Subfamily ANTHRACINAE.

Argyramoeba obscurifrons, Brun.*Rec. Ind. Mus.* III, p. 216.

Phagu, 14—15-v-09, a single ♀

Anthrax paniscus, Rossi.

For description see Schiner, *Fauna Austriaca*, I, p. 50; also Verrall, *British Flies*, V, Stratiomyidae, etc., p. 526.

Brun., *Rec. Ind. Mus.* II, p. 452.Simla, x-06 (*H. M. Lefroy*).**Anthrax himalayensis**, Brun.*Rec. Ind. Mus.* III, p. 322 (fig.).*Anthrax maura*, Brun., *loc. cit.*, II, p. 451.

Phagu, 18—21-v-16; Kufri to Phagu, 18-v-16; Simla, 7,000-9,000 ft., 12—16-v-09. Very near *maura*, L. of Europe, as which I at first recorded it from Naini Tal.

Anthrax aperta, Walk.*Ins. Saund. Dipt.*, pt. 3, p. 180.

Four from Simla, 16-v-09. Taken on *Sedum* and the common marguerite.

Anthrax approximata, sp. nov.

♀ India, Ceylon, Assam, etc. Long. 11-12 mm.

This species is very close to *clara*, Walk., yet certainly distinct. The scales on the frons and face vary from yellow to snow white; in one specimen being yellow on both parts, in others yellow on frons and white on face, those of the latter colour encroaching to some extent on lower part of frons: in one example snow white on practically the whole of both the frons and the face; sometimes some yellow scales around the mouth parts amidst the white ones.

Abdomen not uniformly pubescent as is probably the case in *clara*, but with distinct transverse bands of yellow or whitish scales at base of segments, those on the 2nd and 4th being widest, extend-

ing on the former segment nearly to the middle, and on the latter much further, especially towards the sides. Hind borders of 6th segment with conspicuous snow white scales and a large bunch of longer ones on about the hinder half of each side. Sides of 5th segment and anterior half or more of 6th with long very dark blackish brown scales. Dorsum of abdomen, except for the transverse bands, with black scales, wholly covered with soft fine pubescence, and with a row of black bristles on hind border of 5th, 6th and 7th segments; becoming stronger on each successive segment: a row of fine yellow hairs before the hind border on first four segments and a few fine yellow hairs on dorsum of basal segments. Costal cell clear or faintly obscured, subcostal cell dark brown, the colour not extending further hindward: anterior cross vein a little before middle of discal cell, the exact position apparently rather variable. In all else as in *clara*.

Described from five females in the Indian Museum. Simla, 7-8,000 ft., 28-v-14, *type* (Capt. Evans); Simla, 7,000 ft., 16-v-09; Siliguri, base of Darjiling Hills, 28-iii-10; Dawna Hills, Tenasserim, 2,000-3,000 ft., 2-3-iii-08; Kawkareik, Amherst Distr., Tenasserim, 5-iii-08¹; 23-iii-10 (all *N. Annandale*). In the British Museum from the Khasi Hills, 1878 (*Chennell*); Trincomalee, Ceylon, 12-x-90; 12-xi-90 (*Col. Yerbury*); Nilaveli, Ceylon, 19-vii-91 (*Col. Yerbury*). The two specimens alluded to by me in my first paper on Bombylidae as allied to *clara*, Walk., are amongst those now referred to *approximata*.

Anthrax fuscolimbata, sp. nov.

♀ Western Himalayas.

Long. 15 mm.

Head. Frons forming one-third the width of the head at level of antennae, less than half as wide at vertex; covered with yellowish impressed scales and black pubescence, the scales in the neighbourhood of the antennae sometimes becoming gradually whitish. On the face they are, in the three examples present, wholly snow white in the type, and yellowish white and yellowish respectively in the other two specimens. Antennae black, 1st joint with long black bristles, 2nd with a ring of shorter bristles, 3rd elongate conical, tapering to a rather long style. Proboscis dull yellowish or obscure. Occiput with a border of snow white minute scaly pubescence behind eyes, some small yellow scales on upper part.

Thorax black, covered more or less with small impressed yellow scales; anterior and side margins, shoulders and pleurae covered with dense brownish yellow elongate scales which are paler on the meso- and sternopleurae, or sometimes altogether paler. A fine rather short sparse black pubescence present on dorsum, sometimes remaining after nearly all the yellow scales have been worn off. Scutellum black, with small yellow impressed scales,

¹ Erroneously quoted as 5-ii-08 in *Rec. Ind. Mus.* II, p. 474.

a little fine yellow hair and a row of black bristles on hind margin.

Abdomen black, with transverse bands of yellowish, yellowish grey or whitish small scales, broadest on 2nd and 4th segments where, especially towards the sides, they reach up to or beyond the middle of each segment: a narrow basal band on 3rd segment and a narrow band on hind margins of 5th and 6th. A large bunch of brownish yellow elongate scales towards and on sides of 1st, 2nd and 3rd segments; dorsum of 1st bearing sparse concolorous fine hairs. Sides of 3rd and 4th segments with elongate brownish yellow scaly pubescence which is paler on the latter; sides of 5th and 6th segments with numerous elongate dark brown scales and long black bristles, the posterior part of the side of the 6th segment bearing a conspicuous bunch of elongate snow white scales; 7th segment with black scales only; all the dorsal surface of abdomen, which is not occupied by pale scales, covered with minute impressed black scales; sparse pale fine hairs on about basal half of dorsal surface, replaced on the remainder by black ones, hind margins of segments with a row of black bristles. Belly with a broad transverse band of yellowish scales beyond middle; remaining segments with white scales; whole surface of belly plentifully covered with long yellowish or yellowish grey hairs, with fine black hairs towards tip. Genitalia brownish yellow with circlet of reddish brown blunt spines and black pubescence.

Legs black, coxae with grey or whitish rather long pubescence; femora and tibiae with small white or yellowish grey scales and rows of black bristles.

Wings nearly clear, the brown suffusion on anterior part in type specimen limited to subcostal cell; in the 2nd specimen extending from costa up to but not encroaching on discal cell, dying away towards tip; anterior cross vein just before middle of discal cell; halteres cream yellow.

Described from three paratype ♀♀ in the Indian Museum, neither one of the three being in sufficiently good condition to regard as an ultimate type; Simla, 7-8,000 ft., 26-v-14 (*Evans*); Mussoorie, 6,500 ft. (*Bond*); Guindy, Madras (*Patton*).

Subfamily BOMBYLINAE.

Bombylius major, L.

For description see Schiner, *Fauna Austriaca*, I, p. 60, and Verrall, *British Flies*, V (Stratiomyidae, etc.), p. 497.

Brun., *Rec. Ind. Mus.* II, p. 457 (Notes).

Simla Hills, 28-iv-07 and 4-v-07; Simla, 10—13-iv-14 (*Capt. Evans*); Matiana, 28-iv-07; Kufri, 4-v-07; Kodiali, 8,400 ft.

Dischistus resplendens, Brun.

Rec. Ind. Mus. II, p. 481.

Dharampur, 5,000 ft., 6—8-v-07; below Theog, 7,000 ft., 14-v-09. Also occurs in Assam.

Systoechus socius, Walk.*Ins. Saund. Dipt.* pt. 3, p. 201.

Near Theog, 7,000 ft., 14-v-09. This seems a fairly well distributed species extending from the Himalayas to Ceylon; Kashmir, Kumaon, Dehra Dun, Sikkim, and the Kangra Valley, and several localities in Ceylon.

Usia sedophila, Brun.*Rec. Ind. Mus.* III, p. 227.

Common on *Sedum rosulatum*, the white stone-crop at Simla, 16-v-09, where Dr. Annandale first discovered it. He found it again at Phagu on the same plant, 18—21-v-16. The sexes exhibit some difference in the markings of the head and thorax.

Usia marginata, Brun.*Rec. Ind. Mus.* III, p. 228.

A single ♂ taken by Dr. Annandale at Simla in company with the first series of *U. sedophila*.

Empidideicus indicus, sp. nov.

♀ Simla.

Long. 1 mm.

♀ Frons apparently about one-fourth the width of the head, yellowish; antennae black; proboscis more than $1\frac{1}{2}$ times height of head.

Thorax black, practically bare; humeri bright yellow;

Abdomen black, hind margins of segments pale yellow, and a yellow transverse line across middle of 1st and 2nd segments.

Legs black, knees and tips of tibiae yellowish.

Wings pale grey; auxiliary vein short, ending free: 1st vein ending at middle of costa; praefurca beginning at middle of 1st vein; 2nd vein very short, directed abruptly upwards, ending in 1st vein near tip; 3rd vein in line with praefurca, simple, ending a little before wing tip; 4th vein forked at half its length after quitting basal cells, the portion dividing those cells hardly less distinct; 5th forked, base of upper branch forming lower side of 2nd basal cell; 6th vein reaching wing border. First basal cell a little longer than 2nd; bifurcation of praefurca opposite tip of 2nd basal cell.

Length 1 mm.

Described from four paratype specimens in the Indian Museum in very indifferent condition taken by Dr. Annandale at Simla, 7,000 ft.

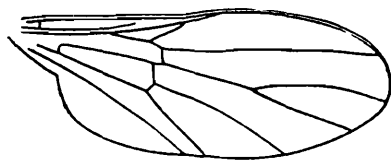


FIG. 1.—*Empidideicus indicus*,
sp. nov., wing.

The present species conforming to all the generic characters, except the presence of the 2nd vein, may be regarded, at least temporarily, as a true *Empidideicus*. Becker says, "2nd and 3rd veins anastomosed." In his species also, the basal cells are equal in length, and he does not mention the auxiliary vein, which, however, is easily overlooked in *indicus*.

Family NEMESTRINIDAE.

Hirmoneura annandalei, Licht.

Rec. Ind. Mus. IX, p. 333.

Simla, 9-v-10; Kufri, 11-5-59; Kufri to Phagu, 21-v-16.

Hirmoneura opaca, Licht.

Rec. Ind. Mus. IX, p. 334.

Simla.

Hirmoneura cingulata, Licht.

Rec. Ind. Mus. IX, p. 333.

Simla Hills, 9,000 ft., 12-v-09.

Family THEREVIDAE.

Thereva bilineata, sp. nov.

♀ Simla District.

Long 11½ mm.

Head. Frons at vertex distinctly more than $\frac{1}{3}$ of the head, at level of antennae, over half the head; its upper two-thirds yellowish brown, the rest, with the face, ash grey; whole frons with scattered black hairs of moderate length; face wholly covered with long pendant whitish grey hair, extending over cheeks and lower part of occiput; some black hairs below or around the mouth; proboscis reddish brown. Antennae black, first two joints with strong black bristles, 3rd as long as 1st. Vertical triangle barely raised; a row of rather strong bristles along upper occipital margin, a second row a short distance behind the first.

Thorax dark brown, nearly black, with two distinct yellowish white well-separated dorsal stripes from anterior to hind margin, and minute yellowish sparse pubescence. A row of five powerful spines behind the humerus, extending towards wing base; two supra-alar (post-sutural), one post-alar; a large and lesser one on each side margin of scutellum and a pair of apical scutellar decussate nearly perpendicular ones. Pleurae ash grey with long whitish grey pubescence. Scutellum ash grey with a large brown spot at base, hind margin with soft yellow hairs as well as the bristles.

Abdomen black; 1st segment grey, with yellow pubescence on hind margin and whitish hairs at sides; rest of segments with

distinct ash grey hind border, which is always narrowest in middle, this border bearing some yellow or yellowish white pubescence; sides of 2nd and 3rd segments with whitish hairs; remainder of dorsum and at sides with short black pubescence; 7th segment shining chestnut brown; genitalia the same, marked with yellow, fairly prominent; belly black, all segments except 1st with well-defined bare hind margins.

Legs. Femora black, with depressed white pubescence and a short row of bristles in middle of underside; tibiae brownish yellow, darker at tips, fore pair with three (inner row wanting), posterior pairs with four rows of strong spines; tarsi brownish yellow or dark brown, joints paler at base, shortly pubescent.

Wings pale grey, normal, halteres black.

Described from a unique ♀ in the Indian Museum from Theog, Simla District, 8,000 ft., 1-v-07 (*N. Annandale*).

This species bears some resemblance to my *flavolineata*.

There is an undetermined ♀, a species of *Thereva*, from Phagu, 18—21-v-16, in the Indian Museum.

Family SCENOPINIDAE.

Scenopinus fenestralis, L.

For description see Verrall, *Brit. Flies*, V (Stratiomyidae), p. 597.

Kasauli, 6,300 ft., 15-v-08; Barogh, 5,000 ft., 10-v-09; 10-v-10.

Family EMPIDAE.

Subfamily *EMPINAE*.

Empis rostrata, Brun.

Rec. Ind. Mus. IX, p. 25.

Theog, 1-v-07, a unique ♀

Pachymeria marginata, sp. nov.

♀ Simla District. Long. 5 mm. to tip of ovipositor.

Head. Frons ash grey, with parallel sides; ocellar triangle large, black; palpi bright orange. Antennae all black, 3rd joint considerably broadened at base, style joints distinct. Occiput bluish grey, with bristles and stiff hairs.

Thorax moderately dark grey with a slight yellowish tinge. Two dark median, well separated narrow stripes from anterior margin to well beyond middle of thorax. An outer stripe each side, foreshortened, enlarged into an irregularly shaped and rather indefinite elongated large spot behind the suture. Dorsum covered with short black hairs except on the stripes. Pleurae colorous with black hairs; a bunch of bristly hairs on each humerus. Two macrochaetae just in front of the wing base, and a

fringe of long stiff black hairs on each side of the metanotum. Scutellum concolorous, with four marginal bristles.

Abdomen moderately dark ash grey; hind margins of segments shining black, the colour extending forwards in the centre nearly or quite to the anterior margin; 5th segment wholly grey, 6th and 7th segments grey, shining black at bases. Belly grey. Ovipositor black.

Legs. Coxae grey, brownish yellow at tips. Femora in no way incrassated, brownish yellow, a brown streak on upper side of fore pair, and traces of such on middle pair. Tibiae and tarsi brownish yellow, tips of joints of latter black. Femora with soft black pubescence, longest on underside of posterior pairs; hind pair with a row of eight or more bristles. Tibiae with soft black pubescence and longitudinal rows of bristles; tarsi pubescent.

Wings very pale yellowish grey; unmarked; stigma absent; halteres brownish yellow.

Described from a single ♀ in the Indian Museum, taken between Kufri and Phagu, 21-v-16 (*N. Annandale* and *S. Kemp*).

This species bears a general resemblance, in the ♀ sex at least, to the common European *P. femorata*, which might well occur in the Himalayas, but is readily distinguished by the hind femora showing no trace of incrassation as in *femorata*.

***Rhamphomyia himalayana*, Brun.**

Rec. Ind. Mus. IX, p. 28.

Matiana, 28—30-iv-07, a unique ♀.

***Rhamphomyia unifasciata*, Brun.**

Rec. Ind. Mus. IX, p. 29.

Simla, 12-v-08. Also occurs at Dehra Dun.

***Hilara compacta*, Brun.**

Rec. Ind. Mus. IX, p. 30.

Simla, 16-v-09; 9-v-09.

Subfamily HEMERODROMIINAE.

***Clinocera obscura*, Brun.**

Rec. Ind. Mus. IX, p. 34.

Simla, 10-v-09.

***Clinocera glaucescens*, sp. nov.**

♀ Simla District.

Long. $3\frac{1}{2}$ mm.

Head. Frons greyish brown, the colour extended over vertex

and in a broad stripe on the occiput. Face, under part of head and rest of occiput, blue grey. Proboscis and the moderately long palpi dark brown. Antennae black, style long, black, curved downwards. Ocellar bristles very long; a row of bristles behind the orbit on the occiput.

Thorax. Dorsum wholly greyish brown, remainder all bluish grey. The chaetotaxy apparently consists of one humeral, one notopleural and four dorso-central bristles. Scutellar apical bristles long.

Abdomen. Dorsum wholly greyish brown under side wholly bluish grey; in one specimen (not the type), the dorsal surface is more or less bluish grey on apical half.

Legs. Coxae bluish grey, remainder black, minutely pubescent.

Wings very pale grey, nearly clear, iridescent.

Described from two ♀ ♀ in the Indian Museum from Phagu, 18—21-V-16 (*N Annandale* and *S. Kemp*).

***Microdromia dorsalis*, Brun.**

Chelipoda dorsalis, Brun., *Rec. Ind. Mus.* IX, p. 33.

Barogh, 5,000 ft., 10-V-10, on banks of a small stream (*N Annandale*).

***Dolichocephala 7-notata*, Brun.**

Rec. Ind. Mus. IX, p. 35.

Simla, 10-V-09, a unique ♂

Subfamily TACHYDROMINAE.

***Tachydromia latifascipennis*, sp. nov.**

♂ ♀. E. and W. Himalayas. Long. $2\frac{1}{4}$ – $2\frac{1}{2}$ mm.

Head. Eyes separated above by a moderately broad frons of uniform width, contiguous on underside. Head shining black, bare. Antennal 1st joint moderately long, of usual shape, 2nd shortly conical with long apical bristle, both joints brownish yellow. Proboscis dark brown; palpi rather elongate, with long whitish grey pubescence and a long apical black bristle. Occiput grey. A pair of bristles behind the vertex, a few shorter ones on back of head.

Thorax elongate, as broad as abdomen, humeri not constricted from mesonotum; wholly shining black, bare. Scutellum and pleurae black. A distinct prealar bristle.

Abdomen black, moderately shining, nearly bare, ♂ genitalia large, ♀ abdomen tapering, ovipositor normal.

Legs black; fore coxae distinctly but not greatly enlarged, sometimes with a pale spot on outer side; fore femora greatly

incrassated, in some specimens the basal part is brownish yellow, in others there are two pale spots on outer side, near base, in some examples the whole femur is blackish brown. About the basal half of all metatarsi yellowish.

Wings grey, with two broad blackish bands, occupying the greater part of the wing, and extending from costa to hind margin, leaving the middle part of the wing rather narrowly clear, and a moderately wide clear wing tip and base. The blackish bands are darker anteriorly.

Described from a few of each sex in the Indian Museum from Darjiling, 8—11-viii-09, including ♂ *type*, 11-viii-09 (*J T Jenkins*), and *type* ♀, 8-viii-09 (*C. A. Paiva*); Dharampur, Simla, 5,000 ft., iv—v-08; Simla, 7,000 ft., 11-v-08 (both *N. Annandale*).

Tachydromia gentilis, Brun.

Platypalpus gentilis, Brun., *Rec. Ind. Mus.* IX, p. 40.

Simla, 10-v-09. I took it at Darjiling in May 1910.

Platypalpus gentilis, Brun.

Rec. Ind. Mus. IX, p. 40.

Simla, 10-v-09. Also taken by me at Darjiling in May.

Tachypeza palliditibiae, Brun.

Platypalpus palliditibiae, Brun., *Rec. Ind. Mus.* IX, p. 41.

Simla 11 v-08, a unique ♂

Tachypeza incisa, Brun.

Platypalpus incisus, Brun., *Rec. Ind. Mus.* IX, p. 41.

Simla, 20 vii-11; a unique ♂

Family PIPUNCULIDAE.

Pipunculus quartarius, Brun.

A specimen from Simla, 7-v-10, was provisionally referred to this species by me, but a closer examination makes the identity very doubtful.

Pipunculus uniformis, sp. nov.

♂ Simla.

Long. nearly $2\frac{1}{2}$ mm.

Head Eyes contiguous for about half the distance from the moderately large vertex to the antennae. Frons and face brownish, silvery white seen from above. Antennae brown, 3rd joint, at least at the narrowed and lengthened tip, with white pubescence, arista black. Occiput moderately puffed out, blackish grey.

Thorax rather dark cinereous brown, sides dull, metanotum grey.

Abdomen rather dark cinereous brown, 1st segment a little greyish on hind corners, 5th segment barely longer than 4th; genitalia concolorous above, large, blacker and shining below, as broad as last segment of abdomen.

Legs mainly black, tips of femora brownish yellow; base and tips of tibiae brownish yellow, apparently to an irregular extent; tarsi more or less brownish yellow, darker towards tips. Hind femora shining black on inner side.

Wings clear, stigma weak, brownish; anterior cross vein at about one-third of the discal cell; halteres dirty yellow.

Described from a unique ♂ from Simla, October, 1908 (*F. M. Howlett*). In the Pusa collection.

Family SYRPHIDAE.

Subfamily SYRPHINAE.

***Bacha tinctipennis*, Brun.**

Rec. Ind. Mus. II, p. 51, pl. xi, fig. 6.

Kufri to Phagu, 21-v-16. First described from Bhim Tal.

***Paragus indicus*, Brun.**

Pipizella indica, Brun., *Rec. Ind. Mus.* II, p. 52.

Paragus indica, *id.*, *loc. cit.*, XI, p. 201.

Matiana, 28—30-iv-07. Also occurs in Nepal.

***Chilosia nigroaenea*, Brun.**

Rec. Ind. Mus. XI, p. 204.

A unique pair, the ♂ from Matiana, the ♀ from Simla, 7-v-10.

***Chilosia plumbiventris*, Brun.**

Rec. Ind. Mus. XI, p. 205.

A single ♀ from Simla, 7-v-10.

***Syrphus*, Fab.**

Nearly a dozen species of this extensive Palaearctic genus occur in the Simla District, but in view of the fact that several are identical with European species it would be risky to describe those I cannot satisfactorily determine.

***Syrphus balteatus*, DeGeer.**

For description v. Verrall, *British Flies*, VIII (Syrphidae), p. 390.

Simla, 26-iv-07 (*Capt. Evans*); Theog, 27-iv-07; Valley of Sutlej River, 6-v-10.

A very widely distributed species extending over all Europe, a great part of North America, over North Africa and through Northern Asia to Japan. Common in the plains of India also.

Syrphus pyrastris, L.

For description v. Verrall, *British Flies*, VIII (Syrphidae), p. 334 (*Catabomba*).

Theog, 27-iv-07 ; Simla, 5-vii-07.

Syrphus torvus, Os. Sac.

For description v. Verrall, *British Flies*, VIII (Syrphidae), p. 356.

Two of each sex from Matiana, 28—30-iv-07. Common in Europe and North America.

Syrphus luniger, Mg.

For description v. Verrall, *British Flies*, VIII (Syrphidae), p. 385.

A single ♂ from Theog, 27-v-07. Common in Europe.

Syrphus umbellatarum, F.

For description v. Verrall, *British Flies*, VIII (Syrphidae), p. 409.

One ♂, Matiana. A well known European species.

Syrphus salviae, Wied.

Auss. Zweifl., II, p. 122.

Simla, viii-14 (*Capt. Evans*).

Syrphus, spp.

Several other undetermined species of this genus yet remain, but it is impossible at present to deal with them in view of so many European species being known to occur in the district.

Platychirus albimanus, F.

For description v. Verrall, *British Flies*, VIII (Syrphidae), p. 280.

Theog, 27-iv-07 ; Matiana ; Simla, 9-v-10.

A very common and widely distributed European species. The melanoid or nearly wholly black form is not rare and one such specimen was recorded erroneously by me¹ as *Melanostoma dubium*, Zett.

¹ *Rec. Ind. Mus.* I, p. 168.

Melanostoma mellinum, Linn.**Melanostoma scalare**, Fab.**Melanostoma orientale**, Wied.

For descriptions see Verrall, *British Flies*, VIII (Syrphidae), pp. 309 and 311, and Wied., *Auss. Zweifl.*, II, p. 139.

The specimens originally referred by me to *scalare* are certainly *orientale*, Wied., and in my second paper on Oriental Syrphidae¹ I have suggested that Wiedemann's species is only a variety of *mellinum*. Assuming the identity, the species has been taken at Theog., 27-iv-07; Simla, 24-iv-07 and Matiana, 28—30-iv-07.

Melanostoma ambiguum, Fln.

For description see Verrall, *British Flies*, VIII (Syrphidae), p. 304.

A single ♂, undoubtedly of this species, from Matiana.

Melanostoma dubium, Zett.

For description see Verrall, *British Flies*, VIII (Syrphidae), p. 307.

Erroneously recorded by me from Matiana. See note under *Platychirus albimanus* on previous page.

Sphaerophoria, St. Farg.

As noted in my second paper on Oriental Syrphidae the species in this genus offer exceptional difficulties, beyond the two common ones, *scutellaris*, F. and *javana*, Wied. In that paper I described four "forms," all occurring in the Simla District, to three of which provisional names were given. These are: Form 1, *flavoabdominalis*, Simla, 6—8-v-07; Form 2, Simla, 6—8-v-07; Form 3, *nigritarsis*, Matiana, 28—30-iv-07; Theog, 24-iv-07; Kodiala, Simla District; Form 4, *viridaenea*, Simla, 16-v-09; Theog, 2-v-07.

Rhingia laticincta, Brun.

Rec. Ind. Mus. II, p. 58.

Simla, 7-v-10; Phagu, 18—21-v-06. Occurs also at Mussoorie and Darjiling.

Rhingia angusticincta, Brun

Rec. Ind. Mus. II, p. 59.

Theog, 27-iv-07; between Kufri and Simla, 4 (?14)-v-10.

¹ *Rec. Ind. Mus.* XI, p. 201 (1915).

Subfamily *VOLUCELLINAE*.*Graptomyza flavonotata*, sp. nov.

Simla District.

Long. $3\frac{1}{2}$ mm.

Head wholly lemon yellow, sparsely beset with short pale hairs; vertical triangle black, ocelli red; tip of snout with a few black stiff hairs; proboscis brownish yellow, black towards tip. Antennae with 1st two joints dark brown, bristly, upper half of 3rd joint dark brown, lower half brownish, yellow arista microscopically pubescent; antennal prominence shining brownish yellow with some stiff black hairs.

Thorax lemon yellow. Whole dorsum from anterior to posterior margins, but leaving fairly broad side margins, shining black, with rather dense short pale yellow pubescence. Two small oval, well separated, lemon-coloured spots on hind margin, placed longitudinally. Scutellum yellow, with a slightly brownish tinge and a marginal fringe of long stiff pale bristly hairs. Sides of thorax black; an inverted pear-shaped pale lemon yellow spot of considerable size on sternopleura, with two smaller oval ones placed longitudinally lower down, one under the larger spot, the other under the wing base. A round pale yellow spot on the propleura.

Abdomen brownish yellow, darker brown on apical half; 2nd segment with three black spots on hind margin, the outer two oval, placed longitudinally and clear of the side margin, the middle one roughly triangular, the apex pointing forward; 3rd segment with two similar oval side spots, the oval middle one placed nearly on anterior margin; 4th segment with a pair of oval side spots considerably obscured by the brownish ground colour. Whole abdomen minutely pale pubescent.

Legs lemon yellow, hind coxae and tips of tarsi blackish; tip of hind femora broadly and hind tibiae and tarsi wholly black. The minute pubescence is yellow or black respectively, following the ground colour.

Wings almost clear, stigma pale brown, halteres lemon yellow.

Described from a single specimen in the Indian Museum taken between Kufri and Phagu, 21-v-16 (N. Annandale and S. Kemp).

Subfamily *ERISTALINAE*.*Eristalis*, Latr.

The species of this genus in the East are very numerous and much further study is required even of those already described before we can consider them at all well known. Many were described from unique specimens, and do not appear to have been met with since, whilst probably some of Walker's types have been lost. Many are very closely allied and require to be studied from numerous or at least several specimens of each, side by

side with their congeners. Only five species can be definitely identified from Simla.

***Eristalis tenax*, L.**

This world-wide species is probably to be found all through the summer months, occurring freely at all the Himalayan places of resort. The dates of the specimens before me are Phagu, 18—21-v-16 (*N. Annandale* and *S. Kemp*); Simla, 12—13-v-13 (*N. Annandale*), and Matiana.

***Eristalis himalayanus*, Brun.**

E. ursinus, Big., preocc. Jaen.

One ♀ from Phagu, 18—21-v-16 (*N. Annandale* and *S. Kemp*).

***Eristalis solitus*, Walk.**

Simla, 12—13-v-13 (*N. Annandale*); Kasauli, 6,300 ft., 15-v-08 (*N. Annandale*).

This species is apparently found all along the 5,000 to 9,000 ft. level of the Himalayas, being common at Darjiling, Mussoorie and Naini Tal. It extends through the East apparently, as I took specimens in Yokohama in May 1906, and Dr. Annandale found it at Otsu near Kyoto in October 1915. The transverse light and dark bands on the thorax are less distinct in the ♀ than the ♂, being sometimes almost indistinguishable; the abdominal bands are often pinkish, the 2nd (overlapping hind margin of 2nd and base of 3rd segment) sometimes comparatively broad, occasionally nearly as broad as the 1st band. The eyes are rather densely pubescent, the hair being brown above and whitish on their lower part; the arista long plumose for half its length, on both sides, there generally being two or three hairs more on the lower side.

***Eristalis albibasis*, Big.**

One ♀, Simla, 16-v-09 (*N. Annandale*), agrees perfectly with Bigot's description.

***Eristalis arvorum*, F.**

This common Indian species occurs at Simla, Matiana, Theog, Phagu and Kufri.

It is a fairly distinct species in both sexes, and like *tenax* and *solitus* is tolerably easy to recognize when once it is understood. Meijere gives *quadrilineatus*, F., as a synonym.

***Eristalis* sp.**

Two ♂♂ and a ♀ from Kasauli, 15-v-08 and Phagu, 18—21-v-16, must approximate to *kobusi*, Meij., but the abdominal marks are quite different. The principal point of resemblance

is a long black bare streak on each side of the face, reaching from about the base of the antennae nearly to the mouth border. A further specimen from Kumaon is in the Indian Museum.

Subfamily *MILESINAE*.

***Eumerus halictoides*, Brun.**

Rec. Ind. Mus. XI, p. 242.

Simla, 9-v-09. Also occurs at Darjiling.

***Eumerus aeneithorax*, Brun.**

Rec. Ind. Mus. XI, p. 244.

A unique ♂ taken by Capt. Evans at Simla in August, 1914.

***Eumerus perpensa*, sp. nov.**

♀ Simla District.

Long. 7 mm.

Head. Frons and face æneous black, seen to be grey dusted when viewed at a low angle; frons with rather dense dark brown and yellow hairs; face with white pubescence. Antennae moderately dark brown on outer side, pale brown on inner side, arista black, bare. Mouth parts pale brown. Occiput black, the margin white dusted.

Thorax æneous blue black, shining, with two narrow whitish well separated median stripes ending some distance before the scutellum, which latter is blue black. Dorsum of thorax with yellow pubescence, that on the scutellum is greyish. A little yellowish pubescence on anterior half of side margins of thorax. Sides of thorax æneous black, with greyish pubescence, except for a fan-shaped row of bright yellow hairs in front of the wing base.

Abdomen shining æneous blue black with minute greyish pubescence, which is only obvious at the side margins and on the spots. The usual three pairs of sublunate spots placed on the hinder half of the 2nd, 3rd and 4th segments, only the latter pair extending over the side margins. The spots are of about equal width, the 3rd pair more indistinct; all being white haired. Each pair of spots begins at about the middle of the segment, well separated at their inner upper ends; the 2nd pair terminating a little further from the hind margin of the segment than the 1st pair; whilst the 3rd pair terminate still further from the hind margin than the 2nd pair. Belly more or less pale brown. Some longer white pubescence at sides of 2nd segment.

Legs mainly æneous black, shining. Tips of femora rather narrowly, about basal half and inner sides of anterior tibiae and base of hind tibiae, also tips of all tibiae, brownish yellow. Tarsi brown with pale pubescence, hind pair with gold brown

pubescence on underside. A row of six small black spines below hind femora near the tip.

Wings vitreous, iridescent; stigma brown, small, distinct; halteres brownish yellow.

Described from a single perfect ♀ in the Indian Museum from Phagu, 18—21-v-16 (*N. Annandale* and *S. Kemp*).

***Eumerus perplexa*, sp. nov.**

♀ Simla.

Long. just over 7 mm.

Allied to *perpensa* but shewing the following differences. Antennae blackish, with greyish bloom, not lighter on inner side. Dorsal pale thoracic stripes appear to be less distinct. Abdomen deeper blue black and the white pubescence on the spots and sides of abdomen a little more conspicuous. Middle tibiae and tarsi wholly orange, latter a little obscure on upper side; hind tarsi more orange than in *perpensa*. Wing distinctly grey.

In length barely longer, but a stouter built species.

A unique ♀ in the Indian Museum, Simla, 12—13-v-13 (*Annandale*).

***Myiolepta himalayana*, Brun.**

Rec. Ind. Mus. XI, p. 233, pl. xiii, figs. 12, 13.

Matiana, marked "S. 15" (probably meaning Sept. 15th).

***Criorhina dentata*, Brun.**

Rec. Ind. Mus. II, p. 87.

Kodiali, Simla Hills, 8,000 ft., a unique ♂ This species may possibly require the erection of a new genus to receive it.

Subfamily CHRYSTOXINAE.

***Chrysotoxum 6-fasciatum*, Brun.**

Rec. Ind. Mus. II, p. 89, ♀; XI, p. 254, ♂

Simla, 9-v-10 Originally described from the United Provinces, India.

Family CONOPIDAE.

***Occemyia atra*, Fab.**

For description see Schiner, *Faun. Austr.* I, p. 382.

Kufri to Phagu, 21-v-16.

Family MUSCIDAE.

Subfamily MUSCINAE.

At least three of the commonest, almost cosmopolitan species may be presumed to occur in all parts of the Simla District, throughout the summer as in most other parts of the Indian hills.

Calliphora vomitoria, Linn.

For description see Schiner, *Faun. Austr.* I, p. 584.

Matiana; Simla. One of the common blowflies.

Calliphora erythrocephala, Mg.

For description see Schiner, *Faun. Austr.* I, p. 584.

Simla; Theog. The commonest species of blowfly.

Stomoxys calcitrans, L.

For description v. Brun., *Rec. Ind. Mus.* IV, p. 68.

Simla, x-11. The common stable fly.

Bdellolarynx sanguinolentus, Aust.

Ann. Mag. Nat. Hist. (8) III, p. 290.

Described from specimens from India, Ceylon and Assam, the type ♂ being taken by me near Calcutta, now in the British Museum. A good series of both sexes from Pusa, in the Pusa collection, taken from October to March (both inclusive). One headless immature specimen is labelled "reared from eggs laid 7-i-14; hatched 9-i-14; pupated 19-i-14; emerged 29-i-14, C.S.S. Pusa." Also taken "on buffalo at Annandale, Simla District, x-1911; Simla, x-1911 [Howlett]; Kasauli, 8-viii-15 (Mitter).

If *Bdellolarynx* is really generally distinct from *Haematobia* the best character is the greater width of the frons, there being always a distinct though narrow space between the eye margins, whereas these latter in *Haematobia* usually almost touch one another for an appreciable distance, and in some specimens they actually do touch. Austen's description of the legs in *sanguinolentus* is rather indefinite, as he does not specially mention the tibiae, which from inference would therefore be included in the general description of the fly as "mouse-grey or slate-grey." The tibiae are usually brownish yellow varying in shade, and in some examples, especially if somewhat immature, they and the femora also are pale brown. Mr. Mitter has described its life-history (*Ind. Journ. Med. Res.*, III, p. 583, 1916).

Haematobia sanguisugens, Aust.

Ann. Mag. Nat. Hist. (8) III, p. 288.

Haematobia rufipes, Brun *Rec. Ind. Mus.* IV, p. 65.

This species was described from males only, and my *H. rufipes* from females only. Mr. Mitter has called my attention both in his paper and personally to *rufipes* being synonymous with Austen's species, and an examination of further specimens of both sexes proves this to be the case. In the ♂ the legs are black or nearly so, except for the narrow pale bases of all the tibiae. In

the ♀ all the tibiae and the posterior femora are brownish yellow, the fore femora usually blackish grey, except at the tips, but these may conceivably be pale also in some individuals.

Both sexes were bred by Mr. Mitter at Kasauli. The unique type of my *rufipes* is from Darjiling, 29-ix-08, taken by me. The species occurs also at Simla, x-1911, ♂ ♀ (*Howlett*); Kasauli, 7-ix-16 (*Mitter*).

This species is closely allied to the European *H. stimulans*, Mg. from which Mr. Austen distinguished it. It should also be near *tibialis*, Rob. Desv., of Europe, but in that species the anterior tarsi are orange as well as the tibiae, and the hind tibiae are brown. *Tibialis* is only 3 mm. in length, *sanguisugens* 5 to 6 mm.

Interesting notes on the breeding habits are given by Mr. Mitter (*Ind. Journ. Med. Res.*, III, p. 530, 1916).

***Stygeromyia maculosa*, Aust.**

Ann. Mag. Nat. Hist. (7) XIX, p. 445.

This species also has been bred by Mr. Mitter at Kasauli, the examples presented by him to the Indian Museum, 1 ♂ and 4 ♀ ♀, being dated 10-viii-16. The life history is described by him (*loc. cit.*, III, p. 395, 1915).

***Graphomyia* sp.**

One ♀ taken from Kufri to Phagu, 21-v (*N. Annandale* and *S. Kemp*), which bears considerable resemblance to the *G. maculata*, Scop. of Europe.

In all probability several other common European muscinids will be found to occur in and around Simla, *Musca corvina*, Fab., for instance, recorded already from various parts of India, one or more species of *Lucilia*, *Pollenia rudis*, Fab., *Curtoneura stabulans*, Fln., and one or both of the known Indian species of *Lyperosia*.

Subfamily ANTHOMYINAE.

Numerous European species will almost certainly be found to occur in the Simla District. Some years ago I sent all my Oriental Anthomyiinae to Prof. Stein, most of which were collected by me in Mussoorie and Darjiling, and though they have not been returned, he acknowledged their safe arrival, noting in a postcard that several species were identical with Palearctic forms. The four species definitely identified by me are as follows:—

***Homalomyia canalicularis*, Linn.**

For description see Schiner, *Faun. Austr.* I, p. 654.

Simla District; Matiana, 28—30-iv-07; Theog, 2-v-07.

***Limnophora tonitruui*, W**

Auss. Zweifl. II, p. 429.

Brun., *Rec. Ind. Mus.* I, p. 381.

Dharampur, 13-v-08.

Spilogaster himalayensis, Brun.

Rec. Ind. Mus. I, p. 382 (*Limnophora*); II, p. 107 (correction).

Phagu, 18—21-v-16; Theog, 2-v-07; Dharampur, 6—8-v-07.

Anthomyia pluvialis, Linn.

For description see Schiner, *Faun. Austr.* I, p. 647.

Simla, x-08 (*F. M. Howlett*); viii-14 (*Capt. Evans*); Theog, 2-v-07.

MUSCIDAE ACALYPTRATA.

Subfamily CORDYLURINAE.

Scatophaga stercoraria, Linn.

For description see Schiner, *Faun. Austr.* II, p. 18.

Simla, 24-iv-07; 5-v-07.

The very common dung-fly of Europe, North America, and North Asia. Two other species of *Scatophaga* occur in the district, but they have not yet been identified.

Subfamily HELOMYZINAE.

Dryomyza formosa, Wied.

Auss. Zweifl. II, p. 447 (*Scatophaga*).

Dryomyza maculipennis, Macq., *Dipt. Exot. Supp.* IV, p. 273.

Simla District, 24-iv-07; Phagu, 18—21-v-16; Simla.

I took this species at Mussoorie, and it occurs also at Darjiling and other places, extending as far east as Japan.

Sepedon ? plumbellus, Wied.

Auss. Zweifl. II, p. 577.

Simla District; Dharampur, 6—8-v-07.

Not uncommon around Calcutta near water from January to July. The Vienna Museum dipterologist returned specimens of this form as probably incorrectly identified.

Sepedon crishna, Walk.

Proc. Linn. Soc. London, V, p. 191.

Matiana, 28—30-iv-07.

Subfamily HETERONEURINAE.

Trigonometopus montanus, sp. nov.

♂ ♀ Simla.

Long. 4 mm.

Head about twice as deep in profile as eyes. Frons and vertex brownish yellow, lower part of frons covered with very short black bristles; an indistinct pale brown median stripe, and traces of one on each side towards anterior margin, contiguous to eyes; 3

fronto orbital, 1 vertical, 1 postvertical and 1 ocellar bristle. Occiput blackish, eye margins with a row of strong bristles with shorter ones behind them. Vertical triangle black, ocelli distinct. A small dark brown oval mark on each side from eye margin to base of antenna. Lower part of head whitish; a row of strong bristles on cheeks from back of head nearly to antennae. Antennae yellowish, 2nd joint with a circlet of strong black bristles, and additional ones; 3rd joint with pale microscopic pubescence and long black dorsal arista, yellowish at base. Proboscis rather long, thick, pale, yellowish, the very small slender palpi at the middle, with three or four long black bristles.

Thorax dull brownish yellow, dorsum with four pale mauve brown stripes, the two median ones continued to tip of the pale yellow scutellum. Pleurae brownish; 3 dorso-central, 2 notopleural, 1 pteropleural; a basal and apical scutellar bristle.

Abdomen, ground colour dull brownish yellow with short pubescence, but the hind margins of the segments broadly brown; in fact this colour covers most of the dorsum, leaving a central pale space occupying most of the 2nd and 3rd segments. Belly yellowish. In what I take to be the ♂ specimen is a globular process at the tip of the abdomen bearing two comparatively large conical protuberances below. In the other specimen no genitalia are visible.

Legs pale yellowish, microscopically bristly; tarsi tips blackish; fore femora with a row of long bristles on upper, outer and under sides; subapical tibial bristle prominent.

Wings pale brownish yellow, paler posteriorly; both cross veins narrowly but distinctly suffused; halteres dirty yellowish, knobs blackish.

Described from two specimens in the Indian Museum taken between Kufri and Phagu, 21.V.16 (*N. Annandale* and *S. Kemp*).

Both my *trilineatus* and the rather widely distributed European *frontalis* seem closely allied to the present species. The unmarked wing in the latter easily distinguishes it from *trilineatus*, whilst *frontalis* possesses the rudiment of an additional cross-vein.

Subfamily HELOMYZINAE.

Helomyza unicolor, sp. nov.

♂ ♀ Simla.

Long. 5 mm.

♀ Wholly brownish yellow, almost orange; lower part of frons brighter, almost chrome yellow; upper part and vertex a little deeper. Under side of head pale whitish yellow or yellowish. Antennae deep orange, arista black, pale at extreme base, pubescent. Sides of thorax paler; pleurae with almost whitish reflections in certain lights.

Abdomen with a blackish band on hind margin of all segments, sometimes indistinct on 2nd segment, the band varying in intensity and width, sometimes filling nearly all the apical segments; a row of strong bristles on hind margin of each segment. The colour of the abdomen varies to more brownish or to pinkish brown;

genitalia concolorous, in ♂ globular, hairy, rather large; in ♀ smaller and normal.

Legs yellowish, tips of tarsi black; hind tibiae a little darkened just beyond base. Fore femora with a row of about 6 long bristles on upper side, a row of long thin hairs, curved at tips, on inner side, and long stiff black hairs on under and outer sides. Middle femora with a row of black bristles on inner side, two rows of closely placed small black spines on under side, with several very long hairs towards base. Hind femora the same, but the small bristles on under side more numerous, and the long basal hairs absent. Tibiae uniformly pubescent, subapical bristle conspicuous; apical spur on middle pair. Some longer stiff bristles on under side of fore tarsi at base.

Wings pale grey; halteres orange.

Described from several specimens in good condition from Phagu, 9,000 ft., 18—21-V-16 (*N. Annandale* and *S. Kemp*).

Subfamily SCIOMYZINAE.

Sciomyza costalis, sp. nov.

Simla District.

Long. $5\frac{1}{2}$ mm.

Head cinereous grey, a bare, moderately broad olive grey stripe on each side of frons from upper corner of eye, the stripes uniting a little below the lowest ocellus, the colour then becoming merged in the more yellowish lower part of frons, which is covered with very short bristly hairs. A moderately distinct short brownish streak placed diagonally towards each lower corner of the frons; the lower margin itself with some silvery white shimmerings here and there. Ocelli distinct, red. Upper sides of frons, and the ocellar triangle with small bristly hairs. A brownish yellow band across the face at level of antennae, with a black spot filling the space between the antenna and the eye margin. Face, underside of head and mouth opening pale yellowish, nearly bare except for short bristly hairs around the latter and extending towards the occiput. Antennae brownish yellow, 3rd joint paler below, first two joints with a whitish shimmer seen from above; 3rd joint as long as 1st and 2nd together; arista black, distinctly plumose on upper and under sides nearly to tip. Proboscis brownish yellow; 2 fronto-orbital, 2 ocellar, 1 vertical and 2 post-vertical bristles.

Thorax cinereous grey, thickly beset with very short black bristles; mesopleura and propleura pale yellowish grey; rest of pleurae nearly ash grey. Sternopleura with minute soft hairs; 1 humeral, 1 presutural, 2 notopleural, 3 supra-alar, 1 inter-alar just behind the suture with a much smaller one just in front of it; a weak propleural and 2 strong pteropleural. Scutellum with 1 basal, placed near the side margin, and 1 apical.

Abdomen cinereous grey, with a broad angular dorsal black stripe composed of a large subquadrate spot in the middle of each

segment, broader on anterior than on posterior margin; whole dorsal surface of abdomen with short black bristles. Belly cinereous grey with shorter black pubescence.

Legs brownish yellow, entirely covered with short black stiff hairs; tips of femora with traces of a dark brown ring; tips of tibiae, whole of front tarsi and last joints of posterior tarsi black.

Wings pale grey; anterior margin (except costal cell) with a moderately dark brown band, the colour limited by the 2nd longitudinal vein up to middle of wing, beyond which it extends a little behind that vein; it is sharply delimited a little before the wing tip, leaving the tips of the submarginal and 1st posterior cells practically clear. The colour from the tip of the 2nd longitudinal vein dying away gradually hindward. In this darker grey part are traces of two or three paler spaces in the neighbourhood of the posterior cross-vein. Anterior cross-vein just perceptibly diffused. Halteres brownish yellow.

Described from a single perfect specimen taken between Kufri and Phagu, 21-v-16 (*N. Annandale* and *S. Kemp*), in the Indian Museum.

Subfamily SAPROMYZINAE.

Several species of the genus *Sapromyza* have been collected, but not yet identified. The Indian Museum collection in this group is at present being worked out by Prof. Bezzi.

Subfamily TRYPETINAE.

Vidalia cervicornis, sp. nov.

♂ ♀. Simla.

Long. 4-5 mm.

Head brownish yellow, frons sometimes a little deeper; face and underside of head whitish yellow; ocellar triangle black.

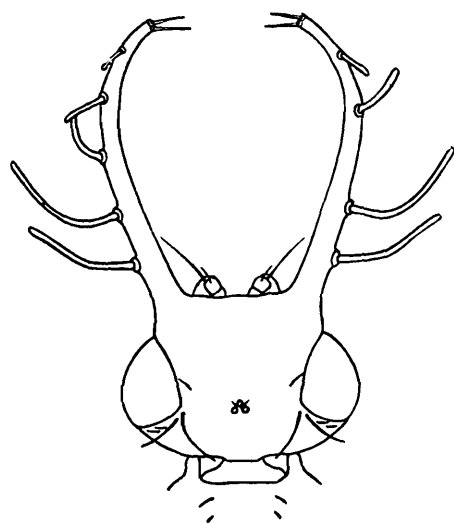


FIG. 2.—*Vidalia cervicornis*, sp. nov., head.

Proboscis, palpi and antennae brownish yellow, arista black, microscopically pubescent. Eyes green. Occiput brownish yellow, with four thin brown perpendicular lines; the inner pair short, the outer ones reaching upper corners of eyes and sometimes bifid.

The ♂ has the frons produced on each side in the form of horns (generic character), and only the upper pair of fronto-orbital bristles occur on the frons, the remainder being placed on the horn-like appendages, one horn bearing five, the other four, whilst the tip of each bears two such bristles.

The ♀ has five long fronto-orbital bristles (two upper, three lower), the lower pair decussate.

The other head bristles (in both sexes) are: 2 vertical; 1 post vertical, small; 1 ocellar, very small; the occipital row normal.

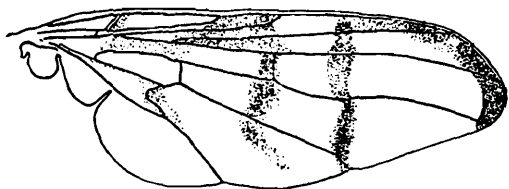


FIG. 3.—*Vidalia cervicornis*, sp. nov., wing.

Thorax brownish yellow, two thin, darker, well separated median lines, the space between with a slight greyish yellow tinge, the anterior end of this stripe sometimes brown; 1 humeral, 1 dorso-central, 1 presutural, 1 pre-scutellar, 2 notopleural, 3 supra-alar (*i.e.*, 1 pre-alar, 1 supra-alar, 1 post-alar), 1 mesopleural, 1 pteropleural, 1 sternopleural. Scutellum concolorous, with 1 basal and 1 apical bristle. Metanotum shining black, with a narrow yellow median stripe.

Abdomen conical; brownish yellow with short black pubescence and bristles on the sides, also on the hind margins of at least the last two segments.

Legs brownish yellow, shortly pubescent; tibiae and tarsi a little paler, a row of long bristles on upper and outer sides of front femora; all coxae with several bristles.

Wings pale grey; costa yellowish before tip of 1st vein, the colour extending hindwards as a narrow yellowish stripe to hind border, embracing anterior cross-vein. A second stripe, narrow, blackish, extends from costa to hind margin, embracing the posterior cross-vein. Costa blackish from the costal end of this stripe to beyond wing tip, the tips of the 2nd, 3rd and 4th veins narrowly black infuscated. Anterior cross-vein exactly at middle of discal cell, posterior cross-vein perpendicular or even slightly recurrent. Anal cell sometimes yellowish. Halteres pale yellow.

Described from 2 ♂♂ and 4 ♀♀ from Phagu, Simla Hills, 18—21-V-16 (N. Annandale and S. Kemp).

In the second ♂ specimen, the horns are only half as long as in the type, they bear only one bristle each, and two at the tip of each; also the single fronto-orbital bristle on the frons is extremely small and weak.

Bezzi says the anterior cross-vein is placed after the middle of the discal cell and describes the arista as "short pilose," whilst Desvoidy describes it as plumulose. These minor distinctions do not seem to prevent the species being placed in *Vidalia*, the principal character of which are the horn-like processes on the head.

***Vidalia melanonotum*, sp. nov.**

♀ Simla District.

Long. $4\frac{1}{2}$ -5 mm.

Head all brownish yellow, occiput streaked with brown on upper part; face with a little whitish shimmer; edges of frons very slightly elevated; ocellar spot black; proboscis, palpi and antennae brownish yellow, arista pubescent. Chaetotaxy complete.

Thorax and scutellum brownish yellow, a large quadrate black spot in middle of anterior margin of former; dorsum appearing a little white-dusted when viewed from in front. Metanotum wholly brilliantly shining black with a small spot on each side below. Chaetotaxy complete.

Abdomen brownish yellow; last segment shining black; a blackish spot towards the sides of the three previous segments; genitalia brownish yellow.

Legs pale yellow. Fore femora with seven long bristly hairs on underside; middle tibiae with one spur; hind tibiae with row of bristly hairs behind (all generic characters).

Wings clear, with blackish brown marks. The costal section between tips of auxiliary and 1st veins blackish, the colour extending hindwards as a moderately narrow band which embraces the anterior cross-vein. An isolated rounded spot on 2nd vein half way between this band and the apical spot. Wing tip broadly blackish from a little before tip of 2nd vein to just beyond tip of 4th vein, a clearer space towards the tip of each of the embraced cells. An irregular streak from bifurcation of 2nd and

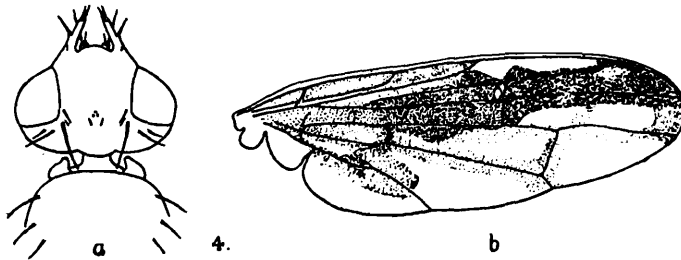


FIG. 4.—*Acidia discalis*, sp. nov.
a. Head. b. Wing.

3rd veins, extending along basal side of discal cell and apical side of anal cell. Posterior cross-vein rather broadly infuscated. Halteres brownish yellow.

Described from 3 ♀ ♀ in the Indian Museum, Phagu, 18—21-v-16 (*type*); between Phagu and Kufri, 21-v-16.

Though no male is present, the characters of this species coincide with those of *Vidalia* except that there is no trace of bristles on the 3rd longitudinal vein. The anterior cross-vein is barely at the middle of the discal cell, whereas it should be at or just beyond the middle. It has a *Spilographa*-like appearance.

Acidia discalis, sp. nov.

Simla District.

Long. 4 mm.

Head pale chrome yellow, occiput with brownish streaks on upper part. Proboscis, palpi and mouth-opening a little brownish. Antennae pale yellow, arista minutely pubescent; 2 upper, 3 lower fronto-orbital bristles, 1 ocellar, 2 vertical (inner nearly perpendicular, outer depressed), 1 post-vertical, perpendicular; ocellar row normal; some bristly hairs on lower part of side of head.

Thorax brownish yellow, pleurae pale, major part of dorsum gold-dusted and with a whitish shimmer seen from in front. Chaetotaxy: 1 humeral, 1 praesutural, 1 dorso-central, 1 praescutellar, 3 supra-alar, 2 notopleural, 2 mesopleural, 1 pteropleural, 1 sternopleural. Scutellum, 1 basal, 1 apical bristle.

Abdomen shining chestnut brown, a little darker here and there, pubescent, with bristly hairs along sides. Belly concolorous.

Legs very pale yellow, tarsi tips a little brighter yellow; fore femora with seven long bristly hairs on underside; middle femora with some smaller bristly hairs towards tip.

Wings pale grey; costal cell nearly clear, yellowish for a short distance before tip of 1st vein. A long brown streak from near base of wing, the upper edge reaching a little above the 2nd vein, meeting the costa at tip of 2nd vein and extending round tip of wing to tip of 3rd vein; the lower edge of the streak encroaching a little on basal half of discal cell, thence extending only a little below the 3rd vein, leaving the 1st posterior cell with a broad brown tip, so that approximately the lower half of that cell is clear except at base and tip; 3rd and 4th veins and posterior cross-vein broadly though rather indistinctly suffused with yellow. Basal part of wing, including anal cell, brownish. Halteres brownish yellow.

Described from a unique specimen in the Indian Museum taken between Phagu and Kufri, 21-v-16 (*N. Annandale* and *S. Kemp*).

***Acidia rioxaeformis*, Bezzi.**

Mem. Ind. Mus. III, p. 143.

Simla, 20-vii-11.

***Oxyna sororcula*, Wied.**

Auss. Zweifl. II, p. 509 (*Trypeta*).

Kufri, Simla Hills, 8,000 ft., 11-v-09.

***Paralleloptera pterocallaeformis*, Bezzi.**

Mem. Ind. Mus. III, p. 155, pl. x, fig. 58.

Dharampur, 14-iv-08 (*N. Annandale*); x-11 (*F. M. Howlett*).

***Tephritis zonogastra*, Bezzi.**

Mem. Ind. Mus. III, p. 164.

Simla, x-08 (*F. M. Howlett*).

Subfamily ORTALINAE.

***Chloria* aenea, F.**

For description see Wied., *Auss. Zweifl.* II, p. 566.

Ulidia aenea, Auct.

Phagu, 18—21-v-16. A widely distributed bright green metallic fly, throughout the East. I have taken it in the Philippines, in Rangoon and various parts of India,

Subfamily MICROPEZINAE.

An unnamed species of *Calobata*.

Subfamily SEPSINAE.

Sepsis cynipsea, L.

For description see Schiner, *Faun. Austr.* II, p. 178.

Simla, 11-v-08; 16-v-09; 9-v-10; Phagu, 11—13-v-09; Theog, April and May; Dharampur, 28-iv—3-v-08; Matiana, 28—30-iv-07; Kufri, 11-v-09; Sutlej Valley.

Sepsis himalayensis, Brun.

Rec. Ind. Mus. III, p. 345.

Simla, 12—13-v-13 (*N. Annandale*); x-11 (sweeping in grass).

Sepsis rufibasis, Brun.

Rec. Ind. Mus. III, p. 348.

Barogh, 10-v-10.

Sepsis fulvolateralis, Brun.

Rec. Ind. Mus. III, p. 349.

Simla, 16-v-09; 9-v-10; Phagu, 11-v-09; Matiana, 28—30-iv-07.

Sepsis rufa, Macq.

Dipt. Exot. Supp. IV, p. 296.

Simla, Oct. 08 (*F. M. Howlett*).

Sepsis spectabilis, Meij.

Ann. Mus. Nat. Hung. IV, p. 178.

Barogh, 10-v-10.

Sepsis bicolor, Wied.

Auss. Zweifl. II, p. 468.

Simla, 11-v-08; 10-v-09 (*N. Annandale*); x-1911 (*F. M. Howlett*). Extremely common at Darjiling.

Sepsis humeralis, Brun.

Rec. Ind. Mus. III, p. 362.

Simla, Oct. 08 (*F. M. Howlett*). A very common species, described originally from China.

Sepsis viduata, Thoms.*Eugen. Resa*, p. 586.Simla, x-1911 (*F. M. Howlett*).**Sepsis lineatipes**, Brun.*Rec. Ind. Mus.* III, p. 354.

Simla, x-1911.

Enicita annulipes, Mg.*Syst. Besch.* V, p. 292.

Simla 24-iv-07; 12—13-v-13; 11-v-08; vii-11; below Simla, 16-v-09 (all *N. Annandale*); Simla, x-11 (*F. M. Howlett*); Phagu, 3-v-07; Barogh, 10-v-10; Kufri, 11-v-09. Apparently common at all the hill stations.

Four specimens in the Indian Museum belong to a genus near *Madiza* that I am unable to recognise. They are from Simla, 12—13-v-13 and Theog, 2-v-07.

Subfamily *OSCININAE*.**Chlorops nigricornis**, sp. nov.

North-West India.

Long. 2 mm.

Head bright yellow; ocellar spot small, black, generally produced forward into a fine line. The configuration of the large impressed triangle, so common to many species, is more or less emphasised by very narrow brownish outlines. Antennae yellowish, 3rd joint black, arista black, yellow at base. Proboscis a little brownish, palpi pale yellow. Occiput yellow, centre part black. The head appears in certain lights to glisten with a brilliant silver hue in many places.

Thorax deep yellow, with the three usual stripes shining bright brown or dark brown, sometimes barely separated. The outer ones in some specimens very nearly attaining the front margin, none of them quite reaching the hind margin. Three distinct black spots on the pleurae. Scutellum pale yellow, a little blackish at base in the middle.

Abdomen blackish, base rather broadly more or less yellowish, sometimes towards sides only, sometimes to the extent of its full width. Abdomen tip pale yellow, margin of segments narrowly yellow, belly yellowish.

Legs all yellow except the brownish tarsi tips; none of the femora thickened.

Wings clear, normal; 2nd and 3rd longitudinal veins parallel, the latter ending some distance before the wing tip, slightly curved upwards at its end; 2nd vein lying closer to the 1st for some distance from its base than in the other species; 3rd and 4th veins

diverging. Posterior cross-vein distant from one to one and a half times its own length from anterior cross-vein, which latter is opposite tip of 1st vein. Halteres pale yellow.

Described from six specimens in the Indian Museum from Bhachkahi, Bahraich District, United Provinces, 15-iii-09; and Simla, 11—12-v-08 (*N. Annandale*).

***Elachiptera brevicornis*, sp. nov.**

Simla District.

Long. $1\frac{1}{2}$ mm.

Head bright chrome yellow; frontal triangle large, black; antennae chrome yellow, 3rd joint shorter than in the other species of *Elachiptera*; upper side black, arista densely black pubescent, a little longer than the joint.

Thorax, including scutellum, dark blackish grey; shoulders dull yellowish, sides obscurely blackish.

Abdomen blackish, belly obscurely yellow.

Legs all yellow, hind femora not at all incrassate.

Wings clear; 3rd and 4th veins practically parallel; anterior cross-vein opposite tip of 1st vein, posterior cross-vein distant twice its own length (or nearly) from anterior cross-vein. Halteres yellowish.

Described from 8 specimens in the Indian Museum from Barogh, Simla District, 5,000 ft., 10-v-10 (*N. Annandale*).

Subfamily GEOMYZINAE.

***Geomyza tripunctata*, Flin.**

For description see Schiner, *Faun. Austr.* II, p. 287.

A single specimen from Simla, 9-v-10, may be this not uncommon European species.

Of the remainder of the Acalyptrate Muscidae there are two or three species of Ephyrinae, a Phytomyzid and one or two Limosinae.

Family PHORIDAE.

***Trineura* ? *aterrima*, Fab.**

Four specimens from Simla, x-08 (*F. M. Howlett*), closely resemble this European species, but possess an inner row of four frontal bristles on each side from half to three quarters as large as the outer row, whereas in *aterrima* these inner bristles are quite small. The specimens probably represent a different, and undescribed species.
