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I. ON THE PSEUDOSCORPIONS OF THE INDIAN MUSEUM, CALCUTTA

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Our knowledge of the Pseudoscorpions of the western parts of the British Indian Empire was hitherto very limited; it was therefore of great interest to me to examine the collection belonging to the Indian Museum, Calcutta, and I take the opportunity here to thank the authorities of this Museum for the liberality with which this group of the collections has been placed at my disposal.

It will perhaps be of some interest to give a list of the species of Pseudoscorpions already known from the Indian Empire. They are as follows:—

1. *Chelifer indicus*, With. Madras.
2. „ *javanus*, Thorell. Burma.
3. „ *navigator*, With. Burma.
4. „ *orites*, Thorell. Burma; Madras.
5. „ *plebejus*, With. Burma; Ceylon.
6. „ *rotundus*, With. Nicobars.
7. „ *vermiformis*, With. Nicobars.
8. „ *birmanicus*, Thorell. Burma.
9. „ *concavus*, With. Nicobars.
10. „ *Galathea*, With. Nicobars.
11. „ *nicobarensis*, With. Nicobars.
12. „ *modestus*, With. Nicobars.
13. „ *Murrayi*, Pocock. Nicobars; Burma.
14. „ *sumatranus*, Thorell. Burma.
15. „ *bidens*, Stecker. India.
16. „ *bisulcus*, Thorell. Burma.
17. „ *borneoensis*, Ellingsen. Burma.
18. „ *depressus* (Koch) Hansen. ?
19. „ *Hansenii*, Thorell. Burma.
20. „ *Helperi*, Stecker. India.
21. *Pseudochiridium claviger*, Thorell. Burma.
22. „ *Thorellii*, With. Nicobars.
23. *Olpium biaroliatum*, Tömösváry. India orientalis.
24. „ *birmanicum*, With. Burma.
25. *Microcreagris birmanica*, Ellingsen. Burma.
26. *Obisium longicolle*, Frauenfeld. Nicobars.
27. *Megathis desiderata*, Stecker. India orientalis.
28. „ *Kochii*, Stecker. India orientalis.

Some of these species are very doubtful, such as No. 15, 20, 26, 27 and 28.

No. 18, *Chelifer depressus* (Koch) Hansen, was really not found in India but in a cargo from India, but about this species see further below.

As a result of the examination of the collection from the Indian Museum, I am able to give, as a continuation, the following list:—

- Chelifer indicus*, With. India.
- „ *javanus*, Thorell. India; Ceylon.
- „ *navigator*, With. Andamans; India; Ceylon.
- „ *orites*, Thorell. India; Ceylon.
- „ *plebejus*, With. India.
- 29. „ *nodosus*, Schrank. India; Ceylon.
- 30. „ *himalayensis*, sp. nov. India.
- „ *borneoensis*, Ellingsen. Ceylon.
- 31. „ *ceylanicus*, sp. nov. Ceylon.
- „ *depressus* (Koch) Hansen. India.
- „ *Hansenii*, Thorell. India.
- 32. „ *subruber*, E. Simon. India; Ceylon.
- 33. „ *superbus*, With. India.
- 34. *Cheiridium museorum*, Leach. India.
- „ *Olpium birmanicum*, With. India.
- 35. „ *Jacobsoni*, Tullgren. India.
- 36. „ *longiventer*, Keyserling. India.
- 37. *Garypus insularis*, Tullgren. India.
- 38. *Teaella affinis*, Hirst. India.
- 39. *Ideobisium* sp. India.

Before treating the species in the collection under consideration, I shall, in connection with these, make some remarks on the *Chelifer birmanicus* group.

There are in the collection a great number of specimens of the *birmanicus*-group; but, remarkably enough, there is not a single specimen with distinct transverse grooves on the cephalothorax; thus not a single specimen could be referred to *Chelifer birmanicus*, Thorell. There are, certainly, one or two specimens of *Ch. javanus* (see further below) which on the cephalothorax have a broad transverse band, irregularly limited in front and behind, with a darker colour than the rest of the surface; but I have considered this only as an accidental irregularity; at all events it does not resemble the usual transverse grooves.

The Indian species of this group, as regards those with no transverse groove on the cephalothorax, are on the whole rather difficult to distinguish from each other, with the exception of *Ch. orites*, which on account of its very short fingers seems to take a rather isolated place, at least among those which I know. There is another species with very short fingers, *Ch. vermiformis*, With., but among the rather numerous specimens in the collection with short fingers I have found none which could be separated from

the proper *Ch. orites*. *Ch. plebejus* seems to be a well-distinguished species. All specimens in the collection, belonging to this group, could be referred to species already known.

Chelifer indicus, With.

India. Calcutta: leg. Sew Rutton, 1 ♂, M. No. ¹ $\frac{1387}{17}$; Calcutta: Museum premises, 1 ♀, 5-vi-1911, leg. S. W. Kemp, M. No. $\frac{1385}{17}$.—Satara district: Helvak, Koyna Valley, ca. 2000 ft., iv-1912, 2 ♂, 1 ♀ leg. F. H. Gravely, M. No. $\frac{1576}{17}$.

The specimen collected by Sew Rutton is not quite developed on account of its having recently cast its skin, but belongs certainly to this species. The species seems to be distinguishable from the nearly related Indian species by the proportionally slender palpal femur (2.5:1). The palps are a little more granulate than recorded by With (for ♀). The specimens from Helvak have the palps somewhat less granulate; the granulation is present mainly on the inner and the upper side, partly also on the hand.

Chelifer javanus, Thorell.

India. Kobo, 400 ft., 2 ♂, 1 ♀, under logs, 1911, leg. S. W. Kemp, M. No. $\frac{1410}{17}$.—Ratnagiri district: Harnai, 4 ♂, 8-v-1912, M. No. $\frac{1582}{17}$.
Ceylon: Pattipola, 6 ♂, under bark of trees, 2-vii-1910, M. No. $\frac{1401}{17}$.
Locality unknown, 2 ♂, M. No. $\frac{1391}{17}$.

The specimens numbered $\frac{1401}{17}$ are certainly fully typical, beautiful, dark coloured ones of this species, the relationship with *Ch. plebejus* is evident, but the palps are strongly granulate on the anterior side and partly also on the upper and lower side. The protuberance of the upper side of trochanter is distinct, but rather low.

As regards the specimens from Kobo and from Harnai, see my introductory remarks on the *birmanicus*-group about the transverse band of the cephalothorax which I regarded only as an irregularity or an accidental deformation of the skin.

Chelifer navigator, With.

India. Calcutta, 2 ♂, taken in the Museum buildings from a nest of *Cypselus affinis*, 15-vi-1909, M. No. $\frac{1571}{17}$.—N. Bengal: Siripur, Saran, 3 ♂, M. No. $\frac{1586}{17}$.—South India: Oorgaum, ca. 2500 ft., 1 ♂, 20-x-1910, M. No. $\frac{1574}{17}$; Marikuppam, ca. 2500 ft., 2 ♂, 19-x-1910, M. No. $\frac{1497}{17}$.
Ceylon: Peradeniya, 5 ♂, under bark of jack-fruit tree, 7-v-1910, M. No. $\frac{1397}{17}$.
Andamans: Ross I., 2 ♀ 29-iii-1911, collected by C. Paiva, M. No. $\frac{1408}{17}$.

This species seems to vary to a degree as regards the granulation of the palps; the specimens from the Andamans, from Marikuppam, and from Siripur have the anterior side of the palps somewhat granulate, which according to With also may be the case. The species seems to be well characterized by the strong, triangular protuberance of the posterior side of the palpal trochanter,

by the *high* femur, the long tibial stalk and the proportionally very slender hand.

Chelifer orites, Thorell.

India. Calcutta, 2 ♀ taken in the Museum buildings from a nest of *Cypselus affinis*, 15-vi-1909 (together with *Ch. navigator*, With), M. No. $\frac{1386}{17}$; 1 ♀ jun., 6-vi-1910 (badly preserved, but probably belonging to this species), leg. Nowbut, M. No. $\frac{1388}{17}$.—N. Bengal: Siripur, Saran, 3 ♀, M. No. $\frac{1393}{17}$.—South India: Marikuppam, ca. 1500 ft., 1 ♀, 19-x-1910, M. No. $\frac{1570}{17}$; Anamalais, Paralai Estate, 3800 ft., 1 ♀ in rotten logs, 28-i-1912, M. No. $\frac{1404}{17}$; Oorgaum, 1 ♀ M. No. $\frac{1406}{17}$.

Ceylon: Anuradhapura, 1 ♀ jun, x-1911, M. No. $\frac{1402}{17}$; Peradeniya, 2 ♂, 1 ♀, M. No. $\frac{1398}{17}$.

This species, easily recognizable from the other Indian species of this group (excl. *Ch. vermiformis*, With) by its very short fingers, seems, according to the localities above mentioned, to be widely distributed on the Indian continent as well as in Ceylon. It is also the largest Indian species of those belonging to the *birmanicus* group. A species so widely distributed must naturally vary more or less in some characters; this variation is especially pronounced as regards the granulation of the palps.

Chelifer plebejus, With.

India. Darjiling District: Siliguri (base of E. Himalayas), 3 ♂, 12 ♀ 2 jun., on bark of *Ficus religiosa*, 28-iii-1910, M. No. $\frac{1393}{17}$.—Orissa District: Puri 1 jun., i-1908, M. No. $\frac{1403}{17}$.—Travancore: Trivandrum, 1 ♂, 30-xi-1911 (Trivandrum Museum).

Ceylon: Peradeniya, 2 ♂, under loose bark of jack-fruit tree, 7-vi-1910, M. No. $\frac{1572}{17}$.

The specimens from Siliguri are well developed; I have compared them with a specimen from Burma for which I am indebted to Mr. With. The upper side of the palpal trochanter has a small, pointed tubercle, also present in With's specimen. But the exceedingly robust and nearly smooth palps are good characters, as is also the strongly curved form of the hand (including the fingers). The specimen from Puri is very young, but belongs certainly to this species; the palps are nearly smooth with the exception of some slight granulation on the inner side of femur.

Chelifer nodosus, Schrank.

India. Calcutta, 1 ♀ Museum compound, under bricks, 17-x-1910, M. No. $\frac{1384}{17}$.—Dehra Dun (base of W. Himalayas), 1 ♂, on a wall of the dining-room of the Forest School, M. No. $\frac{1575}{17}$.

Ceylon: Peradeniya, 1 ♀, 4-viii-1910, M. No. $\frac{1400}{17}$.

There is no doubt that the specimens from Calcutta and from Dehra Dun belong to this species; the whole animal, the galea included, fully resembles German specimens with which they have been compared. The galea, as in *Ch. scorpioides*, is somewhat stag-horn like; but the pointed hairs distinguish it completely from the latter species. The animal is certainly imported from Europe, where the species is often found as a pseudo-parasite on flies.

As to the Ceylon specimen, it may be noted that the outer side of the palpal trochanter has the protuberance not so well developed as is the case in European specimens and in the two Indian specimens just mentioned, but it belongs to the same species, although it is not reported to be taken in a house.

Chelifer himalayensis, sp. nov.

♂ No eyes, nor ocular spots.

Colour.—The whole animal of a deep reddish brown colour.

Cephalothorax a little shorter than wide behind, strongly narrowing forwards from the posterior corner, with convex lateral margins; the slightly convex front margin is only $\frac{1}{3}$ of the length of the posterior margin. Two very strong and deep transverse grooves, especially deep in the central part; the anterior groove about in the middle and straight, the posterior one at about the same distance from the anterior groove and the back margin, in the central part angularly curved backwards. The surface somewhat glossy, slightly but distinctly and regularly granulate. The hairs, most of them crowded along the front and the lateral margins, are truncate.

Abdomen very robust and broad, somewhat broader than long, but very much contracted. The tergites are certainly divided by a longitudinal line, but this line is very indistinct, on account of the contracted abdomen; for the same reason the anterior sclerites are also placed somewhat angularly to each other (which is often the case in species belonging to the subgenus *Chernes*); the surface is glossy and distinctly shagreened; on each sclerite there is in the middle a darker spot; the hairs, situated along the posterior and the lateral margins, are partly truncate and partly (on the posterior somites) nearly pointed; on the last somite there are some longer tactile hairs. The sternites are still more indistinctly divided longitudinally, glossy and minutely shagreened, with numerous, long and pointed hairs along the posterior margins.

Palps somewhat longer than the body¹, very robust. Coxa glossy and slightly granulate; the other palpal joints glossy and distinctly granulate, including the fingers. The clothing of hairs very dense, the hairs rather long, pointed, but distinctly dentate; the hairs of the fingers nearly simple. Trochanter subglobose, in front nearly semicircular, behind with a rounded protuberance, above with a very strong and rounded one. Femur with a distinct and strong stalk, very robust (about twice as long as wide), in front and especially behind strongly widened from the stalk, the front margin slightly convex in the basal half and slightly concave in the distal half, the posterior side slightly convex; femur in all of rather equal width throughout and truncate at the tip (the femur as well as the tibia resembles very much With's figure of

¹ But see note above regarding the contraction of the abdomen.

Ch. australiensis). Tibia a little shorter and somewhat broader than femur, with very strong stalk, on the posterior side moderately and regularly convex, in front somewhat more convex, or rather somewhat swollen. Hand with a distinct stalk, and the base somewhat obliquely truncate with the inner corner broader and more rounded than the exterior one; the hand is about as long as, but considerably ($1\frac{1}{3}$ times) wider than tibia, and about as high as broad, the inner side strongly convex (nearly semicircular), the outer side much less so, on both sides passing gradually into the fingers. Fingers robust, strongly curved and a little longer than the hand; the fixed finger exteriorly with 9-10 small accessory teeth in the distal half; on the inner side both fingers have 2 to 3 small accessory teeth near the tip; the fingers do not gape at all.

Mandibles: Galea with robust trunk and deeply tripartite tip, and along one side of the trunk provided with 7 long filiform teeth, increasing in length towards the base.

Legs minutely granulate with slightly clavate and dentate hairs. The trochantin of the two posterior pairs of legs perpendicularly articulated. Coxa IV very robust, much broader than trochanter, along the posterior margin provided with dense rows of long hairs. The tibia of all legs considerably longer than the tarsus. Claws simple.

The species belongs certainly to the *cimicoides*-group, as the sexual area as well as the whole appearance seems to indicate; the animal reminds one very much of a large *Chelifer cimicoides*.

Length 3.6 mm., length of abdomen 2.25 mm., width 2.30 mm.

Measurements.—Cephalothorax: long. 1.36; lat. 1.49. Femur: long. 1.07; lat. 0.52. Tibia: long. 0.93; lat. 0.57. Hand: long. 1.00; lat. 0.76. Fingers: long. 1.07 mm.

Habitat.—India: W. Himalayas, Mussoorie, 7000 ft., 1♂, M. No. $\frac{1587}{17}$.

The only species among the Asiatic-Australian forms, with which the new species has a nearer relation, is *Chelifer australiensis*, With; yet there are some essential characters in which the two species differ from each other, so they certainly cannot be united. Contrary to the characters mentioned above in the description of the new species, With's species (from Queensland) is distinguished as follows: "Two *rather distinct* grooves" on cephalothorax; "traces of lateral projections or keels on the tergites"; galea has only some shorter teeth at the tip; "the palps are indistinctly granular"; the protuberances of the trochanter have another shape; the hand "higher than broad"; the fingers also interiorly with "accessory teeth" near the middle. The differential characters are not great, but taken together they are certainly sufficient to distinguish the two species.

Chelifer borneoensis, Ellingsen.

Ceylon: Peradeniya, 1♂, under loose bark of jack-fruit tree, 21-vi-1910, M. No. $\frac{1398}{17}$.

The specimen is somewhat smaller in size than the type from Borneo, but is apparently a fully mature male. The cephalothorax is completely smooth and there are no traces of teeth on the claws. These seem to be the only two characters of importance in which males of this species differ from those of *Chelifer Mortensenii*, With.

***Chelifer ceylanicus*, sp. nov.**

♂ No eyes, but ocular spots present.

Colour.—Cephalothorax, tergites and palps palish brown, fingers somewhat darker; the other parts of the animal whitish.

Cephalothorax a little longer than wide in the middle, where it is broadest; behind the anterior groove nearly parallel-sided, in front of it roundly narrowing forwards, the front margin slightly convex. A deep transverse groove about in the middle; before reaching the lateral margin it curves forwards, and the cephalothorax in this place is thus somewhat depressed and widened, attaining here, as mentioned, its greatest width. The posterior groove is scarcely visible, in some specimens indicated. The surface minutely, but distinctly and regularly granulate and only a little glossy. The hairs short, thick and slightly clavate.

Abdomen: The tergites divided longitudinally by a fine line, except the last one. The surface nearly glossless and minutely shagreened; the hairs somewhat longer than those of cephalothorax and slightly clavate; on the last somite some long, tactile hairs. The sternites divided like the tergites, glossy and slightly shagreened, with long, pointed hairs; on six sternites but the last one (4-9) provided with large, broad and laterally narrowing areas with dense bristles.

Palps somewhat longer than the body (with abdomen extended). Coxa smooth and glossy. Trochanter, femur and tibia nearly glossless and minutely, but distinctly granulate, hand very glossy and minutely granulate, fingers smooth. The hairs of trochanter and of the inner side of femur and part of the tibia slightly clavate, those of the outer side of the same joints and those of the hand more or less pointed; the clothing of the hand very dense; the hairs of the fingers dense and pointed with longer tactile ones. Trochanter pedicellate and proportionally slender, nearly twice as long as wide, the inner side somewhat convex, the outer side with a low triangular protuberance near the base, the upper side with a large, much rounded protuberance. Femur slender, nearly four times as long as wide, with a distinct stalk, the inner side nearly straight except for a short concave portion near the tip, behind suddenly widened from the stalk, the hind margin slightly convex, rounded at the tip; femur in all rather parallel-sided, yet a little narrower at the tip than at the base. Tibia a little longer than femur, long and slender, about 4 times as long as wide, with a short and curved stalk, somewhat

club shaped, *i.e.* gradually increasing in width from base to tip, the hind margin nearly straight only a little convex near the tip, the inner side slightly and evenly convex throughout. Hand broader than tibia (*ca.* 1.4 times), with a distinct stalk, and regularly rounded base, long and narrow ($2\frac{1}{2}$ times as long as wide), rather parallel-sided, the inner side nearly straight, the outer side slightly convex, rather abruptly passing into the fingers. Fingers robust, slightly curved, much shorter than the hand (3 : 5).

Mandibles: Galea minute, with some very small teeth at the tip.

Legs granulate on the outer side, on the inner side as well as on trochanter and coxa smooth and glossy. The hairs partly truncate, partly pointed. Claws simple.

The species belongs to the *subruber*-group.

♀ The female resembles the male in all essential characters, except the palps which are somewhat more robust, the femur being $3\frac{1}{4}$ times as long as wide, the tibia $2\frac{1}{2}$ times and the hand $1\frac{3}{4}$ times as long as broad, but the length of the fingers proportionally to that of the hand is about the same. The shape of the palpal joints is also somewhat different: the femur is distinctly curved (concave) on the inner side and somewhat more convex behind (than in the ♂), the tibia is nearly regularly convex on both sides (and therefore not so distinctly club-shaped), which is also the case as regards the hand. The galea is considerably more robust and with larger teeth at the tip.

♂ Length 2.65 mm.

Measurements.—Cephalothorax: long. 0.72; lat. 0.64. Trochanter: long. 0.36; lat. 0.20. Femur: long. 0.79; lat. 0.21. Tibia: long. 0.83; lat. 0.20. Hand: long. 0.72; lat. 0.28. Fingers: long. 0.43 mm.

♀ Length 2.93 mm.

Measurements.—Cephalothorax: long. 0.64; lat. 0.50. Trochanter: long. 0.28; lat. 0.17. Femur: long. 0.60; lat. 0.18. Tibia: long. 0.54; lat. 0.21. Hand: long. 0.57; lat. 0.33. Fingers: long. 0.36 mm.

Habitat.—Ceylon: Peradeniya, 10 ♂, 1 ♀, June, 1910, M. No. ¹³⁹⁸/₁₇.

On examination of these specimens I thought at first that I had before me *Ch. sumatranus*, Thorell but certain essential differences hindered their union, in spite of the resemblance, especially in the shape of the palps. Thorell says about his species, that the cephalothorax is "non granulosus," only "subtillissime coriaceus"; the new species has the cephalothorax distinctly granulate. Thorell's species is further said to have "sulcis duobus transversis," and the palps "laeves, nitidi," which does not agree with the Ceylon specimens.

The new species is related to certain species of the same group from Africa, such as *Ch. angulatus*, Ellingsen, with which

it has, for instance, the lack of eyes in common, but the measurements of the palps are different.

***Chelifer depressus* (C. L. Koch) Hansen.**

India. Calcutta, 1 ♂ jun., M. No. $\frac{1383}{17}$.

The specimen is very young, but the sex is certain on account of the coxae of the IV pair of legs, with the coxal sac, and of the keels of the sclerites which are very well developed on the 5 first tergites; the cephalothorax, too, has its posterolateral spine. The galea is very small with some fine teeth in the distal third. The cephalothorax is slightly granulate, but glossy. The palps are very slender; the femur about four times as long as wide, the stalk included; for this as well as for other reasons the specimen cannot well belong to *Ch. superbus*, With, with which it is however very closely related. The palpal fingers gape very much, both being distinctly "concave" (and not as in *Ch. superbus*, one of them "obtuse-angled") and in the concavity quite destitute of teeth; the straight concurrent part of the extremity is not quite so long as shown in With's figure. It is, however, with some hesitation that I have referred the specimen from Calcutta to the above species, partly because it is so young, partly because *Ch. depressus* has not yet been captured in India, but only in Denmark in a cargo of rice from India. However, there is reason to believe that the species is an Indian one.

***Chelifer Hansenii*, Thorell.**

India. Satara Distr: Hills near Medha, Yenna valley, ca. 2200 ft., 1 ♂, iv-1912, collected by F. H. Gravely, M. No. $\frac{1578}{17}$.

Thorell, in 1889, described a Pseudoscorpion under the above name, from Bhamo in Burma. He remarks that the single specimen he had for examination seemed not to be adult. The sex is not mentioned, but as he says that the galea is "sat fortis," it may perhaps have been a young female.

I have identified the above ♂ from Medha with Thorell's species, as his long and good description agrees well, taking into consideration that his specimen was young and perhaps a ♀, while the male from Medha is adult.

I shall state a little more about the species (if my identification be right) and about the differences from Thorell's description.

The cephalothorax and palps are of a very dark brown colour, the sclerites of the tergites light brown with a darker central spot.

The sternites 7-9 (the last sternite regarded as the eleventh) have in the middle of the broad, light, longitudinal band, a round area, limited on each side by a dark, irregularly crescentic band (interrupted in front and behind, and thus not being a circular band); the round area is provided with bristles, pointing obliquely towards the median line. This quite corresponds with the much

larger bristle-covered areas in most species of the *subruber*-group, to which the species also belongs.

The galea is small, with no traces of teeth.

The hand of the palps, as Thorell states, is glossy, but minutely shagreened; as regards the rest, Thorell's description as to granulation and hairs agrees well, the hairs being on the inner side of trochanter and femur slightly clavate, the other hairs only truncate, or on the fingers simple. The hand is only $1\frac{1}{3}$ times as broad as the tibia (Thorell says *ca.* $1\frac{1}{2}$ times). Differing most from Thorell's description are the shape and the dimensions of the femur, but this may perhaps depend on the age and the sex (see above). The femur of the male (from Medha Hills) has a slender stalk and is (seen from above) not a little wider at the base than at the extremity thus narrowing distally (a rare case in the Chelifers); laterally seen the femur is abruptly, nearly perpendicularly widened from the stalk and very high at the base, but with the upper surface regularly slanting towards the tip. The length of the femur is about $2\frac{1}{3}$ times the width at the base; Thorell says of his specimen, that this proportion is $3\frac{1}{2}$.

The length of the specimen from the hills near Medha (with abdomen extended) is 3 mm.

The other measurements are as follows:—Cephalothorax: long. 0.93; lat. 0.57. Femur: long. 0.60; lat. (at the base) 0.25. Tibia: long. 0.57; lat. 0.25. Hand: long. 0.57; lat. 0.34. Fingers: long. 0.43 mm.

Chelifer subruber, E. Simon.

India. Dehra Dun (base of W. Himalayas), 1 ♀ on the wall of the dining room in the Forest School, M. No. $\frac{1416}{17}$.

Ceylon: Peradeniya, 1 jun., under loose bark of jack-fruit tree, 7-v-1910, M. No. $\frac{1573}{17}$.

The species is a cosmopolitan one. The specimen from Ceylon is rather young and badly preserved, but it may belong to this species.

Chelifer superbus, With.

India. Travancore: Maddathoray (W. base of W. Ghats), 1 ♀, on a monkey (*Macacus sinicus*), 17-xi-1908, M. No. $\frac{1411}{17}$.—W. Dun (base of W. Himalayas), 2 ♀, 2 jun., under bark of dead Sal (*Shorea robusta*), 19-xi-1910, M. No. $\frac{1418}{17}$.—Kobo, 400 ft., 1 ♀ under logs, collected by S. W. Kemp (Abor Expedition), M. No. $\frac{1400}{17}$.

There were also in the collection 4 ♀ from an unknown locality, M. No. $\frac{1412}{17}$, with the notice on the label, that they were taken on a Cerambycid ("infesting *Batocera*").

All the specimens had the character in common, that the fingers were nearly as long as the hand, and that at least some of the claws of the legs had teeth, but there is no doubt that such teeth may be absent. In connexion with the specimens numbered $\frac{1412}{17}$, it may be of interest to note that With's type specimens also were taken on a *Batocera*, from Celebes.

Cheiridium museorum, Leach.

India. Calcutta, 1 ♀, taken in the Museum buildings from a nest of *Cypselus affinis*, 27-vii-1909, M. No. $\frac{1390}{17}$.—Dehra Dun (base of W. Himalayas), 1 ♂, on the wall of a bathroom in Dehra Dun College, M. No. $\frac{1417}{17}$.

There is no doubt that this species, of common occurrence in Europe in museums and other buildings, has been imported into India.

Olpium birmanicum, With.

Syn.: ? *Olpium biaroliatum*, Tömösváry.
? *Olpium Ortonedae*, Ellingsen.

India. Bombay, 1 ♂, June, 1911, M. No. $\frac{1581}{17}$; Bombay : Girgaum, 1 jun. (♀ ?), 4-viii-1912, M. No. $\frac{1585}{17}$.

Assam. Kannyhati, Shamsbernager, Sylhet, 2 ♂, collected by G. Mackrell, June 17, 1911, M. No. $\frac{1394}{17}$. The label in the tube was inscribed: "Caught in box of old books, etc., Kannyhati bungalow, feeding upon the mites which were in abundance round some dead Coleoptera."

These four Indian specimens (3 ♂ and 1 immature) certainly belong to With's species. The noteworthy feature as With points out is "a broad transverse stripe" on the cephalothorax. This "transverse stripe" is absolutely invisible as a transverse *groove*, and is scarcely to be seen when the animal is in a dry state; in alcohol on the contrary it is more or less visible as an inner division, but also in that case nearly invisible in the middle, though more distinct towards the lateral margins. I observed just the same thing in my specimens of *Olpium Ortonedae* (from Ecuador, see my description of this species), and on comparing my specimens from Ecuador with the Indian ones, I can find *no specific differences* between them. Three of the Indian specimens are males; among the specimens from Ecuador there are also females; these have their palps somewhat more robust and their galea a little longer.

The reason that I do not employ the name of *Olpium Ortonedae* for the Indian specimens is because another question arises. Are not both species synonymic with *Olpium biaroliatum*, Tömösváry? With has himself not been without the same sentiment, but finds that Tömösváry's description is "too insufficient for a sure determination." In this he is certainly right, but Tömösváry's description, short as it is, agrees nevertheless remarkably well, and that Tömösváry may possibly have believed he saw another "obsolete" transverse stripe, can easily be understood. I should be inclined to unite the three species, and then Tömösváry's name would have the priority. That I, in spite of this, do not do it, is because With's name for the species is at all events a safe one. Tömösváry's species was from "India orientalis."

To With's description I shall add the following remarks: I will not, like With, say that the palpal femur wholly lacks a stalk, but that it is rather indistinct, and that all tergites may be divided longitudinally, except the last one.

The young specimen from Girgaum agrees in all respects with the adult ones, but is of a paler colour and smaller size, and with

the palps not quite so well developed. The stripe of the cephalothorax is no more developed than in the older examples.

As With has not given any measurements of this species, I shall here give some from an excellent specimen (σ) with extended abdomen, from Assam.

Length 2.72 mm.

Measurements.—Cephalothorax: long. 0.72, lat. 0.50. Femur: long. 0.61; lat. 0.16. Tibia: long. 0.43; lat. 0.18. Hand: long. 0.47; lat. 0.27. Fingers: long. 0.53 mm.

There are in the collection of the Indian Museum a number of specimens of a form or rather of two forms, quite different from the preceding species, and nearly allied to the Palæarctic *Olpium pallipes*, Lucas. In a paper on Pseudoscorpions from Formosa I have mentioned a species of *Olpium* from this island, which I referred to *Olpium longiventer*, Keyserling, yet fully attentive to a species, *Olpium Jacobsoni*, described by Tullgren from Java, so that I thought it best to consider the latter as a form of the former. The Indian specimens, just mentioned, have to a certain extent confirmed this opinion, but they prove nevertheless that there is really one form with somewhat more slender palps (*O. longiventer*) and another form with more robust palps (*O. Jacobsoni*), and I have therefore arranged the Indian specimens under each of these species or forms, as follows:—

Olpium longiventer, Keyserling.

India. W. Dun (base of W. Himalayas), Karwapani, 9 specimens, on the newly whitewashed walls of a resthouse, M. No. $\frac{1+1.5}{17}$.

These specimens agree well with Keyserling's description and figures, among other things in the *slender* palps, the femur of which is about four times as long as wide, as Keyserling reports it; the fingers are about as long as the hand; the palps are quite smooth. I and II pairs of legs have the femoral pars basalis a little longer than pars tibialis.

In this as well as in the following species it is to be noticed that the femur of the I pair of legs has the basal part only *a little* longer than the tibial one (not at least $1\frac{1}{2}$ times as long, as With states in his diagnosis of the genus *Olpium*), but there is no doubt that the two species mentioned here, by their whole appearance and their affinity to *Olpium pallipes*, belong to the true *Olpium*. This feature is present in the Indian specimens as well as in those from Formosa and in Tullgren's types from Java; Keyserling says that the femur is divided in the middle, which really is the case.

Olpium Jacobsoni, Tullgren.

India. Calcutta, 1 specimen, running in sunshine on bathroom wall, Museum premises, 22-X-1011, M. No. $\frac{1.389}{17}$.—Satara District: Koyna Valley, Talashi, 2000 ft., 1 specimen, iv-1912, collected by F. H. Gravely, M. No. $\frac{1.588}{17}$; Hills near Medha, Yenna Valley, 2500-3500 ft., 2 ♀ collected by F. H. Gravely, M.

No. $\frac{1511}{17}$; Ratnagiri District: Karaigaoon (10 miles N. of Dabhol), 1 specimen, v-1912 (S. P. Agharkar coll.); Harnai, 1 specimen, 8-v-1912 (S. P. Agharkar coll.). Dehra Dun, 1 jun., M. No. $\frac{1411}{17}$.—N. Bengal: Siripur, Saran, 1 specimen, under bark of Siris tree, M. No. $\frac{2052}{17}$.

All the specimens are distinguished by having their palps proportionally more robust than is the case in the preceding species: the palpal femur is in all about 3 times as long as wide, and all the characters agree well with Tullgren's description and figures.

Garypus insularis, Tullgren.

India. Madras Presidency: Vizagapatam, 1 ♂, 21-iv-1910, collected by S. W. Kemp, M. No. $\frac{1405}{17}$.

I have no doubt that the above specimen belongs to this species, described by Tullgren from the Seychelles, and it is not very remarkable that this species has also been taken in India, although in the eastern part of the Deccan. The Indian specimen is a male, while Tullgren's type was a female. The galea of the male is, as is usual in *Garypus*, of somewhat smaller size than that of the female, but like this, with some minute teeth at the tips, at least this is the case in one of the galeas. The fingers are strongly curved and nearly $1\frac{1}{2}$ times as long as the hand, which also may be concluded from Tullgren's figure to have been the case in the type, though Tullgren says nothing about it in his description. The length of the Indian specimen is about 4 mm., while the type was 3.3 mm. The species is distinguished by its long and slender palps and, as mentioned, by its proportionally long fingers.

Feaella affinis, Hirst.

India. Chota Nagpur Div., Manbhum District, Purulia, 1 ♀ 10-ii-1912, collected by F. H. Gravely, M. No. $\frac{1392}{17}$.

There is certainly no doubt that the above specimen belongs to the species described by Hirst under the name *Feaella affinis*, from the Seychelles. This is, in the collection under consideration, the second proof of the zoogeographical connection between the Seychelles and the Indian Continent, the first being the preceding species, *Garypus insularis*. The capture of a species of the genus *Feaella* in the Indian Continent is of the greatest interest, though the Seychelles are geographically a connecting link between India and Africa, which must be considered as the cradle of the genus *Feaella*.

S Hirst, in describing his species, points out the great resemblance with *F. mucronata*, Tullgren. This resemblance is still greater than Hirst supposes, as one of the distinguishing characters, in my opinion, must drop. He points out, that of the four prominences of the front margin of cephalothorax, the two lateral ones are broader than the two central ones in his species, the contrary being the case in that described by Tullgren. But *F. mucronata*, in reality, may show a similar development, as

I have seen it in South African specimens. As Hirst rightly observes, the prominence of the anterior side of the palpal trochanter is much smaller in *F. affinis* than in *F. mucronata*, but there are strictly speaking, no real "prominences on the anterior side of the base of the femur" (Hirst) in either of the species, though the corner is perhaps a little more pronounced in *F. mucronata* than in *F. affinis*. "Die Vertiefung" (Tullgren), or "the gap" (Hirst) between the coxa of the II pair of legs is in the ♂ entirely and in the ♀ almost entirely filled up by a prominence from the posterior side of the coxae of the I pair. There is one other character which may be used to distinguish the two species: the first tergite, which is very short, has in each anterolateral corner a rather large thorn-like projection, pointing forwards in *F. mucronata*; this projection is not present in *F. affinis*.

Hirst says: "These differences are, perhaps, not important enough to be regarded as of specific value, and it is possible that this form should be regarded as a local variety of *F. mucronata*." This cannot well be so any longer, the species having also been taken in India, but the two species have very much in common and have no very clear distinguishing characters, and it may be that forms of transition should be found.

Ideobisium (*Ideoblothrus*) sp.

India. Malawany, near Bombay, 1 jun., 10-vii-1912, M. No. $\frac{1584}{17}$.

The specimen is very young and of small size (0.8 mm. long). The animal belongs to no species of the subgenus *Ideoblothrus* hitherto described, but as it is so immature and not well preserved, I do not wish to describe it as a new species. It is, however, the first specimen of this subgenus found on the continent of Southern Asia; from the whole south-eastern region of Asia only one species of *Ideoblothrus* is hitherto known, *Ideobisium* (*Ideoblothrus*) *bipectinatum*, Daday, originally described from New Guinea, and later recorded from the Bismarck-Archipelago (Ellingsen); but this species has its palps quite different from the Indian specimen. The species from New Guinea, too, is of small size. The galea of the Indian specimen is small and simple.

At all events this capture proves that the Indian Continent is inhabited by an *Ideoblothrus*.



II CRITICAL REVIEW OF "GENERA" IN CULICIDAE

By E. BRUNETTI.

PREFATORY REMARKS.

The present paper is written primarily for the systematic dipterologist and is an endeavour to reduce the multitudinous genera proposed by culicidologists to their taxonomic level from the point of view of the systematist.

The standard of validity adopted in the present paper is precisely that which would, so far as I can judge, be accorded by the average systematist in reviewing proposed genera in any family of diptera other than *Culicidae*.

A word first to the new names proposed by me in the Supplement to my Annotated Catalogue of Oriental *Culicidae*.¹ These were stated at the time to be purely *nomina nova*, the names they were intended to displace being preoccupied (the bulk of them, it may incidentally be mentioned, in the order diptera itself, which shows conclusively how little the culicidologists concern themselves with what has been already done in diptera); but I now regret having encumbered the literature of the family to any further extent.

It must be borne in mind that all the considerations and conclusions herein offered rest on the validity of other authors' statements and descriptions, since on the great majority of points at issue there has been no opportunity of independent examination.

For any false deductions of mine in the present treatise, due to incorrect or incomplete descriptions, I claim exoneration on these grounds, but for any due to misconceptions or erroneous judgments of my own I freely accept full responsibility.

GENERAL CONSIDERATIONS ON TAXONOMY IN DIPTERA.

There is no intention in the present paper of drawing an exhaustive comparison between the characters adopted of late years in distinguishing so-called genera in *Culicidae*, and those that have hitherto been employed in the diptera for the same purpose; but all who have any practical acquaintance with this order are aware that, until the influx of students to the study of *Culicidae* caused by the comparatively recent discovery of their direct connection with malaria,² the known species of this family were

¹ Rec. Ind. Mus., iv, 403 *et seq.*

² The first announcement that yellow fever was carried by mosquitoes, and probably malaria also, was made as far back as 1848 by Nott. Nothing more

comfortably provided for under eight genera only, *Anopheles*, *Megarhinus*, *Subethes*, *Psorophora*, *Culex*, *Aedes*, *Corethra* and *Mochlonyx*.¹

The latest set up of these was the latter, in 1844, after which no new genus was proposed till Arribalzaga, by the first splitting up of *Culex*, in 1891, erected *Janthinosoma*, *Ochlerotatus*, *Uranotaenia*, *Taeniorhynchus* and *Heteronychia*.

The next author to dismember the old genera was Theobald, the pioneer of the school of exclusive culicidologists, who in the first two volumes of his Monograph (1901) erected *Toxorhynchites*, *Mucidus*, *Stegomyia*, *Armigeres*,² *Panoplites*,³ *Deinocerites*, *Aedeomyia*, *Wyeomyia*, and *Trichoprosopon*. In the meantime, *Haemagogus*, Will. (1896) was established, and this is apparently a sound genus.

From about 1901 onwards nearly 200 new "genera" have been proposed, the greater number of them on the most slender and inconstant characters.

It must be admitted that the general tendency of modern writers is to recognise a far greater number than formerly of families, genera and other related groups in all orders of the animal kingdom, but it is quite open to question whether such a course is either zoologically correct, or even advisable on the grounds of expediency. The number of families for instance in such groups as birds, fishes, beetles, etc. is much greater now than was the case say half a century ago, and this quite apart from strikingly distinct forms since discovered.

It must also be admitted that the confinement of one's studies to a single group, to the exclusion of all others, more especially a group much restricted both in extent and variety, infallibly narrows one's view of the science as a whole and equally infallibly distorts one's sense of taxonomic proportion; thus mere racial varieties become species, small groups of a few species with perhaps but a single kindred character are promoted to genera, and any such "genus" varying slightly from a very narrow and well beaten track is elevated immediately to the dignity of a subfamily.

Specialists who are also competent all-round zoologists or even good general entomologists are rarer year by year, but a general

seems to have been done till 1880 when Laveran discovered the actual parasite of malaria, after which it was 1894 to 1896 before a definite mosquito theory was propounded. (*Vide* Brit. Med. Jour., Dec. 8th, 1894; Mar. 14th, 21st, 28th, 1896). Ross first found the malaria parasite present in a mosquito's stomach in 1897, and studied the complete cycle of *Plasmodium* in birds in 1898. Grassi proved *Anopheles* to be the general carrier in 1899, since which time mosquito theories have been advanced by Pfeiffer and Koch, Mendini and others. Bovine malaria was traced to the agency of ticks by Smith and another in 1893.

The above medical notes were very generously compiled for me by Capt. R. B. Seymour Sewell, I.M.S., to whom my thanks are heartily tendered.

¹ *Mochlonyx* Lw. is synonymous with *Corethra* as pointed out by me in Rec. Ind. Mus. iv 317.

² Owing to suppressed preoccupation renamed *Desvoidia*, Blanch., also preoccupied, renamed *Blanchardiomyia* Brun.

³ Preoccupied, renamed *Mansonia*, Blanch.

knowledge of the values of ranks in other groups of the animal kingdom is, or should be, imperative in any author who aspires to new classifications on weak characters, more especially if in direct defiance of the expressed views of systematists. In no group of insects has such a lamentable want of technical knowledge been shown than in the writings of the modern authors on *Culicidae*,¹ almost none of whom are dipterologists; in fact they include, as Professor Williston has observed, "some indeed, whose only papers on Entomology have been those proposing new subfamilies!"²

He continues, "Their ignorance of related diptera has more than once been deplorably shown by writers on the *Culicidae*," adding, "no one is competent to discuss philosophically the classification of any group of animal life who is not well grounded in the principles of taxonomy as applied to related animals," * * * * because "the mosquitoes are not organisms isolated from all other living creatures."

He further, whilst accrediting "the right kind of scientific work" with its full dues, postulates that opinion with the observation that "one must learn the value of characters in classification before he can be successful in instructing others or in making his discoveries known. And this knowledge can only be acquired by long and faithful study of living things. In days gone by the profuse maker of genera was ridiculed, and his labours were largely ignored, but I fear even Desvoidy's shade would turn pale with envy in the contemplation of some of the proposed genera of the modern culicidologists" (Man. N.A. Dipt., 3rd Ed. Intro. 15). He vigorously denounces the numerous proposed genera and subfamilies in this family.

Rondani as well as Desvoidy, I believe, suffered to some extent for the same reason, and many of his genera are still unrecognised owing to insufficient characterisation.

As regards classification above the rank of genera, this has no place in the present paper; suffice it to note that every culicid writer adopts a system more or less modified to meet his own views. It seems incumbent on me, however, to notice a very elaborate colour scheme classification offered by Major Christophers quite recently in *Anophelini*, and though I cannot herein examine it critically, it is certain that the characters used in separating the groups are very indefinite and open to various interpretations according to the reader, whilst it is incredible that the variation of species will not render the tables to a great extent inoperative.

¹ With the exception of one or two, like Col. Alcock and Mr. Edwards, who have endeavoured to stem the tide of genus and subfamily making.

² Criticising the 2nd edition of James and Liston's "Monog. Anoph. Mosq. India" Mr. C. S. Banks says, "Had the authors stopped at 'describing the different species in such manner that any specimen collected [might] be easily identified,' their work would have been less liable to adverse criticism by systematists, but they, like so many medical men not trained in systematic zoology, have attempted to dabble in generic legerdemain, thereby increasing the confusion already present in culicid classification and adding to the burden of synonymy which must be borne, not by men of their profession but by the already encumbered entomologist." (Phil Jour. Sci. vii. Sect. D., p. 207, June 1912.)

The erection of what the author evidently intends as super-genera is to be deprecated, as is, in fact, any system that introduces a multiplicity of divisions.

COMPARATIVE EXAMINATION OF STRUCTURAL VALUES.

GENERAL.—Most families of the diptera, whilst quite well circumscribed and distinct in themselves, exhibit fairly wide diversity in several characters, whilst those parts of the body that vary considerably in one family may be tolerably constant in adjacent families or variable to a very much less extent, this being exclusive of families with but a single genus each. For instance, whilst the shape of the body and form of the antennae in *Syrphidae* exhibit considerable variety (*Baccha*, *Syrphus*, *Eristalis*, *Microdon*, *Ceria*), the venation is strikingly uniform; whereas in the *Tipulidae*, the reverse is the case, the shape of the body throughout the family being markedly uniform, whilst the venation shows a large number of modifications. Other instances could be cited, well known to dipterologists.

It will now be my endeavour to compare the variation (or otherwise) of the organs in *Culicidae* usually treated of, with the variation of the same organs, speaking broadly, in other families of diptera.

THE PROBOSCIS.—The proboscis throughout the diptera is exceptionally variable, ranging from the enormously prolonged, conspicuous organ in *Pangonia*, *Rhaphiomidas*, *Bombylius*, *Nemestrina* and other genera; its lesser but still conspicuous and elongate nature in *Geranomyia*, *Empis*, etc. to the very restricted forms in many families: also from its long horny form in *Stomoxys* and *Drymeia* to its soft prehensile nature in most *Muscidae* and *Acalyptrata*; and again to its vestigial form in such species as apparently take no nourishment in the adult state.

In both comparative size and structure the proboscis varies widely throughout the order, but usually not much within the genus, and its range of variability is much greater in many families than in the *Culicidae*.

So far as structure goes, the proboscis is consistently uniform throughout the subfamily *Culicinae*, whilst in the only other subfamily (*Corethrinae*) the mouth is not formed for piercing. The length varies in relation to the body, and this organ may be thin throughout, swollen apically into a more or less elongated club, or it may be foreshortened and thickened throughout. The modifications are not striking, and occur chiefly in the genera relegated by Theobald to his *Uranotaeninae* and amongst those referred to the *Sabethini*.

The mere comparative length, unless very striking and consistent, is not of generic value, as has been shown by its wide range in *Pangonia*, *Bombylius*, *Empis*, etc.

THE PALPI.—Throughout the order, the palpi exhibit great diversity, but usually conform to one of two forms, the elongate,

generally 4-jointed form in the Nemocera, and the (generally) 2 or 3-jointed form in the bulk of the rest of the diptera. In some groups they are only one-jointed and are then of but slight value in restricted classification. One of the earliest classifications was built primarily on the palpi; long (4 or more joints) in Nemocera, and short (2 or 3 joints) in the Brachycera (i.e. the remaining diptera exclusive of Pupipara); and as a ready method of dividing the order into two great groups there is even to-day no better method, especially for the general entomologist.

The palpi in *Culicidae* vary more than any other organ and to a greater extent than in the allied nemocerous families.

Theobald, even in his first volume (p. 4) says the palpi "vary in each group, and are of specific but not always generic value," and in a footnote to page 16 adds, "the subject of the palpi is a very complicated one, and will take some time to work out. Arribalzaga figures the constrictions as joints."

In his latest volumes (iv, 15) he says "the classification by means of the relative lengths of the palpi, is, however, not satisfactory, as we get so many intermediate forms," and again (v. Intro. p. vi), "owing to the dense coating of scales, what look like palpi of 3 segments may really consist of 4, 5 or 6."

It is difficult to obtain definite information as to their structure in many genera without mutilating the unique types, a course from which most authors have refrained.

The ♂ palpi is said by Theobald to be especially liable to shrinkage after death, rendering exact examination difficult.

Besides it is not only the density of the scales, but the actual ill-defined nature of the joints themselves in many species that constitute a real stumbling block, though the taxonomic value in such cases must be considered to be correspondingly reduced. All degrees have been seen to occur from palpably mere constrictions to well-defined joints.

This uncertainty has led many writers to speak of the apical, penultimate and antepenultimate joints, by this means avoiding any statement of the exact number instead of the 1st, 2nd and so on, counting from the base, as is invariably done in diptera.

Possibly under the circumstances this is the safest method, but none the less it is consequently impossible for a reviewer to be precise in his deductions.

Study is also not facilitated by the obscure use of terms, some authors for instance speaking of a joint being "larger" than another when they presumably mean *longer*.

The figures do not always agree with the descriptions, as for example *Anopheles maculatus*, Theob. (Monog. i, 171), though several cases of discrepancy could be mentioned; whilst further ones of ambiguity of description are numerous. Patton figures 4 distinct joints to *A. (Nyssorhynchus) tibani* ♂, the first two quite long and the 3rd and 4th subequal to one another, and of about the normal lengths of the two apical joints in *Anopheles*, yet he does not say whether 4 joints are definitely present or not.

Personally I am disposed to regard the relative length of the palpi to the length of the whole body instead of to the proboscis only (itself an organ of some variation in length), or better still to the length of the head and thorax taken together, as of greater value than the relative length between the sexes, and in any case the number of joints, if quite definite, is of higher taxonomic value than the relative lengths of any of them

This uncertainty amongst authors renders it very difficult to estimate satisfactorily the taxonomic value of palpal lengths and joints, but in regarding both cases as of comparatively secondary importance except when well marked or in the broad sense as understood by the oldest authors, my views will be but in keeping with those of the most recent writers on this family.

A brief review of palpal variation in *Culicidae* is now attempted.

In *Anopheles* (s. str.) the palpus is long in both sexes; in the ♂ 3-jointed, the 1st long, the 2nd and 3rd generally subequal, considerably shorter than the 1st and often thicker or forming an elongate club: in the ♀ 4-jointed, approximately elongated, the joints slightly variable in their relative lengths, the last 2 joints generally less thickened than in the ♂

Taxonomically therefore the palpi in *Anopheles* both in regard to their relative and actual length are tolerably uniform.

Megarhinus has palpi of 4 or 5 joints, long and cylindrical, about as long as the proboscis; in the ♂ rather longer than in the ♀ the last joint in both sexes tapering, the 1st very short. In *M. purpureus* ♀ there are only 3 long joints, in addition to the usual very short basal one.

Ankylorhynchus differs from *Megarhinus* only in the last palpal joint in the ♀ being rounded, not pointed, and this may be a good genus though founded on a female character only.

Toxorhynchites differs from both *Megarhinus* and *Ankylorhynchus* by the palpi in the ♀ being not more than one-third as long as the proboscis, and of 3 joints only, thicker than in *Megarhinus*, the 3rd with rounded tip.

The Culicini must include both the genera of the *Culex* group and those around *Aedes*, but the two groups appear more or less natural divisions although connected by *Mimomyia*, *Gualteria* and *Cacomyia* and probably others. Theobald (Monog. iv, 520) regarded *Finlaya* and *Orthopodomyia* as intermediate between *Culex* and *Aedes*, apparently mainly on the length of the palpi, but he afterwards (l.c. v) replaced them in the Culicini without comment.

The palpi in the *Culex* group may be thus described:—

In the ♂ with 3 distinct joints (occasionally, owing to annulations 6 apparent joints being visible); one genus (or group of genera according to one's views, *Ludlowia*, having only 2 joints, though even this point seems to be open to question.

In the ♀ there are 3 or 4 joints, or with constrictions or annulations, 5.

In the ♂ the 1st joint is elongate, generally as long as or longer than the 2nd and 3rd together, and is often constricted at

or near the middle, or else a band of pale scales occurs there. The 2nd and 3rd joints may taper to a point or retain a nearly uniform width to the tip, or may be thickened separately, or, taken together, may form a more or less distinct club. Of the "genera" sunk in *Culex* in the present paper 6 are described as possessing clavate ♂ palpi, 11 as having the ♂ palpi more or less swollen at the tip, 21 as having non-clavate palpi, whilst of 15 the ♂ is unknown.¹ Of the remainder the information is insufficient or has been unavailable, some being synonyms only.

Many intermediate stages being known to occur, no great value can be attached to these differences. The question of 3 or 4 joints in the male in *Culex* rests practically on the division or otherwise of the long 1st joint; that of 5 joints, if so many are ever present, on the presence of a small basal joint, which, moreover, may perhaps be an antennal protuberance only, such as exists in many diptera and which (as in some species of *Phlebotomus*) has frequently given rise to controversy as to its exact nature.

Yet when we come to the *Aedes* group there is little to erect genera on except the palpal joints.

In *Mimomyia* (type species only), *Ludlowia*, *Megaculex*, *Banksinella*, *Radioculex* and others the ♂ has only 2-jointed palpi clavate apically, and it is on the strength of this character alone that *Mimomyia* (with which must be united the others as synonyms) is in the present paper admitted as a good genus. The venation differs slightly in the shape of the marginal cell, and perhaps in some cases the shorter forked cells.

The palpi in the *Culex* group, therefore, are seen to vary only in the cylindrical or clavate nature of their tips in the ♂, or in being either 2 or 3-jointed in that sex; whilst in the ♀ they are 3 or 4-jointed, or with constrictions, 5.

The palpi in the *Aedes* group consist in the ♂, of 2 or 3 joints (5 in *Haemagogus*), the divisions less clearly marked than in the *Culex* group. The ♀ palpi vary from 2 to 5 apparent joints, the basal joint often sufficiently constricted for one author to regard it as two joints when another would admit only one constricted joint.

Haemagogus, Will. has 5 distinct joints as shewn in Theobald (Monog. ii, 239) and thereon ranks as a good genus. *Hodgesia*, Theob. is said to have single-jointed ♀ palpi (the ♂ being unknown), and this appears to be a good genus also.

The palpi in the Sabethini shew much the same limits of variation as in the Culicini; they are long in the ♂ and moderately long in the ♀ in at least one genus (*Eretmapodites*), long in the ♂ and short in the ♀ in others (*Trichoposopon*, *Hyloconops*), and short in ♂ and ♀ in yet others (*Sabethes*, *Wyeomyia*).

As regards the number of joints they vary from 2 to 5, the latter number reputed to exist in *Eretmapodites* ♂, whilst

¹ These numbers subject to be modified by later investigations or by literature overlooked by me.

Wyeomyia has ostensibly 4, *Sabethes* 3 (doubtful in ♂) and *Sabethoides* 2 only in ♂ and ♀

A general vagueness pervades the references to these organs in this group in most writings, or else their length is spoken of irrespective of the number of joints.

THE ANTENNAE.—These exhibit extensive and even extraordinary modifications in many families (*Stratiomyidae*, *Tabanidae*, *Bombyliidae*, *Cyrtidae*, *Empidae*, *Syrphidae* and some *Acalyptrata*), ranging from conspicuously elongate or variously shaped structures down to a minute, almost globular form. The number of joints often varies within the same family, *Chironomidae*, *Cecidomyiidae* and *Tipulidae*, for example, in the latter varying from 6 to 28 joints.¹ They attain the most extraordinary forms in isolated genera (*Pityocera* in *Tabanidae*, *Talarocera* in *Tachinidae*, *Ctenophora* in *Tipulidae*); and vary to a very wide though less fantastic extent in *Syrphidae*, *Empidae*, *Bombyliidae* and some groups of *Acalyptrata*, so that by comparative analogy there is hardly any family (containing more than a single genus), in which they are not infinitely more diverse than in the *Culicidae*.

In this matter, indeed, we meet with no such difficulties as with the palpi. The normal number of joints is 15 in the ♂ and 14 in the ♀, exceptions being rare. Normally densely plumose in the ♂ and pilose in the ♀, exceptions are uncommon except in some *Sabethini* when though they should be pilose in both sexes, though generally a little more densely so the ♂, the degree of plumosity or pilosity in the ♂ may give rise to doubt.

Only quite a few genera have specialized antennae.

The very fanciful form of ornamentation of these organs in *Lophoscelomyia* ♂ substantiates its erection as a distinct genus, whilst in *Deinocerites* and *Dinomimetes* the excessive length of the 2nd joint also justifies their separation. In *Megarhinus* the 1st scapal joint in the ♂ is conspicuously annular or bead-like, the 2nd being elongate, thickened and densely scaled. One or both scapal joints may be scaled in one sex or both sexes (*Chagasia*, *Calvertina*), and may be enlarged or not, irrespective of scales, in others.

In *Finlaya* an apparent discrepancy occurs, the ♀ being reputed to possess 15-jointed antennae, but there seems to be only Theobald's original statement for this, and, it is true, the absence of contradiction by subsequent authors, but no figure has been available and if the 15th joint proves but a constriction of the 14th the alleged anomaly disappears. The two basal joints are also scaled.

To sum up, the antennae in the *Culicidae* may be regarded as generally consistently uniform, which justifies the exceptions (*Lophoscelomyia*, *Deinocerites* and *Dinomimetes*) being regarded

¹ Some authors have claimed 39 joints in *Cerozodia* (*Cecidomyiidae*), but others have regarded some of these as annular impressions only. However, at least 17 joints are definitely present in some genera of *Tipulidae*, others having, equally certainly, only 6.

as good genera, whilst the somewhat lesser modifications exemplified in *Megarhinus* and the Sabethini are also constant *inter se*.

THE SCALES.—There is no analogy in other families of diptera respecting classification by the scales which clothe the greater part of the body, legs and wings in nearly all *Culicidae*, and Theobald may be regarded as the pioneer of a classification built mainly on this character.

An exhaustive examination of the scales is however unnecessary here, since to any unbiassed examiner it must soon become obvious that any serious attempt at classification of genera on this character alone is foredoomed to failure.

The continual shifting of species from one genus to another, according to the views of each writer, and of the same author at different periods, illustrates on what a slender basis such a classification rests. The difficulty of deciding the exact shape of the scales, the quantity of them requisite to throw a given species into one genus or another, and their exact surface distribution; in each case according to each writer's interpretations of other authors' impressions, as well as to those of his own, is self-evident at the outset. Even mosquito workers themselves are admitting this difficulty.

Scale characters are admittedly useful in sorting species into groups, but it is impossible to regard these even as subgenera on account of the presence of so many intermediate forms.

More recently still, Mr. Edwards says (Bull. Ent. Res. iii, 3) "scale characters have practically been discarded as of value in generic definition," and it must be admitted the general tendency is in this direction. Col. Alcock regards them as quite unsatisfactory, Edwards sinks wholesale, genera so made, and Felt and Dyar and Knab consider genitalic and larval structure as of higher value. One or two recent authors place the construction of the claws before the scales. Only when scales or chaetae, or both together are present on the *metanotum*, a part of the body normally unadorned in diptera, at least with anything stronger than pubescence, can they be regarded of generic importance. In my paper on taxonomic values¹ I underrated their systematic importance when on this part of the body, and the Sabethini section are sufficiently differentiated by this character alone.

As regards scales on the legs, these afford no assistance beyond specializing two or three genera (*Psorophora*, *Mucidus*, *Lophoscelomyia*) in which their length and outstanding nature give the insect a ragged appearance. Yet tufts or fringes of long outstanding scales are found on the legs of several species of *Empis*, in some *Bombylidae* (*Hyperalonia*, *Exoprosopa*) and in other genera in diptera without such species being accorded thereon generic rank.

THE CLAWS.—Theobald at first (Monog. i, ii) attached much value to the claws and Coquillett still does so (Can. Ent. 1876, p. 43, and Science xxiii, 313—1906) but the former admitted later

¹ Rec. Ind. Mus. iv, 53.

the inferior nature of the character (Monog. iv, 15) and considered Coquillett wrong in upholding their importance. He says (*l.c.* iv, 122), "unless both sexes are seen, it is quite impossible to place any culicid in any of the sections into which the family is divided."

I am not yet disposed to admit any high value to this character unless there is good evidence that practically all individuals can be definitely allotted to one or other of the alleged subdivisions; and in other works I have ventured to question the supposed high taxonomic value of what is perhaps a somewhat analogous character, the presence or absence of small (often very minute) spines at the tips of the tibiae in *Tipulidae*, to which much importance is attached by some authors. Mr. Edwards however finds sufficient reliability in the claws to use them as of primary importance in differentiating genera, but this method places *Stegomyia* in the *Aedes* group which does not seem to me its natural affinity. Besides, a character dependent on the female sex alone is nearly always a doubtful one.

THE VENATION.—There are several families amongst the diptera of which each family possesses a type of venation entirely peculiar to itself.

In addition to those with practically but a single genus each, *Rhyphidae*, *Dixidae*, *Simuliidae*, and *Orphnephilidae*; the *Leptidae* (with the *Tabanidae*), the *Stratiomyidae*, and *Syrphidae*, also the *Tachininae* and *Anthomyinae* subfamilies of *Muscidae*,¹ all possess strikingly specialized types of venation, each peculiar to one family only. The *Culicidae* undoubtedly form another family of the same category, offering as pronounced an example of uniformity of venation as can be found. The Psychodid wing is closely allied but differs fundamentally in the basal proximity of the cross veins.

On the other hand, in *Tipulidae*, *Mycetophilidae*, *Chironomidae*, *Bombyliidae*, *Cyrtidae*, *Empidae* and others we find extensive modifications of the type venation peculiar to each.

Genera founded on the presence or absence of certain veins or cells are ordinarily quite valid and constant, but exceptions are not rare, and individual aberration has to be allowed for. In *Culicidae* the genera varying most would appear to be *Megarhinus*, *Mucidus*, *Uranotaenia*, and *Culex*.

Exact precision cannot be expected, and in the matter of venation a little wider range of individual variation must be allowed for, even to the two wings of an individual specimen, such instances being not at all infrequent in many families. This margin of individual variation is known to every depterologist. The venation has, however, been largely ignored by culicid writers

¹ It may be noted that in the *Muscidae*, *sensu latissimo*, I recognise but a single family, with the *Tachininae* (including the *Dexids* and *Sarcophagids*), *Muscinae* and *Anthomyinae* as three subfamilies; each of the *Acalyptrate* groups ranking also as subfamilies of equal rank with these three. The *Acalyptrata* as a group possess technically the same type of venation as the *Anthomyinae*, but modified forms are found, each more or less peculiar to one subfamily only.

because it is less amenable than other characters to the microscopic differences that culicidologists delight in, but which, nevertheless, *have no real specific value in nature.*

Theobald in fact says (Monog. iv, 381) after mature deliberation "the venation is too variable to take with any degree of seriousness." The truth is, that whilst of all taxonomic characters in *Culicidae* the venation, speaking broadly, is by far the most uniform, a single typical form continuing through the family with but two or three minor modifications, affording no opportunity to found thereon a multiplicity of genera, yet it has both in the species and in the individual a sufficiently wide variation to have precisely the same restraining effect as regards species and varieties.

As regards modification, first there is the exact position of the posterior cross vein in *Mucidus*, which, theoretically, is beyond, even if only slightly, the anterior cross vein. This would be a good character if constant (always allowing for individual aberration), but in one or two species (*alternans* and *sudanensis*) this cross vein is evidently so little beyond the anterior cross vein as to discount the generic value of the character. In *Trichoprosopon* the two cross veins are theoretically in a line, but the genus is sufficiently differentiated by the scaled metanotum.

In *Tipulidae* and many families of Brachycera the posterior cross vein is (generically) as often beyond as before the anterior cross vein whilst very many genera have them practically in a line with one another, the presence or absence of a discal cell between them, of course, making no morphological difference.

The validity of *Mucidus* on the position of the posterior cross vein alone is precarious, but the genus seems to be substantiated by the peculiar nature of the scales.

The second modification is the shortened 1st submarginal and 2nd posterior cells (called by culicid writers the "forked cells")¹ in certain genera, one of the principal characters of the Megarhini being the shortness of the forked cells, especially the 1st submarginal, while Theobald would distinguish his subfamily *Uranotaeninae* by the very small 1st submarginal cell.

As regards the generic value of the short forked cells in *Uranotaenia* doubts may be held, as though they are quite short in many species, their length, according to Theobald's figures, which form the only evidence before me, varies considerably, and closely approaches in some species their length in such species of *Culex* (s. *latiss.*) as have these cells rather shorter than usual. In *Culex* they may be regarded as about $\frac{1}{4}$ to $\frac{1}{3}$ the length of the wing, in *Uranotaenia* and *Megarhinus*, theoretically less than $\frac{1}{4}$, and even though in some species they may be less than $\frac{1}{5}$ of the wing, the border line between the longer celled species and *Culex* is very indefinite.

¹ There seems no objection to this term, which is certainly lucid and conveniently brief.

Felt's distinctions of his *Culicelsa*, *Culicada*, *Ecculex*, *Culicella*, *Culiseta* and *Protoculex* in the matter of forked cells, and the position of the posterior cross vein cannot be regarded as having any taxonomic weight whatever, nor can I personally conceive them possessing any constancy.

A further character in *Megarhinus* should be the more proximal position of the anterior and posterior cross veins. No specimen of the genus is before me, and Theobald's plates in his monograph do not attempt any venation but in his text figures of *M solstitialis* and *chrysocephalus* (iv. 134, 135, 137) the cross veins are in their normal position, that is, near or just beyond the middle of the wing.

What apparently is a third modification occurs in *Heptaphlebomyia* in which the presence of an alleged 7th vein with scales caused Theobald to erect a special subfamily for its reception. This view is a misconception and the point is discussed under the generic notes.

There are three folds (sometimes others) in the wing which appear with more or less distinctness in some species of *Culicidae*, in some individuals more vividly than others, and which may easily be mistaken for veins.

Such folds in the wing are well known to the dipterologist, and give rise in the family *Blepharoceridae* to what is known as the secondary venation. The "spurious" vein, one of the principal characters of the great family *Syrphidae* (being constant throughout it with the exception of a single genus) is similarly caused, whilst indistinct "veins" of similar nature occur in *Chironomidae*, *Mycetophilidae*, *Simulium* and other groups, and have, it is true, given rise to erroneous conceptions as to their true nature and value. They must not, however, be confounded with the fixed normal venation.

The first of the three folds referred to is in a line with the longitudinal part of the 3rd vein and certainly might easily be mistaken by a beginner for the basal part of that vein, were it not for the definite statement of dipterologists to the contrary.

As, however, the recent school of workers in mosquitoes mostly appear to deliberately disregard all writings outside of those of their own way of thinking in this particular family it is no wonder that serious errors are perpetuated.¹

The second and third folds of the wing lie respectively behind the 5th and 6th veins and have even been regarded as veins by the author of the British Museum's little brochure, "How to collect mosquitoes." This view is quite erroneous. The hindermost of these folds seems to be thickened somewhat in *Heptaphlebomyia*, and by bearing a row of scales led Theobald astray.

¹ The study of related diptera by means of Schiner's *Fauna Austriaca*, Williston's "Manual of North American Diptera" 3rd Ed., and Verrall's two splendid volumes on "British Flies" would give the student all necessary information on venation. See also my explanation of the venation, with diagram, in *Rec. Ind. Mus.* iv, 408

As regards terminology in venation the culicid workers are in many ways completely wrong and it is remarkable how most of the mistakes are adhered to.

I have dealt elsewhere (Rec. Ind. Mus. iv, 408) with the usual mistakes of modern writers, so need not recapitulate, except to emphasise yet once again that the so-called "supernumary cross vein" is *not a cross vein at all*, but the *basal portion of the 3rd longitudinal vein*, which *always issues from the 2nd longitudinal vein*, in spite of Theobald's deplorable statement (Monog. i, 19) that "In a large number of *Culicidae* the 3rd long vein passes some way into the basal cell and certainly does not arise from the 2nd longitudinal vein!" This view he again expresses in defining *Desvoidia* (Monog. i, 322) (as *Armigeres*), "the wings have the 3rd long vein continued on, into and through the basal cell as a distinct unscaled line."

The fact is, the 3rd longitudinal vein is frequently sharply angled at the end of its basal section, and, as very frequently occurs in many genera outside of the *Culicidae*, it often throws off an appendix at the point of angulation, which adds to the appearance of the vein itself being straight or nearly so, whilst the short basal section of it, being so often at right angles to the remainder heightens the effect of such basal section being a cross vein.

Such an appendix is frequently found in other parts of the wing in different families but gives rise to no misinterpretation. It is quite common adventitiously as well as specifically and more or less generically in some *Bombyliidae*, *Asilidae*, *Therevidae* and *Tabanidae*, whilst in many *Syrphidae* it is more often the rule than the exception at the bend of both the 4th and 5th longitudinal veins (see Verrall, "British Flies," *Syrphidae*, 133) and it occurs at the same spots in numberless Tachinids. Apart from *Tipulidae* and *Culicidae* such an appendix is uncommon in the Nemocera.

In *Toxorhynchites* this appendix is considerably lengthened and the anterior cross vein joins this appendix to the 4th vein, which is quite an abnormal character.

In many cases the 3rd vein emerges in a curve, or at an acute angle from the 2nd longitudinal, and without any appendix, thus proving its regular place of origin, and a large number of Theobald's wing figures confirm this.

Blanchard gives an excellent diagrammatic wing of *Culex* (after Van der Wulp, be it noted), distinctly shewing the natural origin of the 3rd vein and the very obvious anterior and posterior cross veins, but his own figures of *Anopheles* and *Culex* are very slovenly drawn, and exhibit all the common errors of mosquito students. He adheres to these in the text and even introduces still more cross veins that have no existence in *Culicidae*. Giles also speaks of a subcostal and a marginal cross vein and proffers the extraordinary intelligence that the anterior cross vein is *absent in Culicidae*! It would be superfluous to enumerate here the errors of all the recent writers on this group, since they have in the main copied one another, with an individual addition or two, but I

think all without exception are unanimous in the hypothetical "supernumary cross vein."

Even Col. Alcock commits one serious error in describing the venation.

His wing of *Tabanus* is quite correct. In his wing of a mosquito, waiving the point that his 2nd marginal cell is more usually termed the 1st submarginal (since this is a matter that can be regarded from two points of view), he commits a serious error in not recognising the very obvious posterior cross vein, which he terms his "anterior basal cross vein," stating that the posterior cross vein is not present at all and that therefore there is no enclosed anal cell. The presence or absence of the posterior cross vein has no bearing whatever on the anal cell, which is always the cell that lies behind the 5th longitudinal vein, or the lower branch of it when this vein is forked, and it may be open or closed quite independently of the posterior cross vein.

Far be it from my desire, let it be understood, to in any way condemn or undervalue Col. Alcock's valuable chapters on diptera, than which I have seldom perused anything more concise and clear, and it is refreshing to see that he eschews that, to me, particular bugbear, Theobald's "supernumary cross vein" and recognises its true character, as the basal section of the 3rd longitudinal vein.

A new and still more deplorable misconception than Theobald's "supernumary cross vein" is provided by Major Christophers in a recent paper on the wing markings of the *Anophele* group.¹ This author postulates that "if the 2nd longitudinal vein itself formed a direct junction with the 1st, etc., etc.," continuing "some authors figure the vein as acting in this way, but I have not found any example of an *Anopheles* wing shewing this arrangement," though he admits it "appears to occur" in some other *Culicidae*.

This author therefore actually seriously suggests that the 2nd longitudinal vein does not emerge from the 1st either in a curve or at a sharp angle (with or without an appendix at the flexure) but that it is joined to the 1st vein by a cross vein. The 2nd longitudinal vein does most emphatically *not* "continue past this cross vein," etc., to "lose itself in the wing membrane," but both 2nd and 3rd veins emerge from the 1st and 2nd respectively in *Culicidae*, as they do in other families. Is it not extraordinary that present-day writers on mosquitoes find veins that giants of dipterology like Wiedemann, Zetterstedt, Loew, Schiner and the late Osten Sacken and Verrall (two exceptionally gifted exponents of venation in diptera) all overlooked and that the 2nd and 3rd longitudinal veins in *Culicidae* are suddenly found to have totally different methods of origin to those in every other family of diptera?

¹ Ann. Trop. Med. and Paras. vii. No. 1. 57, March 31, 1913.

I protest emphatically against Major Christophers' statement that "it seems absurd to term the longitudinals by numbers and the much less important cross veins by a hybrid nomenclature only partially descriptive. The omission of the radio-sector cross vein,¹ which is every bit as important as the others, is also absurd."

Now firstly, the numbering of the longitudinal veins is correct, concise and easy to remember; and secondly the writer shews a strange ignorance of the comparative value of the veins in diptera when he asserts that the cross veins are "much less important" than the longitudinals, as exactly the reverse is really the case. The anterior and posterior cross veins are of *infinitely more importance taxonomically* than the branching of the longitudinal veins, as is shewn by the absolute fixity in most families of diptera of them both, and especially the former, which any dipterologist of experience can locate with absolute precision in almost every instance.

His discovery that the "radio sector cross vein" is "every bit as important as the others" is stultified by the absolute fact that there is *no cross vein there at all*. Some authors would construe as a cross vein every vein that starts at anything approaching a right angle.

It seems strange that every fresh writer on mosquitoes must introduce new terms for veins and cells, apparently oblivious of the fact that for at least half a century the venation in diptera has been thoroughly understood by dipterologists and two standard systems of terminology accepted, either of which is legitimate, the one employed by the late Mr. G. H. Verrall in his wonderfully accurate and explicit volumes on the British Diptera, the other as used by the late Baron Osten Sacken and by most of the principal dipterologists of today. These two authors were perhaps unequalled in their elaborate knowledge of the classification of the diptera, of the taxonomic value of the different characters dominating each group and in their precise and correct terminology.

Finally it is beyond the present writer's comprehension why recent workers on mosquitoes have from the first so *studiously ignored* both of the two accepted systems of venation used by dipterologists for over half a century and which are morphologically unassailable.

To sum up, the venation in the *Culicidae* as a family, dipterologically speaking, is throughout remarkably uniform, and is tolerably constant, generically and specifically within reasonable limits; the only points of variation being the positions, relatively or absolutely, of the cross veins in *Mucidus* and *Megarhinus*, the shortened fork cells in the latter and in *Uranotaenia*, and the alleged 7th vein in *Heptaphlebomyia*, all of which I have endeavoured to dispose of satisfactorily.

¹ By which is meant the actual, often angulated base of the 2nd longitudinal vein. James and Liston also erroneously regard this basal section as a cross vein, the "marginal transverse vein." One or two others have made the same deplorable error.

THE ♂ GENITALIA.—Though the value of the ♂ genitalia in allied families to the *Culicidae* (*Tipulidae*, *Mycetophilidae*, and, I believe, *Chironomidae* also) has long been known to dipterologists, Osten Sacken describing and figuring them very conscientiously in his classic monograph of the North American *Tipulidae brevipalpi* in 1869, it is not until Theobald's 4th volume of his work (pp. 7, 9) that the subject is broached in this family by him, nor do contemporary authors deign more than an incidental reference to these parts, ignoring them altogether in the specific descriptions. That culicidologists should ignore the male organs is not to be wondered at considering the pernicious precedence consistently accorded by them to the ♀, in spite of dipterologists having pointed out that characters and especially external markings are almost always more fixed in the ♂ than the ♀ and, as the former sex is less bloodthirsty there is, in specimens of it, less discoloration due to imbibed blood.

Dr. Dyar says "genitalic divisions are more natural than those recently founded on scales and palpi," but Theobald, replying (Monog. iv, 13) asserts that he himself supports characters "which are common to both sexes, such as the scales" adding "such we find to be the case, not only from a structural but also from a bionomic point of view." Theobald observes (i, 327) that the ♂ genitalia "vary so much in closely related gnats," but the subject is then shelved.

The genera set up by Felt, *Culicada*, *Culicella*, and the allied others exhibit a reasonable amount of variation in these organs, but not sufficient to separate them generically from *Culex* (*s. latu*). In fact far more diversity is found in them in the very large and homogeneous genus *Tipula*, whilst they vary widely within the limits of the genus in many cases in allied nemocerous families. Generic subdivision on these organs alone is to be deprecated. Dr. Dyar (Proc. Ent. Soc. Wash. vii, No. 1—1905) gives a table of genera (including four new ones), reproduced by Theobald (iv, 11), constructed solely on the ♂ genitalia. Felt (N. York State Mus. Bull. No. 79, Ent. 22—1904) also endeavours to classify similarly, supplementing this character by those of the veins, the scales and the larvae, but his distinctions do not appeal to me as at all convincing and it does not seem conceivable that all the characters hold good in all his genera.

It may well be that the ♂ genitalia are much less diverse than in some allied families, and if used with caution and in conjunction with other characters they should prove a useful adjunct in discriminating species, but they are hardly likely to prove of generic value in this family except possibly in rare instances.

The female genital organs in diptera hardly ever offer much in the way of distinctive characters.

THE LARVA.—Classification by larval characters is not easily criticised unless one has some considerable knowledge of this branch of study. Perhaps Messrs. Dyar and Knab have advanced farthest in this line, and in their view the principal features in the

Anophelinae are the frontal hairs of the head and the structure of the antennae and the palmate hairs; in the *Culicinae*, the form of the clypeus, the siphon and the so-called comb at its base, the antennal structure and the number and structure of the spines forming the pecten. Theobald adds (iv, 6) a table by Felt classifying a certain number of species by larval characters including species widely different in the adult stage. As a matter of fact, according to Felt's own diagnoses, the larva shows considerable difference in their so-called genera *Culicelsa*, *Culicada*, *Ecculex*, *Culicella*, *Culiseta* and *Protoculex*, all of which are inseparable from *Culex*, proper. It must also be noted that Theobald and others of his school contend that classification by larval characters is most untrustworthy, separating very closely allied species, and bringing together widely different ones. Moreover, animals are classified on their adult forms and not on transitional stages. It is also well known in diptera that closely allied species are not infrequently widely different in their early stages.

In Dyar and Knab's lengthy paper on the larvae of *Culicidae*, classified as independent organisms, they combat the value of scale structure as a character of generic values (t. Th. iv, 13). In this paper they sink all the anopheline genera in *Anopheles*, yet raise one species, *barberi*, Coq. to generic rank, (*Coelodiaezes*), a species that Theobald considers so near *bifurcatus*, L., as to be hardly separable. These authors admit three sub-families, *Anophelinae*, *Culicinae* and *Sabethinae*; they refer several of Theobald's species to other genera, and sink *Ochlerotatus*, *Haemagogus*, *Stegomyia*, *Grabhamia*, *Howardina*, *Verrallina*, *Culicelsa*, *Culicada*, *Ecculex*, *Protoculex*, *Gymnoptera*, *Lepidoplastys* and *Pseudoculex* in *Aedes*.

Haemagogus has every appearance of a good genus, whilst the prospect of *Stegomyia* proving a natural group is strong. *Aedes* is certainly distinct from the genera around *Culex*.

The sole substantial character drawn from larval stages that does not interfere with adult classification, is the absence of a respiratory siphon in the *Anophelinae*, an organ which is present in the other groups.

One very useful piece of information gleaned from larval characters is the absolute affinity of the *Corethrinae* with the *Culicidae*.

"Even when the most is made of the difference between the larva of *Culex* and the larva of *Corethra*, there still remains the fact that the larva of *Mochlonyx* (whose adult is indisputably corethrine) possesses the structural peculiarities of the larva both of *Corethra* and of *Culex*, besides exhibiting in its four clypeal bristles one of the peculiarities of the larva of *Anopheles*" (Alcock, Ann. Mag. Nat. Hist. (8), viii, 240 and Entom. for Medical Officers, p. 59).

In further support of the larval characters alone being an insufficient guide to real affinity, Prof. Mienert may be drawn upon. "The likeness between the imagines of the genus is the more remarkable as the difference between the larvae and pupae

and especially between the larvae, is so great; but on the other hand there are other genera among the true *Culicidae*, such as *Culex* and *Anopheles*, of which the imagines, at any rate in one sex¹ are so like as to lead to confusion while the larvae are exceedingly different. * * * "

ABNORMAL CHARACTERS.—Genera founded on legitimate variation of bodily structure are very few, *Dactylomyia*, *Lophoceratomyia*, *Rachionotomyia*, *Deinocerites*, *Dinomimetes* and *Runcho-myia*, all dealt with further on, are, apparently, all that can be found in *Culicidae*.

* * * *

SUBFAMILIES AND SECTIONS IN CULICIDAE.

Having compared the principal characters in *Culicidae* with the same characters in other families of diptera we can proceed to examine the genera proposed of late years and estimate their validity.

The *Culicidae* form only two subfamilies² *Culicinae* and *Corethrinae* and the former should be divided into four sections only.³

Table of sections in CULICINAE.

Scutellum simple, never trilobed; palpi long in ♂ and ♀; larva without respiratory siphon	I <i>Anophelini</i> .
Scutellum trilobed; palpi variable, generally shorter in ♀ than ♂; larva with respiratory siphon.	
Metanotum nude.	
Proboscis strongly recurved	II <i>Megarhini</i> .
Proboscis normally straight; never recurved as in the Megarhini	III <i>Culicini</i> .
Metanotum with scales, chaetae or both	IV <i>Sabethini</i> .

Section I. ANOPHELINI.

The genus *Anopheles* in the original sense is a very well defined and natural one, characterized by the non-trilobed scutellum in conjunction with the long palpi in both sexes. A secondary character is the larva being without a respiratory siphon, whilst the generally maculated nature of the wings in the adult, formed

¹ Meinert adds in a footnote " Thus with regard to *Culex nemorosus* see Zett. (Dipt. Scand. 3458, note):—" caveas ne hunc cum *Anophele bifasciato* confundas."

² Mr. Edwards desires to add the *Dixinae* as a third subfamily, but though this view has the support of as sound an authority as Prof. Williston, I think *Dixa* is best separated from the family.

³ Mr Edwards uses practically the same names, though I had personally decided on them months before his paper was seen by me

by spots and lines of black, white or yellowish scales is a prevailing feature of the genus in Meigen's sense.

Of over twenty genera proposed since *Anopheles*, I can only personally recognize four, *Chagasia*, Cruz, *Calvertina*, Ludl., *Bironella*, Theob. and *Dactylomyia*, Newst. and Cart.

Two of the latest workers in this group, Col. Alcock and Mr. Edwards, are disposed to return the bulk of the known species to *Anophele* proper, that is, in Meigen's sense. All the recent genera set up merely on scale characters are utterly untenable and must be abandoned by the systematist.

Col. Alcock shows (Ann. Mag. Nat. Hist. (8) viii, 240, etc.) how many of the so-called genera in the Anophelini grade into one another and concludes "the so-called 'genera' of the proposed subfamily '*Anophelinae*' cannot be separately focussed as distinct generic conceptions, but must all be merged in a generalization."

Mr. Edwards (Bull. Ent. Res. iii, 241) observes that the so-called genera "grade imperceptibly into one another and are not founded on any structural differences, while *Anopheles* in the broad sense is a very well defined genus easily recognizable even by an amateur."

He deprecates the erection of a number of even subgeneric names as tending to obscure larger relationships and increase the difficulty of determination. "The differences found in the larvae, like those between the adults are very slight, and moreover they do not seem to support the classification by scale characters."

In an earlier volume (loc. cit. ii, 141) the same author in writing on the West African species of *Anopheles* agrees with sinking most of the recently established genera of Anophelina in *Anopheles* but provisionally respects *Stethomyia*, *Chagasia*, *Calvertina* and *Bironella*.

It is striking that three out of four of his retained genera should be the same as those admitted by me working on quite independent lines. *Dactylomyia* had not been proposed at the time he wrote. I can also agree with Mr. Edwards' remarks on synonymy (l.c., p. 141).

The differences between the genera admitted here are sufficiently shown in the following table:—

Table of genera in ANOPHELINI.

A	1st submarginal cell subequal to the 2nd posterior cell, both of normal length.	
B	Antennae without whorls of scales.	
C	No shoulder tubercle . . .	<i>Anopheles</i> , Mg.
CC	A finger-like tubercle on each shoulder . . .	<i>Dactylomyia</i> , Newstead and Carter.
BB	Antennae with whorls of scales (Dense long outstanding scales at sides of thorax)	<i>Chagasia</i> , Cruz.

AA 1st submarginal cell only about half as long as 2nd posterior cell.

D Antennae with whorls of scales *Calvertina*, Ludl.

DD Antennae without whorls of scales *Bironella*, Theob.

Generic notes in ANOPHELINI.

Anopheles, Mg. A natural and easily recognized genus, of which no criticism is necessary.

None of the following proposed genera can be accorded generic rank, and from the feeble lines of demarcation between most of them they cannot be regarded systematically as even subgenera. No special sequence is adopted in listing them here.

Patagiamyia, James.

Myzomyia, Blanch.

(*Grassia*, Theob.)

Neomyzomyia, Theob.

Cyclolepteron, Theob.

Nototricha, Coq.

(*Notonotricha*, Theob. em.)

Feltinella, Theob.

Neostethopheles, James.

Nyssomyzomyia, James.

Stethomyia, Theob.

Pyretophorus, Blanch.

(*Howardia*, Theob.)

Myzorhynchella, Theob.

Arribalzagia, Theob.

Conchyliaestes, Theob.

Myzorhynchus, Blanch.

(*Rossia*, Theob.)

Christya, Theob.

Lophoscelomyia, Theob.

(*Lophomyia*, Giles.)

Nyssorhynchus, Blanch.

(*Laverania*, Theob.)

Cellia, Theob.

Neocellia, Theob.

Aldrichinella, Theob.

(*Aldrichia*, Theob.)

Kerteszia, Theob.

Christophersia, James.

Manguinhosia, Cruz.

Coelodiazeses, Dyar and

Knab¹

The following four genera appear distinct, and are differentiated in the table.

Chagasia, Cruz.

Calvertina, Ludl.

(*Calvertia*, Ludl.)

Bironella, Theob.

Dactylomyia, Newstead and

Carter.

Mr. Edwards thinks *Dactylomyia* may be identical with *Anopheles deceptor*, Don. and *Myzomyia thorntoni*, Ludl. Apparently the ♂ is unknown of *Chagasia* and the ♀ of *Bironella*.

Section II. . MEGARHINI.

The Megarhini form a compact group of 3 or 4 genera characterized by the strongly recurved proboscis, the position of the posterior cross vein *beyond* the anterior cross vein, and the

¹ Erected on larval characters alone and therefore inadmissible: the adult is known and cannot be separated from *Anopheles*.

generally much shortened second submarginal and first posterior wing cells. They are mainly the giants of the family, with tufts of brilliantly coloured scales on the abdomen. The genera are differentiated as follows, but the table is not a satisfactory one, being built on sexual characters, so that it is impossible to generically identify males unless the known corresponding females are present also.

Table of genera in MEGARHINI.

Palpi long in ♂ and ♀ (in ♀ only a little shorter than in ♂).	
Last palpal joint in ♀ truncate or rounded.	<i>Megarhinus</i> , R. Desv.
Last palpal joint in ♀ long and pointed.	<i>Ankylorhynchus</i> , Lutz.
Palpi long in ♂, not more than one-third as long as proboscis in ♀	<i>Toxorhynchites</i> , Theob.

Generic notes in MEGARHINI.

Megarhinus, R. Desv. This is, of course, a well-marked genus of long institution. *Lynchiella*, Lahille, in Peryassu, is synonymous.

Ankylorhynchus, Lutz. A somewhat unsatisfactory genus built on the ♀ palpi only, but if this character is constant it would appear to be a natural group

Toxorhynchites, Theob.

Worcesteria, Banks.

Teromyia, Leices.

One of *Teromyia*'s alleged distinctions is that the ♀ palpi are only half as long as the proboscis, and 5-jointed, as compared with *Toxorhynchites*, in which they are from one-quarter to one-third as long as the proboscis, and 4-jointed. The palpal length, anyway seems very difficult of exact determination and too arbitrary to be a natural distinction

A far stronger distinction, if it really exists, is in the alleged cross vein between the subcostal and 1st longitudinal veins, claimed by Leicester for all his species. This would, of course, be the subcostal cross vein, but it is difficult to conceive that that author is not mistaken, as this vein has never been dipterologically recorded in the family. The juxtaposition of two veins often results in a slight thickening of both which appears at first sight as a cross vein, and in my studies in *Tipulidae* and *Mycetophilidae* few points have given me more trouble than the decision as to the presence or absence of this cross vein, which in both these families is found in some genera and not in others.

Section III. CULICINI.

Although the Anophelini, Megarhini and Sabethini form natural groups, each represented by a limited number of valid

genera, we are confronted in the Culicini (with which must be united the Aedines, as it is clear that, though they appear to be more or less natural groups, we can at present draw no satisfactory line of demarcation between them) with a very extensive series of closely allied forms exhibiting great variety within narrow limits.

Of over 100 groups admitted by Theobald as generic, to which must be added about a dozen others of later erection, only a very small number stand out clearly as valid independently of characters of indefinite or disputed nature, such as the exact number of joints of the palpi and the relative or actual length of these organs, sexually, specifically and generically, and of course apart from any scale characters.

After eliminating these few tolerably well defined genera there are hardly any characters left in the remaining forms on which to construct even sub-genera, and though culicidologists also consider the *Culex* and *Aedes* groups as more or less natural ones, intermediate forms occur, which after all is not surprising.

The original distinctions of palpi in ♂ long, in ♀ short—in *Culex*, and short in both sexes in *Aedes* sufficed for the few species known to the early authors, but, both by the now proved variety in length of this organ within the narrow limits as thus defined, and by the actual indefinite formation of its joints in many 'genera' these differences hold good only in a very general way.

Cacomylia and *Gualteria* are acclaimed as intermediate and though Theobald recently puts *Cacomylia* with the Aedines I have retained it here as of uncertain position. Theobald at one time (Monog. iv, 520) regarded *Finlaya* and *Orthopodomyia* as also intermediate, though later (*l.c.* v) he replaces both in his *Culicinae* without comment, whilst Col. Alcock, one of our latest (and incidentally one of the soundest) authorities on the classification of this family, considers *Myxosquamus*, *Carrollia*, *Eumelanomyia*, *Acartomyia*, *Bancroftia*, *Catageomyia*, and *Boycia* all as "annectant forms between *Culex*, *Stegomyia* and *Aedes*."

Psorophora also has been adjudged intermediate, but this can, at any rate considered solely as a genus, be sufficiently easily recognised by its peculiar leg scales.

Mr. Edwards divides the *Culex* group from the *Aedes* group as follows: In the former the "eggs are laid in masses, the last segment of the ♀ abdomen is broad and immovable, and the claws in the ♀ are never toothed." Genera: *Culex*, *Taeniorhynchus*, *Aedomyia*, *Theobaldia*, *Uranotaenia*, etc.; in the latter group the "eggs are laid singly, the last segment of the ♀ abdomen is narrow, usually completely retractile into the penultimate and the ♀ claws, at least the anterior ones, are nearly always toothed." Genera: *Mucidus*, *Psorophora*, *Janthinosoma*, *Ochlerotatus*, *Stegomyia*, *Aedes*, etc. I regret I cannot consider any of the three characters of sufficient weight, and though palpal characters are also unsatisfactory, they have been adopted in the present paper,

pending some quite decisive method of dividing these two groups.¹

After a critical survey of the proposed genera in the Culicini, founded on the descriptions of the promoters (since little else is available to me) it appears as though, from the systematist's point of view the only valid genera in the *Culex* group are: (1) *Deinocerites*, distinguished by its exceptionally long 2nd antennal joint; (2) *Lophoceratomyia*, by the fantastic adornment of the ♂ antennae; (3) *Rachionotomyia*, by the spine-like production of the scutellum; (4—6) *Psorophora*, *Janthinosoma* and *Mucidus*, by the outstanding scales on the legs, these latter three differentiated amongst themselves by fairly good characters; (7) *Ekrinomyia*, by the posterior cross vein being placed beyond the anterior cross vein, assuming this to be definite and constant in conjunction with the absence of outstanding leg scales; (8) *Mimomyia* (with several synonyms) by the 2-jointed, more or less clavate ♂ palpi; and (9) *Stegomyia*, by the 5-jointed ♂ and 4-jointed ♀ palpi, but this latter genus is admitted herein on the presumption that this character is definite and constant, which, by the way, is not too certain.

The following good genera occur in the *Aedes* group: (1) *Haemagogus*, distinguished by the distinctly 5-jointed antennae in both sexes; (2) *Harpagomyia*, by the elbowed proboscis; (3) *Hodgesia*, by its 13-jointed antennae and one-jointed palpi, in both cases in the ♀ only, the ♂ being unknown.

The remainder of the Aedines² should fall in *Aedes* or *Skusea*, technically distinguished by a 2-jointed ♂ and 4-jointed ♀ palpi in the former, and a 3-jointed palpi in both sexes in the latter, and it seems wise to acknowledge both genera. *Aedes* is, of course, a quite sound genus of many years' standing, but much uncertainty attaches to the descriptions of most of the recent genera and species. *Uranotaenia* will hold good if the character of 2-jointed palpi in ♂ and ♀ can be trusted.

After accounting for the above as good genera in Culicini there remains a very large number of species and groups of species, including *Culex* itself, which have little, if anything, taxonomically to separate them from one another except still vaguer palpal characters, all of admitted variability, the difficulty of unravelling the puzzle being increased by the limited information authors have been able to afford.

Scale characters I strongly resent being considered of generic value, and the continual shifting of species from one genus to another and of genera from the *Culex* to the *Aedes* group and *vice versa*, emphasises both their instability and the existing want of unity of opinion even amongst culicidologists themselves.

¹ Mr. Edwards admits the ♀ claws are variable in at least one species—*Stegomyia simpsoni*, Theob. See *Howardina*, in List of Genera, p. 62.

² The *Aedes* group is considered separately further on, as being more convenient.

This bulky residuum consists, in the *Culex* group (the *Aedes* group being considered further on) of, firstly, nearly a dozen genera of which insufficient information is available to form any opinion, and secondly, *Culex* itself, *sensu lato*. Of this latter well distributed and extensive genus five subgenera may be regarded as fairly well founded: *Chaetocruimyia*, on its spiny legs; *Culicimyia* (*Pectinopalpus*) with its long outstanding scales on the 1st palpal joint; *Taeniorhynchus* on several rather indecisive characters which taken in the aggregate may justify subgeneric rank; *Finlaya* also on several minor characters, some of which would be better for further substantiation; and *Newsteadina*, on the long scaled basal joints of the antennae in both sexes.

Heptaphlebomyia, which Theobald almost decided was not a Culicid at all, is now recognized as "a slightly modified *Culex*"!

The so-called genera sunk in *Culex* in the present paper number no less than 77, including synonyms.

The diagnoses of the following do not allow of their satisfactory disposition: *Brevirhynchus*, *Duttonia*, *Orthopodomomyia*, *Eumelanomyia*, *Gualteria*, *Cacomyia* and *Catageiomyia*.¹

Such information as could be gleaned on these appears in the generic notes.

The genera in the Culicini are now considered in two groups, those round *Culex* and those round *Aedes*, the theoretical distinction being that of the palpi; because, having little or nothing on which to test generic validities beyond the descriptions I have been compelled to adopt this method, for want of any other.

Table of Genera in CULICINI.

A	The 2nd antennal joint normal.	
B	Scutellum normal.	
C	Legs with conspicuous outstanding scales.	
D	Posterior cross vein before the anterior cross vein.	
E	All the legs with outstanding scales	<i>Psorophora</i> , R. Desv.
EE	Hind legs only so-scaled	<i>Janthinosoma</i> , Arrib.
DD	Posterior cross vein beyond the anterior cross vein	<i>Mucidus</i> , Theob.
CC	Body and legs without such conspicuous outstanding scales.	
F	Posterior cross vein beyond anterior cross vein	<i>Ekrinomyia</i> , Leices.
FF	Posterior cross vein before anterior cross vein.	

¹ Of this I have no knowledge beyond its simple inclusion in a table of genera (Theob. Monog., v, 115).

G	Antennae in ♂ fancifully ornamented	<i>Lophoceratomyia</i> , Theob.
GG	Antennae in both sexes without such fanciful ornamentation.	
H	Palpi in ♂ 5-jointed, in ♀ 4-jointed	<i>Stegomyia</i> , Theob.
HH	Palpi in ♂ 3-jointed, in ♀ 3—4-jointed	<i>Culex</i> , L.
HHH	Palpi in ♂ and ♀ 2-jointed	<i>Ludlowia</i> , Theob.
BB	Scutellum produced into a blunt spine (♂ unknown)	<i>Rachionotomyia</i> , Theob.
AA	The 2nd antennal joint many times longer than usual	<i>Deinocerites</i> , Theob.

N.B.—The above table is offered with some diffidence since several of the more striking genera are unknown to me and the remainder rest on the trustworthiness of the characters set up by their promoters.

Generic notes on the CULEX group.

Psorophora, R. Desv.

Janthinosoma, Arrib.

Mucidus, Theob.

These three genera are sufficiently clearly characterized, providing always that the position of the posterior cross vein beyond the anterior cross vein holds constant in all the species. This is by no means certain in *M. alternans*, Westw. and *M. sudanensis*, Theob., for instance.

As regards the palpi, Theobald says *Psorophora* has them 4-jointed, admitting that Robineau Desvoidy and Arribalzaga claimed 5 joints for them, but in *Mucidus* although he describes six species in his monograph he does not mention any number in the ♀ palpi.¹ In his "genera of the *Mucidus* type," Col. Alcock includes *Mansonia*, *Mansonioides*, "*Etorilepidomyia*" (?=*Etorileptiomyia*), *Orthopodomyia*, *Aedimya* and *Finlaya*.

Ekrinomyia, Leices. This genus is apparently sound, the posterior cross vein being beyond the anterior one, but the prominent outstanding scales on the legs being absent prevent it being confused with the first three genera.

Stegomyia, Theob.

Quasistegomyia, Theob.

Kingia, Theob.

Blanchardiomyia, Brun. (*Desvoidya*, Blanch.).

Scutomyia, Theob.

¹ The continual recurrence of omissions like this render it almost impossible for a systematist to arrive at just conclusions.

The principal character of *Stegomyia* is the 5-jointed ♂ palpi, the ♀ having 4 joints, and the other genera added are said to be very near it. Theobald is silent as to the number of joints in the palpi in these, except that *Quasistegomyia* has 3 joints. This would presumably throw this "genus" back into *Culex*. Edwards ranks *Scutomyia* as a synonym of *Howardina*, which latter I cannot separate from *Culex*. Some discussion may be raised here as to the real preoccupation of Blanchard's name or not, on the ground of the spelling. Meade first used the name for a genus of Tachinid flies, spelling it *Desvoidia*, which is emended in the Palaearctic Catalogue to *Desvoidya*, that is to say subsequently to the use of the term by Blanchard, who spelt it *Desvoidea*. As the terms are obviously all used in commemoration of the French dipterologist Robineau-Desvoidy the exact spelling seems immaterial.

In any case, Blanchard's name, however it may or ought to be spelt, has no real weight, being proposed as a *nomen novum* for *Armigeres*, Th., under the assumption that the latter was preoccupied, which is really not the case, *Armiger*, Hartm. (in Moll. 1842), not being a true homonym. The original name *Armigeres*, Theob., should be therefore restored as a matter of principle though generic rank must be denied it. Theobald makes the extraordinary statement that "the wings have the 3rd long vein continued on, into and through the basal cell as a distinct unscaled line"!

Brevirhynchus, Theob. The validity seems doubtful, though the alleged 4-jointed ♂ palpi and the thick sinuous proboscis in the ♀ are good characters. No definite opinion can be offered here. The name, as a generic one, is in any case ill founded.

Mimomyia, Theob.

Ludlowia, Theob.

Banksinella, Theob.

Megaculex, Theob.

Boycia, Theob.

Radioculex, Theob.

Conopomyia, Leices.

Hispidimyia, Theob.

This seems a definite, if not a very clearly limited genus, characterized by the 2-jointed clavate ♂ palpi, and the more or less different shape of the marginal cell, also less distinctly by the shorter fork cells and minor characters. Edwards admits *Banksinella* as distinct, on the fore and mid unguis in the ♀ being dentate, not simple. In *Conopomyia* the 2nd antennal joint is three times the usual length and as Leicester describes both sexes of the three species it may possibly be constant enough to form a sub-genus. "*Mimomyia*" is often regarded as intermediate between the *Culex* and *Aedes* groups, but Edwards has recently shown the type species (*splendens*) to be identical with the above group of genera, whilst the other species of the genus are quite distinct, and for these he has erected the genus *Ingramia*, and this latter genus I leave amongst those requiring confirmation.

Duttonia, Newstead. On this I can pronounce no opinion, the 4-jointed ♂ palpi being uncommon. The ♂ has the "anterior tarsi sub-chelate."

Eumelanomyia, Theob. This shows a little abnormality in the thickened 2-jointed ♀ palpi, and may be left as an uncertain quantity at present.

Orthopodomyia, Theob. This again has 4-jointed ♂ palpi, the ♀ having 5 joints, the last "minute but distinct." It remains in abeyance.

Lophoceratomyia, Theob. This ranks as a good genus on the strikingly fantastic adornment of the ♂ antennae; the ♀ has 2-jointed palpi.

Rachionotomyia, Theob. Generically distinct by the scutellum being drawn out into a blunt spine. ♀ only known.

Cyathomyia, Meij. This is recently erected, near *Finlaya*, and must be left here in abeyance as I know nothing of it, but being established by a dipterologist and not by a culicidologist is at least presumptive evidence in favour of its validity.

Oculeomyia, Theob. From the original description of this, alleging contiguous eyes, "suggesting the family *Acroceridae*," and from Theobald's figure I was willing to accord it generic rank. *Molpemyia*, Theob., is evidently identical. Yet Mr. Edwards says it is founded on a misconception, many species with contiguous eyes existing both in Culicini and Metanotricha (= my Sabethini). It is, of course, a question of degree of contiguity. Blanchard's figures of *Taeniorhynchus taeniorhynchus*, W (p. 291), *Culex fatigans*, W (p. 353), and others show the eyes contiguous or sub-contiguous for a short space only, but in *Oculeomyia* they are shown by Theobald as sub-contiguous for half their length, and this seems to me sufficiently distinct from other genera to form a separate genus. I am disposed to leave the question open at present.

Deinocerites, Theob. (*Brachiomyia*, Theob.) The very long 2nd antennal point makes this a good genus, the pilose ♂ antennae forming a second character. Theobald made a subfamily of this genus and *Dinomimetes*, Knab, together, but the latter belongs to the Sabethini and there is certainly nothing above generic rank in either.

Heptaphlebomyia, Theob. This has given rise to the most erratic views, Theobald, when first describing it, saying it "must undoubtedly be placed in a separate subfamily on account of there being 7, not 6, longitudinal scaled veins,"¹ subsequently (Monog. iv, 531) even adding, "the strangeness of the venation might be thought sufficient to exclude them from the *Culicidae* altogether," (!) yet he admits on the same page that the vein is not, as a rule, scaled for its whole length, and finally Alcock defines the genus as "a somewhat modified *Culex*."

¹ Monog. iii, 336.

In describing what Theobald assumes (with a doubt) to be the ♂ of *H. simplex*, the type species, he says the 7th vein is *apparently not scaled*, and moreover his figure of the wing shows no 7th vein at all! In describing *H. argenteopunctata*, Ventr., he says "this species has a false nerve covered with a row of scales forming a 7th vein." A *row of scales* cannot constitute a *vein*, as his descriptions would lead one to suppose, but remains simply a row of scales. I have never seen *Heptaphlebomyia*, but suspect that the so-called 7th vein is merely the usual fold of the wing a little more distinct than usual, and bearing scales or not according to the species or perhaps, to sex also.¹ Mr. Edwards finally disposes of *H. simplex* and with it the "subfamily" by registering the ♂ as synonymous with *Culex decens*, Theob., and the ♀ with *C. univittatus*, Theob.

The genus *Culex*, L.

Sub-genera of *CULEX*.

The following five species or groups of species appear to have more or less claim to sub-generic rank in *Culex*.

Chaetocruimyia, Theob. This is characterized by long spines on the fore tibiae and lesser, though conspicuous ones on the femora. Other supporting characters are claimed for it. Its generic validity is at least dubious.

Culiciomyia, Theob.

(*Pectinopalpus*, Theob.).

This is erected on a row of long outstanding scales on the ♂ palpi, a feature omitted from the original description. Edwards draws attention to this fact (Bull. Ent. Res. ii, 242) and *Pectinopalpus* becomes synonymous.

Taeniorhynchus, Arrib.

(*Pseudotaeniorhynchus*, Theob.;

Rhynchotaenia, Brethes).

In this the ♂ palpi are clavate, turned downwards at the tips, the ♀ palpi are said to be 5-jointed, the last very minute; the hind metatarsi distinctly shorter than the tibiae, differing thus from *Culex* proper, in which the ♂ palpi are not clavate and are turned upwards at the tip, the ♀ possessing only 3 or 4 joints, and the hind metatarsi are at least as long as the tibiae, generally longer. The distinctions *read* satisfactorily, all depends on the absence of intermediary forms. Edwards thinks *Coquillettidea* may be synonymous.

Finlaya, Theob. This is founded on the ♀ only and is recorded as possessing three abnormalities, a 15-jointed antenna, the two basal joints of which are scaly, and tufts of scales below the abdomen towards the tip.

¹ It is curious that Theobald himself in his 1st vol. (pp. 18, 19) calls attention to the *folds* in the wing, and advises caution not to misinterpret them as veins.

Theobald at first regarded it as intermediate between the Culicines and the Aedines, but later he placed it in the former section, whilst Edwards sinks it in *Ochlerotatus*.

Newsteadina, Theob. The alleged 4-jointed ♂ palpi and the long scales in both sexes on the basal antennal joints may separate this from *Culex* proper, but it must be noted that some species of *Culex* have the basal antennal joints more or less scaled. Its even subgeneric rank is very uncertain, as the supposed 4th palpal joint may be apparent only, due to a constriction.

Mr. Edwards (Bull. Ent. Res. iii, 14) definitely sinks in *Ochlerotatus*, the following genera as synonymous: *Acartomyia*, *Finlaya*, *Aedimorphus*, *Culicelsa*, *Culicada*, *Ecculex*, *Protoculex*, *Pseudoculex*, *Chrysoconops*, *Reedomyia*, *Pecomomyia*, *Pseudograbhamia*, *Phagomyia*, *Polyleptomyia*, *Lepidotomyia*, *Lepidoplatys*, *Pseudoskusea*, *Pseudohowardina*, *Protomacleaya*, *Duttonia*, *Mimeteculex*, *Geitonomyia*, *Myxosquamus*, *Neopecomyia*, *Stenoscutus*, *Bathosomyia*, and *Leslieomyia*. Also, with a doubt, *Gilesia*, *Gualteria*, *Danielsia*, *Cacomyia*, *Stegoconops*, *Molpemyia* and *Andersonia*.

Mr. Edwards separates *Ochlerotatus* from *Culex* (Bull. Ent. Res. ii, 242) partly by the last two joints of the ♂ palpi being thickened and more or less turned downwards at the tip, instead of being thin and turned upwards, as in the latter genus, but in his above list of synonyms are included *Lepidotomyia*, *Pecomomyia*, *Reedomyia*, *Lepidoplatys*, *Culicada*, *Culicelsa* and *Culiseta*, and of these Theobald does not mention the ♂ palpi as clavate, although it is true this is merely negative evidence. He separates the two genera *Ochlerotatus* and *Culex*, in the females by unguar characters, and speaks very positively on this point, but I am not at present prepared to accord it such value.

It seems impossible to recognize *Ochlerotatus* simply on the strength of clavate ♂ palpi, there being so many genera admittedly with the ♂ palpi more or less swollen at the tip¹ and which would be annectant, and in addition there would be semi-intermediate forms, so to speak, to be found in those species which were slightly aberrant in this character, yet included either in the clavate palpi genera or the non-clavate palpi ones.

It has therefore seemed justifiable to sink in *Culex* all genera considered by Mr. Edwards as synonymous with *Ochlerotatus*, except *Finlaya* and *Duttonia*, the former of which ranks in the present paper as a sub-genus of *Culex* and the latter as a genus left in abeyance on account of the 4-jointed ♂ palpi.

Generic synonyms of CULEX.

Acartomyia , Theob.	Aporoculex , Theob.
Aedimorphus , Theob.	Bancroftia , Lutz.
Andersonia , Strickland.	Bathosomyia , Theob.

¹ These are *Macleaya*, *Gymnometopa*, *Theobaldia*, *Grabhamia*, *Pseudograbhamia* and *Mimeteculex*, with no doubt others.

- Carrollia*, Lutz in Theob.
Ceratocystia, Dyar and Knab.
Chrysoconops, Goeldi.
Culicada, Felt.
Culicella, Felt.
Culicelsa, Felt.
Culiseta, Felt.
Danielsia, Theob.
Diceromyia, Theob.
Ecculex, Felt.
Etorleptiomyia, Theob.
(Etorilepidomyia, Alcock, em.)
Feltidia, Dyar.
Geitonomyia, Leices.
Gilesia, Theob.
Gnophodeomyia, Theob.
Grabhamia, Theob.
Heptaphlebomyia, Theob.
Heteronycha, Arrib.
Howardina, Theob.
Hulecoeteomyia, Theob.
Jamesia, Christophers.
Lasioconops, Theob.
Leicesteria, Theob.
Lepidoplatys, Coq.
Lepidotomyia, I. Theob.
Lepidotomyia, II. Theob.
Leslieomyia, Christophers.
Leucomyia, Theob.
Lutzia, Theob.
Macleaya, Theob.
Maillotia, Theob.
Mansonia, Blanch.
Mansonioides, Theob.
Melanoconion, Theob.
Microculex, Theob.
Mimetecculex, Theob.
Mimeteomyia, Theob.
Mochlostyrax, Dyar and Knab.
Myxosquamus, Theob.
Neoculex, Dyar.
Neomacleaya, Theob.
Neomelanoconion, Theob. ?
Neopecomyia, Theob.
Ochlerotatus, Arrib.
O'Reillia, Ludlow.
Panoplites, Theob.
Pardomyia, Theob.
Pecomyia, Theob.
Phagomyia, Theob.
Pneumaculex, Dyar.
Polyleptiomyia, Theob.
Popea, Ludlow.
Protoculex, Felt.
Protomacleaya, Theob.
Protomelanoconion, Theob.
Pseudocarrollia, Theob.
Pseudoculex, Dyar.
Pseudograbhamia, Theob.
Pseudoheptaphlebomyia,
 Ventrillon.
Pseudohowardina, Theob.
Pseudoskusea, Theob.
Pseudotheobaldia, Theob.
Rachisoura, Theob.
Reedomyia, Ludlow.
 ? *Stegoconops*, Lutz.
Stenoscutus, Theob.
Theobaldia, Nev. Lem.
Theobaldinella, Blanch.
Theobaldiomyia, Brun., nom.
 nov. for *Leucomyia*, Theob.
 preocc.
Thomasina, Newstead and Car-
 ter.
Trichopronomyia, Theob.
Trichorhynchomyia, Brun.,
 nom nov. for *Trichorhynchus*,
 Theob., preocc.

N.B.—Accepted synonyms of any so-called genera are included in the above list.

The majority of the above cannot be distinguished from *Culex* by any characters that would be recognized by a systematic dip-terologist. Those which appear to show (from the generic descrip-tions) the greatest modifications are noted below.

Acartomyia has the 1st antennal joint thickened and scaly ;
Aporoculex is founded on some trifling difference in venation ;

Bancroftia has two prominent tufts of hair-like scales, or scale-like hairs, on the scutellum; *Bathomyia* has peculiar ♂ genitalia, and the "1st posterior cell almost uniform in breadth" (!); *Carrollia* has the abdominal segments in the ♂ deeply constricted at the base; *Ceratocystia* is synonymous with *Grabhamia* (t. Coq.); *Culicada* is said to have 4-jointed ♂ palpi, but fuller information on this is required; *Diceromyia* is synonymous with *Mansonioides* (t. Edwards); *Heptaphlebomyia* is dealt with elsewhere (see p. 41); *Howardina* was at first admitted by Edwards on claw characters, but in a later paper he abandons it; *Lasioconops* was founded on a misconception, through some lepidopterous scales adhering, accidentally to the type; *Leucomyia* is said to have 5-jointed ♂ palpi; *Mansonia* is reputed to have 4-jointed ♂ palpi; *Melanoconion* is a group of small black species with densely scaled wings; *Microculex* is a "small stout gnat totally different from any other member of the genus" (*Culex*); *Mimetculex* has the two basal antennal joints scaled; *Mimeteomyia* has the 2nd and 3rd antennal joints rather enlarged; *Mochlostyrax* based on larval characters, is allied to *Melanoconion* in the adult stage; *Pardomyia* is supposed to possess a novel venation but differs only slightly from normal *Culex*; *Pecomyia* has unequal hind ungues in the ♂, said to be unique, also the ♂ genitalia very marked; *Phagomyia* is included here on account of Theobald associating it with other "genera" belonging here, though he says it is near *Stegomyia*; *Pneumaculex* was founded originally on larval characters only, but the adult is now known and is said to be near *Danielsia*, judging from the ♂ genitalia; *Polyleptomyia* is included for the same reason as *Phagomyia*; *Pseudoskusea* has the mid-ungues of the ♂ equal in size, a character found only in this genus; *Rachisoura* has the plumosity of the ♂ antennae a little less dense than usual; *Reedomyia* has the ♂ genitalia "very marked"; *Theobaldia* forms for Theobald a natural group of five species with spotted wings, clubbed antennae and thick wing scales in ♂ and ♀, Edwards ranking it generically distinct on claw characters; *Thomasina* is supposed to have the ♂ palpi short and the ♀ palpi "relatively long"¹ and *Trichorhynchomyia* (nom. nov. for *Trichorhynchus*, preocc.) is said to be "very marked" and to be intermediate between the *Culex* and *Stegomyia* groups.

The Aedes group.

Coming to a closer examination of the *Aedes* group we find much difficulty in the ambiguous or actually negative information afforded us as regards the palpal joints, and the plumosity or pilosity

¹ The authors figure a ♂ head in which the palpi are only a very little shorter than the proboscis, though their diagnosis reads "much shorter." This exaggeration of minute differences is the cause of the bulk of the trouble in understanding culicid writer's meanings. They then figure an isolated ♀ palpus, so there is no means of judging their idea of "relatively short." If they are drawn to the same scale both are of equal length.

of the ♂ antennae, both evidently uncertain quantities in many cases.

The following table attempts to elucidate the few genera that appear well founded, but their validity, of course, depends on the definite nature and constancy of the points tabulated, and it is seen that practically nothing but palpal characters can be used. The other recorded genera appear of uncertain validity.

Table of genera.

Proboscis not elbowed.

Antennae 14-jointed in ♀ as usual.

a.	Palpi in ♂ 5-jointed, in ♀ 5-jointed	<i>Haemagogus</i> , Will.
b.	„ „ 3 „ „ 3 „	<i>Skusea</i> , Theob.
c.	„ „ 2 „ „ 4 „	<i>Aedes</i> , Mg.
d.	„ „ 2 „ „ 2 „	<i>Uranotaenia</i> , Arrib.

Antennae 13-jointed in ♀, ♀ palpi 1-jointed: ♂ unknown

Hodgesia, Theob.

Proboscis elbowed

. *Harpagomyia*, Meij.

Generic notes on the Aedes group.

Haemagogus, Will. By the 5-jointed palpi in ♂ and ♀ this should be a good genus, though the 1st and 5th joints are very small. *Colonemyia*, Leices., may be synonymous as it is also said (with a doubt) to possess 5-jointed palpi.

Zeugomyia, Leices. Palpi in ♂ 3, in ♀ 4-jointed. On this it cannot be synonymous with either *Aedes* or *Skusea*. Its author says it is allied to *Colonemyia*, *Skeiromyia* and *Uranotaenia*, and through these to the *Wyeomyia* group. For my own part I leave its position in abeyance at present.

Skusea, Theob. Of its 3-jointed palpi in both sexes, the last is "small and ripple-like," and on this it is tentatively ranked as valid, at least *pro. tem.* There seems nothing to separate *Aioretomyia*, Leices., and *Acalleoemyia*, Leices., from *Skusea*.

Aedes, Mg. Technically with 2-jointed ♂ and 4-jointed ♀ palpi, this genus is sufficiently distinct from *Culex*, but several others must be included as identical, as *Micraedes*, Coq., *Aedeomyia*, Theob., *Aedinus*, Lutz., and probably both *Leptosomatomyia*, Theob. (established on a unique ♂), and *Squamomyia*, Theob. (of which the ♀ is unknown).

Uranotaenia, Arrib. Apparently a natural group whether of generic rank or not, characterized by 2-jointed palpi in ♂ and ♀, a proboscis swollen at the tip, the usually quite small size and often brilliant blue colouring. *Pseudouranotaenia*, Theob., *Anisocheleomyia*, Theob., *Verrallina*, Theob. (in which trace of an additional basal palpal joint is spoken of in the ♀, the ♂ being unknown), and *Ficalbia*, Theob., are evidently synonyms.

Hodgesia, Theob. The ♂ is unknown, which is unsatisfactory. The ♀ antenna is reputed to have only 13-joints, which

would be an abnormality, and the 1st joint is large and globular. The palpi is one-jointed only, which in itself would entitle it to generic rank, especially if a similar character exists in the ♂. From the one-jointed palpi attributed to *Skeiromyia*, Leices., this may be synonymous.

Harpagomyia, Meij. The short thick elbowed proboscis distinguishes this. *Grahamia*, Theob., is, on his own showing, synonymous, as, though it appeared first in print, the paper was for private circulation only. *Malaya*, Leices., is also synonymous, for Edwards has shown that though Leicester described the metanotum ("mesonotum," *lapsus*) as with scales, which would throw the genus in the Sabethini, it is probable these were accidentally attached, and in that case the genus falls here, and becomes synonymous with *Harpagomyia*. Moreover, the name *Malaya* is practically preoccupied by *Malaia*, Heller in 1891.

However, if the genus *has* scales on the metanotum it in all probability will be synonymous with *Limatus*, Theob.

Topomyia, Leices. No palpal information is given by the author, though he describes nine species. The males are said to be very gossamer-like and the genus may quite likely prove a good one.

Genera of uncertain position.

The following genera are left in abeyance, simply in the section Culicini, as no exact position is at present assignable to them.

Cacomyia, Coq. A large cluster of outstanding blunt spines are found below the penultimate abdominal segment; the palpi are half as long as the proboscis, and some alleged slight differences of venation are urged in favour of this genus.

Theobald says *Gualteria* has similar characters, so the two may be identical, in which case the latter has precedence, but at the time of its erection it was said to be "near *Danielsia*," a genus of the *Culex* group. Theobald placed it with the Aedines, but it seems likely that with its ♂ palpi half as long as the proboscis it should be referred, and probably *Gualteria* also, to the *Culex* group.

Philodendromyia, Theob., and **Polylepidomyia**, Theob.

These two genera, once placed erroneously in the Sabethini group, are referred by Theobald as probably intermediate between the *Culex* and *Aedes* groups. Of the former the ♂ antennae are pilose, the ♀ being unknown. Of the latter the ♂ is unknown, and both palpi and proboscis are said to vary in almost every individual.

Ingramia, Edwards. (*Mimomyia*, Theob. *pt*; *Dasymyia*, Leices., *preocc.*)

This genus is really a new name for the species recently placed in *Mimomyia*, except the type species, *splendens*. *Dasymyia* is synonymous with *Ingramia*, but is preoccupied.

Section IV. SABETHINI.

The genera comprised herein under this section are distributed finally by Theobald (Monog., v, 554 et seq.) in three sub-families: (1) *Trichoprosoponinae*, with *Runchomyia*, *Trichoprosopon*, *Joblotia* (wrongly admitted as a good genus), *Hyloconops*, *Goeldia* and *Eretmapodites*; (2) *Dendromyinae*, with *Sabethes*, *Phoniomyia*, *Wyeomyia*, *Menolepis*, *Bolbodeomyia*, *Sabethoides*, *Dendromyia* and *Prosopolepis*; *Limatus* forming his other sub-family. Two other genera *Philodendromyia* and *Polylepidomyia*, though included in his table are rightfully excluded in a footnote and referred to the *Uranotaenia* group, the metanotum being nude.

He places *Dinomimetes*, Knab., in the *Deinoceratinae*, a sub-family he characterizes by the very long 2nd antennal joint, and short palpi in both sexes, but the metanotum bearing setae is a stronger character than the abnormal length of the 2nd antennal joint, and the genus must come in the present section.

In separating the genera Theobald uses scale distribution, some points of venation and the length and shape of the proboscis as distinguishing characters.

On examining the genera systematically, two are seen to be individually specialized, *Dinomimetes* and *Runchomyia*, whilst in possessing the palpi always more than half as long as the proboscis, *Trichoprosopon* ♂ & ♀, *Eretmapodites* ♂ and *Hyloconops* ♂ are separated from the remainder, in which they are at most one-third as long as the proboscis.

Sabethes is easily recognized by the paddle-like scales on some of the legs, a feature absent in the other genera except in some species of *Eretmapodites* (v. tab. genera, *post*). This feature is by no means generic in itself, it is not dependent on sex and occurs in various genera in diptera, *Empis*, *Rhamphomyia*, etc.

The proboscis varies considerably in length, from half as long as to longer than the whole body, and may be dilated or swollen apically or not. No generic characters can be safely drawn from it in this section except to identify *Limatus*. The antennae are normally pilose in both sexes, a little denser in the ♂, and this character appears fairly constant, but it is subplumose or plumose in *Sabethes* and certainly plumose in *Hyloconops*.

Even of *Wyeomyia* I have seen no definite statement of the number of palpal joints in the ♂, whilst there seems an uncertainty of them being 3-jointed in the ♀

The presence of chaetae only scales only or both together may all be regarded as of equal taxonomic value.

Table of genera in SABETHINI.

- | | | |
|----|--------------------------------------|-------------------------------|
| A | 2nd antennal joint very long. (Meta- | |
| | notum with chaetae) | .. <i>Dinomimetes</i> , Knab. |
| AA | 2nd antennal joint normal. | |
| B | Palpi comparatively long, always | |
| | more than half as long as proboscis. | |

- | | | |
|----|---|---|
| C | Antennae pilose in ♂ as well as ♀ | |
| D | Metanotum with both chaetae and scales; palpi in ♂ 4-jointed, in ♀, 3-jointed. | <i>Trichoposopon</i> , Theob.,
♂ ♀ |
| DD | Metanotum with chaetae only; palpi in ♂ 5-jointed, in ♀ 4-jointed. | <i>Eretmapodites</i> , Theob.,
♂ |
| CC | Antennae plumose in ♂, pilose in ♀ (metanotum with chaetae and scales) | <i>Hyloconops</i> , ¹ Lutz, ♂ |
| BB | Palpi comparatively short, or very short; at most one-third the length of the proboscis. (In <i>Goeldia</i> and some species in either sex in <i>Sabethes</i> , about $\frac{1}{3}$ as long as proboscis. Metanotum with chaetae only, scales only, or both). | |
| E | Frons with a protuberance between the eyes. (Proboscis longer than the whole body) | <i>Runchomyia</i> , Theob. |
| EE | Frons normal. | |
| F | Proboscis not elbowed. | |
| G | Legs with paddle-like scales. (Antennae in ♂ moderately or quite plumose, in ♀ pilose: metanotum with chaetae) | <i>Sabethes</i> , R. Desv. |
| GG | Legs without such scales. (Antennae pilose ♂ ♀). | |
| H | Palpi ostensibly 4-jointed. (Metanotum with chaetae only, scales only, or both) | <i>Wyeomyia</i> , Theob.,
(s. <i>latu</i> , <i>mihi</i> .) |
| | Metanotum with chaetae only or scales only; palpi in ♂ never so long as $\frac{1}{3}$ of the proboscis. | sub-genus <i>Wyeomyia</i> ,
Theob. |
| | Metanotum with both chaetae and scales; palpi in ♂ one-third as long as proboscis, in ♀ very short. | sub-genus <i>Goeldia</i> , ²
Theob. |
| HH | Palpi 2-jointed in ♂ and ♀ (Antennae in ♀ densely pilose) | <i>Sabethoides</i> , ³ Theob |
| FF | Proboscis elbowed. | <i>Limatus</i> , Theob. |

¹ It is impossible to satisfactorily include *Hyloconops* ♀ in the present table, Theobald saying simply that the ♀ palpi are "short," the ♀ antennae being pilose, these definitions being insufficient for the purpose.

² Some doubt attaches to the alleged ♀ of this genus.

⁸ *Sabethinus*, Lutz, may be synonymous with *Sabethoides*, according to Theo-

Generic notes in SABETHINI.

Dinomimetes, Knab. The very long 2nd antennal joint "14 times as long as wide" conspicuously separates this from all other genera in the family except *Deinocerites*, a genus of Culicini. The eyes are said by Theobald to be contiguous, and this is made a generic character but Edwards points out that this is no uncommon feature both in Culicini and Sabethini.

Trichoprosopon, Theob. A sufficiently distinct genus by the metanotal adornment coupled with palpal characters.

Joblotia, Blanch., is an absolute synonym, erected as a *nom. nov.* under the mistaken assumption that Theobald's name was preoccupied by *Trichoprosopus*, Macq., in Diptera.

Lutz would employ *Joblotia* as a separate genus, for *Trichoprosopon lunata*, Theob., characterized by the clypeus not being hairy.

Lestiocampa, Dyar and Knab. Firstly this is inadmissible, being founded on larval characters only. Theobald says that in the adult it differs from *Runchomyia* only in the absence of the conical frons, but he refers some of the species to *Trichoprosopon*, with which it may be considered synonymous.

Eretmapodites, Theob. This author claims generic rank for this on the thin hairless σ palpi, the ungues, and the greater length of the two last antennal joints (presumably in both sexes), but it is admitted here as valid on the metanotal¹ and palpal characters given in the table.

Some species, at least in the σ , have paddle-like scales on the legs, in this respect resembling *Sabethes*. These species, in the σ σ are recognizable by the thin palpi, but I know of no method of distinguishing the φ φ with certainty.

Hyloconops, Lutz. Theobald professes to differentiate this genus from *Trichoprosopon* by the "swollen apex of the proboscis and the shorter σ palpi," but the latter is said to have the proboscis with "rather expanded apex." The plumose instead of pilose σ antennae, assuming no doubt on the matter, is a better distinction. As regards the φ *Hyloconops*, insufficient information is accorded to be able to identify it with certainty.

Chaetomyia, Leices. (renamed *Leicesteriomyia*, Brun.), must, on account of its metanotum bearing scales and chaetae, be removed from the Culicini to this section. In my table of genera it comes with *Hyloconops*, from which insufficient information as to the latter genus precludes my separating it. It may possibly be synonymous.

Runchomyia, Theob. (*Binotia*, Blanch.). The frontal prominence in this genus sufficiently distinguishes it. The proboscis

bald; on the other hand it seems quite possible to be synonymous with *Wyeomyia* (v. generic notes, *post*).

¹ Newstead describing a new species from the Congo says no metanotal scales or chaetae are present. They may have been rubbed off, or perhaps the species is placed wrongly here.

being longer than the whole body is also a useful character, although it shares this distinction with at least *Phoniomyia*.

Sabethes, R. Desv. This genus, one of the oldest erected in the family, is well characterized by the paddle-like fringe of scales on the legs, a peculiarity shared only with some species of *Eretmapodites* (v. *ante*).

Wyeomyia, Theob. This appears, in the wide sense, a good genus, but it seems doubtful if it can be subdivided, at least any further than into *Wyeomyia* s. str. and *Goeldia*, Theob., and additional species may break down the apparent differences between these. The ♀ form attributed to *Goeldia* is not definitely known to belong here.

Phoniomyia, Theob.

Dendromyia, Theob.

Menolepis, Lutz.

(*Heinzmannia*, Ludl.).

Bolbodeomyia, Theob.

Prosopolepis, Lutz.

There seems no justification for recognizing any of these as good genera. Theobald would found *Phoniomyia* on the proboscis being "longer than the whole body" but in one species *P. indica*, it is only "nearly as long" as the whole body, and some species of *Wyeomyia* probably possess it nearly as long as in *P. indica*. The white scaled metanotum in *Menolepis*, the "complex ♂ genitalia" forming a "very marked genus" in *Bolbodeomyia*, and the scaled clypeus in *Prosopolepis* are all indefinite or quite minor characters, and all these must sink in *Wyeomyia*, *sensu lato*.

Sabethoides, Theob. The alleged 2-jointed palpi afford the only grounds on which to establish this.

As regards *Sabethinus*, Lutz., Theobald admits that "apart from any marked genitalic diversity" (he notes the genitalia as very marked) this genus only differs from *Sabethoides* by the swollen tip of the proboscis.

In Theobald's description of *Sabethinus* he mentions no number of joints to the palpi, but as *Sabethoides* is only admitted in this paper as a good genus on the strength of its alleged 2-jointed palpi, both of these genera become synonymous with *Wyeomyia* if their palpi prove 4-jointed as in the latter. If they have 3-jointed palpi they might, united, form a separate genus, or an unpaddled legged section of *Sabethes*, the recorded variation of the antennae and proboscis being of a minor nature.

Limatus, Theob. (*Simondella*, Laveran). The elbowed proboscis seems sufficient on which to erect this genus.

Genera of uncertain position in CULICIDAE.

The following genera are regarded by Theobald as of uncertain position in the family. I have no further information of them.

Isostomyia,¹ Coq.

Lepidosia, Coq. Science xxiii, 314 (1906).

Tinoletes Coq. Proc. Ent. Soc. Wash. vii, 185 (1906).

The sub-family CORETHRINAE.

There is nothing to be criticized in this group the few admitted genera being well founded, *Corethra*,² Mg., *Chaoborus*, Lichtenstein (*Sayomia* Coq.), and *Ramcia*,³ Annandale.

The question of the synonymy of the first two genera was fully discussed by me recently.⁴

Mr. W. S. Dallas, F.L.S., has given⁵ a translation of a paper by Prof. Meinert on *Corethra*, in which the latter accepted *plumicornis*, F., as the type species simply because it figured as such in popular manuals.

Prof. Meinert, however, added, "Strictly speaking, the generic name *Corethra* should be retained for *Tipula culiciformis*, DeGeer, and when other species such as *C. plumicornis* and *pallida* were afterwards proved to belong to a different genus from the first named species a new generic name ought to have been selected for them." He, however, refrained from making the transposition, and concluded, "If such a change is eventually to be made, it had better remain over for some future monographer of the group."

The conclusions reached substantiate the synonymy as worked out by me, though at the time I had no knowledge of Meinert's paper.

Some controversy has of late years arisen by the mosquito workers desiring to exclude the *Corethrinae* from the *Culicidae*, on the absence of a biting mouth and scales, or because they do not appear to have any economic value, perhaps. This cannot be done. The two groups have been accepted without dispute in a single family for a century by dipterologists, who, when all is said and done, must remain the ultimate judges of systematic questions.

In spite of attempts to prove the contrary, the most recent researches have proved the biological affinity of the two groups, Alcock asserting this most emphatically, and the new genus *Ramcia*, set up by Dr. Annandale,⁶ though decidedly more corethrine than culicine, is distinctly intermediate in nature.

Dr. Adolf Eysell in his paper "Sind die Culiciden eine Familie?"⁷ desires to separate the corethrines and would also form a separate family of the anophelines, but both suggestions are dipterologically incorrect.

¹ I can find no reference to the description of this genus.

² I have shown *Mochlonyx*, Lw. to be synonymous with *Corethra*. (Rec. Ind. Mus. iv, 317).

³ Edwards has adopted the term *Chaoborinae* for this subfamily, but the antiquity of *Corethrinae* must preserve it from alteration.

⁴ Rec. Ind. Mus. iv, 317 and vi, 227

⁵ Ann. Mag. Nat. His. (5) xii, 374 (1883).

⁶ Rec. Ind. Mus. iv, 505.

⁷ Archiv. fur Schiffs. und Tropen Hygiene ix, 51-55 (1905).

SYSTEMATIC CATALOGUE OF VALID GENERA IN CULICIDAE.

Sub-family. I. CULICINAE.

Sect. I. ANOPHELINI.

- 1 *Anopheles*, Mg.¹
- 2 *Chagasia*, Cruz.
- 3 *Calvertina*, Ludl.
- 4 *Bironella*, Theob.
- 5 *Dactylomyia*, Newst. and
Carter.

Sect. II. MEGARHINI.

- 6 *Megarhinus*, R. Desv.
Lynchiella, Lahille.
- 7 *Ankylorhynchus*, Lutz.
- 8 *Toxorhynchites*, Theob.
Worcesteria, Banks.
Teromyia, Leices.

Sect. III. CULICINI.

CULEX GROUP.

- 9 *Psorophora*, R. Desv.
- 10 *Janthinosoma*, Arrib.
- 11 *Mucidus*, Theob.
- 12 *Ekrinomyia*, Leices.
- 13 *Lophoceratomyia*, Theob.
- 14 *Stegomyia*, Theob.
Quasistegomyia, Theob.
Kingia, Theob.
Armigeres, Theob.
Desvoidya, Blanch.
Blanchardiomyia, Brun.
Scutomyia, Theob.
Gymnometopa, Coq.
- 15 *Mimomyia*, Theob.
Ludlowia, Theob.
Megaculex, Theob.
Radioculex, Theob.
Banksinella, Theob.
Boycia, Newstead.
Hispidomyia, Theob.
Conopomyia, Leices.
- 16 *Culex*, L.²
Sub-genera—
I *Chaetocruuiomyia*, Theob.

Culex, L. (contd.)

- II *Culiciomyia*, Theob.
Pectinopalpus, Theob.
Neomelanoconion,
Theob. ♂ only.

- III *Taeniorhynchus*, Arrib.
Pseudotaeniorhynchus,
Theob.
Rhynchotaenia,
Brethes.

- ? *Coquillettidea*, Dyar.

- IV *Finlaya*, Theob.

- V *Newsteadina*, Theob.

- 17 *Rachionotomyia*, Theob.

- 18 *Deinocerites*, Theob.
Brachiomyia, Theob.

- 19 ? *Cyathomyia*, Meij.

Genera requiring confirmation.

- 1 *Brevirhynchus*, Theob.
- 2 *Duttonia*, Newstead.
- 3 *Eumelanomyia*, Theob.
- 4 *Orthopodomyia*, Theob.
- 5 *Oculeomyia*, Theob.
? *Molpemyia*, Theob.

AEDES GROUP.

- 20 *Haemagogus*, Will
? *Colonemyia*, Leices.
- 21 *Skusea*, Theob.
Aioretomyia, Leices.
Acalleoemyia, Leices.
- 22 *Aedes*, Mg.
Micraedes, Coq.
Aedeomyia, Theob.
Aedinus, Lutz.
? *Leptosomatomyia*, Theob.
? *Squamomyia*, Theob.
- 23 *Uranotaenia*, Arrib.
Pseudouranotaenia, Theob.
Anisocheleomyia, Theob.
Verrallina, Theob.
Ficalbia, Theob.
- 24 *Hodgesia*, Theob.
? *Skeiromyia*, Leices.

¹ For list of synonyms, see p. 34.

² For list of synonyms, see p. 43.

- 25 **Harpagomyia**, Meij.
Grahamia, Theob.
Malaya, Leices.

Genera requiring confirmation.

- 1 *Zeugnomomyia*, Leices.
- 2 *Topomyia*, Leices.
- 3 *Ingramia*, Edw.
Dasymyia, Leices.
Mimomyia, Theob.
- 4 *Pseudograhamia*, Th.¹

Genera requiring confirmation
 belonging to Section CULICINI.

(Uncertain whether to *Culex*
 or *Aedes* group.)

- 1 *Philodendromyia*, Theob.
- 2 *Polylepidomyia*, Theob.
- 3 *Cacomyia*, Coq.
- 4 *Gualteria*, Lutz.

Sect. IV. SABETHINI.

- 26 **Dinomimetes**, Knab.
Trichoprosopon, Theob.
Joblotia, Blanch.
Lestiocampa, Dyar and
 Knab.
- 27 **Eretmapodites**, Theob.

- 28 **Hyloconops**, Lutz.
Leicesteriomyia, Brun.
 (*Chaetomyia*, Leices.)

- 29 **Runchomyia**, Theob.
Binotia, Blanch.

- 30 **Sabethes**, R. Desv.

- 31 **Wyeomyia**, Theob.

Sub-genera—

I *Wyeomyia*, Theob.

II *Goeldia*, Theob.

(Syns. *Wyeomyia*, s. lato).

Phoniomyia, Theob.

Menolepis, Lutz.

Bolbodeomyia, Theob.

Dendromyia, Theob.

(*Heinzmannia*, Ludl.)

Prosopolepis, Lutz.

- 32 **Sabethoides**, Theob.

Sabethinus, Lutz.

- 33 **Limatus**, Theob.

Simondella, Laveran.

Sub-fam. II. CORETHRINAE.

- 34 **Corethra**, Mg.

Mochlonyx, Lw.

- 35 **Chaoborus**, Lichtenstein.

Sayomyia, Coq.

- 36 **Ramcia**, Annandale.

INDEX OF PUBLISHED GENERA IN CULICIDAE.²

Acalloemyia, Leices., Cul. Mal. 194 (1908).

Type, *A. obscurus*, Leices., sp. nov., ♂ ♀, l.c., the only
 species. = *Skusea*, Theob.

Acartomyia, Theob., Monog. iii, 251 (1913).

Type, *A. zammitii*, Theob., sp. nov., ♂ ♀, l.c. 252, the only
 species. = *Culex*, L.

Aedeomyia, Theob., Monog. ii, 218 (1901) (sp. allotted); Jour.
 Trop. Med. iv, 235 (July 15, 1901), (nom. nud.)

Aedomyia, Edwards, emend. Bull. Ent. Res. iii, 24.

Type, *Aedes squamipennis*, Arrib., ♂ ♀, the first species, by
 present designation. = *Aedes*, Mg.

¹ Nothing sufficiently definite about this to estimate its generic validity.

² In the present index, "Monog." refers to Theobald's "Monograph of the Culicidae of the World," and Leices. "Cul. Mal." to a long paper by Dr. Leicester published in the "Studies from the Institute of Medical Research," Kuala Lumpur, vol. iii (1908).

Aedes, Mg., Syst. Besch. i, 13 (1818).

Type, *Aedes cinereus*, Mg., by original designation.

A valid genus.

Aedimorphus, Theob., Monog. iii, 290 (1903).

Type, *Uranotaenia domestica*, Theob., l.c., ii, 253, ♀, the only species at the erection of the genus. = *Culex*, L.

Aedinus, Lutz., in Peryassu, Os Culic. do Bras. 36 (1908).

Type, *A. amazonensis*, Lutz., sp. nov., by original designation. = *Aedes*, Mg.

Aioretomyia, Leices., Cul. Mal. 185 (1908).

Type, *A. varietas*, Leices., sp. nov., ♂ ♀, l.c., the first of the six species, by present designation. = *Skusca*, Theob.

Aldrichia, Theob., Monog. iii, 353, App. (1903).

Aldrichinella, Theob. emend.; loc. cit., v, 77 (1910). *Aldrichia*, preocc. Coq., 1894, in Bombyliidae.

Type, *A. error*, Theob., l.c., iii, 353, ♀, by original designation. = *Anopheles*, Mg.

Andersonia, Strickland, Entom. (1911), p. 250.

Type, *A. tasmaniensis*, Strick., sp. nov., l.c., by original designation. = *Culex*, L.

Anisocheleomyia, Theob., Entom. xxxviii, 52 (1905); Monog., iv, 570.

Type, *A. nivipes*, Theob., sp. nov. (the first of the four species given in his Monog., iv 570) by present designation.

= *Uranotaenia*, Arrib.

Ankylorhynchus, Lutz., in Bourroul's Mosq. Bras. 3 (1904).

Type, *Culex violaceus*, Hgg., in Wied. by present designation¹ as the earliest described of the three species referred to this genus by Theobald. (Monog. iv, 127). A valid genus.

Anopheles, Mg., Syst. Besch. i, 10 (1818).

Type, *A. maculipennis*, Mg., by customary european acceptance.²

N.B.—Coquillett quotes *bifurcatus*, L., as the type species, but *A. maculipennis* is I think usually regarded in Europe as the type. A valid genus.

Aporoculex, Theob., Monog. iv, 316 (1907).

Type, *A. punctipes*, Theob., sp. nov., ♀, the only species.

= *Culex*, L.

Armigeres, Theob., Monog. i, 322 (1901).

Type, *Culex obturbans*, Walk., the only species at time of erection.

N.B.—*Armigeres* is not preoccupied, *Armiger*, Hartm., in Moll., 1842, not being a homonym, and this name should be res-

¹ Lutz's work is not accessible, and Theobald does not note any type species having been selected.

² Prof. Kertész's Catalogue adopts the name *claviger*, F., for this well-known species. The alteration, after a century, is quite inadmissible.

tored in place of *Desvoidya*, Blanch., if the genus is ever considered valid. = *Stegomyia*, Theob.

Arribalzagia, Theob., Monog. iii, 81 (1903).

Type, *Arribalzagia maculipes*, Theob., sp. nov. ♀, l.c., by original designation. Coquillett ranks it synonymous with *Cellia*, Theob. = *Anopheles*, Mg.

Bancroftia, Lutz., in Bourroul's Mosq. Bras 40 (? 59) (1904).

Type, *B. albicosta*, Lutz., sp. nov., ♀, the only species. = *Culex*, L.

Banksinella, Theob., Monog. iv, 468 (1907).

Banksiella, Brun., Rec. Ind. Mus. iv, 477, lapsus.

Type, *Culex luteolateralis*, Theob., ♂ ♀, by original designation. = *Mimomyia*, Theob.

Bathosomyia, Theob., Monog. v, 267 (1910).

Type, *B. abnormalis*, Theob., sp. nov., l.c. 268, ♂ only, the only species. = *Culex*, L.

Binotia, Blanch., Arch. Paras. viii, 478 (1904); Les Moust., 427.

N B.—Erected as a *nom. nov.* for *Runchomyia*, Theob., under the supposed preoccupation by *Rhynchomyia* R. Desv., in Muscinae. = *Runchomyia*, Theob.

Bironella, Theob., Ann. Mus. Hung. iii, 69 (1905).

Type, *B. gracilis*, Theob., ♂, sp. nov., l.c., the only species. A valid genus.

Blanchardiomyia, Brun., Rec. Ind. Mus. iv, 440 (1912).

Nom. nov. for *Desvoidya*, Blanch., preoccupied by Meade in Muscidae (*Desvoidia*) = *Stegomyia*, Theob.

Bolbodeomyia, Theob., Rec. Ind. Mus. iv, 31 (1910).

Type, *B. complex*, Theob., sp. nov., l.c., ♂ ♀, by original designation. = *Wyeomyia*, Theob.

Boycia, Newstead, Ann. Trop. Med. and Paras. i, No. 1, 33 (1907).

Type, *B. mimomyiaformis*, Newst., sp. nov., l.c. 34, ♂ ♀, fig. 7, wing, by original designation. = *Mimomyia*, Theob.

Brachiomyia, Theob., Monog. ii, 343, App. (1901).

Type, *B. magna*, Theob., sp. nov., ♀, l.c. 344, by original designation. Synonymous with *Deinocerites*, Theob. (t. Theob., l.c., iii, 275).

Brevirhynchus, Theob., Rec. Ind. Mus. ii, 293 (1908).

Type, *B. magnus*, Theob., ♂ ♀, sp. nov., l.c., ♂ ♀, by original designation. Of doubtful validity.

Cacomyia, Coq, U.S. Dep. Agric. Bull. Tech. Ser. ii, 16 (1906).

Type, *Haemagogus albomaculatus*, Theob., by designation of Coquillett. Of uncertain validity.

Calvertia, Ludl., Can. Ent. xli, 22 (1909); emended by Miss Ludlow to *Calvertina*, loc. cit., xli, 234 (1909); *Calvertia*, preocc. by Warren in Lepidoptera.

Type, *Chagasia lineata*, Ludl., Can. Ent. xl, 50.

A valid genus.

Carrollia, Lutz in Theob., Monog. iv, 206 (1907).

Type, *C. iridescens*, Lutz (*irridescens*, lapsus), the original species. = *Culex*, L.

Catageiomyia, Theob., Monog. v, 115 (1910) *nom. nud.*

N.B.—I can obtain no further information respecting this genus.

Cellia, Theob., Jour. Trop. Med.¹ v, 183 (June 16, 1902); Monog. iii, 107 (1903).

Type, Theobald gives *Anopheles pulcherrimus*, Theob., as the first species in his Monograph, and apparently intended it as the genotype, but I have seen *A. pharoensis*, Theob., suggested in its place.

Ceratocystia, Dyar and Knab, Jour. N.Yk. Ent. So. xiv, 183 (1906).

Type, *Culex discolor*, Coq. Identical with *Grabhamia*, Theob., according to Coquillett. = *Culex*, L.

Chaetocruimyia, Theob., Monog. v, 195 (1910).

Type, *C. sylvestris*, Theob., sp. nov., l.c., ♀, the only species. = Subgen. *Culex*, *pro tem.*

Chaetomyia, Leices, Cul. Mal. 100 (1908).

Preocc. Brauer and Berg. in Tachininae (1892). Renamed *Leicesteriomyia*, Brun., Rec. Ind. Mus. iv, 452.

Type, *C. flava*, Leices., sp. nov., l.c., 101, ♂ ♀, the only species. May be identical with *Hyloconops*, Lutz.

Chagasia, Cruz, Brasil Medico xx, 20, p. 199 (1906).

Type, *Pyretophorus fajardi*, Lutz, by original designation.

A valid genus.

Chaoborus, Lichtenstein, Wied. Arch. Zool. i, 174 (1800).

Type, *Tipula crystallina*, Degeer (as *antisepticus*, sp. nov.).

Synonymous with *Sayomyia*, Coq. A valid genus.

Christophersia, James, Rec. Ind. Mus. iv, 103 (1910); Paludism 33, *nom. nud.*

Type, *C. halli*, James, Paludism i, 33, by original designation. = *Anopheles*, Mg.

Christya, Theob., Rep. Sleep. Sick. Roy. So. 7, p. 34 (1903).

Chrystya, Giles, Revis. Anoph. 40 (1904).

Type, *Christya implexa*, Theob., sp. nov., l.c., ♀ = *Anopheles*, Mg.

Chrysoconops, Goeldi., Os Mosq. do Para. 114 (1905).

N.B.—I have seen no type species stated; *Culex fulvus*, W., is the earliest described species of those now referred to it. = *Culex*, L.

Coelodiazesis, Dyar and Knab., Jour. N.Yk. Ent. So. xiv, 77 (1906).

¹ This volume is inaccessible to me, perhaps only a *nom. nud.*

Type, Anopheles barberi, Coq., by original designation.

Erected on larval characters alone, therefore inadmissible.

In any case it=*Anopheles*, Mg.

Colonemyia, Leices., Cul. Mal. 233 (1908).

Type, C. caeruleocephala, Leices., sp. nov., l.c., ♂ ♀, the 1st species, by present designation.

Probably=*Haemagogus*, Will.

Conchyliastes, Theob., in Howard's "Mosquitoes," p. 235 (1901).

Type, Culex posticatus, W (as *musicus*, Say), the first species by Coquillett's designation, the latter author saying it is synonymous with *Arribalzagia*. =*Anopheles*, Mg.

Conopomyia, Leices., Cul. Mal. 113 (1908).

Type, C. metallica, Leices., sp. nov., l.c., ♂ ♀, the first of the three species, by present designation. =*Mimomyia*, Theob.

Coquillettidia, Dyar, Proc. Ent. So. Wash. vii, 47 (1905).

Edwards sinks in *Taeniorhynchus*, Arrib.

Corethra, Mg., Illig. Mag. ii, 260 (1803).

Mochlonyx, Lw., 1844.

Type, Tipula culiciformis, Degeer, by original designation.

A valid genus.

Culex, L. Syst. Nat. Ed. x, 602 (1758).

Type, C. pipiens, L., by universal designation and by Latreille's, Consid. Gen. 442 (1810). A valid genus.

Culicada, Felt, N.Yk. State Mus. Bull. 79, Ent. 22, App. p. 391b (1904).

Type, Culex canadensis, Theob., by original designation, but Theob. says (Monog. iv, 319) that the type species should be *cantans*, Mg., giving no reason, but perhaps because it is the oldest known species referred to it. =*Culex*, L.

Culicella, Felt, N.Yk. State Mus. Bull. 79, Ent. 22, App. p. 391c (1904).

Type, Culex dyari, Coq., by original designation. = *Culex*, L.

Culicelsa, Felt., loc. cit., p. 391 (1904).

Type, Culex taeniorhynchus, W., by original designation.

=*Culex*, L.

Culiciomyia, Theob., Monog. iv, 227 (1907).

Type, C. inornata, Theob., sp. nov., l.c., ♂ ♀, the first species, by present designation.

Admitted herein as a subgenus of *Culex*.

Culiseta, Felt., N.Yk. State Mus. Bull. 79, Ent. 22, App. p. 391e (1904).

Type, Culex absobrinus, Felt., by original designation.

=*Culex*, L.

Cyathomyia, Meij., Ann. Jard. bot. Buitenzorg 3rd supp., p. 922 (1910).

Type, C. jenseni, Meij., sp. nov., l.c., by original designation.

Admitted herein as valid, *pro. tem.*

Cycloleppteron, Theob., Monog. ii, 312 (1901); *id.*, Jour. Trop. Med. iv, 234 (1901) *nom. nud.*; *Cyclolepidopteron*, Blanch., em. Type, *Anopheles grabhami*, Theob., by original designation.
= *Anopheles*, Mg.

Dactylomyia, Newstead and Carter, Ann. Trop. Med. iv, 377 (1910). Type, *D. ceylonica*, Newst. and Cart., sp. nov., *l.c.*, by original designation. Type in Liverpool School of Tropical Medicine. Mr. Edwards thinks may = *Anopheles deceptor*, Don., and *Myzomyia thorntoni*, Ludl. Apparently a valid genus.

Danielsia, Theob., Entom. xxxvii, 73 (1904). Type, *D. albotaeniata*, Theob., *l.c.*, p. 111, ♂ ♀, by original designation.
= *Culex*, L.

Dasymyia, Leices., Cul. Mal. 102 (1908). Type, *D. fusca*, Leices., sp. nov., ♂ ♀, *l.c.*, the only species. *Dasymyia*, preocc., Egg. 1858 in Syrphidae (= *Pocota*, St. Farg. and Serv.); renamed *Ingramia*, Edw.

Deinocerites, Theob., Monog. ii, 215 (1901); Jour. Trop. Med. iv, 235 (1901), *nom. nud.*; *Brachiosoma*, Theob., July 15, 1901, *Brachiomysia*, Theob., Nov. 23, 1901. Type, *D. cancer*, Theob., sp. nov., *l.c.*, the only species.
A valid genus.

Dendromyia, Theob., Monog. iii, 313 (1903). Type, *D. ulocoma*, Theob., sp. nov., *l.c.*, ♀, the first of the five species given, by present designation. = *Wyeomyia*, Theob.

Desvoidea, Blanch., Comp. rend. liii, 1043 (1901), *nom. nov.* for *Armigeres*, Theob., under presumed preoccupation by *Armiger*: *id.*, Moust., 265. *Desvoidya*, Theob., emend. Gen. Ins. Fasc., 26, 17. *Desvoidea*, preoc. Meade, 1892, in Tachininae (*Desvoidia*); see p. 40 ?
= *Stegomyia*, Theob.

Diceromyia, Theob., 4th Rep. Wellc. Lab. Vol. B. 151 (1911). Type, unknown to me.
= *Culex*, L.

Dinomimetes, Knab, Jour. N Yk. Ent. So. xv, 120 (1907). Type, *D. ulocoma*, Theob., sp. nov., ♀, *l.c.*, by Coquillett's designation.
A valid genus.

Duttonia, Newstead, Ann. Trop. Med. and Paras. i, No. 1, 17 (1907). Type, *D. tarsalis*, Newst., sp. nov., *l.c.* 18, ♂ ♀, fig. 2, wing, the only species; in Liverpool School of Tropical Medicine.
Of doubtful validity.

Ecculex, Felt., N.Yk. State Mus. Bull. 79, Ent. 22, App. p. 391c (1904). Type, *Culex sylvestris*, Theob., by original designation.
= *Culex*, L.

Ekrinomyia, Leices., Cul. Mal. 71 (1908).

Type, *E. aureostriata*, Leices., sp. nov., *l.c.*, ♂ ♀, the only species. Possibly a valid genus.

Eretmapodites, Theob., Monog. i, 280 (1901).

Type, *E. 5-vittatus*, Theob., sp. nov., *l.c.*, by original designation. A valid genus.

Etorleptiomyia, Theob., 1st Rep. Wellc. Lab. 71 (1904); Gen. Ins. Fasc. 26, 44; Monog. iv, 505 (*Etiorleptiomyia*). *Etorilepidomyia*, Alcock, em. Ann. Mag. Nat. Hist. (8) viii, 249.

Type, *O' Reillia luzonensis*, Ludl., ♀ = *Culex*, L.

Eumelanomyia, Theob., Monog. v, 240 (1910).

Type, *E. inconspicua*, Theob., sp. nov., *l.c.*, ♂ ♀, the only species. Of uncertain validity.

Feltidia, Dyar, Proc. Ent. So. Wash. vii, No. 1, 47 (1905).

Type, *Culex jamaicensis*, Theob., by original designation.

N.B.—This genus was erected on the identical species which formed the genotype of *Grabhamia* and is synonymous with that genus. = *Culex*, L.

Feltinella, Theob., Monog. iv, 56 (1907).

Type, *F. pallidopalpi*, Theob., sp. nov., *l.c.*, ♂, by original designation. = *Anopheles*, Mg.

Ficalbia, Theob., Monog. iii, 296 (1903).

Type, *Uranotaenia minima*, Theob., the first described of the four species now allotted to the genus, by present designation. = *Uranotaenia*, Arrib.

Finlaya, Theob., Monog. iii, 281 (1903).

Type *F. poicilia*, Theob., sp. nov., ♀, *l.c.* 283, by present designation. Admitted herein as a sub-genus of *Culex*, L.

Geitonomyia, Leices., Cul. Mal. 134 (1908).

Type, *Culex caecus*, Theob., by original designation.

= *Culex*, L.

Gilesia, Theob., Monog. iii, 233 (1903).

Type, *G. aculeata*, Theob., sp. nov., *l.c.*, ♀, only, the only species. = *Culex*, L.

Gnophodeomyia, Theob., Jour. econ. Biol. i, No. 1, 21 (1905); Monog. iv, 251.

Type, *G. inornata*, Theob., sp. nov., ♀, the only species.

= *Culex*, L.

Goeldia, Theob., Monog. iii, 330 (1903).

Type, *G. fluviatilis*, Theob., sp. nov., the original species.

Admitted herein as a sub-genus of *Wyeomyia*, Theob.

Grabhamia, Theob., Monog. iii, 243 (1903).

Feltidia, Dyar; *Ceratocystia*, Dyar and Knab. See *Feltidia*.

Type, *Culex jamaicensis*, Theob., the original species.

= *Culex*, L.

Grahamia, Theob., in Rept. on Dr. Graham's Collection,¹ and Monog. v, 497, footnote, and 548.

Type, *Grahamia trichorostris*, Theob., sp. nov., *l.c.*

N.B.—As Theobald's paper was not for sale, Meijere's genus *Harpagomyia*, with which *Grahamia* is synonymous, takes precedence. = *Harpagomyia*, Meij.

Grassia, Theob., Jour. Trop. Med. v, 181 (June 16, 1902).

Preocc. Fisch., 1885, in Protozoa; renamed *Myzomyia*, Blanch.

Type, *Anopheles rossii*, Giles. = *Anopheles*, Mg.

Gualteria, Lutz, in Bourroul's Mosq. Bras. 49 (? 54) (1904).

Type, *G. oswaldii*, Lutz, sp. nov., *l.c.*, the first of the two species, by present designation. Possibly identical with *Cacomyia*, Coq. Of doubtful validity.

Gymnometopa, Coq., Proc. Ent. So. Wash. vii, 183 (1906).

Type, *Stegomyia mediovittata*, Coq., by original designation.

N.B.—Theobald says (Monog. iv, 209) the genus was founded on his (Theobald's) *Stegomyia 6-lineata*, and that it is probably synonymous with *Macleaya*. Coquillett himself appointed *mediovittata* as the type species and added *6-lineata* also to his genus. The question of its identity or otherwise with *Macleaya* is another one. Coquillett and Theobald place *Gymnometopa* near *Stegomyia*, and I follow Edwards in ranking it synonymous, but I have seen no reference to the palpi. = *Stegomyia*, Theob.

Haemagogus, Will., Trans. Ent. So. Lond. (1896) 271.

Type, *H. splendens*, Will., by original designation.

A valid genus.

Harpagomyia, Meij., Tijd. v. Ent. lii, 165 (1909).

Grahamia, Theob., Report on Dr. Graham's collection. 'This Report not on sale and therefore technically not "published."'

Type, *H. splendens*, Meij., sp. nov., *l.c.*, by original designation. A valid genus.

Heinzmannia, Ludl., Can. Ent. xxxvii, 130 (1905) (*Heizmannia*, lapsus); emend., Banks, Phil. Jour. Sci. i, 99. Absolutely synonymous with *Dendromyia*, Theob.

Type, *Heinzmannia scintillans*, Ludl., sp. nov., Can. Ent. xxxvii, 130. = *Wyeomyia*, Theob.

Heptaphlebomyia, Theob., Monog. iii, 336 (1903).

Type, *H. simplex*, Theob., sp. nov., ♀, *l.c.*, the original species. = *Culex*, L.

Heteronychia, Arrib., Rev. Mus. la Plata I, 397 (1891).

Type, *Culex aestuans*, W. (as *dolosa*, sp. nov.) the only species, but *aestuans* is considered synonymous with *fatigans*.

= *Culex*, L.

¹ The full title of this paper is "Descriptions of new Mosquitoes collected by Dr. Graham in Ashanti." Colonial Office Report, Miscellaneous, No. 237 (May 23, 1909).

Hispidimyia, Theob., Monog. v, 245 (1910).

Type, *H. hispida*, Theob., sp. nov., ♂ ♀, *l.c.*, the only species.
= *Mimomyia*, Theob.

Hodgesia, Theob., Jour. Trop. Med. vii, 17 (Jan. 15, 1904);
Monog. iv, 579.

Type, *H. sanguinae*, Theob., sp. nov., ♀, *l.c.*, by original designation.
A valid genus.

Howardia, Theob., Jour. Trop. Med. v, 181 (1902).

Renamed *Pyretophorus*, Blanch; (*Howardia*, preocc. Dalla Torre 1897 in Insecta).

Type, unknown to me. = *Anopheles*, Mg.

Howardina, Theob., Monog. iii, 287 (1903).

Type, *Culex walkeri*, Theob., by designation of Dyar (Proc. Ent. So. Wash. vii, 49 (1905).

N.B.—Edwards sinks *Howardina* in *Stegomyia*, saying the ♀ claws are variable. (Bull. Ent. Res. iii, 11). = *Culex*, L.

Hulecoeteomyia, Theob., Entom. xxxvii, 163 (1904); Monog. iv, 219 (1907).

Type, *H. trilineata*, Leices., in Theob., sp. nov., ♂ ♀, *l.c.*, by present designation.

N.B.—Is Alcock's *Hylecoetomyia* (Ann. Mag. Nat. Hist. (8) viii, 248), an emendation? = *Culex*, L.

Hyloconops, Lutz, in Bourroul's Mosq. Bras. 49 (? 55) (1904).

Type, *H. pallidiventer*, Lutz, apparently the original species, as *longipalpis*; the only other species was not described till 1907 (Monog. iv, 588).
A valid genus.

Ingramia, Edwards, Bull. Ent. Res. iii, 43 (May 1912).

Mimomyia, Theob., Monog. iii, 304 pt.; *Dasymyia*, Leices., (preocc.) pt.

Type, *Mimomyia malfeyti*, Newstead, by original designation.
Of uncertain validity.

Isostomyia, Coq.

Type, *Aedes perturbans*, Will., the original species.

Of uncertain validity and position.

Jamesia, Christophers, Sci. Mem. Med. Off. Ind. (n. s.) xxv, 12 (1906).

Type, Major Christophers quotes *Culex concolor* and *tigripes* as belonging to his genus, without specifying either as a definite type. In any case as *Jamesia* is erected on larval characters it has no *locus standi*, and, in any case again, it is only a *Culex*
= *Culex*, L.

Janthinosoma, Arrib., Rev. Mus. la Plata I, 394 (1891).

Conchyliastes, Theob.

Type, *Culex discrucians*, Walk.

A valid genus.

Joblotia, Blanch., Comp. rend. So. biol. Paris liii, 1046 (Dec. 6, 1901), *nom. nov.* for *Trichoprosopon*, Theob., under the assumed preoccupation by *Trichoprosopus*, Macq.

= *Trichoprosopon*, Theob.

Kerteszia, Theob., Ann. Mus. Hung. iii, 66 (1905); Monog. iv, 117. *Type*, *K. boliviensis*, Theob., sp. nov., ♀, *l.c.*, by original designation. = *Anopheles*, Mg

Kingia, Theob., Monog. v, 135 (1910).

Type, *Stegomyia luteocephala*, Newstead, by original designation. = *Stegomyia*, Theob

Lasioconops, Theob., Monog. iii, 235 (1903) (*Lacioconops*, lapsus, v, 44).

Type, *L. poicilipes*, Theob., sp. nov., *l.c.*, the only species.

= *Culex*, L.

Laverania, Theob., Jour. Trop. Med. v, 181 (June 16, 1902), preocc Billet 1895 in Protozoa, and again by Grassi and Filetti in 1900. Renamed *Nyssorhynchus*, Blanch.

Type, *Anopheles argyritarsis*, R. Desv. = *Anopheles*, Mg.

Leicesteria, Theob., Entom. xxxvii, 211 (Aug. 1904); Monog. iv, 201 (1907).

Type, *L. longipalpis*, Leices, *l.c.*, the original species.

= *Culex*, L.

Leicesteriomyia, Brun., Rec. Ind. Mus. iv, 452 (1912); *nom. nov.* for *Chaetomyia*, Leices., preocc. Brauer and Berg in Tachininae.

Possibly = *Hyloconops*, Lutz.

Lepidoplatys, Coq., Science xxiii, 314 (1906).

Type, *Culex squamiger*, Coq.

= *Culex*, L.

Lepidosia, Coq., Science xxiii, 314 (1906).

Type, *Culex cyanescens*, Coq.

Of uncertain validity and position.

Lepidotomyia I., Theob., Ann. Mus. Hung. iii, 80 (1905).

Synonymous with *Reedomyia*, Ludl.

Type, *L. alboscuteolata*, Theob., sp. nov., *l.c.*, by original designation. = *Culex*, L.

Lepidotomyia II., Theob., Gen. Ins. Fasc. 26, 22 (1905); Monog. v, 249; *non Lepidotomyia*, Theob., Ann. Mus. Hung., iii.

Type, *L. magna*, Theob., sp. nov., ♂ ♀, the only species.

= *Culex*, L.

Leptosomatomyia, Theob., Ann. Mus. Hung. iii, 110 (1905); Monog. iv, 548.

Type, *L. lateralis*, Theob., sp. nov., ♂ only, by original designation. Probably = *Aedes*, Mg.

Leslieomyia, Christophers, Paludism No. 2, p. 68 (1911).

Type, *L. taeniorhynchoides*, sp. nov., *l.c.* ♂ ♀, by original designation. = *Culex*, L.

Lestiocampa, Dyar and Knab, Jour. N.Yk. Ent. So. xiv, 226 (1906)

Type, *Wyeomyia lunata*, Theob.

N.B.—Inadmissible, being founded on larval characters only.
It is however synonymous with *Trichoprosopon*, Theob.

Leucomyia, Theob., Monog. iv, 372 (1907).

Preocc. Brauer and Berg. 1892 in Sarcophaginae, renamed
Theobaldiomyia, Brun.

Type, *Culex gelidus*, Theob., by original designation.

=*Culex*, L.

Limatus, Theob., Monog. ii, 349 App. (1901).

Simondella, Laveran.

Type, *L. durhamii*, Theob., by original designation.

A valid genus.

Lophoceratomyia, Theob., Ann. Mus Hung. iii, 93 (1905). Monog.
iv, 471.

Type, *L. fraudatrix*, Theob., sp. nov. ♂ ♀, *l.c.*, by present
designation, the first of the two species. A valid genus.

Lophoscelomyia, Theob., Entom. xxxvii, 12 (Jan. 1904).

Lophocelomyia, Theob., Gen. Ins. Fasc. 26, 10 (*lapsus*).

Lophomyia, Giles, Jour. Trop. Med. vii, 366 (1904).

Type, *Lophoscelomyia asiatica*, Theob., sp. nov., *l.c.*, 13.

=*Anopheles*, Mg.

Ludlowia, Theob., Monog. iv, 193 (1907).

Type, *Mimomyia chamberlaini*, Ludl., the original species.

=*Mimomyia*, Theob

Lutzia, Theob., Monog., iii, 155 (1903).

Type, *Culex bigotii*, Bell., ♂ ♀, the original species.

=*Culex*, L.

Lynchiella, Lahille in Peryassu, Os Culic. do Bras. 125 (1905).

Type, unknown to me.

=*Megarhinus*, R. Desv.

Macleaya, Theob., Entom. xxxvi, 154 (1903); Monog. iv, 203.

Type, *M. tremula*, Theob., nov. sp., *l.c.*, the only species.

=*Culex*, L.

Maillotia, Theob., Monog. iv, 274 (1907).

Type, *M. pilifera*, Theob., sp. nov., ♀, *l.c.*, the only species.

=*Culex*, L.

Malaya, Leices., Cul. Mal. 258 (1908).

Type, *M. genurostris*, Leices., sp. nov., ♂, *l.c.*

N.B.—The name is practically preoccupied by *Malaia*, Heller
(1891). =*Harpagomyia*, Meij.

Manguinhosia, Cruz in Peryassu, Os Culic. do Bras. 112 (1908).

Type, *M. lutzi*, Cruz, *l.c.*, the only species. =*Anopheles*, Mg.

Mansonia, Blanch., Comp. rend liii, No. 37, 1046 (1901); Moust.
375; *nom. nov.* for *Panoplites*, Theob., preocc. Gould, 1853,
in Aves.

Type, *Culex titillans*, Walk.

=*Culex*, L.

Mansonioides, Theob., Monog. iv, 498 (1907).

Type, *M. 7-guttata*, Theob., sp. nov., ♀, *l.c.*, the original
species. =*Culex*, L.

Megaculex, Theob., Monog. iv, 282 (1907).

Type, *Culex albitarsis*, Theob., l.c., ii, 267, ♂; iii, 186, ♀, the only species. = *Mimomyia*, Theob.

Megarhinus, R. Desv., Essai Culic. in Mem. So. Nat. Hist. Paris, iii, 412 (1827); *Megarrhinus*, *Megarhina*, *Megarrhina*, Auctt., *Lynchiella*, Lahille.

Type, *Culex haemorrhoidalis*, F.

N.B.—*Megarhina*, was used by St. Farg. and Serv. in Diptera, and *Megarhinus* proposed again by Schonh. 1836 in Coleoptera. A valid genus.

Melanoconion, Theob., Monog. iii, 238 (1903).

Mochlostyrax, Dyar and Knab.

Type, *Culex atratus*, Theob., by Dyar's designation (Proc. Ent. So. Wash. vii, 49). = *Culex*, L.

Menolepis, Lutz in Peryassu, Os Culic. do Bras. 38 (1908).

Type, *M. leucostigma*, Lutz, sp. nov., l.c., the only species.

= *Wyeomyia*, Theob.

Micraedes, Coq., Proc. Ent. So. Wash. vii, 185 (1906).

Type, *M. bisulcatus*, Coq., by original designation.

= *Aedes*, Mg.

Microculex, Theob., Monog. iv, 461 (1907).

Type, *M. argenteoumbrosus*, Theob., sp. nov., ♀ l.c., the only species. = *Culex*, L.

Mimetculex, Theob., 3rd Rep. Wellc. Res. Lab. Gordon College, 258 (1908); Monog. v, 408.

Type, *M. kingii*, Theob., sp. nov., ♂ ♀, l.c., the only species.

= *Culex*, L.

Mimeteomyia, Theob., Monog. v, 210 (1910).

Type, *M. apicotriangulata*, Theob., sp. nov., l.c., the only species. = *Culex*, L.

Mimomyia, Theob., Monog. iii, 304 (1903).

Type, *M. splendens*, Theob., sp. nov., ♀, l.c., the original species.

Admitted on Edward's testimony as a valid genus.

N.B.—All the species except the genotype are now removed to *Ingramia*.

Mochlonyx, Loew., Stett. Ent. Zeit. v, 121 (1844).

Type, *Corethra velutina*, Ruthe, by original designation.

= *Corethra*, Mg.

Mochlostyrax, Dyar and Knab, Jour. N.Yk. Ent. So. xiv, 223 (Ap. 15, 1906).

Type, *M. caudelli*, Dyar and Knab, by original designation.

N.B.—Technically inadmissible, founded on larval characters only, but from the adults subsequently discovered or bred, it is said to be allied to *Melanoconion*. = *Culex*, L.

Molpemyia, Theob., Monog. v, 479 (1910).

Type, *M. purpurea*, Theob., sp. nov., ♀, l.c., the only species.

N.B.—Probably synonymous with *Oculeomyia*, which Mr. Edwards sinks in *Culex*.

Mucidus, Theob., Monog. i, 268 (1901).

No type species was appointed by Theobald, so out of the five species included by that author at the erection of the genus I propose *alternans*, Westw., as being (apart from *laniger*, W., which Theobald at that time had not seen) the oldest described one (1835). Both sexes were present before him, and the "type" (Theobald does not say which sex) is in the Hope collection at Oxford. A valid genus.

Myxosquamus, Theob., Monog. v, 225 (1910).

Type, *M. confusus*, Theob., sp. nov., ♀, l.c., by original designation. = *Culex*, L.

Myzomia, Blanch., Comp. rend, liv, 795 (July 4, 1902).

Type, *Anopheles rossii*, Giles, by original designation.

N.B.—Theobald suggests (Monog. iii, 12) altering the type to *junesta*, Giles, but this of course is inadmissible. James apparently desires to erect a new genus *Nyssomyzomyia*¹ on *rossii*, but this is impossible, as the latter must remain the type of *Myzomyia*. = *Anopheles*, Mg.

Myzorhynchella, Theob., Monog. iv, 78 (1907).

Type, *M. nigra*, Theob. = *Anopheles*, Mg.

Myzorhynchus, Blanch., Comp. rend. liv, 795 (1902).

Type, *Anopheles sinensis*, W., by original designation.

= *Anopheles*, Mg.

N.B.—Major James suggests *barbirostris*, Wulp, as the type species which is quite impossible in the face of Blanchard's definite selection of a type.

Neocellia, Theob., Monog. iv, 111 (1907).

Type, *N. indica*, Theob., sp. nov., ♂ ♀, l.c., the first species. = *Anopheles*, Mg.

Neoculex, Dyar, Proc. Ent. So. Wash. vii, 47 (1905).

Type, *Culex territans*, Walk. = *Culex*, L.

Neomacleaya, Theob., Monog. iv, 238 (1907).

Type, *N. indica*, Theob., sp. nov., ♀, l.c., the original species. = *Culex*, L.

Neomelanoconion, Theob., Monog. iv, 514 (1907).

Type, *Culex rima*, Theob., Rep. Liverp. Sch. Trop. Med. App p xi (1901), by original designation, (iv, 514).

N.B.—*Neomelanoconion* ♂ = *Culiciomyia*, Theob., according to Edwards. = *Culex*, L.

Neomyzomyia, Theob., Monog. v, 29 (1910).

Type, *Anopheles elegans*, James in Theob., by original designation. = *Anopheles*, Mg.

¹ Rec. Ind. Mus. iv, 106. In this paper Major James desires to make *culicifacies*. Giles, the type of *Myzomyia*, which is impossible since *rossii* was definitely selected as such by Blanchard. These attempts to alter genotypes are zoologically unpardonable.

Neopecomyia, Theob., Monog. v, 261 (1910).

Type, *N. uniannulata*, Theob., sp. nov., ♀, *l.c.*, the only species.
= *Culex*, L.

Neostethopheles, James, Rec. Ind. Mus. iv, 98 (1910).

Type, *N. aitkeni*, James, by original designation.
= *Anopheles*, Mg.

Newsteadina, Theob., Ann. Trop. Med. Paras. II, No. 4, 297 (1909); Monog. v, 474.

Type, *Culex arboricollis*, D'Emm de Char. *loc. cit.*, 257, ♂ ♀
Admitted herein *pro tem* as subgenus *Culex*, L.

Nototricha, Coq.

Type, *Cyclolepteron mediopunctatus*, Theob., by original designation, the only species.

N.B.—Theobald (Monog. v, 33) spells the genus *Notonotricha*.
= *Anopheles*, Mg.

Nyssomyzomyia, James, Rec. Ind. Mus. iv, 101 (1910).

Type, *Anopheles rossii*, Giles, according to James, but this is impossible, as this species was the chosen type of *Myzomyia* at its erection by Blanchard.
= *Anopheles*, Mg.

Nyssorhynchus, Blanch., Comp. rend., liv, 795 (1902). *Nom. nov.* for *Laverania*, Theob., preocc.

N.B.—Blanchard desired to make *Anopheles albimanus*, W., the type, but as his name is simply a *nomen novum* the original type of *Laverania*, *argyritarsis*, R. Desv., must remain as the type of *Nyssorhynchus*. Theobald suggests (Monog. iii, 14) *maculatus*, Theob., as type, and James (Rec. Ind. Mus. iv, 100) would follow him, but, as Edwards has pointed out (Bull. Ent. Res. ii, 141) this is not permissible.
= *Anopheles*, Mg.

Ochlerotatus, Arrib., Rev. Mus. la Plata i, 385 (1891).

Type, Coquillett designated *O. confirmatus*, Arrib., sp. nov. as type, but Edwards says *Culex alvifasciatus*, Macq. was so appointed, which, as these were apparently the only two species admitted by Arribalzaga, seems the more likely.

N.B.—Mr. Edwards believes strongly in the validity of this genus.
= *Culex* L.

Oculeomyia, Theob., Monog. iv, 515 (1907).

Type, *O. sarawaki*, Theob., sp. nov., *l.c.*, the original species.
Of uncertain validity.

O'Reillia, Ludl., Can. Ent. xxxvii, 101 (1905).

Type, *O. luzonens*, Ludl., sp. nov., *l.c.*, the original species.
Synonymous with *Etorleptiomyia*, Theob. = *Culex*, L.

Orthopodomyia, Theob., Entom. xxxvii, 236 (1904). Monog. iv, 527.

Type, *O. albipes*, Leices. in Theob., sp. nov., *l.c.* 237, the original species.
Of uncertain validity.

Panoplites, Theob., Rep. Coll. Mosq. Brit. Mus. 5 (1900); Monog. ii, 173 (1901).

Renamed *Mansonia*, Blanch., *Panoplites*, preocc.

Type, *Culex titillans*, Walk., as *Taeniorhynchus taeniorhynchus*, Arrib., by designation of Neveu Lemaire (Mem. So. Zool. xiv, 214). = *Culex*, L.

Pardomyia, Theob., Monog. iv, 280 (1910).

Type, *P. aurantia*, Theob., sp. nov., ♀, *l.c.*, the original species. = *Culex*, L.

Patagiamyia, James, Rec. Ind. Mus. iv, 98 (1910).

Type, *Anopheles gigas*, Giles, by original designation. = *Anopheles*, Mg.

Pecomyia, Theob., Jour. econ. biol. I, No. 1, 24 (1905); Monog. iv, 265.

Type, *P. maculata*, Theob., sp. nov., the original species. = *Culex*, L.

Pectinopalpus, Theob., Monog. v, 416 (1910).

Type, *P. fuscus*, Theob., sp. nov., *l.c.*, the only species. Synonymous with *Culiciomyia*, Theob., which is regarded herein as a subgenus of *Culex*.

Phagomyia, Theob., Gen. Ins. Fasc. 26, 21 (1905). Monog. iv, 223.

Either *P. (Stegomyia) gubernatrix*, Giles (Entom. 1901, p. 194), or *P. irritans*, Theob. (Rep. Liverp. Sch. Trop. Med. App. 3, 1901), must be the generic type, but I cannot tell which has priority. = *Culex*, L.

Philodendromyia, Theob., Monog. iv, 623 (1907).

Type, *P. barkerii*, Theob., sp. nov., ♂, *l.c.*, the original species. Of uncertain validity.

Phoniomyia, Theob., Monog. iii, 311 (1903).

Type, *Wyeomyia longirostris*, Theob., by designation of Dyar, Proc. Ent. So. Wash. vii, 49. = *Wyeomyia*, Theob.

Pneumaculex, Theob., Monog. iv, 523 (1907). Dyar Proc. Ent. So. Wash. vii, No. 1, *nom. nud.*

Type, *Culex signifer*, Coq., Can. Ent. xxviii, 43 (1896).

N.B.—The genus must stand to Theobald's credit, as he apparently first described it, Dyar's reference being merely a *nomen nudum*. Founded originally on larval characters and therefore inadmissible but the adult has since been obtained.

= *Culex*, L.

Polyleptiomyia, Theob., Gen. Ins. Fasc. 26, 21 (1905); Monog. iv, 223 (1907)

Type, *P. albocephala*, Theob. (Monog. iii, 140), the only species, a unique ♂. = *Culex*, L.

Polylepidomyia, Theob., Ann. Mus. Hung. iii, 118 (1905). Monog. iv, 625.

Type, *P. argenteiventris*, Theob., sp. nov., ♀, *l.c.*, the only species. Of uncertain validity.

Popea, Ludl., Can. Ent. xxxvii, 95 (1905).

Type, *P. lutea*, Ludl., sp. nov., ♂ *l.c.*, the only species.

=*Culex*, L.

Prosopolepis, Lutz in Peryassu, Os Culic. do Braz. 38 (1908).
Theob. Monog. v, 594.

Type, *P. confusus*, Lutz., sp. nov., the original species.

=*Wyeomyia*, Theob.

Protoculex, Felt, N.Yk. State Mus. Bull. 79, Ent. 22, p. 391d,
App. (1904).

Type, *Culex serratus*, Theob., by original designation.

=*Culex*, L.

Protomacleaya, Theob., Monog. iv, 253 (1907).

Type, *Culex triseriatus*, Say.

=*Culex*, L.

Protomelanoconion, Theob., Monog. v, 462 (1910).

Type, *P. fusca*, Theob., sp. nov., *l.c.*, 463.

=*Culex*, L.

Pseudocarrollia, Theob., Rec. Ind. Mus. iv, 12 (1910). Monog.
v, 186.

Type, *P. lophocentralis*, Theob., sp. nov., ♀, *l.c.*, the only
species.

=*Culex*, L.

Pseudoculex, Dyar, Proc. Ent. So. Wash. vii, 45 (1905).

Type, *Culex aurifer*, Coq.

=*Culex*, L.

Pseudoficalbia, Theob., Trans. Linn. So. Lond. xvi, 89 (1912);
U. South. Afr. Dept. Agric. 1st Rep. Vet. Res. *nom. nud.* 272
(1911).

=*Uranotaenia*, Arrib.

Pseudograbhamia, Theob., J. Bomb. N. H. So. xvi, 244 (1905).
Monog. iv, 314.

Type, *P. maculata*, Theob., sp. nov., *l.c.*, the only species.

=*Culex*, L.

Pseudograhamia, Theob., Rec. Ind. Mus. iv, 26 (1910). Monog.
v, 551.

Type, *P. aureoventer*, Theob., sp. nov., ♀, *l.c.*, 27, the
original species.

Of doubtful validity.

Pseudoheptaphlebomyia, Ventr., Bull. Mus. Paris xi, 427 (1905)
nom. nud.

Type, not allotted.

=*Culex*, L.

Pseudohowardina, Theob., Monog. iv, 223 (1907).

Type, *Culex trivittata*, Coq., by original designation.

=*Culex*, L.

Pseudoskusea, Theob., Monog. iv (1907).

Type, *Skusea multiplex*, Theob., by present designation, as
the only species mentioned at the erection of the genus.

=*Culex*, L.

Pseudostegomyia, Ludl., Can. Ent. xxxvii, 99 (1905) (lapsus calami
for *Quasistegomyia*; (t. Ludl. in Theob. Monog. v, 135).

Pseudotaeniorhynchus, Theob., Novae Culicidae i, 19 (1911).

Type, *Taeniorhynchus fasciolatus*, Arrib. Mr. Edwards says
this is certainly synonymous with *Taeniorhynchus*, which
is herein ranked as a subgenus of *Culex*.

- Pseudotheobaldia**, Theob., Monog. iv, 217 (1907).
Type, *P. niveitaeniata*, Theob., sp. nov., ♂, *l.c.* = *Culex*, L.
- Pseudouranotaenia**, Theob., Jour. econ. biol. i, 33 (1905);
 Monog. iv, 566 (1907).
Type, *P. rowlandii*, Theob., sp. nov., *l.c.*, the original species.
 = *Uranotaenia*, Arrib.
- Psorophora**, R. Desv., Essai Culic. (1827).
Type, *Culex ciliata*, F., the oldest described species at the
 institution of the genus. A valid genus.
- Pyretophorus**, Blanch., Comp. rend xxiii, 795 (1902).
Type, *Anopheles costalis*, Lw., by original designation.¹
 = *Anopheles*, Mg.
- Quasistegomyia**, Theob., 2nd Rep. Gord. College Wellc. Labor.,
 69 (1906).
Type, *Q. unilineata*, Theob., sp. nov., the original species.
 = *Stegomyia*, Theob.
- Rachionotomyia**, Theob., Jour. Bomb. Nat. Hist. So. xvi, 248
 (1905). Monog. iv, 518.
Type, *R. ceylonensis*, Theob., sp. nov., ♀, *l.c.*, the original
 species. A valid genus.
- Rachisoura**, Theob., Monog. v, 207 (1910).
Type, *R. sylvestris*, Theob., sp. nov., *l.c.*, 208 the only species.
 = *Culex*, L.
- Radioculex**, Theob., Rec. Ind. Mus., ii, 295 (1908); Monog. v, 192.
Type, *R. clavipalpis*, Theob., sp. nov., *l.c.*, the original species.
 = *Mimomyia*, Theob.
- Ramcia**, Annandale, Spol. Zeyl. vii, 187 (1911).
Type, *R. inepta*, Annand., sp. nov., ♂, *l.c.*, the only species.
 A valid genus.
- Reedomyia**, Ludl., Can. Ent. xxxvii, 94 (1905).
Type, *R. pampangensis*, Ludl., sp. nov., ♀, *l.c.*, the original
 species. = *Culex*, L.
- Rhynchotaenia**, Brethes, Ann. Mus. Buen. Ayres xx, 470 (1910),
nom. nov. for *Taeniorhynchus*, Theob.
- Rossia**, Theob., Jour. Trop. Med. v, 181 (1902).
 Preocc. by Owen 1838 in Mollusca, and Bonap., 1838, in Aves;
 renamed *Myzorhynchus*, Blanch.
 No type species ever set up, and as *Rossia* is displaced by
Myzorhynchus, which itself sinks in *Anopheles*, nothing is
 to be gained by selecting one now. = *Anopheles*, Mg.

¹ Major James' suggestion (Rec. Ind. Mus. iv, 92) to set up *palestinensis*, Theob., as the "type example" of the genus (whatever he may mean by that as distinct from "type of the genus") is unpardonable. *A. costalis*, Lw., was definitely selected by Blanchard as the type and must remain so.

Runchomyia, Theob., Monog. iii, 319 (1903).

Binotia, Blanch., *nom. nov.* on alleged preoccupation by *Rhynchomyia*, R. Desv (1830), in Muscinae.

Type, *R. frontosa*, Theob., sp. nov., ♀, *l.c.*, by original designation.
A valid genus.

Sabethes, R. Desv., Essai Culic. 411 (1827).

Sabettus, Scudd., emend. (1882).

Type, *Culex longipes*, F., so far as I can ascertain. Coquillett gives *C. cyaneus*, F., "as *locuples*, sp. nov."; the Kertész Catalogue makes *locuples* a synonym of *longipes*, F., which has another synonym in *remipes*, W. (this latter being given as genotype by Theobald). *Cyaneus*, F., is a separate species under *Culex* in the Kertész Cat. and even if it should prove synonymous with *longipes*, F., the latter takes bare precedence by being described on the previous page.

A valid genus.

Sabethinus, Lutz., in Bourroul, Mosq. Bras. 48 (? 57), (1904).

Sabettinus, Blanch., Moust. 634, emend.

Type, *S. intermedius*, Lutz, the first species described, by present designation. Theobald says the genus may be synonymous with *Sabethoides*, Theob., which is the view adopted herein.

Sabethoides, Theob., Monog. iii, 328 (1903).

Sabettoides, Blanch., emend., Moust. 423.

Sabethinus, Lutz.

Type, *S. confusus*, Theob. Admitted as valid *pro. tem.*

Sayomyia, Coq., Can. Ent. xxxv, 190 (1903).

Type, *Corethra punctipennis*, Say. = *Chaoborus*, Lichtenstein.

Scutomia, Theob., Entom. xxxvii, 77 (1904).

Type, *Culex sugens*, W., by present designation, as the oldest described species included by Theobald at the erection of the genus.
= *Stegomyia*, Theob.

Simondella, Laveran, Comp. rend. soc. biol. liv, 1158 (1902).

Type, *S. curvirostris*, Lav. = *Limatus*, Theob.

Skeiromyia, Leices., Cul. Mal. 248 (1908).

Type, *S. fusca*, sp. nov., ♂ ♀, *l.c.*, the only species.

Probably = *Hodgesia*, Theob.

Skusea, Theob., Monog. iii, 291 (1903).

Type, *S. funerea*, Theob., by original designation.

A valid genus.

Squamomyia, Theob., Rec. Ind. Mus iv, 28 (1910); Monog. v, 529.

Type, *S. inornata*, Theob., sp. nov. ♂, the original species.

Probably = *Aedes*, Mg.

Stegoconops, Lutz, Imprensa Medica (1906) (? *nom. nud.*); Peryassu, Os Culic. do Bras. 34 (1908).

Type, unknown to me.

= *Culex*, L.

Stegomyia, Theob., in Howard's Mosquitoes p. 233 (Jan. 1, 1901); Monog. i, 283.

Type, *Culex fasciatus*, F., as *calopus*, Mg.

Apparently a valid genus.

Stenoscutus, Theob., Monog. v, 263 (1910).

Type, *S. africanus*, Theob., sp. nov., ♀, l.c. = *Culex*, L.

Stethomyia, Theob., Jour. Trop. Med. v, 181 (1902).

Type, *S. nimba*, Theob., sp. nov., l.c., the original species.

= *Anopheles*, Mg.

Taeniorhynchus, Arrib., Rev. Mus. la Plata i, 389 (1891).

Restricted by Theobald, Monog. ii, 190 (1901).

Type, *Culex titillans*, Walk., as *C. taeniorhynchus*, W., technically.

N.B.—Theobald observes (Monog. iv, 483) the genus was technically founded on Wiedemann's *taeniorhynchus*, with which the author regarded *titillans* as synonymous, also adding two new species, *confinnis* and *fasciolatus*. Coquillett would adopt *titillans*, in place of *taeniorhynchus*, to avoid tautonomy, but the selected original type species must stand. Admitted herein as a sub-genus of *Culex* L.

Teromyia, Leices., Cul. Mal. 49 (1908).

Type, *T. acaudata*, Leices., sp. nov., ♂ ♀, the first species, by present designation. See p. 35 as to possible validity.

= *Toxorhynchites*, Theob.

Theobaldia, Neveu-Lemaire, Comp. rend. liv, 1331 (Nov. 29, 1902). *Theobaldinella*, Blanch., Moust. 390, nom. nov., under supposed preoccupation by *Theobaldius*, Neville, in Mollusca.

Type, *Culex annulatus*, Schrk.

= *Culex*, L.

Theobaldiomyia, Brun., Rec. Ind. Mus. iv, 462 (1912), nom. nov. for *Leucomyia*, Theob. preocc., Brauer and Berg., 1892 in Sarcophaginae.

Thomasina, Newstead and Carter, Ann. Trop. Med. Paras. iv, 553 fig. 1 head ♂ (1910-11).

Type, *Mansonia longipalpis*, (♀ only descr.) Newstead and Thomas, Ann. Trop. Med. Paras. iv, 145, ♀

= *Culex*, L.

Tinoletes, Coq., Proc. Ent. So. Wash. vii, 185 (1906).

Type, *T. latisquama*, Coq., by original designation.

Of uncertain validity and position.

Topomyia, Leices., Cul. Mal. 238 (1908).

Type, *T. minor*, Leices., sp. nov., ♂ ♀, l.c., the first of the nine species, by present designation. Probably a valid genus.

Toxorhynchites, Theob., Monog. i, 244 (1901).

Type, *T. brevipalpis*, Theob., sp. nov., ♀, l.c., by original designation. The attempt to make *Megarhinus mutilus* the type must fail, as stated by Mr. Edwards (Bull. Ent. Res. iii, 3).

A valid genus.

Trichopronomyia, Theob., Ann. Mus. Hung. iii, 98 (1905); Monog. iv, 479.

Type, *T. annulata*, Theob., sp. nov., ♂, l.c., the original species. = *Culex*, L.

Trichoprosopon, Theob., Monog. ii, 283 (1901); Jour. Trop. Med. iv, 235, July 15, 1901, *nom. nud.*

Type, *T. nivipes*, Theob., sp. nov. the original species. A valid genus.

Trichorhynchomyia, Brun., Rec. Ind. Mus. iv, 477 (1912).

nom. nov. for *Trichorhynchus*, Theob., preocc.

Trichorhynchus, Theob., Jr. Bomb. Nat. Hist. Soc. xvi, 240 (1905); Monog. iv, 270.

Preoccupied by Balbiani 1887 in Protozoa; renamed *Trichorhynchomyia*, Brun.

Type, *T. fuscus*, Theob., by original designation. = *Culex* L.

Uranotaenia, Arrib., Rev. Mus. la Plata i, 405 (1891).

Type, *U. pulcherrima*, Arrib., by designation of Neveu-Lemaire (Mem. So. Zool. Fran. xv, 21—1902).

Apparently a valid genus.

Verrallina, Theob., Monog. iii, 295 (1903).

Type, *Aedes butleri*, Theob., by Coquillett's designation. = *Uranotaenia*, Arrib.

Worcesteria, Banks, Phil. Jour. Sci. i, 779 (1906).

Type, *W. grata*, Banks, sp. nov. the original species.

Some doubt attaches as to *grata* being distinct from *Toxorhynchites immisericors*. = *Toxorhynchites*, Theob.

Wyeomyia, Theob., Monog. ii, 267 (1901); Jour. Trop. Med. iv, 235, July 15, 1901, *nom. nov.*

Type, *W. grayii*, Theob., by designation of Neveu Lemaire, (Mem. So. Zool. Fran. xv, 223—1902).

A valid genus. ? p. 268.

Zeugnomyia, Leices., Cul. Mal. 231 (1908).

Type, *Z. gracilis*, Leices., sp. nov., ♂ ♀, l.c. 232, the only species. Of uncertain validity.

III FURTHER RECORDS OF INDIAN BRACKISH WATER MYSIDAE WITH DESCRIPTIONS OF A NEW GENUS AND SPECIES

By WALTER M. TATTERSALL, D.Sc., *Keeper of the Manchester Museum.*

(Plates xii-xiii.)

In 1908 I described two new species of Mysidae from brackish water, near Calcutta (*Rec. Ind. Mus.*, vol. ii, pt. 3, 1908). Since that time, Dr. Annandale and his staff have continued their exploration of the brackish waters of India and have sent to me, from time to time, samples of the Mysidae they found in their material, for identification. Most of the specimens sent me were found to belong to one or other of the two forms I had previously described. They have proved to be abundant and widely distributed on the east coast of India. Among the material sent me, however, I found a bottle of specimens from a brackish creek near Bombay, which proved to belong to an undescribed species requiring the formation of a new genus.

In the present paper, I give a description with figures of the new species and a complete list of all the records for the two previously described forms. These three species are, so far as I am aware, the only Mysidae known from the littoral of India. Many purely marine species must still await discovery and it seems probable that further work in the brackish waters of the west coast will bring to light undescribed forms.

I am much indebted to Dr. Annandale for the opportunity of examining the material here dealt with and to Mr. S. W. Kemp for valuable notes on the occurrence of the species and for a complete list of known localities. To both these gentlemen I desire to express my best thanks.

Macropsis orientalis, Tattersall.

M. orientalis, Tattersall, *Rec. Ind. Mus.*, vol. ii, pt. 3, 1908.

Complete list of localities.

(1). Chittagong town, brackish ponds near river. (*N. Annandale* and *S. W. Kemp*.)

(2). Dhappa, near Calcutta, brackish ponds (*N. Annandale*).
Type locality.

Found since in abundance in the same district, in water with 5.09–7.41 g. NaCl per litre.

(3). Port Canning, Lower Bengal, brackish ponds (*N. Annandale*).

(4). Zoological Gardens, Calcutta, fresh water (*S. W. Kemp*). (The pond in which Mr. Kemp took the specimens is filled periodically from a creek of the R. Hughli. *N. A.*)

(5). Belgachia, Calcutta, brackish water canal. (*S. W. Kemp*.)

(6). Garia, Lower Bengal, brackish ponds (*N. Annandale* and *S. W. Kemp*).

(7). Nalbano, L. Chilka, Puri district, brackish water (*J. T. Jenkins*).

(8). S. end of L. Chilka (inland), brackish water (*N. Annandale*).

(9). Barkul, Chilka Lake, in water with 4.09 g. NaCl per litre (*F. H. Gravely*).

(10). Rambha, Ganjam district, brackish ponds (*N. Annandale*).

(11). Vizagapatam backwater, Vizagapatam, salt water (*S. W. Kemp*).

(12). Sar Lake, nr. Puri, Orissa, fresh water (*N. Annandale*).

(13). Madpur, Bengal (*R. A. Hodgart*).

(14). Edge of the Mahanadi River, Cuttack, Orissa (*N. Annandale*).

I am indebted to Mr. Kemp for the above list of records for this species and for samples of specimens from nearly all the localities, from which I have been able to confirm Mr. Kemp's determinations. When forwarding the list of captures, Mr. Kemp kindly gave me the following note on the general occurrence of this species. "The species usually occurs in enormous numbers swimming in shoals. In one instance, when a strong breeze was blowing, it was noticed that the shoal kept to the windward side of the pond. In the neighbourhood of Calcutta, it seems to prefer ponds and canals, of slowly moving water, which are brackish, but does not occur in the salt lakes proper. None the less, as shown in the records given above, it is sometimes found in water almost or fully as salt as the sea and the fresh water record from a pond in the Zoological Gardens at Calcutta, cannot be questioned."

Since writing the above, Mr. Kemp forwarded to me specimens from Madpur, in the Midnapore district from absolutely fresh water, "at least thirty miles away from the nearest possible source of saline contamination"

The species was taken in abundance at all the above localities.

We may therefore summarise our knowledge of the distribution of this species by saying that it is an abundant form at the head of the Bay of Bengal and on the east coast of India, from Chittagong and the delta of the Ganges to Vizagapatam, usually found in brackish water or in fresh water not far distant from the influence of brackish tidal streams, but occasionally found in abso-

lutely fresh water, beyond suspicion of saline contamination as at Madpur or in the Zoological Gardens at Calcutta, or in water almost as salt as the sea as at L. Chilka.

I have seen no specimens at all from the west coast of India.

Potamomysis assimilis, Tattersall.

P. assimilis, Tattersall, *loc. cit.*

(Plate xiii, fig. 14.)

Complete list of localities.

(1). Chittagong town, brackish ponds near river (*N. Annandale* and *S. W. Kemp*).

(2). Dhappa, near Calcutta, brackish ponds (*N. Annandale*).
Type locality.

(3). Garia, Lower Bengal, brackish ponds (*N. Annandale* and *S. W. Kemp*).

(4). Sar Lake, near Puri, Orissa, fresh water (*N. Annandale*).

(5). Edge of the Mahanadi River, Cuttack, Orissa, fresh water (*N. Annandale*).

I have seen specimens from all these localities. This species has a general distribution very closely agreeing with that of *Macropsis orientalis*. It is generally found in company with the latter, but is apparently as a rule not nearly so abundant. Moreover, it seems to prefer brackish water, since it has not yet been taken in water as salt as the sea and only twice has it been found in fresh water. It has not yet been found on the west coast of India.

The additional material that I have been able to examine of this species has enabled me to supplement my original description. I find that in mature males, 6 mm. in length, there is a prominent hirsute lobe on the antennules, similar in form to but shorter than the same appendage in *Macropsis orientalis*. At the time of describing the species, my largest male specimen measured only 4 mm. and in specimens of that size, the appendage is just beginning to show itself as a small hirsute tubercle.

The female has two pairs of incubatory lamellae.

In the specimens from the Mahanadi River, I find that the small spines arming the truncate apex of the telson show a tendency to an arrangement in series of shorter spines with a longer spine between each series (see plate xiii, fig. 14). This arrangement was shown to a much less extent in the type specimens but is probably characteristic of the species.

Most of the specimens have a row of black chromatophores on the inner margin of the outer uropod.

Genus Indomysis, nov.

Form of the body comparatively slender.

Eyes well developed.

Carapace not produced in the form of a rostral plate; lateral corners acutely produced.

Superior antennae of the usual structure but wanting the hirsute appendage in the male.

Antennal scale narrowly oval in shape, setose all round, unjointed.

Telson short, entire, quadrangular in shape, lateral margins armed with a few short spines; apex truncate, armed with a row of small teeth.

First, second and third pairs of pleopods in the male, as in the female. Fourth pair distinctly biramous, inner ramus quite small and bearing only a few delicate setae, outer ramus considerably elongate, extending beyond the posterior margin of the last segment of the pleon, consisting of a single elongate joint terminated by a long slender spiniform seta. Fifth pair elongate, extending beyond the posterior margin of the last segment of the pleon, consisting of a single linear joint armed with setae.

It is possible that the characters of the mandibular palp and the terminal joints of the sixth, seventh and eighth thoracic limbs, as given in the description of the type species below may be found to be of generic significance when further species of the genus are discovered.

This new genus is distinguished by the combination of characters afforded by the unjointed antennal scale, the short entire quadrangular telson and the form of the pleopods in the male. It resembles the genus *Potamomysis* in the form of the telson, but the latter genus has the antennal scale jointed and the pleopods of the male quite different, the fifth pleopod resembling the first, second and third, and the fourth of entirely distinct form. I know of no other genus with which it can be confused. Only one species, the type of the genus, *Indomysis annandalei*, is as yet known.

Indomysis annandalei, gen. et sp. nov.

(Plate xii, figs. 1-5 and pl. xiii, figs. 6-13.)

Form (fig. 1) of the body moderately slender, thorax more than half as long as the pleon.

Carapace leaving the last segment of the thorax fully exposed; anterior margin not produced in the form of a rostral plate but almost regularly and evenly round and slightly upturned; antero-lateral corners produced into acute spiniform projections; a small obtuse frontal spine visible below the anterior margin of the carapace.

Eyes well developed and almost completely uncovered by the carapace; form nearly cylindrical, one and a half times as long as wide, cornea occupying rather less than the distal half of the eye, hardly at all expanded, pigment black.

Superior antenna (fig. 2) somewhat slender, proximal joint of the peduncle longer than the distal two combined, the latter each

armed on their inner distal corners with a single very long and stout plumose seta; hirsute appendage apparently lacking in male specimens.

Inferior antenna with the peduncle about one half as long as the scale, last two joints subequal.

Antennal scale (fig. 3) about four and a half times as long as broad in its widest part, extending considerably beyond the distal end of the antennular peduncle, narrowly oval or lanceolate in shape, setose all round, without a second joint; basal joint from which the scale springs with the outer distal corner acutely produced.

Mandible with a well developed molar process; second joint of the palp linear, not expanded and unarmed; third joint of the palp comparatively short.

First and second thoracic legs (figs. 4-5) of normal form and structure, the masticatory lobes of the first pair well developed.

Third pair of thoracic legs (fig. 6) long and slender; tarsus slightly longer than the merus, three jointed, the first joint the longest; nail well developed.

Fourth and fifth pairs of thoracic legs (figs. 7-8) similar in form to the third pair but having the tarsus shorter and only two jointed; the tarsus of the fifth pair shorter than the tarsus of the fourth.

Sixth and seventh pairs of legs (fig. 9) peculiarly modified; ischial joint long and slender longer than the meral joint; tarsus short and robust, two jointed, second joint quite short; nail well developed and rather robust, having on its inside a strong toothed spine; on the lower distal corner of the first joint of the tarsus there is a long and strong slightly curved spine, which, with the dactylus gives the appearance of a chelate termination to the limbs.

Eighth thoracic legs (fig. 10) long and slender; merus longer than the same joint in the sixth and seventh legs and more slender; tarsus reduced to a single quite short joint, expanded distally, terminating in a short curved nail; the expanded distal end of the tarsal joint forms a sort of palmar edge on which the dactylus can inpinge and is armed with a row of six or seven short spines.

First five segments of the pleon roughly subequal in length; sixth segment about one and three quarters as long as the fifth.

Telson (fig. 13) shorter than the last segment of the pleon, one third as long again as broad at the base and almost three times as long as broad at the apex; latter squarely truncate, armed at each angle with a single spine between which is a row of small teeth, extending entirely across the whole apex of the telson, some of the teeth longer than the others; lateral margins of the telson armed proximally with four to seven short spines, the distal portion of the lateral margins unarmed. In the example figured, the left margin of the telson bears only four spines while the right margin bears seven.

Inner uropods one and three quarters as long as the telson, without spines on its inner margins; otocyst rather large.

Outer uropods twice as long as the telson.

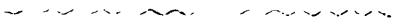
First, second and third pleopods in the male similar to those of the female; fourth pleopods (fig. 11) distinctly biramous, inner ramus quite small and armed with a few slender setae; outer ramus extending beyond the posterior end of the last segment of the pleon, consisting of a single joint terminated by a very long stout spiniform seta; fifth pleopods (fig. 12) elongate, reaching backwards as far as the outer ramus of the fourth pair, consisting of a single joint armed at the distal end with about four very long and slender setae.

Marsupial pouch of the female, composed of two pairs of lamellae

Locality. Brackish creek at Panvel, near Bombay, February, 1911 (*J Caunter*). About two hundred specimens up to 7 mm. in length.

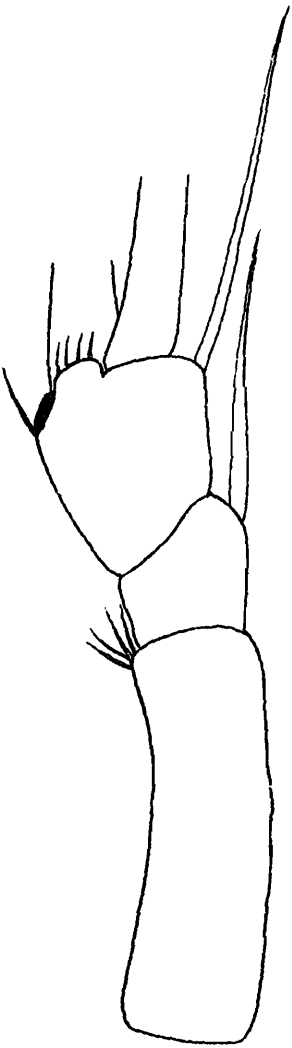
I dedicate the species to Dr. Annandale, the Superintendent of the Indian Museum, who has done so much to elucidate the brackish water fauna of India. I have not seen any specimens from any other locality in India

This species differs from all other members of the sub-family Mysinae in the form of the pleopods of the male and the elongate form of the fifth pleopods necessitates a modification of the definition of the sub-family in order that this species may be included. The pseudochelate appearance of the sixth and seventh thoracic limbs, and the peculiar form of the extremity of the eighth thoracic limbs are quite characteristic and unknown to me in any other species.

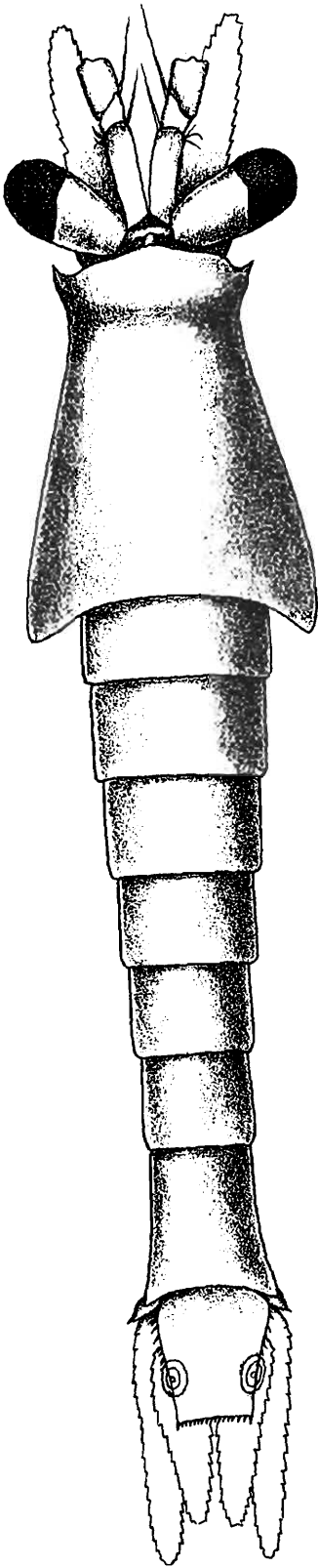


EXPLANATION OF PLATE XII.

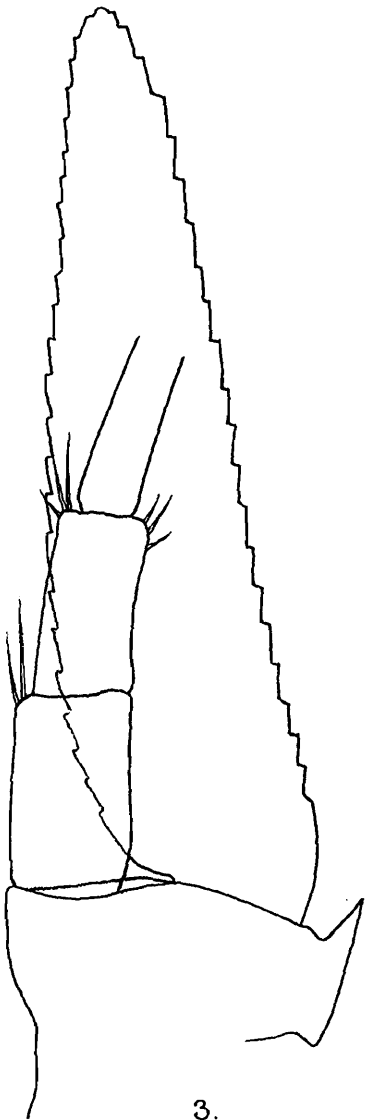
- FIG 1.—*Indomysis annandalei*, adult female.
,, 2.—,, ,, , antennular peduncle.
,, 3.—,, ,, , antennal scale.
,, 4.—,, ,, , endopod of the first thoracic limb.
,, 5.—,, ,, , endopod of the second thoracic limb.



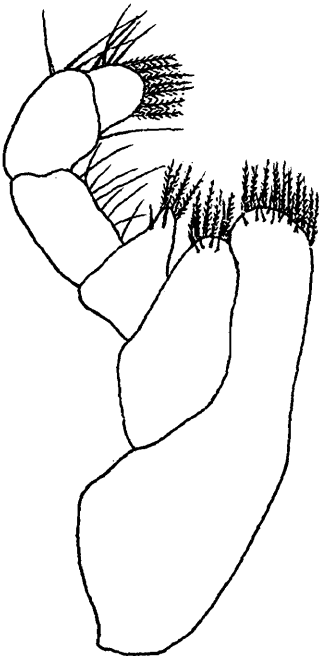
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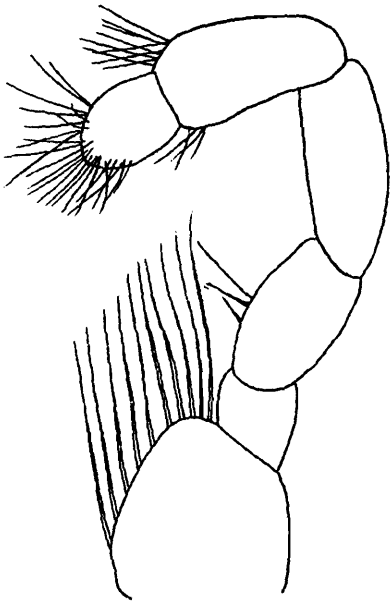
1.



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4.



5.

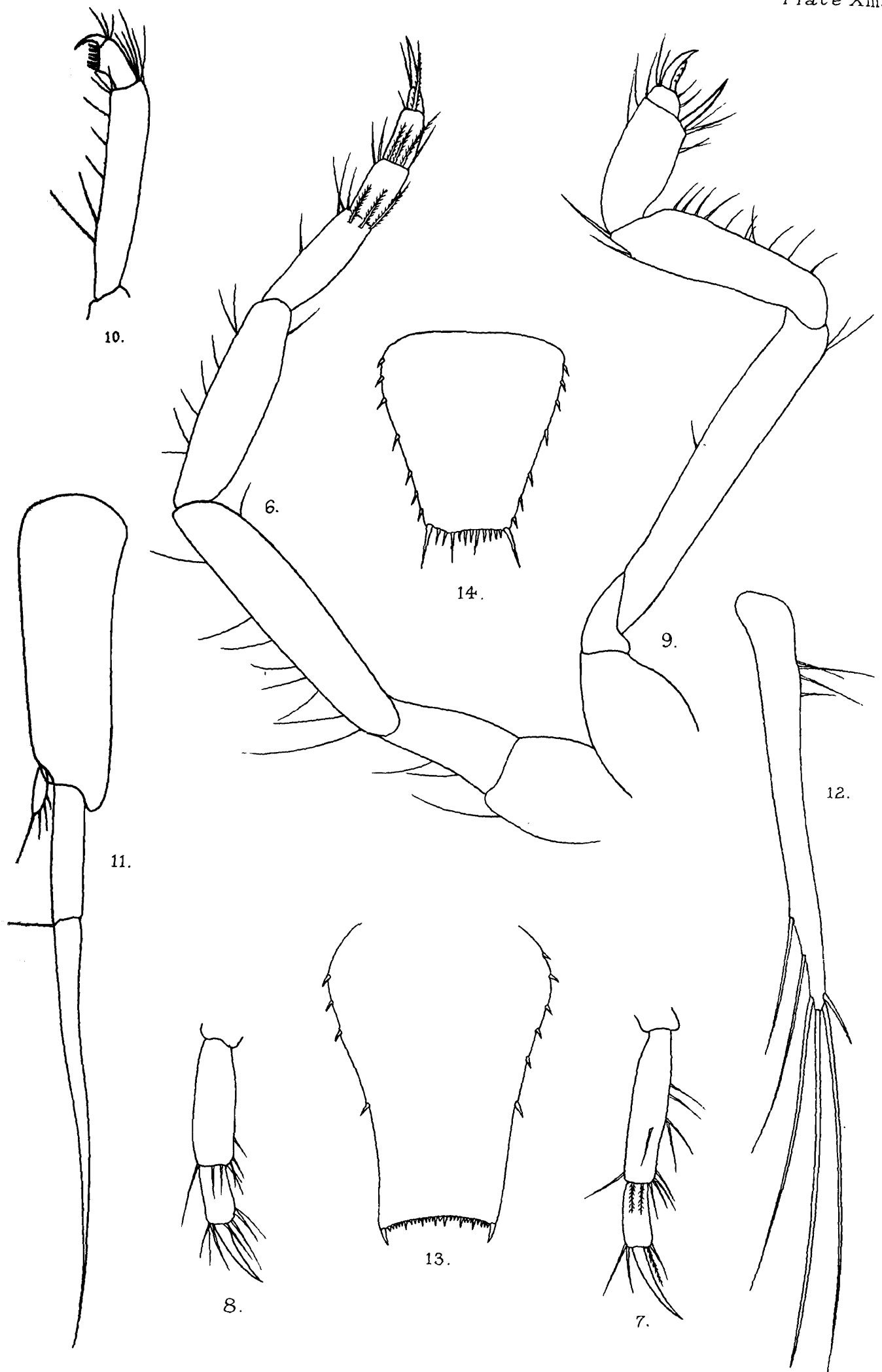
W.M.T. del.

A.C.Chowdhary, lith.

INDOMYSIS ANNANDALEI, gen. nov., sp. nov.

EXPLANATION OF PLATE XIII.

- FIG. 6.—*Indomysis annandalei*, endopod of the third thoracic limb.
- „ 7.— „ „ , tarsus of the fourth thoracic limb.
- „ 8.— „ „ , tarsus of the fifth thoracic limb.
- „ 9.— „ „ , endopod of the seventh thoracic limb.
- „ 10.— „ „ , tarsus of the eighth thoracic limb.
- „ 11.— „ „ , fourth pleopod of the male
- „ 12.— „ „ , fifth pleopod of the male.
- „ 13.— „ „ , telson.
- „ 14.—*Potamomysis assimilis*, telson.



W.M.T. del.

A.C. Chowdhary, lith.

Figs. 1-13. *INDOMYSIS ANNANDALEI*, gen. nov., sp. nov.

Fig. 14. *POTAMOMYSIS ASSIMILIS*, Tattersall.