

THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY,
INCLUDING
ZOOLOGY, BOTANY, AND GEOLOGY.



CONDUCTED BY

ALBERT C. L. G. GÜNTHER, M.A., M.D., PH.D., F.R.S.,
WILLIAM CARRUTHERS, PH.D., F.R.S., F.L.S., F.G.S.,
AND
WILLIAM FRANCIS, F.L.S.

BEING A CONTINUATION OF THE "ANNALS" COMBINED WITH
MESSRS. LOUDON AND CHARLESWORTH'S "MAGAZINE OF NATURAL HISTORY."

WITH TWO PLATES.

Illustrative of Mr. R. Bullen Newton's paper on Fossil Mollusca &c. from
Southern Nigeria and Prof. E.-L. Trouessart's on a new Species of *Semno-*
pithecus (*Semnopithecus poliocephalus*) from Tonkin.

LONDON:

TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

Sold by Simpkin, Marshall, Hamilton, Kent, & Co., Ld.; Baillière, Paris:
Hodges, Figgis, & Co., Dublin: and Asher, Berlin.

Literature dealing with Oriental species of Mochlonyx.

- LINNÉ. 1761. Fauna Suec. ed. ii. p. 467.
 MACQUART. 1850. Dipt. Exot. Suppl. 4, p. 239.
 RONDANI. 1873. Ann. Mus. Genova, vol. iv. p. 183.
 BIGOT. 1887. Bull. Zool. Soc. Fr. tom. xii. p. 59.
 GRÜNBERG. 1906. Zool. Anz. Bd. xxx. p. 88.
 ——. 1907. Die blutsaugenden Dipteren, p. 157.
 PICARD. 1908. Bull. Soc. Ent. Fr. p. 20.
 AUSTEN. 1909. Ann. & Mag. Nat. Hist. (8) iii. p. 292.
 BRUNETTI. 1910. Records of Ind. Mus. vol. iv. no. iv. p. 66.

My best thanks are due to Lt.-Col. Alcock, I.M.S., F.R.S., C.I.E., &c., and Mr. Austen, of the British Museum, for their great help in preparing this paper.

XXVI.—*Remarks on the Classification of the Culicidæ, with particular reference to the Constitution of the Genus Anopheles.* By A. ALCOCK, C.I.E., M.B., LL.D., F.R.S., Lt.-Colonel I.M.S. (retired).

BEFORE the great discovery of Ross attracted attention to mosquitoes no one questioned the propriety of grouping the Culicidæ in two subfamilies—namely, (1) Corethrinæ, in which the proboscis is short and soft and the veins of the wings are clothed with ordinary hairs; and (2) Culicinæ, in which the proboscis is long and stiff (and the mouth-parts in the female are formed for piercing) and the veins of the wings are clothed with scales.

Some recent writers, however, ignoring all the common features that distinguish these two groups from other Nematocerous Diptera, and exaggerating the importance of the functionally different mouth-parts of the female Culicinæ, have cut the Corethrinæ adrift, and have given the exclusive possession of the common family title to the Culicinæ. Such a proceeding seems to me to defeat the humane objects of a zoological classification, which are to draw tight and to knit together the morphological bonds that should unite diversely modified relatives. 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*.

Recent writers, again, having exalted the Culicinæ to the rank of a family, have been obliged to magnify the importance of the often trivial characters that distinguish its component species, and have finished by dividing this most homogeneous little group of insects into no less than ten "subfamilies." It is unfortunate that one of the most adventurous of these separatists is Mr. Theobald, who has otherwise done such good service by demonstrating the taxonomic value of the scales that clothe the several regions of the body in this family.

It seems pertinent to nature, and also convenient for purposes of identification of species, to adhere to the old grouping of the family Culicidæ into two subfamilies—Corethrinæ and Culicinæ—and to divide the Culicinæ into four sections, as follows:—

Section 1. MEGALORHINI = Megarhininæ of Theobald.

Section 2. EPIALURGI (*ἡπιάλος* = ague fever, and *ἔργον* = work), = Anophelinæ of Theobald.

Section 3. CULICALES = Culicinæ, Heptaphlebomyinæ, Dinoceratinæ, Aedinæ, and Uranotæniinæ of Theobald.

Section 4. METANOTOTRICHA = Trichoprosoponinæ, Dendromylinæ, and Limatinæ of Theobald; this group being entirely conventional.

Section 1. MEGALORHINI.

This section includes a small number of large mosquitoes in which the proboscis is bent downwards like a pothook and the body is clothed everywhere with flat strongly refracting scales. The second marginal cell of the wings is particularly small. The length of the palpi is variable in the female. The larva is large and has a breathing-tube. The species are found in the Neotropical, Ethiopian, Oriental, and Australian Regions.

Section 2. EPIALURGI.

This section includes the single genus *Anopheles*, with about 100 species, distributed in all the great zoogeographical regions.

The genus *Anopheles* may be characterized as follows:—

Head somewhat pyramidal, its predominant scales usually being loose-set and cuneiform or narrowly flabelliform ("upright forked scales" of Theobald). Palpi about as long

as the proboscis in both sexes, clubbed in the male. Proboscis of the usual form.

Scutum clothed either with hairs or with scales, which seldom form a dense coat. Scutellum with the free edge simply convex. Metanotum glabrous.

Abdomen clothed either with sparse hairs or with scales and hairs, the scales (when present) being often localized and inconspicuous, but sometimes conspicuous and fairly abundant.

Wings as a rule, to which, however, there are numerous exceptions, spotted.

In repose the body of the insect is, as a rule, inclined at an angle with the surface of rest.

The larva has no breathing-tube and is provided with two latero-dorsal series of fan-like tufts of scales on a varying number of the abdominal segments.

For the sake of convenience the species that compose the genus may be grouped in subgenera according to the following table; but the groups, though they can be defined with sufficient precision, grade into one another:—

Synopsis of Subgenera of Anopheles.

- A. The covering of the scutum consists mainly either of hairs or of narrow falcate scales. (In any doubtful case the palpi are slender, *i. e.* not shaggy with outstanding scales.) = 1.
- B. The covering of the scutum consists mainly of broadish elliptical, commonly recumbent scales = 2.
 - Abdomen either without scales or with some inconspicuous narrow scales on the genital lobes and terminal segment, or with a tuft of scales on the ventral surface of the penultimate segment = 3.
 - 1. Abdomen with an outstanding tuft of stiff and slender scales of extraordinary length on either side of every segment. = *Christya*.
 - Abdomen with broad and very conspicuous scales on several segments, some of the scales sometimes forming regular and outstanding tufts . . = *Arribalzagia*.
 - 3. Wings either not spotted at all or having a few dark spots formed merely by clumps of scales, or if "variegated" then there are not more than two distinctly formed colour-spots on the anterior edge. (In ambiguous cases, *e. g.* where a spot at the tip of the wing might be reckoned as anterior, then the palpi are shaggy.) = 4.
 - Wings usually much spotted in contrasted colours, their anterior edge barred or branded with numerous alternate dark and light spots or streaks. (In any ambiguous case the palpi are not shaggy.) Inconspicuous scales occasionally present on the terminal abdominal segment and genital lobes. . = *Myzomyia*.

4. { No scales on the abdomen (very rarely there may be a few scattered and inconspicuous scales on the genital lobes) = *Anopheles*.
 { Abdominal scales present, usually as a small outstanding tuft on the ventral surface of the penultimate segment, rarely as a uniform covering to the terminal segment = *Myzorhynchus*.
 2. { The predominant scales of the head are of the "upright forked" kind (cuneiform) = *Nyssorhynchus*.
 { The predominant scales of the head are not "upright forked" = *Chagasia*.

The species of *Myzomia* may be arranged in two inter-graduating series as follows:—

- a. The covering of the scutum consists mainly of hairs = *Myzomyia*.
 b. The covering of the scutum consists mainly of falcate scales = "*Pyrethorus*."

The species of *Nyssorhynchus* may be arranged in three fairly distinct series as follows:—

- a. Abdominal scales present on a few of the distal segments = *Nyssorhynchus*.
 b. Abdominal scales scattered on all the segments . . = "*Neocellia*."
 c. Abdominal scales fairly abundant on all the segments, and also in outstanding tufts which may be either lateral or ventral = "*Cellia*."

The following are not included in the foregoing synopsis or in the sequel:—

1. *Aldrichia error*, Theobald.—One specimen, from India, in the British Museum. As it stands it consists of the head, thorax, wings, and appendages of a *Myzomyia rossii*, Giles, to which the scaly dark-coloured abdomen of some other species of mosquito has been attached.

2. *Bironella gracilis*, Theobald.—Described from three males.

The subgenus *Anopheles* shades into *Myzorhynchus* through *Anopheles separatus*, Leicester, *Anopheles vestitipennis*, Dyar and Knab, and *Anopheles grabhamii*, Theobald; it also shades into *Myzomyia* through *Anopheles gigas*, Giles, and *Anopheles wellcomei*, Theobald, and perhaps into *Pyrethorus* through *Anopheles atratus*, Skuse.

The subgenus *Christya* is essentially similar to *Myzorhynchus*.

The subgenus *Arribalzagia* is also essentially similar to *Myzorhynchus*, and shades into *Anopheles* through *Anopheles grabhamii*, Theobald, and *Anopheles vestitipennis*, Dyar and Knab.

The two series which constitute the subgenus *Myzomyia* show the transition from such forms as *Anopheles gigas*, Giles, and *Anopheles wellcomei*, Theobald, to *Nyssorhynchus*. The species known as "*Pyretophorus*" *costalis* is about as nearly intermediate between *Myzomyia* and *Nyssorhynchus*, in all respects, as can be imagined; and the significance of its position is enhanced by the fact that it is a variable species, some individuals leaning more towards *Myzomyia*, and others more towards *Nyssorhynchus*.

All these considerations justify the conclusion that the so-called "genera" of the proposed "subfamily" Anophelinae cannot be separately focussed as distinct generic conceptions, but must all be merged in one generalization.

a. Subgenus ANOPHELES, Meigen.

(Including *Anopheles* and *Stethomyia* and *Cyclolepidopteron grabhamii* of Theobald's Monograph, and *Neostethopheles* and *Patagiamyia* of James.)

There may be some narrow scales on the pronotum and front of the scutum (or even, in one species, in the field of the scutum), but the vestiture of the scutum consists mainly of hairs, which are sparse. There may, very rarely indeed, be a few narrow and inconspicuous scales on the genital lobes, but the vestiture of the abdomen also consists of sparse hairs. The wings are either unspotted or have a few dark spots formed by clumps of scales, or they may have a few colour spots, in which case not more than two of these—distinctly formed—are present on the anterior costal edge. The wing-scales are usually, but not always, long and narrow. The palpi are usually slender.

The subgenus is represented in all the great zoogeographical regions, though it only just enters the Ethiopian region.

b. Subgenus MYZORHYNCHUS, Blanchard.

(Including *Myzorhynchus* and *Lophoscelomyia* of Theobald's Monograph.)

There are no true scales in the field of the scutum, though there may be some on its front edge and on the pronotum. Abdominal scales are restricted to a single outstanding tuft on the ventral surface of the penultimate segment, except in

one species (= "*Lophoscelomyia*"), in which the terminal segment and genital lobes are covered with narrow scales. Wings very dark, though not without spots; their front edge never has more than two spots (exclusive of a spot which may be present in the fringe at the tip of the wing), which are usually small. Wing-scales usually rather broadly elliptical. Palpi always shaggy with scales.

One species is Palæartic and one is Australian; the others are Oriental and Ethiopian.

c. Subgenus *CHRISTYA*, Theobald.

Differs from *Myzorhynchus* chiefly in having an outstanding wisp of stiff, slender, extremely long scales on either side of every segment of the abdomen. In addition to these peculiar lateral scales there are some ordinary narrow scales on the genital lobes and last segment of the abdomen.

One species, found in Eastern Africa.

d. Subgenus *ARRIBALZAGIA*, Theobald.

(Including *Arribalzagia*, *Manguinhosia*, *Kerteszia*, and part of *Cyclolepidipteron* of Theobald's Monograph.)

There may be some narrow scales on the pronotum and front of the scutum, but the vestiture of the scutum consists mainly of hairs. Conspicuous broad scales are present (scattered) on some or all of the segments of the abdomen, and often stand out as prominent tufts or broken bands. The wings, though spotted, have a dark cast, owing to predominance of blackish scales, and in several of the species there are large black spots on the front edge, the colour of which, though mainly due to broad scales, is partly due to staining of the wing-membrane itself. Wing-scales broad. Palpi shaggy with scales.

Restricted to the Neotropical region.

e. Subgenus *MYZOMYIA*, Blanchard.

(Including *Myzomyia*, *Feltinella*, *Neomyzomyia*, and *Pyretophorus* of Theobald's Monograph, and *Nyssomyzomyia* of James.)

There may be some distinct scales on the pronotum and adjacent part of the scutum, but the main vestiture of the scutum consists of hairs or of narrow scales. There may be a few narrow scales on the genital lobes, or even—few, scattered, and inconspicuous—on the terminal segment of the abdomen, but the main vestiture of the abdomen consists of hairs. The wings are almost always profusely spotted, and

the anterior costa is barred with numerous alternate dark and light spots or streaks. Wing-scales almost always narrow. Palpi usually slender.

Chiefly Ethiopian and Oriental, but also represented in the Palæartic and perhaps in the Neotropical regions.

a. In the ordinary *Myzomyia* series the vestiture of the scutum consists mainly of hairs or hair-like scales.

b. In the "*Pyretophorus*" series the vestiture of the scutum consists mainly of narrow falcate scales.

f. Subgenus *NYSSORHYNCHUS*, Blanchard.

(Including *Nyssorhynchus*, *Neocellia*, and *Cellia* of Theobald's Monograph, *Calvertina* of Ludlow, and *Christophersia* of James.)

The scutum is fairly well covered with short, more or less recumbent, elliptical scales of considerable breadth, which cannot be confused with hairs. Narrow scales are also almost always present on more or less of the abdomen. The wings, though they have a dark cast, are much speckled, and there are always numerous spots on the costa. Wing-scales rather broad. Palpi shaggy. It is very common for the legs to be profusely speckled or finely barred with white, and for some of the tarsal segments of the hind legs to be white.

Ethiopian, Oriental, Australian, and Neotropical; one species enters the confines of the Palæartic region.

a. In the ordinary *Nyssorhynchus* series there are no scales on the anterior abdominal segments and no outstanding tufts of scales.

b. In the "*Neocellia*" series there are scales on the dorsal surface of all the abdominal segments (though they are often very sparse on the anterior segments) and no outstanding tufts of scales.

c. In the "*Cellia*" series all the abdominal segments are fairly well clothed with scales, and in addition there are outstanding tufts of scales, which may be either lateral or ventral.

g. Subgenus *CHAGASIA*, Cruz.

(Including *Chagasia*, Cruz, and *Myzorhynchella*, Theobald.)

The scutum is covered with distinct more or less recumbent scales of considerable breadth. The vestiture of the abdomen consists of hairs, but there may be some narrow and inconspicuous scales on the genital lobes. The wings have a dark cast, though they may be spotted; the wing-scales are of considerable breadth. The palpi are shaggy with scales and

the legs are either profusely barred or have some of the tarsal segments white. Some of the antennal segments may have more or less conspicuous whorls of scales. On the head broad, somewhat procumbent scales, which are not "forked," predominate, and it is chiefly this character that separates the subgenus from *Nyssorhynchus*.

Restricted to the Neotropical region.

Section 3. CULICALES.

The species of this section are distinguished from *Epialurgi* by having the posterior edge of the scutellum trilobed, from *Megalorhini* by not having the proboscis bent like a pothook, and from *Metanototricha* by not having any scales or bristles on the metanotum.

The scaly covering of the head shows much diversity. The scutum, scutellum, and abdomen are always thickly covered with scales. The relative length of the palpi is very variable; all gradations can be found, in both sexes, between palpi which are long and palpi which are short.

The wings in the majority of species are not spotted; but there are numerous species in which they are speckled, not a few in which they are mottled, and there are some in which they are spotted like those of some of the species of *Anopheles* (subgenus) or beautifully dappled like those of a *Myzomyia* or *Nyssorhynchus*.

The larva has a breathing-tube of varying length.

Some recent systematists have broken the *Culicales* in pieces like a potter's vessel, and have multiplied genera by methods which resemble those of Procrustes. Taking these proposed genera as they stand, they can be segregated into seven groups, principally according to the characters of the scales of the head, scutellum, and wings—characters the import of which Mr. Theobald was the first to notice.

a. *Genera of the Culex type*.—Three kinds of scales are found on the head, namely loose-set, falcate, and cuneiform scales on the crown and flat overlapping squames on the cheeks. The scales of the scutellum are usually falcate, but squames may be present or may even predominate. The wing-scales are usually long and narrow, but may be elliptical or narrowly spathulate. In a few species the wings are spotted by clumps of scales or are even spotted in contrasted colours. The palpi of the female are very short, those of the male are almost always longer than the proboscis.

The genus *Heptaphlebomyia*, Theobald, which has been proposed as the representative of a distinct subfamily, seems to me to be merely a *Culex* with a few inconstant scales on the so-called seventh longitudinal vein—a vein that exists in many species of mosquitoes.

The genus *Dinocerites*, Theobald, which has also been proposed as a representative of a distinct subfamily, also seems to me to be a slightly modified *Culex*. The antennæ are of extraordinary length in both sexes, and the insect is said to have the habit of breeding in the brackish water that collects in the burrows of crabs. This habit may possibly explain the length of the antennæ, which, like the elongated antennæ of certain insects that inhabit dark caves, and the exceedingly long streamers of certain fishes that live in the sunless depths of the ocean, may be an adaptation to conditions where eyesight is of no avail. That *Dinocerites* also has well-developed eyes does not invalidate this suggestion, since the insect is not said to spend the whole of its existence in dark crab-burrows.

b. *Genera of the Stegomyia type*.—Though some loose cuneiform scales are usually to be found on the nape, and though a few localized falcate scales may exist on the head and scutellum, the predominant—sometimes the only—scales of both these regions are flat overlapping squames that impart a very smooth appearance. The wings are never spotted, and their scales are slender and stiff-looking. The palpi, as a rule, are long in the male and quite short in the female, but they may be decidedly shorter than the proboscis in the male (*e. g.* in *Hylecatomyia*), or as much as two-thirds the length of the proboscis in the female (*e. g.* in *Brevirhynchus* and in a species of *Leicesteria*), or quite short in both sexes (*e. g.* in *Harpagomyia*).

c. *Genera of the Aedes type*.—Though there may be some localized cuneiform and falcate scales on the head, the predominant scales are flat overlapping squames, as in *Stegomyia*. The scales of the scutellum are entirely falcate. The palpi may be quite short in both sexes (*e. g.* in *Aedes*), or short in the female and about two-thirds the length of the proboscis in the male (*e. g.* in *Mimomyia*), or short in the female and as long as the proboscis in the male (*e. g.* in *Pseudoskusea*).

d. *Genera of the Uranotania type*.—The predominant—sometimes the only—scales of the head and scutellum are

flat overlapping squames. The scales of the scutum are often broadly elliptical. As a rule some of the wing-scales are broad triangular plates. The second marginal cell of the wing is very small. Palpi very short in both sexes. Small or minute insects, commonly with beautiful blue markings.

e. *Genera of the Psorophora type.*—The predominant scales of head, scutum, and scutellum are elliptical squames, which may be either flat or curved and are often rather distant. In those forms where both sexes are known the palpi are short in the female and long in the male.

f. *Genera of the Mucidus type.*—The head is shaggy with upstanding scales of several kinds, among which either coarse falcate scales or broad cuneiform or flabelliform scales are conspicuous. The wings are speckled or mottled, or they may be spotted—in field, costa, and fringe—like those of a *Nyssorhynchus*. The legs also are, as a rule, much banded or brindled. The wing-scales are either broadly foliaceous or broadly subtriangular. The palpi may be quite short in both sexes, or nearly as long as the proboscis in both sexes, or long in the male and short in the female. The mosquitoes of this group seem to link the *Culicales* with the *Epialurgi*. The following forms belong to this group:—*Mucidus*, Theobald (= *Lepidoplastys*, Coquillett); *Mansonia*, Blanchard (= *Pneumaculex*, Dyar); *Mansonioides*, Theobald; *Etorilepidomyia*, Theobald; *Orthopodomomyia*, Theobald; *Newsteadina*, Theobald; *Aedimya*, Theobald; *Finlaya*, Theobald.

g. *Annectant forms between Culex and Stegomyia*—in which the squames of the cheeks, which in *Culex* are not visible in a dorsal view, extend more or less on to the crown of the head, and do not lie flat as in *Stegomyia*, though they overlap, and in which the scales of the scutellum are either exclusively falcate as in *Culex* or are combined with overlapping squames. *Acartomyia*, Theobald, may be taken as a standard, and all the seven “genera”—each of which rests on a single species—that can be collected into this group might be united.

Section 4. METANOTOTRICHA.

The species included in this small section resemble *Culicales*, particularly those of the *Stegomyia* and *Aedes* groups, but are distinguished by having a few inconspicuous bristles or scales (or both bristles and scales) on the metanotum.

The head and scutellum, and usually the scutum also, are covered with flat squames, which are often refulgent or iridescent. The palpi may be short in both sexes or short in the female only.

The species are most abundant in the Neotropical region, but also occur in the Ethiopian and Oriental regions and in the outskirts of the Australian region.

In conclusion, I have to thank Messrs. Austen and Edwards, of the British Museum staff, for the liberty they have given me to examine the collections in their charge and for the many ways in which they have obliged me when I required assistance.

XXVII.—*New Rodents from S. America.*

By OLDFIELD THOMAS.

(Published by permission of the Trustees of the British Museum.)

Comys superans, sp. n.

A very large species with grey belly.

Size considerably larger than in any hitherto described *Comys*.

Fur soft and woolly, but not very long; hairs of back about 8–9 mm. in length. Ground-colour above greyish rufous, the hairs dark greyish with russet tips; flanks clearer russet. Under surface pale grey (grey no. 3), the hairs slaty basally, whitish terminally. Ears rather short, brown. Hands with a narrow darker line down the metacarpus, sides and digits whitish. Feet broad, pale brown above; fifth hind toe reaching to the end of the first phalanx of the fourth; scutellation of upper surface of feet unusually distinct, the skin of both metatarsus and digits spotted with brown. Tail long, slender, finely scaled (15 rings to the cm.), thinly haired; brown above and below, or indistinctly mottled with whitish.

Skull with the large brain-case and shortened anterior zygomatic plate characteristic of *Comys*. Upper outline bowed. Ridges not heavily developed and not showing any indication of postorbital projections. Palatal foramina fairly large and open. Parapterygoid fossæ rather broad.

Molars large and heavy, the anterior end of the series slightly curved outwards.