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THE PHILIPPINE MOSQUITOES.

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In April 1901, under the authority of the Medical Department, U. S. Army, there was begun in Manila, a research having for its original object some anatomical study of mosquitoes, especially those connected with the transmission of malaria. However, as the mosquitoes of the Philippine Islands were entirely unknown it became at once evident that systematic study of these insects was necessary before any anatomical problem could be undertaken, and the research then became purely entomological, only the correlation of the appearance of certain species with the incidence of these diseases being left of the work in preventive medicine. The anatomical work has since, for the most part, been worked out by others.

The collections are made by the Surgeons or Hospital Corps men, and, with a statement of the number of cases of malaria, dengue and filariasis present during the time of collection, mailed to me. While many of the collections are received in excellent condition, the identification of the specimens is often much hindered, or rendered impossible by carelessness in collecting, in preparing for shipment, and by accidents incident to transportation. On this account some species must wait for additional collections, often a matter of months, before accurate determination or description is possible.

The following forms have been determined from these collections and most of them previously reported, but it seems of possible interest that a complete list to date should be published, and this with the descriptions of some new forms are given below.

LIST OF MOSQUITOES REPORTED.

Anophelinæ. Theobald.
- *Anopheles* Meigen.
  - *formosus* Ludlow.
- *Myzomyia* Blanchard.
  - *funesta* Giles.
  - *indefinita* Ludlow.
  - *rossii* Giles.
  - *thorntonii* Ludlow.

Stethomyia Theobald.
pallida Ludlow.
Myzorhynchus Blanchard.
barbirostris van der Wulp.
pseudobarbirostris Ludlow.
sinensis Wiedemann.
vanus Walker.
Nyssorhynchus Blanchard.
flava Ludlow.
(*Cellia flava* Ludlow.)
fuliginosus Giles.
philippinensis Ludlow.
stephensi (?) Liston.
theobaldi Giles.
Calvertina Ludlow.
(*calvertia* Ludlow.)
lineatus Ludlow.[1]

MEGARHININÆ. Theobald.
Toxorhynchites Theobald.
argenteotarsis Ludlow.
lewaldii Ludlow.
(*Megarrhinus lewaldii* Ludlow.)

CULICINÆ. Theobald.
Mucidus Theobald.
mucidus Karsch.
Quasistegomyia Theobald.
gardnerii Ludlow.
Kingia (?) Theobald.
gregoryi Ludlow.
Desvoidya Blanchard.
fusca Theobald.
joloënsis Banks.
(*D. fusca* v. *joloënsis* Ludlow.)
obturbans Walker.
Stegomyia Theobald.
amesii Ludlow.
fasciata Fabricius (*calopus* Meigen.)
" v. *mosquito* Arribalzaga.
" *luciencis* Theobald.
nigritia Ludlow.
quasinigritia n. sp. Ludlow.
samarensis Ludlow.
(*S. scutellaris* v. *Samarensis* Ludlow.)
scutellaris Walker.
Ludlowia Theobald.
chamberlainii Ludlow.
minima Ludlow.
Scutomyia Theobald.
nivea Ludlow.
Duttonia Theobald.
alboannulis Ludlow.
Popea Ludlow.
lutea Ludlow.
Culiciomyia Theobald.
annulata Theobald.
inornata Theobald.
Neomacleaya Theobald.
indica Theobald.
Danielsea Theobald.
pagei Ludlow.
Reedomyia Ludlow.
alboscutella Theobald.
nivoscutella Theobald.
pampangensis Ludlow.
Pardomyia Theobald.
quadripuncta Ludlow.
Leucomyia Theobald.
argentea Ludlow.
(*Taeniorhynchus argenteus* Ludlow.)
gelidus v. *cuneatus* Theobald.
Culex Linnæus.
alis Theobald.
annulioris Theobald.
aureopunctis Ludlow.
cæcus Theobald.
concolor Desvoidy.
fatigans Weidemann.
fragilis Ludlow.
hirsutum Theobald.
impellens Walker.
ludlowii Blanchard.
(*annulifera* Ludlow.
microannulatus Theobald.)
sitiens Walker.
tigripes Grand & Charm.
Taeniorhynchus Arribalzaga.
ager Giles.

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[1] This was at first referred tentatively to *Chagasia* Theob. but the abdominal scales seemed to throw it out of this genus.

aureosqumatus Ludlow.
(*T. Pagei* Ludlow).
lineatopennis Ludlow.
tenax Theobald.
whitmoreii Giles.
sp.?
Chrysoconops Goeldi.
aurites (?) Theobald.
brevicellulus (?) Theobald.
conopas Frauenfeld.
Mansonia Blanchard.
annulipes Walker.
uniformis Theobald.
Mansonoides Theobald.
annulifera Theobald.
septemguttata Theobald.
Etoerleptiomyia Theobald.
(*O'Reillia* Ludlow.)
luzonensis Ludlow.
Finlaya Theobald.
poicilia Theobald.
Oculeomyia Theobald.
fulleri Ludlow.

AËDINÆ. Theobald.
Aedeomia Theobald.
squamipenna Arribalzaga.
Skusea Theobald.
diurna Theobald.
mediofasciata Theobald.
(*Pseudoskusea nigritarsis* Ludlow.)
funera Theobald.

URANOTAENIINÆ. Mitchell.
Uranotaenia Arribalzaga.
ceruleocephala Theobald.
lateralis Banks.
(*U. caeruleocephala* v. *lateralis* Ludlow.)
powelli Ludlow.
pygmea Theobald.
testacea Theobald.
Pseudouranotaenia Theobald.
parangensis Ludlow.
triangulata Ludlow.

HARPAGOMYINÆ. Ludlow.
Harpogomyia Meijere.
caeruleovitatta Ludlow.
Hodgesia Theobald.
niveocaputis sp. nov.

DENDROMYINÆ. Lutz.
Dendromyia Theobald.
(*Heizmannia* Ludlow.)
scintillans Ludlow.

A few words as to this list. So far as may be such errors as have occurred previously in my papers have been eliminated and corrected, this accounts for a couple of synonomies; variety *samarensis* mihi of *Stegomyia scutellaris* Walker I have elevated to a species, not because I am greatly in sympathy with the creation of species on slight differences, but merely to protect "the fruits of labor"; *Stegomyia persistans* Banks has been omitted because so far as I can judge it is merely a well marked *fasciata* (*calopus*) he being undoubtedly misled by imperfect descriptions, and by not having studied this species in America. The differences are destroyed by the slightest rubbing of the thorax, and this marking occurs in the Americas as well as the Philippines. Mr. Banks has been unfortunate in his collections if this be the only form he has found, the less well marked (or rubbed) form as well as v. *mosquito*, and v. *luciencis* are fairly common in the specimens taken by myself in the Philippines and in the collections sent by the Surgeons in the last ten years.

Danielsea pagei sp. nov.

Female. Head very dark, covered with dark flat scales except a narrow border of bright ochraceous slender curved scales around the eyes, a small spot of the same at the nape, and bright ochraceous forked scales also at the nape; antennæ dark brown, verticels and pubescence brown; palpi short, very dark; proboscis brown, very dark, somewhat swollen at the apex; clypeus brown; eyes dark brown.

Thorax—prothoracic lobes brown with bright ochraceous curved scales and dark brown bristles; mesonotum brown, covered with dark brown and bright ochraceous slender curved scales, the latter occurring as a very slender line on each side of the "bare space" extending cephalad the length of the mesonotum, a broken irregular or curved line exterior to this, and a more or less complete lateral line from the wing joint to the nape, much widened on the cephalad portion; scutellum dark, covered with bright ochraceous slender curved scales except in the middle of each lobe where the scales are dark brown and broader; pleura brown with at least three bunches of white scales; metanotum dark brown.

Abdomen with dark brown scales, with rather large white lateral spots on the six proximal segments; venter with heavy basal white bands.

Legs—coxæ and trochanters testaceous, the former with white scales; femora dark scaled dorsally, lighter at the bases, and ventral aspect white almost to the apex, more markedly so on the mid and hind legs, otherwise the legs are dark scaled; ungues all uniserrate.

Wings brown, clear, heavily scaled with brown rather large clavate scales; 1st submarginal longer and about the same width as 2nd posterior, its base interior, and its stem about 2-3 the length of the cell. The stem of the 2nd posterior cell markedly longer than its cell; root of 3rd longitudinal vein meets the mid cross-vein and is of about the same length, the posterior cross-vein about the same length as the mid, and distant twice its own length. Halteres with light stem and fuscous knob.

Length 3.5 with proboscis 4.5 mm.

Habitat. Fort Pikit, Mindanao, P. I. Taken. Nov. 6 A.M.

Described from seven specimens sent in collections by Major Henry Page, M. C., U. S. A.

Kingia gregoryi sp. nov.

Female. Head black covered with very dark flat round-ended scales, a brilliant white median triangular spot extending from the vertex caudad about half the length of the head, apex caudad, and equally brilliant lateral spots, a few dark bristles over the eyes: antennæ very dark, verticels dark and probably pubescence also, but it appears white in some lights, basal joint very dark; palpi brown scaled at the base and a very heavy brilliant white tip, probably extending over more than one joint; proboscis broken, what is left is brown scaled, eyes very dark; clypeus testaceous.

Thorax dark brown covered with dark brown broad curved scales and roundish-flat white ones; prothoracic lobes heavily covered with silver-white scales and a few brown bristles; mesonotum partly denuded but showing very dark broad curved scales over the general surface, a heavy spot of brilliant white round-ended flat

scales at the laterocephalic angles, and the remains of a white median line of the same brilliant scales. This line is perfectly shown as a short line on the cephalad portion and on a spot midway of its length, the rest of the median portion of the mesonotum denuded; scutellum has a very large mid lobe, with brilliant white round-ended flat scales, and brown flat scales on the lateral lobes; pleura is very dark, and almost covered with brilliant white scales; metanotum dark brown.

Abdomen covered dorsally with dark brown scales and large lateral brilliant white spots, more basal than apical, but not strictly basal, on all but the eighth segment which is brown; venter with all creamy but brilliant scales.

Legs—coxæ all with brilliant white scales, trochanters with brown apical bands; femora a little lighter at the base and ventrally, otherwise the legs are entirely dark, almost black, with a tendency to dark blue iridescence;u ngues simple and equal.

Wings clear, brown scaled; cells long; the first sub-marginal longer and about the same width as the second posterior, more than twice as long as its petiole, its base interior to that of the second posterior, the latter also somewhat longer than its petiole; root of the third longitudinal is slightly interior to and about the same length as the mid cross-vein; the posterior cross-vein about the same length as the mid, and twice its own length interior; the scales resemble somewhat small *Taeniorhynchus* scales. Halteres have the apical half of the stem and knob dark, the base of the stem white.

Length, 4.5 mm. without proboscis.

Habitat. Ludlow Barracks, Parang, Mindanao, P. I. Taken. January.

Described from one moderately good specimen, its most serious defect being the broken proboscis. I am not sure it is a Kingia for there are *no* curved scales on the head, and the scales of the lateral abdominal spots are not outstanding, but it agrees with the description for this genus better than any other and I have therefor referred it here. The specimen was sent in a collection made by Capt. J. C. Gregory, M. C., U. S. A.

Stegomia quasinigritia sp. nov.

Male. Head black scaled except a very narrow median line of light scales, a white median spot at the point of the vertex, minute submedian white spots at the ocular margin, and a few white lateral scales: a few forked scales on the occiput; antennæ banded, verticels dark, first joint testaceous, enlarged, basal joint dark with numerous white, close-lying scales, especially on the median aspect; palpi long accuminate, dark brown with four large white spots, at the bases of the four distal joints; proboscis black, not so long as the palpi by nearly the length of their terminal joint; eyes dark; clypeus dark.

Thorax dark brown, prothoracic lobes with dark brown and white scales and brown bristles; mesonotum with a short median white line of slender curved scales at the cephalad margin, a few white scales near the wing joint, and also near the "bare space"; scutellum dark, the mid-lobe with dark brown flat scales, the lateral lobes white and the scales extremely long; pleura brown with a few white scales; metanotum a rich reddish brown.

Abdomen with dark brown scales and basal ochraceous bands, well marked on the 2nd, 3rd, 4th, and 5th segments, lacking on the distal segments; greyish lateral spots on some of the segments; venter heavily light banded on the 2nd, 3rd, 4th, and 5th segments, the rest mostly dark.

Legs—coxæ and trochanters testaceous with a few dark scales; femora dark except the very base, a line on the ventral aspect, and the apex which are white; tibiæ all dark; first tarsal basally white banded, broadly so on the hind legs, second and third minutely white at their bases on the fore and mid legs, broadly so on the hind legs, fourth and fifth brown on the fore legs, the fourth with a very small white basal spot on the mid legs, and mostly white on the hind legs, the fifth entirely white on the hind legs, femoral and tibial spines white; ungues unequal the larger uniserrate on mid and fore legs, simple on the hind legs.

Wings clear, brown scaled; 1st sub-marginal cell longer and slightly narrower than the 2nd posterior cell, twice as long as its petiole, its base slightly interior to that of the 2nd posterior; root of the 3rd longitudinal vein a little interior to the mid cross-vein and about the same length; posterior cross-vein one-third longer than the mid cross-vein and a little more than twice its own length distant; halteres with dark knob and light stem.

Length, 4 mm. and 2 for Proboscis—6 mm.

Habitat. Turucan, Mindanao, P. I. Taken. Nov.

Described from one specimen sent by L. F. Seith, Sgt. 1st Cl. H. C. It lies close to several of the dark *Stegomyiæ*, but seems to have enough differences to warrant describing as a new species.

Hodgesia niveocaputis n. sp.

Female. Head almost black, covered with white and very dark brown scales, the white scales forming a large median spot extending well around to the sides, where it almost joins a lateral white spot, and caudad, nearly to the margin of the occiput, the extent being partly governed by the direction of the light, brown scales and bristles on the occiput: antennæ brown, verticels, and pubescence brown, the hairs of the latter longer than in the usual forms, basal joint dark: proboscis brown, a little swollen at the apex, and a well marked bulb-like expansion at the base just anterior to the clypeus (dorsal aspect); eyes dark; clypeus testaceous.

Thorax shiny black; prothoracic lobes densely covered with white flat scales (as described for the type); mesonotum sparsely covered with small extremely slender dark brown curved scales; some brown bristles, near the scutellum and at the wing joint; scutellum with small flat dark brown scales and brown bristles; pleura with three white spots, one very near the wing joint; metanotum very dark. Abdomen covered with dark brown scales, and five lateral white spots, the latter occurring on the 1st, 2nd, 3rd, 5th, and 6th segments, those on the 3rd and 5th segments being much the more pronounced; venter practically white scaled, but brown in some lights.

Legs; coxæ and trochanters pale, with some white scales; femora very light lemonish white at the bases and ventrally, otherwise brown except in the hind legs, where they are light lemonish white both dorsally and ventrally, only the

apex being brown; otherwise the legs are brown (in some lights fawn color); ungues simple and equal.

Wings clear, brown scaled; cells long; 1st submarginal longer but no narrower than the 2nd posterior, its base slightly interior; root of the third longitudinal vein and the mid cross-vein meet nearly in a line, and they are of about equal length; the posterior cross-vein equal to the mid and a little more than its own length distant; halteres have the bases of the stem light and the apex and knob dark.

Length about 2.75 mm. with proboscis, 1.75 without.

Habitat. Fort Pikit, Malabong, Mindanao, P. I. Taken in November.

Described from five specimens sent through Major Henry Page, M. C., U. S. A. One specimen of this genus was received a couple of years ago, but was not in good enough condition to determine and I referred it provisionally to *sanguinæ* Theobald. It is, however, almost surely the same as those just described.

Harpagomyia caeruleovittata sp. nov.

Female. Head black with a large brilliant blue white median spot, followed by greyish or light golden brown and white lateral scales, all the caudad half of the head covered with bronzy dark brown scales; antennæ missing, basal joint very dark; palpi thread-like yellowish, very short; proboscis short, much swollen on the apical fourth, with the two long recurved bristles described for the type, mostly brown scaled, but light at the base; eyes dark; clypeus long and appears to be formed of three sclerites, or to have additional lateral sclerites, heavily covered with a rather long fine white fuzzy tomentum.

Thorax shiny black; prothoracic lobes covered densely with brilliant white scales mesonotum with very long slender curved bronzy dark brown scales except the cephalad lateral angles where there are round light golden brown flat scales, and a median line, extending back about two thirds the length of the mesonotum, of round blue or bluish white scales; scutellum with mid lobe white scaled and the lateral lobes brown scaled; pleura largely covered with brilliant white flat roundish scales; metanotum very dark brown.

Abdomen brown scaled with large apical brilliant white scales on all the segments but the 3rd, apical hairs light; venter with broad white apical bands.

Legs; coxæ and trochanters light testaceous; femora and tibiæ with ventral light line, otherwise the legs are entirely brown scaled though the more distal joints often appear golden. Ungues all missing.

Wings clear, brown scaled; the cells long, first submarginal longer and about the same width as the 2nd posterior, more than twice as long as its petiole, its base well interior to that of the 2nd post.; root of the 3rd longitudinal vein and mid cross-vein of about equal length and meet in an almost straight line; posterior cross-vein about equal to the others and more than its length distant. Halteres, stem light, knob dark.

Length. 2.75 mm. with proboscis.

Habitat. Ludlow Barracks, Mindanao, P. I. Taken. July.

Described from one specimen. The three species, Meijere's, Theobald's and this lie very close together, the color of the iridescent scales on the head and mesothorax being a possibly misleading characteristic, but the scutellum in this species is white scaled only on the mid-lobe, the scales on the lateral lobes being not only brown but smaller than those on the midlobe, and while this is a small difference it may serve to separate it from the others.

As I have only one specimen it has not seemed wise to dissect it, but the mouth parts as described by Meijere[1] and the peculiarities of the clypeus as noted above seem to me to be of more than generic value. The insect of course comes under Lutz' group *Culicimorphæ*, for though the proboscis is long, the lack of development of the maxillae and mandibles into the long processes found in what Lutz calls the *Euculicidæ* prevents the insect from using it as a piercing instrument. It, however, seems quite distinct in its peculiarities, and as I prefer to keep all the forms with Culicid wing venation under the *Culicidæ* the only way seems to be to create a new sub-family. I therefore propose to call this sub-family *Harpagomyinæ* n. sub-fam. with *Harpagomyia splendens* Meijere as the type for genus and species.

Duttonia alboannulis sp. nov.

Female. Head dark, with flat white scales forming a median line, a broad stripe of ochraceous and brown flat scales, a small brown spot and lateral white scales, a line of curved scales brown around the eyes, and verysmall curved scales among the forked brown and ochraceous scales on the occiput; brown bristles near the eyes; antennæ dark brown, verticels and pubescence brown, basal joint very dark, covered with brilliant white close-lying scales; palpi dark brown with brilliant white tips; proboscis dark brown; eyes dark brown; clypeus dark brown with white long spatulate scales.

Thorax almost black; prothoracic lobes with brilliant white flat scales and brown bristles; mesonotum entirely covered with slender dark brown curved scales except a few light scales at the nape, and a small spot of broader white and ochraceous curved scales just cephalad of the wing joint; scutelum dark, with brilliant broad white flat scales; pleura dark with several spots of white scales; metanotum dark brown.

Abdomen dark and covered with dark scales, large basal lateral white spots, and a few apical white scales on some segments, forming a very narrow band on the seventh segment.

Legs; coxæ and trochanters testaceous with brown and white scales; femora dark dorsally, ventrally light, and the hind femora are basally light for nearly one

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[1] J. C. H. Meijere. Drei myrmekophile Diptern aus Java. Tidg. v. Entom., Vol. LII (1909).

half their length, white at the apex, more marked on the hind legs; tibiæ all dark; first tarsals have a small basal white spot, larger on the hind legs and the remainder of the forelegs is dark; second tarsals on mid and hind legs with a basal white spot, the remainder of the mid-legs dark; third and fourth joints broadly white banded in the hind legs, the last joint pure white; fore and mid ungues uniserrate.

Wings clear, brown scaled; the cells long, 1st submarginal longer and slightly narrower than the 2nd posterior, double the length of its petiole, its base inside that of the 2nd posterior; root of the 3rd longitudinal vein and the mid cross-vein about equal in length and meet, posterior cross-vein a little longer, and more than twice its length distant; halteres have the stem light and knob dark.

Length 6.5 mm. with proboscis, 5.75 mm. without the proboscis.

Habitat. Mindanao, P. I. Taken. Nov.–Jan.

In general coloring and marking this suggests some of the *Stegomyia*, but besides the differences in cephalic scales, those on the scutellum are broader, and round-ended like those found in *Kingia*.

For only a few of these insects have the life-habits been worked out in any country, and in the Philippines only *M. Ludlowii* has been carefully studied. Banks found this Anopheline breeding indifferently in fresh or brackish water, and lately some interesting data as to *M. indefinita* have been received. It has been bred from larvæ taken from muddy puddles, quite at variance with our usual idea as to Anopheline habits and the latest collections have the memorandum, "from larvæ taken from an open drain, the water comes from bath houses and is of course more or less soapy." So far as I know this is the first instance reported of Anophelines breeding in dirty drain water.