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MOSQUITO LITERATURE

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III. NOTES ON PERUVIAN MOSQUITOES AND MOSQUITO LITERATURE

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In a recent paper Dr. H. G. Dyar and the writer have indicated the mosquitoes so far known from the Andean and coast regions of Peru.¹ Newstead and Thomas have reported a limited number of species from Iquitos, in the forest region of eastern Peru.² Professor C. T. Brues has submitted for my examination a paper containing descriptions of two supposedly new species of Peruvian mosquitoes, published at Lima in 1907. The paper in question is rare and has until now escaped the notice of systematists. Its authors are M. O. Tamayo and C. A. Garcia and it deals with Lake Huacachina and other smaller nearby lakes which are reputed to have therapeutic qualities.³ A part of the report is taken up with the natural history of the lake, and in that connection two species of mosquitoes are figured and described as new. On page xxxv of the extract "*Anopheles peruvianus* Tamayo" is proposed, and on page xxxvii "*Culex raymondii* Tamayo." The descriptions, although lengthy are unsatisfactory. Large, but rude, figures, on five plates, illustrate both sexes of the imagos, the larvae and pupae of the two species.

The writer is of the opinion that both these proposed new species are synonyms of well known, widely distributed species. This opinion is supported by specimens from Peru.

Anopheles peruvianus is without doubt identical with *A. pseudopunctipennis* Theobald in spite of discrepancies in the description and still more in the figures. From the description and figure of the female the following essential characters may be abstracted: the head has on the vertex a patch of white twisted scales which project in a tuft between the eyes. The palpi are black scaled, with narrow pale rings at the articulations and the last joint yellowish white. Thorax with the median section whitish (gray) and with three characteristic lines. Legs dark, with narrow pale rings at the bases of the tarsal joints, which are entirely covered with very dark scales. Wings with the costa black on the basal two-thirds, followed by a yellowish white spot which originates at the tip of the subcostal vein; this is again followed by black, beyond which the extreme tip is again whitish scaled. The subcostal and first veins show three black spots, the first of

¹ New mosquitoes from Peru. *Insector Insectiæ Menstruus*, 1914, ii, No. 4, pp. 58-62.

² The mosquitoes of the Amazon region. *Ann. Trop. Med. & Parasitol.*, Liverpool, 1910, iv, pp. 141-150, pl. 11.

³ Las aguas de Huacachina. Informe presentado a la Sociedad Geográfica de Lima, 1907, 4, 63 pp., 12 pls. (Extract from *Memoria de la Municipalidad de Lima*, 1906.)

which is at the basal third, the other two delimit white spots which accompany those on the costa. Two other less conspicuous black spots occur on the third vein and upper branch of the fifth. The one on the third vein lies exactly beneath the costal white spot; the one on the upper branch of the fifth vein is interrupted at the basal cross-vein.

It will be seen that the spots on the wing-veins, as far as indicated, correspond with those of *Anopheles pseudopunctipennis*. Black spots existing in the latter species on the second, fourth and sixth veins, as well as small spots near the base of the fifth vein and the tip of its lower branch are not indicated. Yet it seems certain that these discrepancies are due to omissions or oversight, or, still more likely, damaged condition of the specimens, rather than to any existing differences.

This opinion is substantiated by a specimen declared to be identical with *Anopheles peruvianus* and presented to Professor Brues by Dr. Gastiaturú. As we learn from a footnote on page xxxvii of the treatise of Tamayo and García, Gastiaturú had also considered the species as new and had proposed to describe it as *Anopheles multimaculatis* but in his thesis had suppressed this name. The specimen given to Professor Brues is the one that formed the basis of Gastiaturú's *A. multimaculatis*, later declared to be identical with *A. peruvianus*. It is a male with the spots on the wing-veins somewhat obliterated in the posterior region by loss of scales. However, by careful scrutiny the distribution of black and white scales can be traced and is found to agree perfectly with *pseudopunctipennis*. As to the pale rings stated to exist at the bases of the tarsal joints in *A. peruvianus*, these are merely due to reflection of light and not to any difference in the color of the scales at those points. The ornamentation of the palpi as described for the female *A. peruvianus* corresponds with typical *pseudopunctipennis*.

Anopheles peruvianus is based on specimens from Lake Huacachina. This lake is near Ica, south of Lima and not far from the coast, at an altitude of about 1,200 feet. Tamayo states that *A. peruvianus* is common in different parts of the coast region and that it occurs also in the *montaña*, that is, in the forest region on the eastern slopes of the Andes. The following localities are specifically mentioned. West of the continental divide, Huacachina, San Pedro de Lloc and Lima and its environs; on the eastern slopes of the Andes, Chanchamayo. It should be explained that this last locality is not strictly within the humid forest region, but rather in a partly open transition zone. Gastiaturú's specimen probably came from the vicinity of Lima. Before me are two other specimens of *A. pseudopunctipennis* collected by Townsend in the region about Lima, one at San Bartolomé, altitude about 4,900 feet, the other in Verrugas Canyon, at about 5,500 feet altitude.

When we consider the distribution of *Anopheles pseudopunctipennis*, its occurrence in the Andean and coast regions of Peru appears in no wise

remarkable. It is more especially the common form of *Anopheles* of the semi-arid American tropics. It occurs from California and south-western Texas southward to northern and north-central Argentina, but within this territory its distribution is governed by local conditions. Collections from Mexico and Central America show that it occurs in the more arid portions and is absent from the humid forest zones. It is common in Panama. In South America it has so far been reported from only a few widely separated localities. The United States National Museum has received specimens through Dr. J. H. Egbert from Santa Marta on the coast of Colombia, a distinctly arid locality. Recently the species has been found in Trinidad (near Port of Spain) by Professor F. W. Ulrich. The Peruvian localities have been already indicated. Finally, the species has been reported from northern Argentina (Provinces of Jujuy, Salta, Tucumán and Santiago del Estero), again a semi-arid region.

Turning now to the second mosquito described by Tamayo and Garcia, *Culex raymondii*, its identification must be purely inferential. Neither the description nor the figures offer details that could lead to an exact diagnosis. The figure of the larva shows by the somewhat elongate breathing tube with several hair tufts, together with the large antennæ with large, outwardly situated tuft, that the insect belongs to *Culex* in the restricted sense; but beyond this the crude figure does not permit one to go. The female is described as having a dark proboscis and palpi, black erect forked scales on the occiput, the recumbent scales yellowish white. Mesonotum without ornamentation. Abdomen dorsally blackish, the segments with basal white bands; venter pale. Legs dark, the tarsi with whitish basal bands, most distinct on the first joint. Claws simple. Wings unspotted, the scales uniformly dark colored. Total length (including proboscis) 8.5 mm. The larvæ are said to occur in unused wells in the vicinity of Lake Huacachina.

There is every probability that *Culex raymondii* is nothing but the widely distributed, semi-domestic *Culex quinquefasciatus* (= *fatigans*). The description fits it very well, as far as it goes, with the exception of the ringed tarsi. In the figures of the two sexes the tarsi show no rings, and it is safe to assume that they are as little in evidence in this form as in the *Anopheles peruvianus* already discussed. *Culex raymondii* is said to occur in Lima and its outskirts, and this again points to our widely spread species of domestic habits, *Culex quinquefasciatus*, as do the larval habits above indicated.

Following is an annotated list of the mosquitoes now known to occur in Peru. Professor C. H. T. Townsend, until recently entomologist to the Peruvian government, has most liberally placed at my disposal his notes on mosquitoes and mosquito conditions in Peru and I have made free use of them. The Peruvian mosquitoes may be grouped under four headings, as follows:

1. Cosmopolitan species of the tropical and subtropical zones, occurring only in association with man and independent of moisture conditions.

Culex quinquefasciatus Say (*C. fatigans* Auct.)

Reported by Tamayo and Garcia (as *Culex raymondii*) from Lima and vicinity and Huacachina. The following is abstracted from Townsend's notes: "This species has been taken by me from Ancon at sea level to Chosica at 2,800 feet and about the upper limits of the foothill zone. It is the common mosquito of the whole region bordering the coast below an elevation of about 3,000 feet. I found it breeding in the street wells of Ancon, and it is the common mosquito of Lima and vicinity. It is not as abundant at Ancon as *Aedes calopus*, and seems to be overridden by the latter along the extreme coast line. It is the only mosquito I have observed at Chosica. It is comparatively scarce in individuals both in Lima and in Chosica. A recent epidemic of dengue in Barranco, a suburb of Lima, occurring during the cooler season of 1913, was probably spread by this mosquito."

Aedes calopus Meigen (*Stegomyia fasciata* Auct.)

The following is from Townsend's notes: "This species extends all the way down the west coast of South America to the Antofagasta region of northern Chile, and doubtless at times much farther to the south. I have found this species at Piura, which is well inland but only two hundred feet or less above the sea. I have found it abundant at Ancon, a beach resort an hour north of Lima by train, where it breeds in the street wells. These wells are largely open, without pumps, or only imperfectly covered, allowing ingress and egress of the mosquitoes. Far within the rain forest region to the east of the Andes, along the navigable upper stretches of the rivers where commerce has introduced it, this species also occurs, notably in the Iquitos region." The species has been reported from Iquitos also by Newstead and Thomas.

2. Coast species breeding in salt or brackish water.

Aedes epinolus Dyar and Knab

Closely related to *Aedes taeniorhynchus* and *niger* and perhaps best considered a subspecies. Townsend's observations are as follows: "This is the Peruvian salt-marsh mosquito and conforms in general habits to the typical form in other parts of America. It was found breeding in large numbers during the first week in February (1914) in salt ponds immediately back of the beach at Ventanillas, an uninhabited point about nine miles south of Ancon and about half way between the latter and Callao. The ponds in question vary from small to large and stretch along just inside the beach line for some miles, being formed by inroads of the sea during unusually rough weather. This species reached Ancon in great swarms during the last week or so of January, 1914, and the municipality called upon the writer to make an investigation of the plague. On February 3 the adults were still to be found in some numbers in Ancon, though rapidly disappearing, while it was determined that the species was not breeding there. On February 4 the ponds at Ventanillas were visited. Small ponds showed numerous large nearly full-grown larvae, without either small larvae or pupae. Large ponds showed no signs of larvae. Rims of cast pupal skins just above the waterline, stuck to the hard gravel, fringed the ponds, having been left to dry as the water evaporated to a lower level. The adults were present in swarms and very blood-thirsty. The only blood supply present in this immediate region of the coast is that furnished by the seafoal that continually haunt the coast line. On January 11, 1914, the sea was unusually

heavy along this region of the coast. It evidently overrode the high natural break-water of smooth pebbles that forms the beach at Ventanillas, thus producing a great breeding area for this mosquito. As a result immense swarms migrated from these ponds a week or two later, and these reached Ancon in force to the great dismay of the inhabitants."

3. Species of the dry regions of the mountains and coast.

Anopheles pseudopunctipennis Theobald

(Synonyms: *franciscanus* McCracken, *tucumanus* Lahille, *argentinus* Brèthes, *peruvianus* Tamayo, *multimaculatis* Gastaburú)

The known distribution has been already indicated in the previous discussion. Townsend thinks that in Peru the species probably ranges considerably above 8,000 feet. Its occurrence must be more or less local, depending, as it does, upon the presence of suitable breeding places, such as isolated pools in stream-beds, water-holes, abandoned wells, etc.

Anopheles species, near *maculipes* Theobald

A single female specimen in rather poor condition presented to Dr. Brues by Dr. Gastiaburú, along with the specimen of *A. pseudopunctipennis* already discussed. The locality is uncertain, but most probably not remote from Lima. The specimen resembles *A. maculipes* and related species in the coloration characters and in the shape of the wing-scales, but differs in numerous details. It probably represents an undescribed species, but it seems inadvisable to found a species in a difficult group on a single poor specimen of uncertain origin.

Phalangomyia debilis Dyar and Knab

Matucana (Brues).

4. Species of the humid forest region east of the Andes.

Anopheles boliviensis Theobald

(Synonyms: *lutzii* Theobald, not Cruz; *cruzi* Dyar and Knab)

Described twice by Theobald, first from southern Brazil and then from Songo, Bolivia. The latter locality is presumably on the eastern side of the Andes and within the forest region. This species breeds almost exclusively in water held by the leaves of epiphytic bromeliads and therefore is a typical forest inhabitant. Townsend says: "I took this species in the *montaña* of the province of Jaen, in northern Peru, from the Rio Charape at about 4,500 feet to the lower slopes of Huascaray ridge at about 7,000 to 7,500 feet. It was abundant at both localities and an active biter. Both localities are forested, the Huascaray slopes in patches, the Rio Charape more thickly. Both afford tree holes and epiphytes as breeding places, but do not furnish other standing water, the streams being comparatively swift."

Anopheles tarsimaculatus Goeldi (*albimanus* Newstead and Thomas)

Reported by Newstead and Thomas as the common *Anopheles* at Iquitos. This is a geographic race or subspecies of *A. albimanus*, distinguishable by the difference in the palpal banding. It is the chief malaria transmitter in the Amazon region and throughout most of the Brazil-Guiana forest zone.

Janthinosoma posticata Wiedemann (*musica* Newstead and Thomas)

Reported from Iquitos by Newstead and Thomas. A very widely distributed species east of the Andes.

Aedes leucomelas Lutz

Townsend took a single female of this species at Hacienda Charape on the Rio Tabaconas, about 3,500 to 4,000 feet, Sept. 18, 1911.

Mansonia titillans Walker

Iquitos (Newstead and Thomas). Widely distributed through the American moist tropics, but owing to the peculiar larval habits local in occurrence. The larvae inhabit permanent waters and live attached to the roots of certain aquatic plants from which they obtain the needed air. The female is an aggressive blood-sucker and when abundant a serious pest.

Mansonia pseudotitillans Theobald

A single specimen from Iquitos doubtfully so identified by Newstead and Thomas.

Culex chrysothorax Newstead and Thomas

(*Neomelaniconion chrysothorax* Newstead and Thomas, not *Melanoconion chrysothorax* Peryassú)

Described from Iquitos, Peru, and Manáos; Brazil. The specific name is pre-occupied by the species of Peryassú, as the two species are congeneric and belong in *Culex*. I refrain from proposing a new name, as the species may be identical with others already described.

Límatos durhami Theobald

Reported from Iquitos by Newstead and Thomas.

Sabethes species

Townsend has the following note on a species of this genus, the members of which are strictly forest insects. "I took two specimens on February 12, 1910, at Yahuar Mayo on the Rio Inambari, about 1,700 feet, in the southern *montaña* of Peru. The species is of a brilliant metallic coloring, with feathered legs. It was determined by Dr. A. Lutz as this genus, with the note: 'Very much like a species I brought from the Amazons region.'"