



PROCEEDINGS
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THE NEW GUINEA SPECIES OF *CULEX* (*CULICIO-
MYIA*), WITH DESCRIPTIONS OF TWO NEW
SPECIES*

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The members of this subgenus have unicolorous scaling of the tarsi, proboscis and scutum, and a lower mesepimeral bristle is present. They are usually of about medium size. The main characteristic of the subgenus is the presence of a row of long, translucent, modified scales extending ventrolaterally from the apical portion of the long segment of the male palpus. Usually also there are some broad flat scales on the head vertex, no scales on the pleurites, and a spiny crest on the male style. One species, *C. pullus*, a ground-pool breeder, is one of the most commonly encountered species of *Culex* in New Guinea, and both this species and *C. fragilis* are widely distributed. Neither is of any importance as pests so far as known.

Only five species are definitely known at present from New Guinea. An Indian species, *C. pallidothorax*, was listed from New Guinea by Bonne-Webster (1938) but without any description of specimens and the records are possibly attributable to *C. pullus*.

***Culex* (*Culiciomyia*) *nailoni* new species**

MALE.—*Head*: Proboscis slightly longer than fore femur, dark scaled. Palpus longer than proboscis by length of apical segment, dark scaled, with long bristles on apical two segments; a row of at least five long, curved, pale, modified scales arising from ventrolateral surface toward apex of long segment. Antenna with dense long hair whorls. Vertex with a small median triangular area of narrow pale brown scales not reaching eyes; remainder of vertex, border of eyes and lateral surface of head with broad pale scales; a patch of brownish upright forked scales posteriorly. *Thorax*: Scutum clothed with fine brownish scales; two narrow bare submedian lines extending almost to antescutellar space.

*From the 19th Medical General Laboratory, U. S. Army. Contribution No. 10 from the Entomology-Mammology Department.

Scutellum with narrow brownish scales on each lobe. Posterior pronotum with fine, hairlike scales on upper third. Pleurites pale yellowish without scales or dark markings; mesepimeron with a single long, median, lower bristle. Wings with the lateral scales of veins 2 to 4 long, linear, those at the tips of the forked cells slightly broadened; first forked cell about 1.5 times length of its stem, arising slightly closer to base of wing than second; posterior cross vein closer to base of wing than mid by a little more than its own length. Length of wing 2 mm. Inner surface of the femora with a narrow line of pale scales, the legs otherwise uniformly dark; fore and mid tarsal claws subequal, the larger ones toothed. *Abdomen*: Tergites uniformly clothed with dark scales. *Hypopygium* (fig. 1): Coxite about twice as long as mid width, unscaled; inner border with a row of closely set strong setae. Subapical lobe (SA) prominent, apically with a heavy rod and five flattened pointed spines; at base a stout rod on ventral side and a slender flattened spine on dorsal side. Apicóventral lobe (AV) slender, clothed with small hairs, the apex with an elongate somewhat flattened rod. Style (S) a little more than half as long as coxite, strongly curved, slightly swollen basally and constricted medially, tapered to a pointed reflex tip; crest not spinose; a small patch of fine hairs on inner margin subbasally, outer margin and crest with several short hairs; appendage subapical, blunt. Paraproct moderately sclerotized apically, without the usual tuft of hairs and row of blunt spines on crest, having instead five or six long, closely appressed, pointed spines, at the base of which on the inner margin is a slender, weak extension bearing a few minute hairs; lateral arm short, slightly curved. Phallosome long and slender; lateral plate elongate, rounded at tip, simple except for a small sub-basal ventral tooth; basal process narrow, curved, pointed, nearly half as long as lateral plate. Ninth tergite with shoulders slightly rounded, well separated, each bearing a few weak setae.

FEMALE.—Similar to male except as follows: Antenna slightly longer than proboscis, with five or six short bristles arising from the base of each flagellar segment, pale hairs over entire surface; palpi not quite one-fourth length of proboscis; first fork cell a little more than twice the length of its stem; lateral scales toward tips of veins 2 to 4 distinctly broadened.

LARVA (fig. 6)—*Head*: Broader than long, very lightly pigmented. Antenna about three-fifths as long as head, with numerous heavy spines on basal three-fourths; a narrow darkly pigmented ring basally; tuft about two-thirds from base; subapical bristles arising well before apex. Preclypeal spines slender, about a third the length of antenna. Head hairs arising posterior to base of antenna, plumose, A with 6 to 8 branches, B and C double; *d* fine, single, anterior and internal of B; *e* bifid, *f* three-branched. *Abdomen*: Segment I with the upper lateral hair 3-branched, the lower single; lateral hair of II 3-branched, III single or with 2 or 3 branches, IV double, V 2-3 branched, VI and VII single (the hairs on I and II much stouter and darker than on other segments). Comb of segment VIII a triangular patch of 27 to 37 long, narrow scales, apically rounded and fringed; pentad hair 1 with five or six plumose branches, 2 and 4 single, 3 with five plumose branches, 5 with three or four plumose branches. Siphon rather long and narrow,

the apex about half as wide as base, index about 5:1, the surface covered with rows of fine spicules; a prominent acus present; pecten with 18 to 25 teeth on basal two-fifths, each tooth with a few stout denticles on one side; four or five pairs of branched hairs on apical half of siphon, the first three pairs longer than the diameter of the siphon at the point where they arise. Anal segment encircled by saddle; surface of saddle covered with rows of small spicules, the posterior border with short spines; lateral hair single or double; dorsal subcaudal hair single or double, ventral one single; anal gills equal, slender, pointed, about one and a half times as long as saddle.

Holotype.—Male (459), reared from larva taken from crab hole in rain forest, elevation 250 feet, Hollandia, Netherlands New Guinea, 22 December 1944 (W. T. Nailon, Collector). *Allotype*.—Female (459), same data. *Paratypes*.—Six males, 13 females, 12 larvae, and 3 larval exuviae (459), same data as above. Holotype, allotype, and paratypes deposited in the United States National Museum; other paratypes to be deposited in the Museum of the Division of Economic Entomology, Council for Scientific and Industrial Research, Canberra, A.C.T., Australia.

On external characters, this species is separable from other *Culiciomyia* of New Guinea by its small size combined with a lack of pleural and abdominal markings. The peculiar development of the paraproct (which is reminiscent of some species of *Lophoceraomyia*) appears to be unique in the subgenus, while the absence of a spiny crest on the style is unusual. *C. bailyi* Barraud, of India, which is similar in the latter respect, differs in having a banded abdomen, a dark stripe across the upper part of the pleura and in several genitalic characters.

Only one collection of this species was made at Hollandia, though it is probably more elusive than rare. *Aedes* (*Pseudoskusea*) *lunulatus* King and Hoogstraal and *Aedes* (*Aedes*) sp. were taken from the same crab hole at the same time. The species is named for Sergeant William T. Nailon, the collector.

Culex (*Culiciomyia*) *fuscicinctus* new species

MALE.—Similar in size and general appearance to *C. nailoni* except as follows: narrow scales of head yellowish, covering almost all of vertex; flat scales reduced, limited to a short line laterally on eye margin; no scales on posterior pronotum (three bristles on posterior border); pleurites pale with two brownish stripes, one beginning on the posterior pronotum and continuing across the upper part of the sternopleuron and mesepimeron, the other beginning on propleuron and extending across onto the lower portion of the mesepimeron; propleuron with about six bristles; femora largely pale beneath for entire length; lateral scales of veins 2 to 4 linear, slightly broadened towards tips of 2.1 and 2.2; first fork cell about one and a third times as long as its stem, its base about level with that of the second; abdominal tergites with small basal lateral spots of pale scales. Wing length 2 mm. *Hypopygium* (fig. 2): Coxite about a third longer than its midwidth; apicoventral lobe prominent, with a closely set pair of stout rods, one heavily sclerotized, arising from its apex, a group of about 15 flattened setae below these; subapical lobe inapparent but in its usual position a stout blunt rod, a lanceolate leaflet and a flattened

spine, a patch of uniform setae external to these. Style slightly more than half as long as coxite, the base greatly enlarged and finely pilose, the apical portion tapered to an upturned pointed tip; crest with six or seven retrorse spiny platelets; two papillated hairs on apical third; appendage slightly subapical, long, bluntly rounded. Paraproct sclerotized, the crown with a row of blunt spines and a tuft of hairs; lateral arm short and blunt. Phallosome (damaged in mount) apparently simple in structure without teeth. Ninth tergite with slightly rounded lobes bearing several small setae.

HOLOTYPE.—Male, collected by the writers in a light trap operated in the laboratory clearing, elevation 250 feet, Hollandia, Netherlands New Guinea, 4 April 1945. Female and larva unknown. The holotype is deposited in the United States National Museum.

On the combination of genitalic characters (enlarged base of style, two apical spines and patch of flattened setae on coxite, and short lateral arm of the paraproct) this species is very distinct among the described species. It is separable otherwise from other New Guinea species by the small amount of flat scales on the eye margins, presence of basal lateral spots on the abdominal tergites, two brownish stripes across pleurites, and, except for *C. nailoni*, by its small size.

Culex (Culiciomyia) papuensis (Taylor)

Melanoconion papuensis Taylor, 1914. Trans. Ent. Soc. London, p. 201.
(Type female, Papua, Lakekamu Gold Field.)

Culex (Culiciomyia) papuensis Taylor. Edwards, 1924, Bull. Ent. Res. 14:397 (in part).

This species has been confused with *C. fragilis* as the females of the two forms are similar in appearance. The male genitalia and the larvae of the two, however, are found to be very distinct. An examination by the senior author in 1944 of the type female in the University of Sydney (through the kindness of Mr. F. W. Taylor) showed it to be the same as females reared by ourselves and others from larvae having an inflated airtube. An illustration of the male genitalia of *C. papuensis* by Brug (Bull. Ent. Res., 17:82, 1926) is not recognizable either as this species or *C. fragilis* (only four spines are shown on the subapical lobe and the paraproct lacks a lateral arm).

The following description of the male hypopygium and larva, not previously described, is based on reared material from Hollandia, Netherlands New Guinea, and Dobodura, Papua.

Hypopygium (fig. 3): Coxite about twice as long as mid width; apico-ventral lobe (AV) large, bearing a cluster of about a dozen curved modified bristles; subapical lobe (SA) prominent, with two groups of structures, the first consisting of a stout spine and two longer, apically curved and flattened rods, the second group a pair of stout spines one of which is flattened leaflike; a dense patch of long fine hairs at side of lobe near base of style. Style (S) about three fourths as long as coxite, curved and upturned at tip, the crest with a row of from four to seven erect spines of varying sizes; a pair of fine hairs on each side near crest; appendage small, blunt, subapical. Paraproct heavily sclero-

tized, the crown basally bearing a row of about eight apically curved, broadened spines and an overlying row of shorter pointed spines; apically with a dense tuft of hairs; lateral arm (LA) long, slender and curved. Lateral plate of phallosome slender apically, widened basally, with from 4 to 7 small teeth on one side and a much larger tooth sub-basally. Ninth tergite with shoulders slightly rounded, separated, each bearing about 7 setae.

LARVA (fig. 7).—*Head*: Pale, two-thirds as long as wide. Antenna about two-thirds as long as head, with slender spinules on basal two-thirds; tuft arising near middle, with about 12 plumose branches not reaching apex of shaft; shaft narrower beyond tuft, without subapical bristles. Preclypeal spines one-sixth length of antenna, moderately stout, usually with one to four small lateral spinules; a slender clypeal hair arising near base of spines. Head hair A arising just posterior to base of antenna, with six to nine plumose branches; B and C both long, arising behind and interior of A, both usually 3-branched, one or the other sometimes 2-branched, plumose; *d* arising about level with A and interior of C, single, lightly plumose; *e* and *f* with two or three branches non-plumose. *Abdomen*: Lateral hairs on segment I double or triple, on segment II usually double or single, on III to V usually single, sometimes double. Segment VIII with lateral comb a triangular patch of from 35 to 45 elongate, apically rounded scales, each fringed from base to apex; pentad hair 1 with five or six plumose branches; hairs 2 and 4 single, non-plumose; hair 3 with seven or eight plumose branches; hair 5 double, lightly plumose. Siphon index 4:1, bulbous sub-basally, the distal half narrowed to apex, which is one-third width of base; acus present; 3 to 5 pecten teeth on basal two-fifths, each with elongate denticles along basal half of one side; four pairs of latero-ventral hair tufts, 4 to 6 branched, beyond pecten. Anal segment completely encircled by saddle, short spinose rows posteriorly on saddle; saddle hair single to triple; subcaudal hair tufts single; ventral brush of four or five pairs of tufts arising from a grid; anal gills slightly swollen basally, the apical half tapered to a blunt tip; dorsal pair about three times length of saddle (sometimes shorter), ventral pair about five-sixths as long as dorsal pair.

On external characters, the adults of this species are most apt to be confused with *C. fragilis* among the New Guinea fauna. They are somewhat larger (wing about 4.0 mm. compared with 3.5 mm.) and darker in color, there is no trace of apical lateral pale spots on the abdominal tergites, the wing scales on veins 2 to 4 are distinctly narrower, and there are fewer flat scales on head vertex. The swollen airtube of the larva is unusual, although in this respect it resembles somewhat *C. phalidothorax* Theobald of India and runs to this species in D. J. Lee's "Atlas of the Mosquito Larvae of the Australasian Region. Tribes-Megarhinini and Culicini" (Aust. Mil. Forces, 1944, North Melbourne). The adults of *pallidothorax* differ in having a banded abdomen and in several characters of the male genitalia.

This species was much less common at Hollandia than *Culex fragilis*, although the larvae were sometimes very numerous in certain collections of water. Twice they were taken in large numbers from the putrid water in hollowed sago trunks used by natives for preparing their sago dough; in these instances no other species was found with them.

Other collections were from wooden kegs, tin food containers, tree-holes, and drums, with *Aedes (Finlaya) notoscriptus* (Skuse), *Culex (Lutzia) halifaxi* (Theob.), *C. (Neoculex) brevipalpis* (Giles), *C. (Culex) pullus* Theob., and *Uranotaenia argyrotarsis* variety. The breeding places were shaded or semi-shaded, and the water was either clear or filled with leaves. In two collections at Dobodura, eastern New Guinea, (one collection in a steel drum filled with rocks and water, the other in pools in sagging canvas) numerous larvae were taken, associated with *C. fragilis*, *Aedes (Stegomyia) scutellaris* (Walk.), *A. (F.) notoscriptus*, *A. (F.) novalbitarsis* K. & H., *Tripteroides bimaculipes* (Theob.), and *Uranotaenia* sp. At Hollandia, adult specimens were taken in the light trap at the edge of rain forest only five times between January and June, and no females were taken attempting to bite.

Culex (Culiciomyia) fragilis Ludlow, 1903

Culex fragilis Ludlow, 1903. Jl. N. Y. Ent. Soc. 11:142. (Type male and female, Oras, Samar, Philippine Is.)

Culex (Culiciomyia) papuensis of Lee, 1944 (nee Taylor), Atlas of Mosq. Larv. of Aust. Region, Aust. Mil. Forces, p. 96. (Illustration of larval characters).

A recent comparison by the writers of adult and larval material of *C. fragilis* from the Philippines has indicated that New Guinea specimens are the same species. The larva (fig. 8) is distinguishable from related species by the long tubular gills, multiple branching of head hairs B and C, and three pairs of hair tufts on a rather short siphon. The adults have a wide line of flat scales along the eye margin, the wing scales on the forked veins are distinctly broadened and the abdominal tergites have faint yellowish spots on the apical corners. In the male (fig. 4) the styde has a long crest of blunt spines, subapical lobe of coxite with a leaflet and about seven rods and spines, paraproct with a basal arm shorter and stouter than in *C. pullus*, the crown with a row of about seven long blunt spines followed by an equal number of sharp ones; lateral plate of phallosome with four to six medial teeth and a larger one sub-basally. Differences between this species and *C. papuensis* are mentioned under the latter.

This was one of the most common *Culex* breeding at Hollandia. Of 62 larval collection records about half are from temporary and semi-permanent ground pools, especially with stagnant, more or less foul or algae-filled water, in all degrees of shade, and the others are from larger tree and log holes and artificial containers, especially with rotting vegetation and usually shaded. Associated larvae from ground pools were *Culex (Lutzia) halifaxi*, *C. (Culicio.) pullus*, and *Uranotaenia argyrotarsis* var; from tree and log holes, coconut husks and artificial containers were *Aedes (Finlaya) notoscriptus* and *aureostriatus*, *A. (Stegomyia) scutellaris*, *Armigeres (Armigeres) breinli*, *Tripteriodes* spp. *Uranotaenia nigerrima*, *Culex (Lutzia) halifaxi*, *C. (Mochto.) brevipalpis*, and *Megarhinus splendens*. Three collections were from putrid water in the tips of fallen betel nut palms in a rain forest, associated with larvae of *Armigeres (A.) breinli* and *milnensis*. Adult fe-

males were taken from tents and from buttresses of large rain forest trees. None were taken hovering about persons or attempting to bite. Males and females in about equal proportions were attracted in large numbers to light traps operated between January and June.

Culex (Culiciomyia) pullus. Theobald

Culex pullus Theobald, 1905. Ann. Mus. Nat. Hung., 3:87. (Type female, Muina New Guinea.)

Culex (Culiciomyia) muticus Edwards, 1923. Bull. Ent. Res. 14:6. (Type male and female, Rabaul, New Britain; synonymized by Edwards, 1926, Bull. Ent. Res. 17:121.)

Culex (Culiciomyia) muticus Edw. Hill, 1925, Proc. Roy. Soc. Viet., 37:74. (Partial illustration of larva and pupa.)

Culex (Culiciomyia) muticus Edw. Brug., 1934, Bull. Ent. Res., 25:517. (Description and illustration of male genitalia and notes on the larval siphon.)

Culex (Culiciomyia) pullus Theob. Lee, 1944, Aust. Mil. Forces, p. 94. (Illustration of larva.)

?*Culex (Culiciomyia) pallidothorax* of Bonne-Webster (nec Theobald), 1938. Meded. Dienst Volksgezond, Ned.-Ind., 27, 206-212. (Listed from New Guinea.)

The larva of this species is easily recognized by the very long and slender airtube which has a lightly sclerotized section beyond the middle, giving the tube a broken appearance. The lateral and submedian hairs of abdominal segments 4 to 6 are each long and single. The characteristics of the adults are as given in the key. Parts of the male hypopygium are shown in Fig. 5.

Aside from *Aedes (Stegomyia) scutellaris*, this was the most commonly encountered mosquito at Hollandia. About 150 larval collections of *pullus* were recorded, and many individuals were frequently present. Sixteen records were from log holes or artificial containers, the others from shaded and sunlit collections of ground water of all types, except permanent ponds and brackish water. The list of associated species from these pools includes almost all the ground pool breeders taken at Hollandia. The collections other than ground pools were from large holes in logs, usually shaded, and from large cans, cisterns, oil drums, and beached canoes, in association with *Aedes (S.) scutellaris*, *A. (S.) albolineatus*, *A. (F.) notoscriptus*, *Culex (Lutzia) halifaxi*, *C. (Mochtwo.) brevipalpis*, *C. (Culicio.) fragilis*, *C. (Culicio.) papuensis*, *Megarhinus splendens* and *Tripteriodes* spp. Adults of both sexes were taken in tents and from buttresses of large rain forest trees on several occasions. Females were taken hovering about persons in the rain forest and sago swamp, but never biting. In light trap collections at the edge of a rain forest, adults of both sexes (about one-fourth males) were taken at an average of from four to ten per night during different months from January to May, 1945.

Besides New Guinea, the species has been reported from New Britain, the Solomons, Amboina and Queensland, Australia.

DESCRIPTIVE KEY TO ADULTS

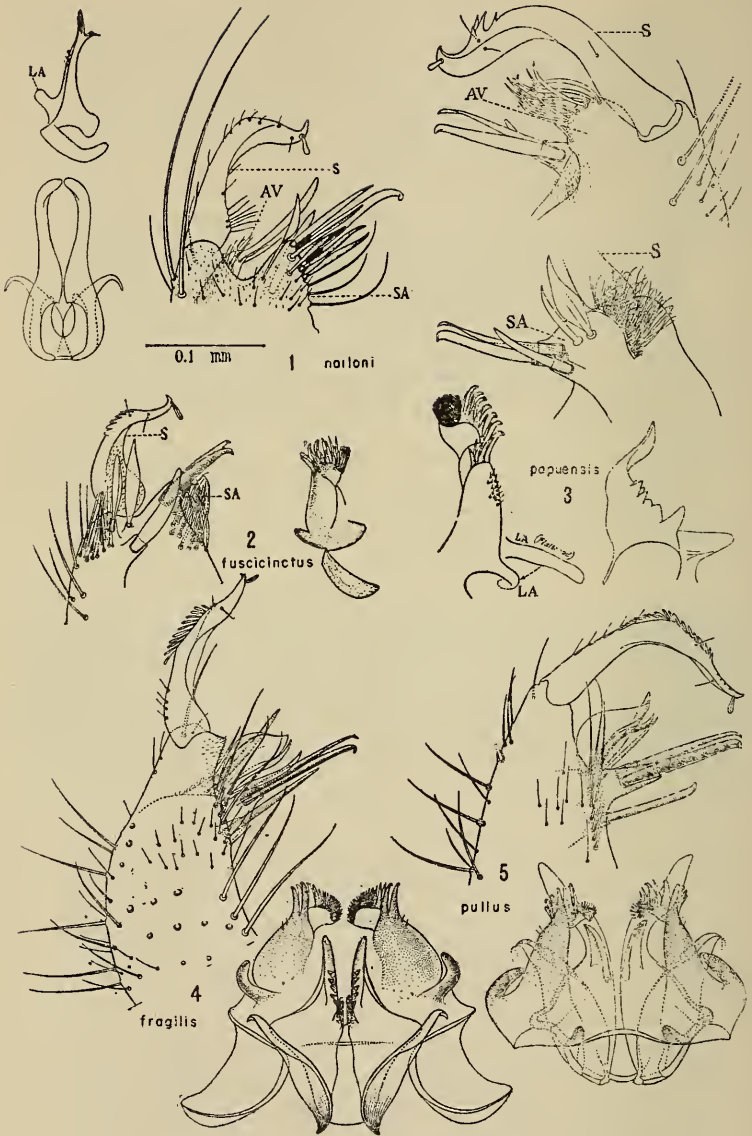
1. Abdominal tergites with wide basal white bands (frequently having a rounded posterior border on some segments). Upper parts of pleurites dark or with dark spots on sternopleuron and mesepimeron; subapical lobe of coxite with a large leaflet; apical half of style with a long row of flattened platelets on crest; lateral plate of phallosome elongate, rounded at tip, simple, basal arm elongate, pointed; basal arm of paraproct long and curved *pullus*
- Abdominal tergites unbanded 2
2. Abdominal tergites with small basal lateral spots of white scales; pleurites with two dark longitudinal stripes; only a few broad flat scales laterally on eye margin, not extending nearly to mid line. Style enlarged at base, the crest with a short row of spines; apicoventral lobe of coxite with two stout rods from tip; subapical lobe with a narrow leaflet; lateral arm of paraproct short; lateral plate of phallosome untoothed medially
fuscicinctus n. sp.
- Abdominal tergites without basal lateral white spots; pleurites unicolorous or with only indistinct dark markings; head vertex with 1-3 rows of flat scales along eye margin reaching median line, or nearly so; male style not greatly enlarged at base..... 3
3. Abdominal tergites entirely dark 4
- Abdominal tergites with indistinct apical lateral pale spots. Lateral wing scales distinctly broadened; head with a wide line of flat pale scales around eye margin, narrowly interrupted at mid line; a single lower mesepimeral bristle; crest of style with a long row of rounded spines; subapical lobe of coxite with a moderately broad leaflet; lateral arm of paraproct moderately long, stout; lateral plate of phallosome with 4-6 median teeth and a larger basal tooth *fragilis*
4. A small species, rather pale in color; head with a wide line of flat scales along eye margin, usually uninterrupted in middle. Lateral wing scales slightly broadened on apical half of the forks of vein 2; male style without a spiny crest; apicoventral lobe of coxite with an elongate rod; subapical lobe without a leaflet; lateral plate of phallosome simple; paraproct with a short lateral arm and only a few pointed spines on crest
nailoni n. sp.
- A rather large species, darker in color; head with the lines of flat scales well separated by narrow scales in middle. Lateral wing scales linear; two or three lower mesepimeral bristles frequently present; male style with a few spines on crest; apicoventral lobe of coxite with a cluster of modified bristles; subapical lobe with a narrow leaflet; lateral plate of phallosome toothed; paraproct with a long curved lateral arm, the crest with the usual dense tuft of hairs and a row of flattened, rounded spines *papuensis*

KEY TO LARVAE (Fourth instar)

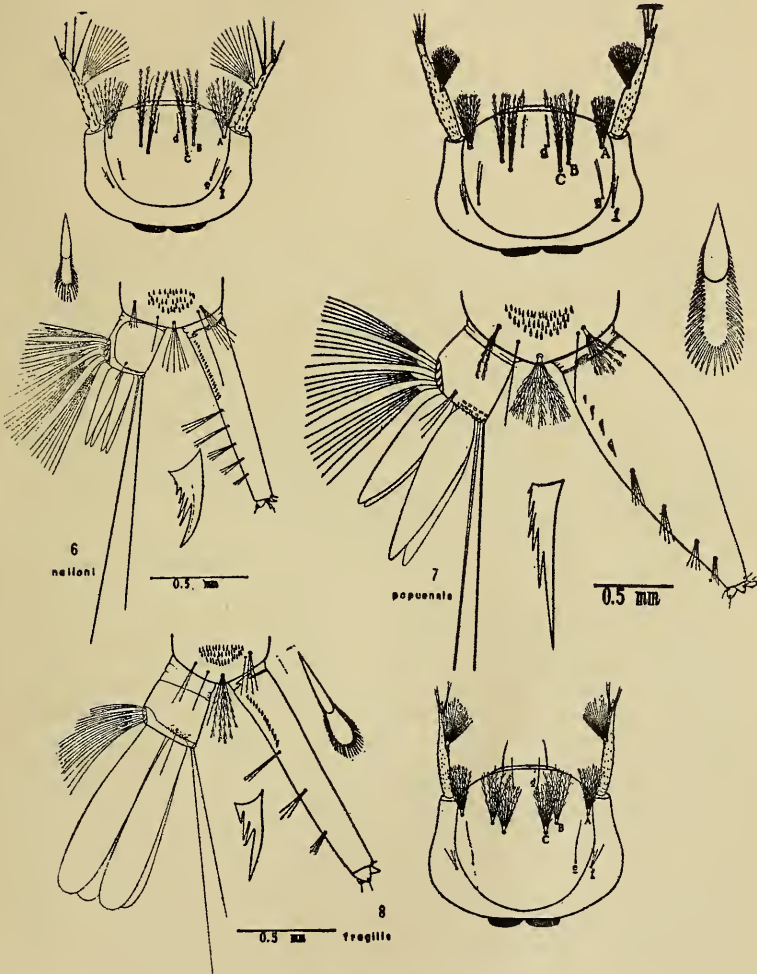
1. Airtube elongate, the sides straight and nearly parallel; pecten normal; anal gills usually equal..... 2
 Airtube enlarged, distinctly inflated before middle and tapered to tip; pecten of only 3-5 teeth; anal gills unequal, the dorsal pair twice as long as saddle, or longer, rather large but tapered to a bluntly pointed tip..... *papuensis*
2. Airtube moderately long, index about 5:1, normally sclerotized.... 3
 Airtube very long and slender, index 8-10:1, a weakly sclerotized band at apical third which gives the tube a fractured appearance; two or three pairs of ventrolateral hairs, single or bifid, very small; anal gills slender, about as long as saddle; head hairs B and C usually triple..... *pullus*
3. Anal gills large, 3-4 times as long as saddle, broadly rounded at tip; siphon with three pairs of hair tufts, each about as long as diameter of tube; head hairs B and C with 6-8 branches
fragilis
 Anal gills slender, less than twice as long as saddle; siphon with five pairs of hair tufts of decreasing lengths apically; head hairs B and C usually bifid..... *nailoni*
 (Larva of *fuscicinctus* unknown.)

ILLUSTRATIONS

Male genitalia: Fig. 1, *Culex nailoni*, paraproct, phallosome and tip of coxite (outer aspect); Fig. 2, *C. fuscicinctus*, tip of coxite (inner aspect) and paraproct; Fig. 3, *C. papuensis*, coxite (outer and inner aspects), paraproct and lateral plate of phallosome; Fig. 4, *C. fragilis*, coxite, paraproct and phallosome; Fig. 5, same of *C. pullus*. Head and terminal segments of larvae: Fig. 6, *Culex nailoni*; Fig. 7, *C. papuensis*; Fig. 8, *C. fragilis* (New Guinea).



New Guinea Species of Culex.



New Guinea Species of *Culex*.