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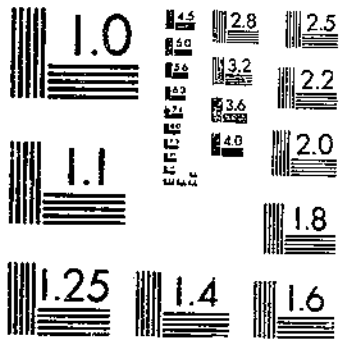
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THE LARVAE AND PUPAE OF THE MOSQUITOES BELONGING TO CULEX SUBGENERA

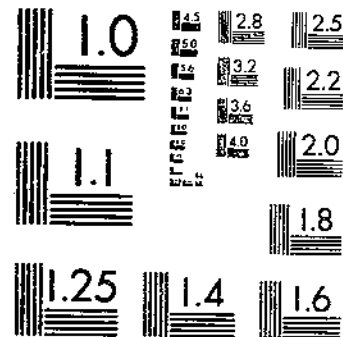
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MICROCOPY RESOLUTION TEST CHART
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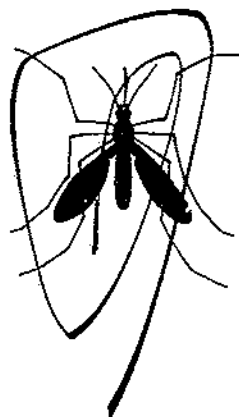


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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The Larvae and Pupae of the Mosquitoes Belonging to the Culex Subgenera *Melanoconion* and *Mochlostyrax*¹²



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THIS bulletin brings up to date information on the immature stages of the subgenera *Melanoconion* and *Mochlostyrax*. Dyar's monograph (5)³ contains brief descriptions and illustrations of the larvae of 95 species, but has been made virtually obsolete by the several publications on the larvae and pupae of these groups that have appeared within the last 8 years. Moreover, recent work on the adults of these two subgenera by Rozeboom and Komp (14, 18) based on their field rearings in tropical South America and their study of material in the collection of the United States National Museum, has made this study of the immature stages almost mandatory. The writer has been able to include accounts of the pupae of 34 species, many of which are described here for the first time.

The adult females of most of the species are indistinguishable from one another, and reliance must be placed on the males for the identification of adults. In the past it has been necessary to rear larvae and pupae to the adult stage in the hope of obtaining males for exact determination; hence the need for a means to recognize the immature stages in any groups such as these. In those field investigations involving studies of life histories or surveys for the application of control measures, it is essential for the worker to recognize any species in any stage of development. Moreover, it is essential in studying any group to recognize the unimportant as well as the economically important members.

ECONOMIC IMPORTANCE

The principal importance of the *Melanoconion* and *Mochlostyrax* mosquitoes is their ability to attack man. The feeding habits of some species are not known. Some have been shown to prefer avian hosts,

¹ Submitted for publication November 13, 1953.

² Order Diptera, Family Culicidae.

³ Italic figures in parentheses refer to Literature cited, page 124.

and Pratt *et al.* (17, p. 246) have taken several species in animal bait traps. Under favorable conditions, however, where adults appear in enormous numbers, a few species, especially *erraticus* and *pilosus* in our Southeastern States, have been recorded as extremely annoying pests. As early as 1910 Thibault (21) recorded *erraticus* (as *abominator*) to be very abundant and troublesome in Arkansas, where he observed them biting in woods and outhouses, and even in dwellings. They occurred throughout the summer and fed heavily early in the morning and again at dusk, but sometimes throughout the day. Horsfall (10) indicates that this species (as *inhibitor*) occurs as a pest in enormous numbers in the rice fields of southeastern Arkansas, where the shallow water and overgrowth of vegetation make ideal breeding places. King *et al.* (12, p. 44) have shown that *erraticus* and *pilosus* have been taken in large numbers in light traps in Florida; here and in Louisiana the former species has been taken while biting out of doors at night. A statement by R. E. Bellamy (personal communication) indicates that *erraticus* has been a troublesome biter in southern Georgia, and another species, *opisthopus*, has been incriminated as a biter on the Florida Keys by Ernestine B. Thurman (personal communication).

DISTRIBUTION AND ECOLOGY

Tropical South America is the population center of these two subgenera, which are confined to the New World. Extreme southern Canada appears to be the northernmost limit of distribution. About ten species occur within the continental limits of the United States. Little is yet known of the distribution of species of these subgenera south of Brazil.

The eggs are laid in floating rafts on the water surface or, more rarely, on emergent vegetation just above the water line. The larvae and pupae inhabit ground pools of various types, including temporary ponds, pools left from drying streams or from stream overflows, or long-standing collections of rain water on the ground. They have also been found in more permanent water, such as the quiet edges of slowly moving streams, in permanent impoundments, and especially in swamps in the tropical forest. They are frequently found in emergent vegetation which supplies full or partial shade, but also have been collected from exposed rock pools and water held in the buttressed roots of trees. At least two species, *nigrimacula* and *ocellatus*, breed in plant containers, and two others, *opisthopus* and *iolambdis*, have been taken from crab holes in Puerto Rico and Florida.

The full-grown larvae of several species of *Mochlostyrax* habitually remain submerged for long periods, and when observed in a laboratory rearing pan are usually lying on their backs at the bottom.

Adults find concealment in low vegetation and in or on tree trunks fairly close to the aquatic habitat where their eggs are laid. Their feeding habits vary, as shown above, the females biting at any time of day or night.

Laboratory rearings of *opisthopus* made by Pratt *et al.* (17, p. 246) in Puerto Rico indicated the duration of each stage to be as follows: Egg, 1 to 2 days; first and second larval instars, 2 to 3 days; third

larval instar, 3 to 4 days; fourth larval instar, 13 to 16 days; pupa, 36 to 48 hours. These workers state that the life cycle from the egg may be accomplished in less time in nature if the habitat is favorable.

SYSTEMATIC DESCRIPTIONS AND POSITION OF THE SUBGENERA

The writer (8) has discussed the larval characters of the subgenus *Melanoconion* in detail. The following is a brief summary of that discussion:

Head wider than long; antenna constricted on outer third or fourth, spined, with a large tuft at constriction; head hair 5 (upper) single or multiple; head hair 6 (lower) usually single; posterior ventral mandibular tooth present, usually with an accessory tooth; mentum seldom with more than six well developed teeth on either side of a larger central one. Thorax spicular-pilose; dorsal prothoracic hairs 2 to 8 well developed, hair 1 nearly always multiple, hairs 2, 3, 5, and 6 always single and stout, hairs 4, 6, 7, and 8 single to triple. Abdomen usually bare, sometimes entirely covered with spicules similar to those on the thorax; hair 6 (lateral) well developed and two- to four-branched. Comb either a row of pointed scales, a patch of apically fringed scales, or a combination of these. Air-tube index 5.0 to 14.0, most typically 5.0 to 8.0, with several pairs of ventral tufts, the basal ones rarely within the pecten, the apical never inserted at the tip; at least two pairs of lateral air-tube tufts in addition; terminal hook of air tube recurved anteriorly and usually with a secondary hook; pecten on approximately the basal fourth of tube, of 8 to 25 evenly spaced spines. Anal segment completely ringed by the plate, the latter usually with an armature of short, small spines on dorsal postero-lateral surface; dorsal hair of dorsal brush with a variable number of small branches at base, ventral hair single; ventral brush about three times as long as anal ring; gills variable.

The following summary of characters will serve to distinguish the subgenus *Machlostyrax* in the larval stage:

Head wider than long; antenna constricted on outer third with a large tuft as in *Melanoconion*; head hair 5 single to multiple; head hair 6 commonly single but may be multiple, always longer than hair 5; ventral hair 13 with a stout base and at least seven long branches; posterior ventral mandibular tooth present but without an accessory tooth; mentum as in *Melanoconion*. Thorax spicular-pilose; prothoracic hair 1 nearly always multiple, hairs 2, 3, 5, and 6 always single, hairs 4, 6, 7, and 8 single to triple. Abdomen, at least the first four segments, bare; lateral hair 6 well developed and double to four-branched. Comb, a patch of apically fringed scales, or more typically, a single row of long, heavy, pointed scales, but never a combination of the two types. Air-tube index not over 4.0, the tube rarely, if ever, infuscated near the middle; seven to nine pairs of ventral tufts, the basal always within the pecten and nearly as long as the air tube, the apical inserted at extreme tip of tube; pecten on basal third of tube, the spines usually with a fringe of very fine hairs; terminal hook of air tube recurved anteriorly and always with a secondary hook at or near its stout base. Anal segment completely ringed by the plate, never an armature of single spines present, although the irregular rows of minute setae are usually enlarged apically; dorsal hair of dorsal brush with a variable number of small branches at its base, ventral hair single; ventral brush 2.5 to 3 times as long as anal ring; gills variable.

The following provisional listing has been devised for separating the larvae of these two subgenera from those of other New World *Culex*, since the subgenera *Neoculex*, *Isostomyia*, and *Microculex* are similar to them in the larval stage. The italicized item introducing each paragraph is a character typical of the larvae of either *Melanoconion* or *Machlostyrax*, or both:

1. *Mouth brushes not fringed.* Fringed mouth brush hairs is a characteristic of the predaceous subgenus *Lutzia*.

2. *Head hair 6 single, head hair 5 single or multiple and usually shorter than head hair 6.* Head hairs 5 and 6 of most *Culex* (*Culex*) larvae are nearly subequal in length and are both usually heavily branched. This is likewise true of *Micraedes*.

3. *Antennal tuft at outer third, the tuft large, with a distinct constriction of the shaft beyond the tuft to the tip.* *Carrollia*, some *Culex*, and *Micraedes* bear a hair or tuft at or before the middle of the shaft, the latter without a distinct constriction.

4. *Dorsal hair of dorsal tuft with one or several very short branches at the base.* *Isostomyia* and several other subgenera appear to have no such short branches.

5. *Mentum with not more than seven well developed lateral teeth.* Two species of *Melanoconion*, *ocellatus* and *nigrimacula*, do possess the mentum and long air tube characteristic of *Microculex*.

6. *Terminal hook of air tube recurved anteriorly, commonly with a small secondary hook.* In no other subgenera have I observed this characteristic hooking of the spine. When present in other groups, it is quite straight or very gently curved at its tip.

7. *At least two small lateral tufts on the air tube.* The absence of these, together with the nearly straight air-tube spine, are characters common to *Neoculex*, and are the only ones found that separate this subgenus from the two concerned in this review. The pecten spines of all North American *Melanoconion* are fringed along their ventral borders; those of *Neoculex* are usually provided with 3 or 4 large basal teeth. Similar pecten spines, however, have been seen by the writer in some tropical *Melanoconion* as well.

The larvae of *Culex* (*Aedinus*) are apparently not known.

The author has found no characters that will distinguish the pupae of these two subgenera from those of other subgenera of *Culex*. Their morphology and chaetotaxy have been treated at length in another paper (Footé, 9). The following summary of characters serves to distinguish the group in the pupal stage:

Cephalothorax with 9 pairs of hairs, the first 3 on the ocular plate; trumpet normally about 6 or 7 times as long as width at distal end, rarely longer, with an open side dorsally on the distal third to fifth and usually with a distinct area of chitinization at the base of this opening, the distal border more or less truncate. Metathorax with three pairs of hairs, hair 10 nearly always multiple and shorter than hair 11. Abdominal segments much wider than long, each with a sinuate anterior dorsal border, the segments becoming longer and narrower posteriorly; hair 5 on segments IV, V, and VI usually very large and at least double, sometimes feathered; hair 2 on these segments always with at least 5 branches; hair 8 on segments II through VI lateral and minute; no hairs ventrally on segments I and II, 5 pairs ventrally on segments III through VII; hair 9 small and multiple on all segments; hair 10 small and multiple on segments III through V, single and long on segments VI and VII; hair 11 single or double and long on all segments; hair 12 minute and usually single except on segment VII; hair 13 minute and inserted at the centerline at the extreme anterior border. Segment IX fused dorsally to VIII, with a minute lateral seta in most species; segment X nearly as long as wide in the male, much shorter in the female. Paddle ovoid, about 1.5 to 1.75 times as long as wide, the midrib distinct along most of its length, lateral spiculation extremely minute, two terminal paddle hairs.

KEY TO THE SUBGENERA MELANOCONION AND MOCHLOSTYRAX

Air-tube index not less than 5.0, the ventral margin not distinctly curved along its entire length; not more than 6 pairs of ventral tufts, the anterior pair rarely inside the pecten and never more than 0.75 times as long as the air tube, the posterior pair well basad of posterior end of the tube. Subgenus *Melanoconion*, p. 7.

Air-tube index not over 4.5, the ventral margin distinctly curved along its entire length; tube with 7 to 9 pairs of heavy ventral tufts, the anterior pair always inside the pecten and about as long as the tube, the posterior pair inserted at the extreme posterior end.-----Subgenus *Mochlostyrax*, p. 106.

The systematic position of these mosquitoes has undergone several changes. Species of the subgenus *Melanoconion* have been recognized since the turn of the century as forms that deserved a designation of their own. Accordingly, Theobald (20, p. 238) erected the genus *Melanoconion* as a group separate from *Culex* for these mosquitoes. In 1906 Dyar and Knab (6, p. 223) likewise proposed the name *Mochlostyrax* for *caudelli*, a species whose larva lies on its back on the bottom of shallow ground pools in which it breeds. Later workers, especially Howard, Dyar, and Knab (11, p. 220), considered that these groups did not deserve separation from *Culex* as distinct genera, and included these species in the latter genus without any recognition whatever as separate entities. Dyar (5) included a large number of additional species with *caudelli* in *Mochlostyrax*, making it a subgenus of *Culex*, and divided it into four sections: *Dinoporpa*, with the single species *trifidus*; *Helcoporpa*, with the single species *menytes*; *Mochlostyrax*, with six species; and *Choeroporpa*, with about 70 species. Dyar also included Theobald's genus *Melanoconion* as a subgenus of *Culex*, with the 4 sections *Tinolestes*, *Gnophodeomyia*, *Melanoconion*, and *Anoedioporpa*, the last-named comprised of species all of which now have been assigned to other subgenera outside the province of this work.

Edwards (7, p. 218) raised Dyar's section *Mochlostyrax* to subgeneric rank, with *caudelli* and its close relatives as its only members, and relegated all the remaining forms to the subgenus *Melanoconion*. In their excellent review, Rozeboom and Komp (18, p. 77), on the basis of male terminalia alone, found no justification for giving *Mochlostyrax* a higher rank than section: these authors retained Dyar's 1928 classification, this time as a section of *Melanoconion*, within which is included all of Dyar's subgenera *Mochlostyrax* and *Melanoconion*.

After a rather exhaustive study of the morphology and chaetotaxy of the larvae of the subgenus *Melanoconion* (in the sense of Rozeboom and Komp), the writer has concluded that Dyar and Knab's genus *Mochlostyrax* is deserving of subgeneric rank, as suggested by Edwards; hence it is so treated in this bulletin. The larvae possess distinctive anal segment appendages and chaetotaxy, and the males, at least on the basis of their terminalia, are separable as a distinct group from other subgenera of *Culex*.

MATERIAL

Nearly all the species available for this study are presented by specimens in the collection of the United States National Museum (USNM)⁴. This material includes gifts of associated larvae, pupae, and adults from the extensive collections of L. E. Rozeboom (R) of the Johns Hopkins School of Hygiene, of W. H. W. Komp (K) of the National Institutes of Health, and from the Bonnes (USNM) in Surinam. Other valuable sources of material were the collections loaned by individual entomologists, including H. D. Pratt (P), U. S. Public Health Service, Chamblee, Ga.; R. B. Eads (E), Texas State Health Department; J. A. Mulrennan (M), Florida State Health Department; and Griffith Quinby (Q), U. S. Public Health Service, Savannah, Ga.

USE OF THE KEYS AND DESCRIPTIONS

In the keys and descriptions, the author has adopted Marshall's modification of Martini's (16) system for numbering the hairs of the head and the small dorsal and ventral thoracic hairs of the larvae (see fig. 8, p. 26). The formula for designating the branching of the dorsal prothoracic hairs has been adopted from Senevet and Abonnenc (19). The numbers inside parentheses of this formula are the numbers of branches of the submedian prothoracic hairs, starting with the inner hair (hair 1). The five following numbers refer to the number of branches of prothoracic hairs 4 through 8, in that order. The designations of the larval abdominal hairs are the writer's and correspond fairly well to those evolved independently by Belkin (7) and commented upon by him later (2). The terminology of Cook (4) has been employed in the morphological treatment of head characters. Pupal hairs are numbered in accordance with the system of Knight and Chamberlain (13) without change (see fig. 9, p. 27). In the pupal descriptions a Roman numeral indicates the abdominal segment and an Arabic numeral the hair on it.

Variability has been taken into account as much as possible to reduce the necessity for retracing to any couplet. In the case of the branching of prothoracic hair 4, however, this has not always been possible. It is therefore recommended that if a specimen does not key out satisfactorily among the species noted as "prothoracic hair 4 single" it be run through again using the alternative condition. The same precaution should be exercised in using the air-tube index, which is taken as the ratio of the length of the posterior border of the tube to its width at the base. In large measure this index depends upon the pressure that was applied to the coverslip at the time the specimen was mounted, and certainly varies from slide to slide. This is particularly true of cast skins, which have no supporting internal structure to keep them from becoming flattened. Most indices obtained from actual measurement, therefore, may well be low, because the

⁴ Letters in parentheses are used in the later descriptive sections to indicate the source of material of the several species.

keys and descriptions containing these structures are constructed to represent as nearly as possible the true proportions. Observations should be adjusted correspondingly.

Other sources of difficulty may be the length of the preclypeal spines in relation to the distance between them and the proportions of certain of the hair lengths. Frequently a correction will have to be made for the angle at which these structures lie.

The first synonymic reference for each species is to the original description, whether it was published on the basis of a larva or an adult. The following entries contain all the references concerning the taxonomy of the immature stages, and in addition the original description representing every other name applied to the species, some of which are of adults only. The same form has been used for all formal descriptions, so that characters follow each other in the same order in every case. The translations of those descriptions found in Senevet and Abonnenc (19) and in Lane and Whitman (15) have been made to conform with this pattern, as have those in English taken from Bonne and Bonne-Wepster (3), Dyar (5), and others.

SPECIES OF MELANOCONION

KEYS TO THE IMMATURE STAGES

Larvae

- | | | |
|--------|--|---------------------------|
| 1. | Head square; no ventral tufts on air tube (Section <i>Tinolestes</i>)..... | |
| | Head distinctly wider than long, the lateral margins rounded; ventral tufts or hairs usually present..... | 2 |
| 2 (1). | Comb scales in 1 to 3 rows, all pointed, or both pointed and apically fringed scales present..... | 3 |
| | Comb scales in 2 to 4 irregular rows, each with an apical fringe.... | 20 |
| 3 (2). | Comb scales a combination of pointed and apically fringed scales.... | 4 |
| | All comb scales with distinct apical points..... | 7 |
| 4 (3). | Basal ventral air-tube tufts over 2 times as long as air tube at point of insertion; head hair 5 single to triple..... | 5 |
| | Basal ventral tufts not more than 1.5 times air-tube width: head hair 5 with 5 or 6 branches..... | 6 |
| 5 (4). | Preclypeal spines extremely short; prothoracic hair 10 single; abdomen as spicular-pilose as the thorax.... | chrysonotum Dyar and Knab |
| | Preclypeal spines about as long as one-half the distance between them: prothoracic hair 10 double; abdomen bare..... | |
| 6 (4). | Armature of anal ring with 6 to 8 single spines confined to posterolateral border..... | batesi Rozeboom and Komp |
| | Armature of anal ring without any single spines whatever..... | zeteki Dyar |
| | | aiken (Aiken) |

³ Unfortunately, most of the original larval material discussed by Dyar, especially of those species which were originally described from larvae, have been inexplicably lost from the Museum collection, rendering it impossible to examine those of which Dyar and his coworkers have given only very brief descriptions. These, therefore, have been necessarily included in this study entirely from information available in the literature. In most cases the published descriptions have proved unsatisfactory because of their brevity, a factor which, in turn, makes the true relationships of these forms and their positions in the keys rather uncertain.

| | | |
|----------|---|---|
| 7 (3). | Head hair 5 eight- to ten-branched, nearly as long as hair 6; mental plate with eight or more lateral teeth..... | 8 |
| | Head hair 5 single to multiple; if multiple, not more than two-thirds as long as hair 6; mental plate with fewer than eight lateral teeth (<i>gbarms</i> Dyar)*..... | 9 |
| 8 (7). | Head hair 4 long, exceeding anterior margin of head..... | |
| | Head hair 4 short, slight, not attaining head capsule..... | |
| | <i>nigrinacuta</i> Lane and Whitman | |
| 9 (7). | Anterior ventral air-tube tuft distinctly less than 2 times width of air tube at point of insertion..... | 10 |
| | Anterior ventral air-tube tuft over 2 times width of tube at point of insertion..... | 12 |
| 10 (9). | Comb of one or two rows of 10 to 12 pointed scales, each with a swollen base..... | Species A <i>gbarms</i> Dyar (?) ⁺ |
| | Comb a triangular patch of scales in at least 3 irregular rows..... | 11 |
| 11 (10). | Comb a triangular patch of about 30 scales, each pointed and with an apical fringe..... | <i>coppenamensis</i> Bonne-Wepster and Bonne |
| | Comb of narrow, pointed scales in a patch three rows deep..... | Species B |
| 12 (9). | Prothoracic hair 4 single..... | 13 |
| | Prothoracic hair 4 double..... | 16 |
| 13 (12). | Abdomen densely spicular-pilose; head hair 5 triple to eight-branched..... | 14 |
| | Abdomen pilose only on segments VI, VII, and VIII; head hair 5 single or double..... | 15 |
| 14 (13). | Air-tube index 6.0 to 6.5..... | <i>erraticus</i> Dyar and Knab |
| | Air-tube index 7.0 or more..... | Species B |
| 15 (13). | A ventral gill-like pouch at base of antenna..... | <i>educator</i> Dyar and Knab (part) |
| | Without such a gill..... | <i>comminator</i> Dyar |
| 16 (12). | Sockets of head hair 4 closer to hair 6 than to each other..... | 17 |
| | Sockets of head hair 4 closer to each other than to hair 6..... | 18 |
| 17 (16). | Pecten spine with three to five quite coarse teeth toward the apex; comb scale with lateral fringe nearly to tip; head hair 5 single..... | <i>implicatus</i> Senevet and Abonnenc |
| | Pecten spine with many fine fringing teeth; comb scale fringed on base only; head hair 5 double to four-branched..... | <i>mistura</i> Komp and Robeboom |
| 18 (16). | Abdomen as densely spicular-pilose as the thorax; neither head nor air tube infuscated..... | <i>saramuccensis</i> Bonne-Wepster and Bonne |
| | Abdomen bare; head and a ring on air tube infuscated..... | 19 |
| 19 (18). | Slender, free portion of comb scale with a lateral fringe clear around tip..... | <i>theobaldi</i> (Lutz) |
| | Slender, free portion of comb scale without such a lateral fringe extending to the extreme tip..... | <i>educator</i> Dyar and Knab (part) |
| 20 (2). | Head hair 6 nine- to 11-branched..... | <i>atococi</i> Bonne-Wepster and Bonne |
| | Head hair 6 single, or at most double..... | 21 |
| 21 (20). | Prothoracic hair 3 single, about 5.0 times as long as head hair 5; a transparent gill-like pouch at base of antenna; comb scale with a free portion..... | <i>psutharus</i> Dyar |
| | Prothoracic hair 3 multiple, not longer than 3.0 times as long as head hair 5; no transparent gill-like pouch at base of antenna; comb scale usually long and slender, with a free portion..... | 22 |
| 22 (21). | Air-tube index 8.0 or over..... | 23 |
| | Air-tube index less than 8.0..... | 35 |
| 23 (22). | Some of the ventral tufts of the air tube single, extremely short..... | 24 |
| | All ventral tufts of air tube multiple; head hair 5 not obviously exceeding anterior margin of head..... | 25 |
| 24 (23). | Head hair 5 long, exceeding anterior margin of head; prothoracic hair 4 single..... | <i>carcinophilus</i> Dyar and Knab |
| | Head hair 5 short, about 0.4 times as long as hair 6; prothoracic hair 4 double..... | Species D |
| 25 (23). | Prothoracic hair 3 distinctly shorter than head hair 5..... | 26 |
| | Prothoracic hair 3 as long as or longer than head hair 5..... | 28 |

*See footnote 5 on page 7.

| | | | |
|----------|---|---|----|
| 26 (25). | Air tube infuscated in a wide band at middle..... | <i>marinocca</i> Dyar | 27 |
| 27 (26). | Comb of 30 to 35 scales; anterior ventral air-tube tufts about 2 times as long as width of air tube at point of insertion..... | <i>distinguendus</i> Dyar | |
| | Comb of about 60 scales; anterior ventral air-tube tufts not 1.5 times width of tube at point of insertion..... | <i>niccericusis</i> Bonne-Wepster and Bonne | |
| 28 (25). | Abdominal hair I-7 double..... | <i>opisthopus</i> Komp | 29 |
| 29 (28). | Abdominal hair I-7 single..... | | |
| 29 (28). | Head hair 5 single, about 0.75 times the length of hair 6..... | <i>castor</i> Dyar | 30 |
| 30 (29). | Head hair 5 with at least three branches..... | | |
| 30 (29). | Prothoracic hair 3 with only two branches..... | <i>productus</i> Senevet and Abonnenc | 31 |
| 31 (30). | Prothoracic hair 3 with at least 5 branches..... | | |
| 31 (30). | Prothoracic hair 3 nine- to 11-branched; the separate branches of head hair 5 almost as heavy as those of head hair 6..... | <i>kummi</i> Komp and Rozeboom | 32 |
| 32 (31). | Prothoracic hair 3 not more than 10-branched; branches of head hair 5 distinctly finer than those of hair 6..... | | |
| 32 (31). | Air-tube index over 10; prothoracic hairs 7 and 8 four- and three-branched, respectively..... | Species E | 33 |
| 33 (32). | Air-tube index not over 9.0; prothoracic hairs 7 and 8 three- and two-branched, respectively..... | | |
| 33 (32). | Anal-ring armature of 14 to 16 spines on extreme posterior margin; prothoracic hair 3 distinctly longer than head hair 5..... | <i>atrofus</i> Theobald | 34 |
| 34 (33). | Anal-ring armature of 6 to 10 heavy spines confined to extreme posterior margin; prothoracic hair 3 about the same length as head hair 5..... | | |
| 34 (33). | Air tube infuscated in a band at middle; anterior ventral air-tube tuft 1.6 times as long as air-tube width at point of insertion..... | <i>dunni</i> Dyar | 35 |
| 35 (22). | Air tube without any median infuscation; anterior ventral tuft 2 times as long as air-tube width at insertion..... | <i>commercyensis</i> Bonne-Wepster and Bonne (part) | 36 |
| 35 (22). | Anterior ventral tuft of air tube not over 2 times width of tube at point of insertion..... | | |
| 35 (22). | Anterior ventral tuft of air tube at least 2 times width of tube at point of insertion..... | | 41 |
| 36 (35). | Prothoracic hair 4 single; anal-ring armature with or without single spines..... | | 37 |
| 36 (35). | Prothoracic hairs 4 through 8 with the formula 2-1-1-3-2; anal-ring armature a patch of single spines..... | | 38 |
| 37 (36). | No single spines in armature of anal ring; prothoracic hair 7 double..... | <i>bonneti</i> Senevet* | |
| | | <i>productus</i> Senevet and Abonnenc (part)* | |
| | Anal-ring armature consisting of single spines; prothoracic hair 7 triple..... | <i>commercyensis</i> Bonne-Wepster and Bonne (part) | |
| 38 (36). | Head hair 5 double or triple..... | <i>evansae</i> Root | 39 |
| 39 (38). | Head hair 5 single..... | | |
| 39 (38). | All abdominal segments except VIII bare, without spicules..... | <i>thomasi</i> Evans* | 40 |
| 40 (39). | Abdominal segments II, III, IV, and V with fine but stout spicules..... | | |
| 40 (39). | Pecten spine with ventral fringe to extreme base..... | <i>taurieri</i> Senevet and Abonnenc* | 41 |
| 41 (35). | Pecten spine not fringed to extreme base..... | <i>comatus</i> Senevet and Abonnenc* | 42 |
| 41 (35). | Abdominal hair II-6 single..... | <i>simulator</i> Dyar and Knab* | 43 |
| 42 (41). | Abdominal hair II-6 double (<i>gracitator</i>)*..... | | 44 |
| 42 (41). | Prothoracic hair 4 double..... | | |
| 42 (41). | Prothoracic hair 4 single..... | | |

*See footnote 5 on page 7

| | | |
|----------|---|-------------------------|
| 43 (42). | Subapical pecten spine about 1X5, not nearly as long as air-tube width; head hair 18 double; subapical antennal spines distantly removed from apex..... | |
| | <i>intricatus</i> Brethes <i>gracitator</i> Dyar and Knab* | |
| | Subapical pecten spines about 1X12, the apical spine nearly as long as tube width at insertion; head hair 18 four- to six-branched; subapical antenna spines not distantly removed from apex..... | |
| | <i>conspirator</i> Dyar and Knab | |
| 44 (42). | Preclypeal spines about 1X4, blunt..... | 45 |
| | Preclypeal spines longer, pointed apically..... | 46 |
| 45 (44). | Abdominal integument almost as heavily spicular-pilose as the thorax..... | |
| | <i>humilis</i> Theobald | |
| | Abdominal segments lightly and very sparsely spicular-pilose..... | |
| | <i>sarsinator</i> Dyar | |
| 46 (44). | Prothoracic hairs 7 and 8 both double..... | 47 |
| | Prothoracic hair 7 triple, hair 8 double, or these hairs double and single, respectively..... | 49 |
| 47 (46). | Anal ring with a dorso-lateral armature of heavy spines..... | |
| | <i>lucifugus</i> Komp | |
| | Spines of anal ring armature extremely fine and delicate..... | 48 |
| 48 (47). | Head hair 5 is 0.75 times as long as head hair 6, exceeding anterior margin of head; prothoracic hair 3 shorter than head hair 5; in bamboo..... | |
| | <i>decorator</i> Dyar and Knab* | |
| | Head hair 5 not as long as 0.75 head hair 6 and not attaining anterior margin of head; prothoracic hair 3 as long as, or longer than, head hair 5..... | |
| | <i>mutator</i> Dyar and Knab | |
| 49 (46). | Comb scale short, the fringed portion about as long as the base, with no elongated portion between..... | 50 |
| | Comb scale long, a narrow portion present between the base and the fringe..... | 52 |
| 50 (49). | Abdomen slightly spicular-pilose; head hair 5 single, double or triple, about 0.5 times as long as head hair 6..... | |
| | <i>abominator</i> Dyar and Knab | |
| | Abdomen bare; head hair 5 less than 0.5 times as long as hair 6..... | 51 |
| 51 (50). | Head hair 5 four- to eight-branched; anal ring armature a broad patch of single spines..... | |
| | <i>bastagarius</i> Dyar and Knab | |
| | Head hair 5 double; anal ring armature of six to eight spines confined to postero-lateral border..... | Species F |
| 52 (49). | Abdomen spiculate on first four segments..... | 53 |
| | Abdomen bare on these segments..... | 54 |
| 53 (52). | Abdomen as spicular-pilose as the thorax; head hair 5 fine, shorter than hair 6; posterior ventral mandibular tooth with notch at apex..... | |
| | <i>inhibitor</i> Dyar and Knab | |
| | Abdominal spiculation present but weak; head hair 5 mostly single, longer than 0.5 times the length of hair 6; posterior ventral mandibular tooth without a notch at tip, but sometimes with a small anterior projection..... | |
| | <i>elevator</i> Dyar and Knab | |
| 54 (52). | Head hair 5 at least 0.75 times as long as hair 6, single or double; if single, then nearly as heavy as head hair 6..... | |
| | <i>totambdis</i> Dyar | |
| | Head hair 5 distinctly shorter than 0.75 times hair 6, with much finer branches..... | 55 |
| 55 (54). | Posterior ventral mandibular tooth notched at tip..... | 56 |
| | Posterior ventral mandibular tooth with a small anterior projection well removed from tip, or absent; or entire posterior tooth absent..... | 58 |
| 56 (55). | Head hair 5 0.5 times as long as head hair 6, or less, with 2 or 3 fine branches..... | |
| | <i>mulrennani</i> Basham <i>phlogistus</i> Dyar (part) | |
| | Head hair 5 usually longer than one-half head hair 6..... | 57 |
| 57 (56). | Prothoracic hair 3 four- to six-branched..... | |
| | <i>scrutimarge</i> Root | |
| | Prothoracic hair 3 with about 11 branches..... | <i>plectaporpe</i> Root |

*See footnote 5 on page 7.

- 58 (55). Posterior ventral mandibular tooth absent; California and Lower California..... *anips* Dyar
 Posterior ventral tooth with a distinct anterior projection..... 59
 59 (58). Air-tube index 7.0 or over; air tube without a dark ring of infuscation at middle..... *eggymon* Dyar
 Air-tube index under 7.0; air tube with or without a ring at middle..... 60
 60 (59). Fringe of pecten spine extremely fine; North America..... *peccator* Dyar and Knab
 Fringe of pecten spine coarse; Panama and south..... 61
 61 (60). Terminal hook of air tube with a large secondary hook arising at extreme base, and about 0.5 times the length of primary hook..... *albincusis* Bonne-Wepster and Bonne
 Terminal hook of tube with a weak secondary arising at basal third or fourth of primary..... *phlogistus* Dyar (part)

Pupae

1. Trumpet 15 to 17 times as long as greatest width, very slender..... 2
 Trumpet not over 12 times as long as greatest width, slender or stout..... 4
 2 (1). Hair 5 on segment IV double..... *ocellatus* Theobald*
 Hair 5 on segment IV five- to six-branched..... 3
 3 (2). Hair V-5 four- to five-branched..... *nigrimacula* Lane and Whitman*
 Hair V-5 double..... *zeteki* Dyar
 4 (1). Trumpet with a distinct notch on distal border of pinna..... *donni* Dyar
 Distal border of pinna either truncate or slightly evaginated, never with a notch..... 5
 5 (4). Postero-lateral corners of segment VIII gently rounded, without an indication of posteriorly directed points..... 6
 Postero-lateral corners of segment VIII with distinct points..... 8
 6 (5). Paddle hair 8 about one-third the length of paddle; free edges of pinna flared outward from edges of trumpet..... *psatharus* Dyar
 Paddle hair 8 much shorter than one-third the length of paddle; trumpet otherwise..... 7
 7 (6). Metanotal hair 10 double; hair VIII-8 inserted in extreme postero-lateral corner of that segment..... *opisthopus* Komp
 Metanotal hair 10 multiple; hair VIII-8 inserted anterior to the postero-lateral corner..... *mutator* Dyar and Knab
 8 (5). Postero-lateral corner of segment VIII drawn out into a distinct process; hair VIII-8 inserted on the extreme tip..... *atkenii* (Aiken)
 Postero-lateral corner of segment VIII distinctly pointed, but not produced; hair VIII-8 inserted anterior to postero-lateral corner..... 9
 9 (8). Hair V-5 distinctly exceeding posterior border of sixth tergite..... 10
 Hair V-5 attaining, but not exceeding, posterior border of sixth tergite..... 15
 10 (9). Hair 8 of segments III, IV, V and VI single or double..... *sursumptor* Dyar
 Hair 8 of these segments with more than two branches..... 11
 11 (10). Hair II-2 with about 40 branches..... *erraticus* Dyar and Knab
 Hair II-2 with less than 30 branches..... 12
 12 (11). Hair VIII-8 with 7 or 8 heavily spiculate branches..... *chrysonotum* Dyar and Knab
 Hair VIII-8 with five or fewer branches, spiculate or not..... 13
 13 (12). Cephalothoracic hairs 4 and 5 the same length; hairs 4 and 6 on segment IV sub-equal, both single or double..... *bustagarius* Dyar and Knab
 Cephalothoracic hair 5 distinctly longer than hair 4; hair IV-4 longer than hair IV-6, the former with more than two branches..... 14
 14 (13). Cephalothoracic hair 3 extremely long, double; hair 1 shorter and multiple..... *carcinophilus* Dyar and Knab
 Cephalothoracic hair 3 multiple; hair 1 longer than hair 2..... *elevator* Dyar and Knab

*See footnote 5 on page 7.

- 15 (9). Hair VIII-8 single and bare.....
commeynensis Bonne-Wepster and Bonne
 Hair VIII-8 with more than two branches, spiculate or not..... 16
- 16 (15). Hair II-2 the same length or longer than hair II-4..... 17
 Hair II-2 distinctly shorter than hair II-4..... 19
- 17 (16). Pinna of trumpet not closing at base in a distinct V-shape and without a distinct cleft; trumpet not markedly wider at tip than at base.....
Theobaldi (Lutz)
 Pinna of trumpet closing in a distinct V with sclerotization at the base, trumpet widening distinctly toward tip..... 13
- 18 (17). Hair IV-4 nearly two times as long as hair IV-6; trumpet about four times as long as greatest width.....
mistura Komp and Rozeboom
 Hairs 4 and 6 on segment IV the same length; trumpet about six times as long as greatest width.....
educator Dyar and Knab
- 19 (16). Trumpet tube-like, hardly larger in diameter at the tip than at the base and not distinctly enlarged, at least as far as the tracheoid portion; ratio of length to width not less than 6..... 20
 Trumpet growing distinctly larger in diameter toward the tip, the tip of the pinna distinctly wider than the base; ratio of length to width not more than 5.5..... 23
- 20 (19). Hair II-4 more than two times as long as hair II-2..... 21
 Hair II-4 less than two times as long as hair II-2..... 22
- 21 (20). Hair 5 on segments V and VI attaining posterior margins of following tergites.....
iolambdis Dyar
 Hair 5 on segments V and VI shorter, attaining only about two-thirds the lengths of the following tergites.....
batesi Rozeboom and Komp
- 22 (20). Hairs 5 and 6 on segment II subequal; hairs 4 and 6 on segment V subequal.....
lucifugus Komp
 Hair II-5 more than two times as long as hair II-6; hair V-4 longer than hair V-6.....
atratus Theobald
- 23 (19). Trumpet index 8.0 or over, the trumpet long and relatively narrow; hair VIII-8 very sparsely spiculate..... 24
 Trumpet index 6.0 to 7.0, without noticeable flaring at tip; hair VIII-8 either heavily spiculate or bare..... 25
- 24 (23). Hairs 5 and 6 on segment VII single and subequal.....
egeymon Dyar
 Hair VII-5 about one-third to one-half the length of hair VII-6.....
phlogistus Dyar
- 25 (23). Hair VIII-8 bare, without trace of spiculation.....
albivensis Bonne-Wepster and Bonne
 Hair VIII-8 heavily spiculate, the spicules long and dense..... 26
- 26 (25). Hair 5 on segments V and VI multiple, the branches not much heavier than those of hair IV-5.....
scratimarge Root
 Hair 5 on segments V and VI double, the branches bare and considerably heavier than those of hair IV-5, which is multiple.....
castor Dyar

DISCUSSION OF THE SPECIES

CULEX (MELANOCONION) ABOMINATOR Dyar and Knab

(Fig. 1)

Culex abominator Dyar and Knab, 1909, Smithsn. Misc. Collect. 52: 237; King and Bradley, 1930, Ent. Soc. Amer. Ann. 30: 352; Bads, 1942, Jour. Econ. Ent. 26: 337; Wirth, 1945, Ent. Soc. Wash. Proc. 47: 202.

Culex erraticus (Dyar and Knab) Dyar, 1928, The Mosquitoes of the Americas p. 209.

Larva.—Head: Preclypeal spines longer than one-half the distance between them; hair 4 single or double, slight, 0.3 times as long as hair 5, closer to socket of hair 6 than is that of hair 5; hair 5 single or double, 0.5 times as long as hair 6, spiculate on outer two-thirds; hair 6 single, distal third extending beyond anterior margin of head, not spiculate; hair 7 eight-branched, spiculate; hair 18 double or triple, shorter than hair 20, which is four- to six-

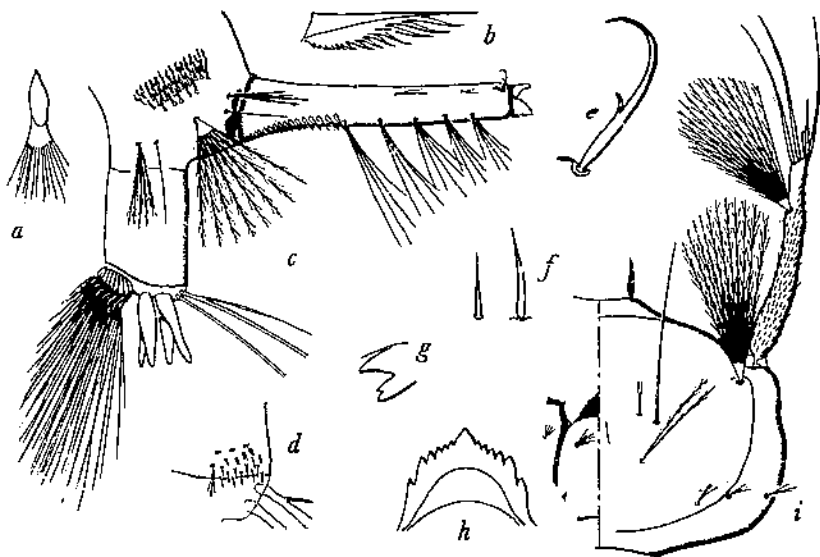


FIGURE 1.—*Gulex (Melanoconion) abominator* Dyar and Knab: *a*, Comb scale; *b*, pecten spine; *c*, terminal abdominal segments; *d*, armature of anal ring; *e*, terminal air-tube look; *f*, maxillary (left) and preclypeal (right) spines; *g*, ventral mandibular teeth; *h*, mentum; *i*, ventral (left) and dorsal (right) views of head.

branched. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth narrower but about the same length, with a notch at tip; maxillary spine 0.6 times as long and as heavy as preclypeal, not darkly pigmented; mentum a large shouldered tooth and four to six smaller each side becoming larger distally, the distal tooth somewhat removed. Antenna infuscated on constricted portion; subapical spines 1.1 times as long as hair 10; hair 10, 2.5 times as long as terminal spine. Thorax: Integument sparsely spicular-pilose. Prothoracic hair formula (1-1-6)-1-1-1-3-2; prothoracic hair 3, 1.4 times as long as head hair 5. Abdomen: Integument very sparsely spicular-pilose. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI triple; hair III-6, 0.8 times as long as short branch of hair II-6; hair VI-6 missing. Comb of 25 to 40 apically fringed scales in three or four irregular rows, the scales in posterior row 1.3 times as long as those in anterior row, the bases of all scales 0.7 times as long as the free portions, the individual scales with a shortened free portion before the fringe. Proportions of anal plate destroyed in mount; armature consisting of a very narrow patch of eight to ten single spines confined to extreme postero-lateral and dorsal border of ring; dorsal hair of dorsal brush with a single shorter branch 1.5 times as long as anal ring; ventral brush 2.5 times as long as ring; gills four, 0.5 times as long as ring, tapering from broad bases to blunt points. Air-tube index 5.0, tube without a ring of infuscation near the middle; five pairs of multiple ventral tufts, the anterior pair 2.3 times as long as width of air tube at point of insertion, posterior pair 1.8 times as long as tube width at insertion; pecten of 18 to 20 spines on basal third of tube, the subapical spine 1 x 5 with eight to 12 fringing teeth, the basal ones extremely short, the

apical much longer but not attaining apex; terminal hook 0.5 times as long as tube width at tip, with an extremely fine secondary hook on basal half: acus normal.

Material.—Texas: Three whole-mounted larvae (E).

Locality and Habitat.—Texas. Eads (1942) reports this species taken from a roadside pool.

Taxonomic Discussion.—The larva bears morphological characters similar to those of *bastagarius*, a form with a more southern distribution, in having comb scales with an apical fringe which arises from the posterior border of the basal portion, with very little or no intervening portion. However, it is probably more closely allied to *peccator* and *anips*. *Culex anips*, which occurs only in California, bears a clasper which closely resembles that of a true *Choeroporpa: peccator*, occurring from Texas eastward, bears a similar clasper with minor differences; *abominator*, the form occurring between these two, shows similarities to both the other species, and *mulrennani*, the Florida form, may be another representative of this group.

Curiously enough, there appears to be no such gradations in the larvae of these species. Larvae and adults of *peccator* and *abominator* appear to have a rather large number of characters in common, whereas *anips* appears to be more distantly related.

CULEX (MELANOCONION) AIKENII (Aiken)

(Fig. 2)

Gnophodromyia inornata Theobald, 1905, Jour. Econ. Biol. 1: 21.

Gnophodromyia aikenii Aiken, 1907, Brit. Guiana Med. Ann., p. 60.

Culex cocosa Dyar and Knab, 1919, Insector Insectifae Menstruus 7: 47.

Culex panacossa Dyar, 1923, Insector Insectifae Menstruus 11: 120.

Culex aikenii Bonne and Bonne-Wepster, 1925, The Mosquitoes of Surinam, p. 277; Dyar, 1928, The Mosquitoes of the Americas, p. 337.

Larva.—Head: Preelypeal spines shorter than one-half the distance between them; hair 3 present at anterior margin of clypeus and inserted slightly lateral of preelypeal spine; hair 4 single, slight, socket as close or closer to that of hair 6 than is that of hair 5; hair 5 five- to seven-branched, 0.66 times as long as hair 6, heavily spiculate, the spicules long; hair 6 single, distal third extending beyond anterior margin of head, without spiculation; hair 7 nine- to twelve-branched, spiculate; hair 18 double or triple; hair 20 triple- to five-branched, hairs 18 and 20 subequal in length. Anterior ventral mandibular tooth slightly longer than width at base, posterior tooth much narrower and somewhat shorter, notched at tip, the sides almost parallel; maxillary spine 1.3 times as long as preelypeal, darkly pigmented, but not as heavy; mentum a broad shouldered central tooth and four or five either side becoming progressively larger distally. Antenna lightly infuscated from just below constriction to tip; subapical spines 1.1 times as long as hair 10; hair 10, 3.0 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules very short. Prothoracic hair formula (1-1-7-12)-2-1-1-(3-6)-(2-4); prothoracic hair 3, 0.75 times as long as head hair 5; prothoracic hair 4 with each of the two branches divided near base. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI triple- to seven-branched; hair 6 on segments III and VI 0.6 times as long as short branch of hair 11-6. Comb of 25 to 30 apically fringed scales in two or three irregular anterior rows and four to seven long pointed scales in one posterior row, the bases of all scales about the same

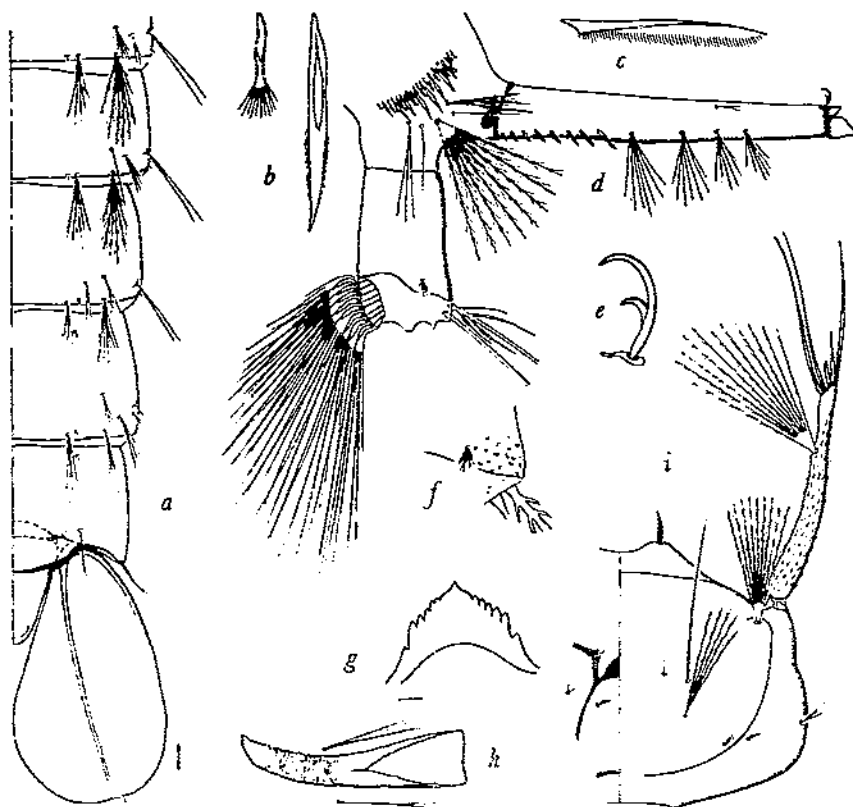


FIGURE 2.—*Culca* (*Melanoconion*) *alkeui* (Aiken): a, Terminal abdominal segments of pupa; b, anterior (left) and posterior (right) comb scales; c, pecten spine; d, terminal abdominal segments; e, terminal air-tube hook; f, armature of anal ring; g, mentum; h, pupal trumpets; i, ventral (left) and dorsal (right) views of head.

length as the free portions, the longest of the pointed scales about 2.5 times as long as the longest fringed ones. Proportions of anal ring 16 x 23, the ring widest at apex; armature consisting mainly of the large discontinuous rows of spines, here appearing in groups of two, three, or four; dorsal hair of dorsal brush with four or five short branches, the longest usually 0.5 times as long as anal ring; ventral brush 1.8 times as long as anal ring; gills four, the dorsal pair 0.5 times as long as the ventral, the ventral 0.6 times as long as ring. Air-tube index 5.3 to 5.5, tube without a median ring of infuscation; four or five pairs of ventral tufts, the anterior pair 1.3 times as long as width of air tube at point of insertion, posterior pair 1.3 times as long as tube width at insertion; pecten of five to nine well separated teeth on basal third of tube, proportions of sub-apical spine 1 x 10, an extremely fine ventral fringe present, their number not discernible; terminal hook 0.6 times as long as tube width at tip, with a stout secondary hook on basal third; acus with a very short dorsal arm.

Pupa.—Cephalothorax: Trumpet four times as long as width at tip, the sides tapering evenly from the base, pinna 0.45 times as long as total length, cleft at base of pinna 0.12 times as long as pinna. Hair 1 single or double; hair 2 triple; hair 3 triple or four-branched, these hairs increasing in length in that order; hairs 4 and 6 double; hair 5 four-branched, all the same length, hair 7 missing;

hair 8 triple, 0.5 times as long as trumpet; hair 9 double, 0.6 times as long as trumpet. Metathorax: Hair 10 with 10 to 14 branches; hair 11 double or single, 1.2 times as long as hair 10; hair 12 double or triple, same length as hair 10. Abdomen: Hair I-7 triple, 0.4 times as long as hair I-6; hair II-4 double, 2.0 times as long as six-branched hair 2; hair II-5 triple, 0.3 times as long as hair II-6, which is four- or five-branched. Hairs 4 and 6 on segment IV subequal. Hair IV-4 single, 1.5 times as long as hair IV-6, which is triple- or four-branched. Hair 5 on segments IV, V, and VI seven- to nine-branched, extending to two-thirds of the following segment, all branches spiculate; hairs 5 and 6 on segment VII triple and subequal. Hair 8 double on segments III through VI; hair VII-8 single, the same length as hair VII-4. Posterolateral corners of segment VIII drawn out into distinct posterior projections, hair VIII-8 single and inserted at extreme tip of this projection. Paddle hair 8, 5.0 times as long as paddle hair 7.

Material.—Panamá: Fourteen whole-mounted larvae (R); three larvae (USNM). Venezuela: two larvae, two pupae (R).

Distribution and habitat.—Mexico, Panamá, Guianas, Colombia, Venezuela. Dyar (1928) states that larvae occur among the roots of floating *Pistia*, and Bonne and Bonne-Wepster (1925) found it to occur "... in a ditch."

Taxonomic discussion.—Dyar's (1928) description of the larva is misleading in stating head hair 5 to be triple; these are distinctly single in the specimens examined. It is the only species in the subgenus whose larva lacks an armature of single spines on the anal ring, and whose head is provided with hair 3, a minute seta inserted on the anterior edge of the clypeus immediately posterior to and slightly laterad of the precltypeal spines. A more distinct character for its recognition is the combination of pointed and apically fringed scales in the comb, a character shared by only two other species, *batesi* and *chrysonotum*. It may be separated from these by the key characters. The pupa is the only one whose eighth segment is drawn out into distinct apico-lateral processes upon which hair VIII-8 is inserted.

CULEX (MELANOCONION) ALBINENSIS Bonne-Wepster and Bonne

(Fig. 3)

- Culex albinensis* Bonne-Wepster and Bonne, 1919, Insector Inscitiae Menstruus 7: 173; Bonne and Bonne-Wepster, 1925, The Mosquitoes of Surinam, p. 298; Dyar, 1928, The Mosquitoes of the Americas, p. 311; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 86; Lane, 1951, Ent. Soc. Wash. Proc. 53: 334.
- Culex maroniensis* Bonne-Wepster and Bonne, 1919, Insector Inscitiae Menstruus 7: 157.
- Culex gordoni* Evans, 1924, Ann. Trop. Med. and Parasitol. 18: 360.

Larva.—Head: Precltypeal spines longer than one-half the distance between them; hair 4 double, short, close to socket of hair 6 than is that of hair 5; hair 5 0.4 times as long as hair 6, triple to five-branched, spiculation fine and indistinct; hair 6 single, distal third extending beyond anterior margin of head; hair 7 nine-branched, spiculate; hair 18 five- or six-branched and the same length as hair 20, which is four-branched. Anterior ventral mandibular tooth as long as width at base, posterior ventral tooth narrower and slightly shorter, with a short anterior projection but little removed from the tip; maxillary spine 0.5 times as long and wide as precltypeals, darkly pigmented; mentum a broad central tooth and four smaller lateral teeth each side, sometimes a much smaller and more distinctly removed fifth. Antenna infuscated at extreme base and from insertion of antennal tuft to one-half the constricted portion; subapical spine 0.33 times as long as hair 10; hair 10, 2.2 times as long as terminal spine. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-(9-10)-1-1-1-3-2; prothoracic hair 3 the same length as head hair 5, spiculate. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6

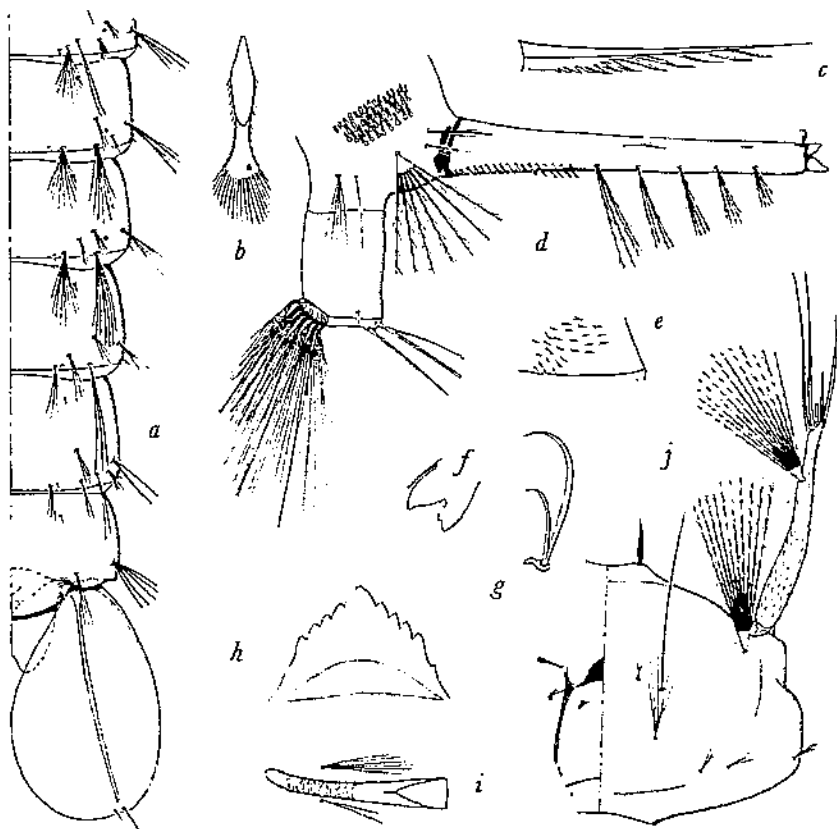


FIGURE 3.—*Culix (Melanoconion) ulbinensis* Bonne-Wepster and Bonne:
a, Dorsal view of terminal abdominal segments of pupa; *b*, comb scale from posterior row; *c*, subapical pecten spine; *d*, terminal abdominal segments; *e*, armature of anal ring; *f*, ventral mandibular teeth; *g*, terminal air-hook; *h*, mentum; *i*, pupal trumpet; *j*, ventral (left) and dorsal (right) views of head.

on segments III through VI triple or four-branched; hair III-6 0.75 times as long as short branch of hair II-6; hair VI-6 same length as short branch of that hair. Comb of 35 to 45 apically fringed scales in three or four irregular rows, scales in posterior row 1.3 times as long as those in anterior row, bases of all scales as long as the free portions. Proportions of anal plate destroyed in mounts; armature consisting of a broad patch of 20 to 25 pointed spines, the dorsal 10 or 12 larger than the ventral, covering posterior dorso-lateral surface of ring; dorsal hair of dorsal brush with a single shorter branch 0.8 times as long as ring; ventral brush 2.3 times as long as anal ring; gills four, 2.0 times as long as ring. Air-tube index 6.0 to 6.5, the tube with the faint suggestion of a ring medio-ventrally; five pairs of ventral tufts, the anterior pair 2.0 times as long as width of air tube at point of insertion, posterior pair 1.6 times as long as tube width at insertion; pecten of 17 to 19 separated spines on basal third of tube, the subapical spine 1×10 , with 12 to 20 fringing teeth, the basal minute, the apical long, the fringe not attaining the apex; terminal hook 0.5 times as long as tube width at tip with a long slender secondary spine rising from the base; acus normal.

Pupa.—Cephalothorax: Trumpet 6.0 times as long as width at tip, the lateral margins tapering evenly from the base; pinna 1.5 times as long as width at tip, the apical margin flat, the cleft at base of pinna 0.25 times as long as pinna itself.

Hair 1 five-branched, long; hair 2 0.5 times as long as hair 1, triple or four-branched; hair 3 triple, 1.5 times as long as hair 2. Hairs 4 and 6 triple and subequal; hair 5 five-branched; hair 7 double; both these hairs 1.6 times as long as hairs 4 and 6. Hair 8 five-branched, 0.4 times as long as trumpet; hair 9 double, 0.3 times as long as trumpet. Metathorax: Hair 10, 10- to 12-branched, 0.8 times as long as single hair 11; hair 12 triple or four-branched, 0.7 times as long as hair 11. Abdomen: Hair I-7 triple, 0.45 times as long as hair I-6; hair II-1 single, 1.8 times as long as hair II-2, which is 20-branched; hairs 5 and 6 on segment II four- or five-branched, the former 1.5 times as long as the latter; hairs 4 and 6 on segment IV four- or five-branched and triple, respectively, the former 2.0 times as long as the latter; hairs 4 and 6 on segment V triple or four-branched, the former 1.5 times as long as the latter. Hair V on segments IV and V seven- to eight-branched and six- to seven-branched, respectively, hair IV-5 extending two-thirds the distance along the following tergite, hair V-5 extending three-fourths this distance; hair VI-5 double or triple, heavier than hair 5 of the preceding two segments, extending seven-eighths of the distance along the tergite of segment VII; hairs 5 and 6 on segment VII double, the latter 1.8 times as long as the former. Hair 8 on segments III, IV, V, and VI triple or four-branched; hair VII-8 heavy, double, without spiculation, 0.7 times as long as hair VIII-8; hair VIII-8 with five stout, bare branches the same length as those of hair VII-8, inserted anterior to the postero-lateral corner; paddle hair 8, 2.5 times as long as paddle hair 7.

Material.—Colombia: One larval skin, one pupal skin, both associated with a male (R).

Distribution and habitat.—Surinam, Venezuela, Brazil. Larvae collected in marshy areas and in ground pools.

Taxonomic discussion.—The larva of *albinensis* described here agrees with Dyar's description (1928) in all respects except that of the comb, which he states to be composed of several large spines in a patch. The larva of this species is similar in all important respects to that of *phlogistus*. The major difference is the type of terminal hook, that of *albinensis* having a strong secondary arising from the extreme base and about one-half as long as the primary. The secondary of *phlogistus* is reduced and arises from the basal fifth of the shaft. The pupae may be recognized most easily by their trumpets, that of *albinensis* tapering evenly from base to apex, and that of *phlogistus* appearing to have its widest diameter proximal to the tip. Lane (1951) states *maroniensis* to be the same as *albinensis*, but lack of immature material of the former species precludes a comparison in these stages.

CULEX (MELANOCONION) ALCOCCI Bonne-Wepster and Bonne

(Fig. 4)

Culex alcocci Bonne-Wepster and Bonne, 1939, Insector Inscilinae Menstruus 7: 171; Bonne and Bonne-Wepster, 1925, The Mosquitoes of Surinam, p. 290; Dyar, 1928, The Mosquitoes of the Americas, p. 302.

Larva.—Head: Preclypeal spines longer than one-half the distance between them; hair 4 missing, but sockets closer to each other than to those of head hair 5; hair 5 with 11 branches, all of which are stout and heavily spiculate, 1.3 times as long as hair 6; hair 6 with nine or ten branches, the individual branches stout and none attaining anterior margin of head, all heavily spiculate; hair 7 nine- to eleven-branched, spiculate; hairs 18 and 20 not discernible. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth narrower and shorter with a blunt anterior projection near base; maxillary spine 0.5 times as long and 0.33 times as thick as preclypeals, not darkly pigmented; mentum a broad central tooth and six to eight each side. Antenna entirely infuscated; subapical spines 1.2 times as long as hair 10; hair 10, 2.0

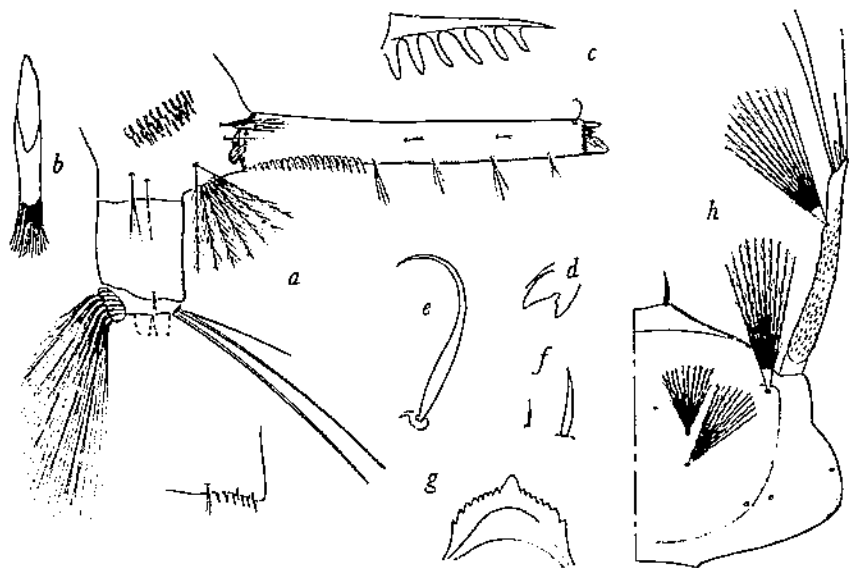


FIGURE 4.—*Culex (Melanoconion) alcocki* Bonne-Wepster and Bonne: a, Terminal abdominal segments of larva and armature of anal ring; b, comb scale from posterior row; c, subapical pecten spine; d, ventral mandibular teeth; e, terminal air-tube hook; f, maxillary (left) and preclypeal (right) spines; g, mentum; h, dorsal view of head.

times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules minute yet plainly visible. Prothoracic hair formula (1-1-0)-2-1-1-2-2; prothoracic hair 3, 2.0 times as long as head hair 5 and the same length as prothoracic hair 1. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI single or double. Comb of 30 to 32 apically fringed scales in two or three irregular rows, scales in posterior row 1.5 times as long as those in anterior row, bases of all scales about the same length as free portions. Proportions of anal ring destroyed in mounting; armature consisting of 8 to 10 short, pointed spines confined to extreme posterior dorso-lateral border of ring; dorsal hair of dorsal brush with one shorter branch 1.2 times as long as anal ring; ventral brush 3.0 times as long as anal ring; gills distorted badly in mount. Air-tube index 5.0, without a central ring of infuscation; four pairs of ventral tufts, the anterior pair 1.3 times as long as width of tube at point of insertion, posterior pair the same length as width of tube at insertion; pecten of 17 or 18 touching spines, the subapical 1×5 , with 4 to 7 extremely large, well-separated fringe teeth; terminal hook 0.5 times as long as width of tube at apex without a secondary hook whatever; acus normal.

Material.—Surinam. One larval skin associated with a male (USNM No. 22705).

Distribution and habitat.—Surinam. In temporary forest pools, often in association with *Aedes* larvae.

Taxonomic discussion.—The single larva examined agrees very well with the descriptions of Bonne and Bonne-Wepster (1925) and of Dyar (1928). It is unmistakably recognized by the multiple head hair 6, the only *Melanoconion* seen in this study with a multiple lower head hair.

CULEX (MELANOCONION) ANIPS Dyar

(Fig. 5)

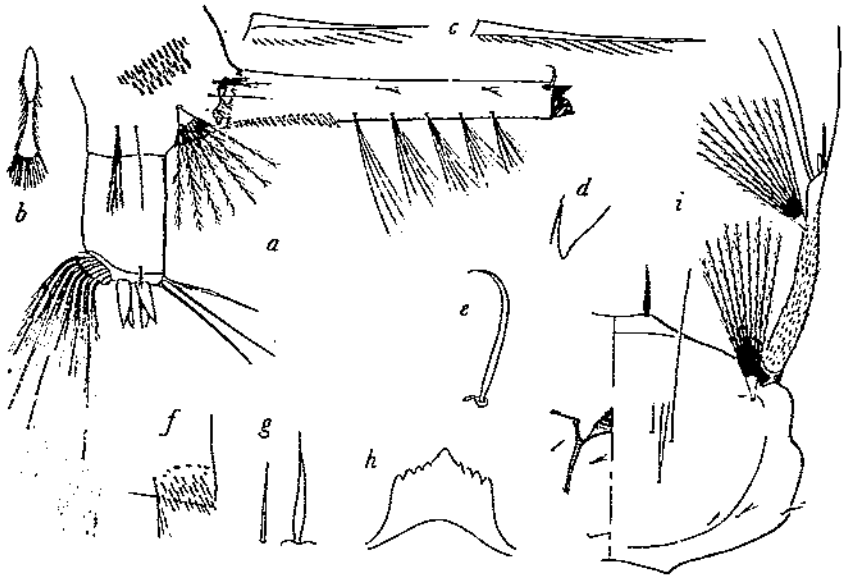


FIGURE 5.—*Culex (Melanoconion) anips* Dyar: *a*, Terminal abdominal segments of larva; *b*, comb scale from posterior row; *c*, subapical (left) and apical (right) pecten spines; *d*, ventral mandibular teeth; *e*, terminal air-tube hook; *f*, armature of anal ring; *g*, maxillary (left) and preclypeal (right) spines; *h*, mentum; *i*, ventral (left) and dorsal (right) views of larval head.

Culex anips Dyar, 1916, *Insector Insectivae Menstruus* 4: 48; King and Bradley, 1937, *Ent. Soc. Amer. Ann.* 37: 358; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 87; Brookman and Reeves, 1953, *Ent. Soc. Amer. Ann.* 46: 231.

Larva.—Head: Preclypeal spines longer than one-half the distance between them; hair 4 single, the sockets closer to those of hair 6 than to each other; hair 5 single or double, 0.44 times as long as hair 6, spiculation extremely fine and present on apical half only; hair 6 single, distal 0.4 extending beyond anterior margin of head, spiculation confined to apical two-thirds; hair 7 multiple, long, spiculate; hair 18 double, hair 20 four- to six-branched and the same length as hair 18. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth entirely lacking; maxillary spine 0.8 times as long as broad as preclypeal, darkly pigmented; mentum a broad shouldered tooth and four or five smaller each side, increasing in size distally. Antenna infuscated on entire constricted portion; subapical spines 1.1 times as long as hair 10; hair 10, 3.8 times as long as terminal spine. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-7)-1-1-1-3-2; prothoracic hair 3, 1.25 times as long as hair 5, distinctly spiculate. Abdomen: Integument bare. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI double to four-branched. Comb of 40 to 50 apically fringed scales in three or four irregular rows, scales in posterior row 1.2 times as long as those in anterior row, bases of all scales 3.0 times as long as free portions. Proportions of anal plate 14 x 20; armature consisting of a small triangular patch of 20 to 25 slender spines near but not confined to posterior dorso-lateral border; dorsal hair of dorsal brush with two shorter branches, the longest 1.5 to 1.7 times as long as anal ring; ventral brush 2.25 times as long as ring; gills 4, 0.33 times as long as ring, tapering to narrow points from broad bases. Air-tube index 5.8; tube without a central ring of infuscation; nine ventral

tufts, the anterior tuft 3.3 times as long as width of air tube at point of insertion, posterior tuft 2.0 times as long as tube width at insertion; pecten of 17 to 19 spines on basal third, subapical spine 1 x 6, with 12 to 15 fringing teeth becoming longer toward apex, but not attaining it, the apical spine 1 x 10, with 20 to 25 very fine subequal fringing spines; terminal hook 0.6 times as long as tube width at insertion, without secondary hook whatever; acus normal.

Material.—Baja California: One whole-mounted larva (USNM).

Distribution and habitat.—Reported from southern California in large permanent pools with cattails and *Lemna*, and from Lower California.

Taxonomic discussion.—See remarks under *abominator*. The larva of *anips* is closely related to that of *abominator* and *peccator* in having apically fringed comb scales, long basal air-tube tufts, a single prothoracic hair 4, and a nearly bare abdomen. It is easily separated from these by the absolute lack of a posterior ventral mandibular tooth, a character which only rarely occurs in this subgenus.

CULEX (MELANOCONION) ATRATUS Theobald

(Fig. 6)

Culex atratus Theobald, 1901, A Monograph of the Culicidae 2: 55; Dyar, 1928, The Mosquitoes of the Americas, p. 338.

Culex falsifeator Dyar and Knab, 1909, Smithsn. Misc. Collect. 52: 257.

Culex adrievi Floch and Abonnenc, 1945, Inst. Pasteur de la Guyane et du Ter. de l'Inini, p. 110: 29.

Larva.—Head: Preclypeal spines longer than one-half the distance between them; hair 4 single, long, about 0.5 times as long as hair 5, same distance from each other as they are from socket of hair 6; hair 5 four- to six-branched, 0.40 times as long as hair 6, not spiculate; hair 6 single, distal 0.4 extending beyond anterior margin of head, spiculation short but distinct; hair 7 nine- to eleven-branched, heavily spiculate; hairs 18 and 20 missing. Anterior ventral mandibular tooth as long as width at base, posterior ventral tooth the same length but narrower, with a blunt anterior projection removed from tip; maxillary spine 0.6 times as long and 0.4 times as wide as preclypeal, very slightly pigmented; mentum a broad central tooth and four to six each side, the sixth somewhat removed. Antenna infuscated on extreme base and entire constricted portion; subapical spines 2.0 times as long as hair 10; hair 10, 1.8 times as long as apical spine. Thorax: Integument spicular-pilose, the spicules long and heavy. Prothoracic hair formula (1-1-6-7)-2-1-1-3-2; prothoracic hair 3, 1.4 times as long as head hair 5, distinctly spiculate. Abdomen: Integument bare. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI three- or four-branched; hair III-6, 0.60 times as long as short branch of hair II-6; hair VI-6, 0.85 times as long as short branch of that hair. Comb of 45 to 55 apically-fanned scales in three or four irregular rows, the scales in the posterior row 2.0 times as long as those in anterior row, bases of scales in posterior row 0.40 times as long as the scale itself. Proportions of anal plate 14 x 23, wider at apex than at base; armature consisting of six to eight extremely long, slender, sharply pointed spines crowded together on or very close to posterior dorso-lateral border; dorsal hair of dorsal brush with two to four shorter branches, the longest of these 1.3 times as long as anal ring; ventral brush 2.4 times as long as ring, gills four, 0.5 times as long as ring, tapered from broad bases to narrow points. Air-tube index 8.0 to 10.0; tube without a central infuscated ring; four or five pairs of fine ventral tufts, the individual tufts usually irregularly spaced and without spiculation, the anterior pair 1.5 to 1.9 times as long as width of air tube at point of insertion, the posterior pair 0.6 times as long as width of tube at insertion; pecten of 15 to 22 separated teeth on basal fourth of tube, the posterior tooth tending to be removed from the others, the subapical tooth 1 x 7, with 15 fringing teeth tending to become longer toward the apex; terminal hook 0.33 times as long as air-tube width at tip, with fine secondary hook on basal third; acus with a very short dorsal projection.

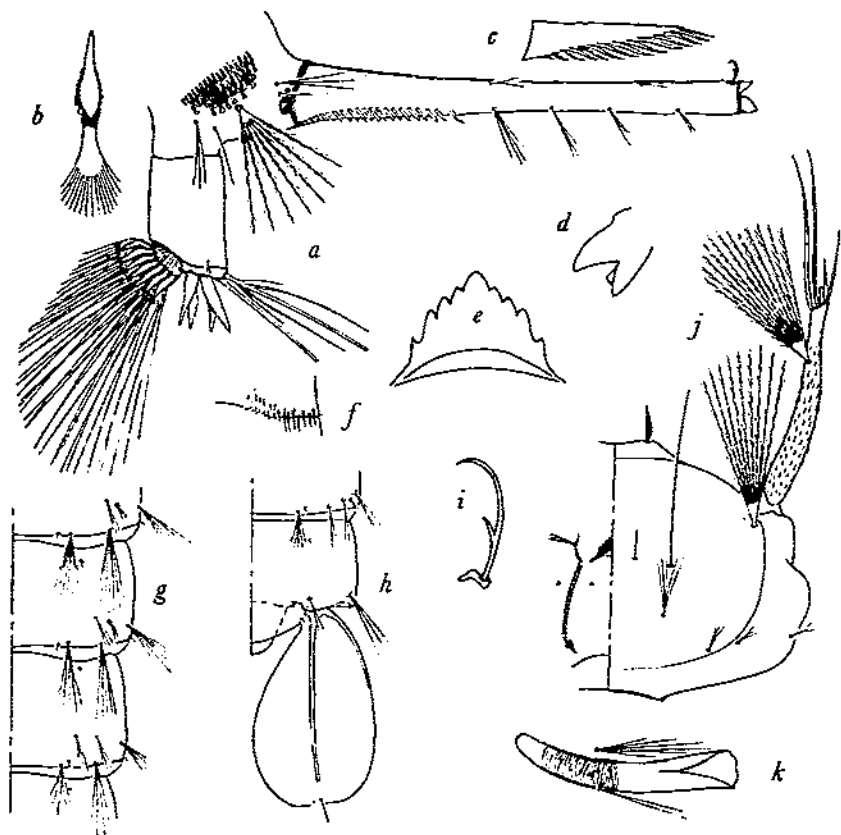


FIGURE 6.—*Culex (Melanoconion) atratus* Theobald: *a*, Terminal abdominal segments of larva; *b*, comb scale from posterior row; *c*, subapical pecten spine; *d*, ventral mandibular teeth; *e*, mentum; *f*, armature of anal ring; *g*, dorsal view of segments IV and V of pupa; *h*, terminal abdominal segments of pupa (dorsal); *i*, terminal air-tube hook; *j*, ventral (left) and dorsal (right) views of head; *k*, pupal trumpet.

Pupa.—Cephalothorax: Trumpet rather strongly curved, six times as long as width at tip, the lateral margins tapering very gently from base to apex; pinna 1.3 times as long as wide, cleft at its base, 0.5 times as long as pinna, distal margin slightly evaginated. Hair 1 four- or five-branched, 1.8 times as long as triple hair 2; hair 3 triple- or four-branched and 0.8 times as long as hair 1. Hair 4 triple- or four-branched, 0.75 times as long as hair 5; hair 5 four- or five-branched; hairs 6 and 7 double and the same length as hair 5. Hair 8 five-branched, 0.6 times as long as trumpet; hair 9 double, 0.4 times as long as trumpet. Mesothorax: Hair 10 seven to ten-branched, 0.75 times as long as single hair 11; hair 12 triple and the same length as hair 11. Abdomen: Hair 1-7 double, 0.45 times as long as hair 1-6; hair 11-2 with about 15 branches, 0.75 times as long as single hair 11-4; hairs 5 and 6 on segment II four- or five-branched, the former 3.0 times as long as the latter; hairs 4 and 6 on segment IV triple- or four-branched, the former 3.0 times as long as the latter; hairs 4 and 6 on segment V triple- or four-branched, the former 1.25 times as long as the latter. Hair IV-5 seven- or eight-branched, hair V-5 five- or six-branched, these hairs attaining the basal two-thirds of the following tergites; hair VI-5 with four slightly heavier branches, attaining basal half of following tergite; hairs 5 and 6 of segment VII double and subequal. Hair 8 on segments III through VI with

four to six branches; hair VII-8 the same length but with only two heavier branches; hair VIII-8 triple, the branches heavy, 1.25 times as long as hair VII-8, inserted anterior to the postero-lateral corner. Paddle hair 8, 2.5 times as long as paddle hair 7.

Material.—Florida: 19 whole-mounted larvae (P). Haiti: Two whole-mounted larvae (USNM); three whole-mounted larvae (R). Virgin Islands: One whole-mounted larva (USNM); four whole-mounted larvae (R). Puerto Rico: 96 larval skins and whole-mounted larvae, 15 pupal skins (P); three whole-mounted larvae (NSNM).

Distribution and habitat.—Florida, Jamaica, Haiti, Trinidad, Guadeloupe, Puerto Rico, Virgin Islands, Cuba, Brazil. The larvae occur in ground pools.

Taxonomic discussion.—The male of *atratus* is closely related to those of *commercyensis*, *dunni*, *spissipes*, and *zetei* in having a striate leaf on the sidepiece distal to the outer division of the lobe. Together these five species comprise the Section *Melanoconion* as originally proposed by Dyar (1928). Few larval characters common to all five species have been found which separate them as a group corresponding to the adults. The larva of this species may be distinguished by the long air tube (index 8.0 or over) and by the other key characters. It has many characters in common with *dunni*, from which it is separated by the lack of a median air-tube ring, the long prothoracic hair 3 and the relatively greater number of spines in the armature of the anal ring. The pupa appears to be closely related to *hatsi*, *lucifugus*, and *iolambdis*, the differences between which are outlined in the key.

CULEX (MELANOCONION) BASTAGARIUS Dyar and Knab

(Fig. 7)

Culex bastagarius Dyar and Knab, 1906, Biol. Soc. Wash. Proc. 19: 170; Boune and Bonne-Wepster, 1925, The Mosquitoes of Surinam, p. 302; Dyar, 1928, The Mosquitoes of the Americas, p. 321.

Culex rapulans Dyar, 1920, Insector Insectiæ Menstruus 8: 69.

Culex virgatus Dyar, *Ibid.*, p. 78.

Culex alfaroi Dyar, 1921, Insector Insectiæ Menstruus 9: 34.

Culex innominatus Evans, 1924, Ann. Trop. Med. and Parasitol. 18: 363 Root, 1927, Amer. Jour. Hyg. 7: 587; Dyar, 1928, The Mosquitoes of the Americas, p. 318.

Culex curlyx Dyar and Shannon, 1924, Insector Insectiæ Menstruus 12: 48.

Larva.—Head: Pre-clypeal spines shorter than one-half the distance between them; hair 4 single or double, longer than the distance between them, closer to each other than to socket of hair 6; hair 5 four- to eight-branched, 0.37 times as long as hair 6, no visible spicules; hair 6 single, distal third extending beyond anterior margin of head, spiculation present but short; hair 7 multiple, spiculate; hair 18 double, the same length as hair 20, which is five- to six-branched. Anterior ventral mandibular tooth as long as width at base, posterior ventral tooth the same length but narrower, with a wide notch at tip; maxillary spine 0.7 times as long and wide as pre-clypeal, darkly pigmented; mentum with a strong central tooth and four or five lateral, blunt ones which increase in size distally. Antenna not markedly bifuscated, constricted portion 0.45 times as long as entire antenna; subapical spines 1.20 times as long as hair 10; hair 10, 2.5 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules not long or dense. Prothoracic hair formula (1-1-3-4): 1-1-1-3-2; prothoracic hair 3, 1.5 times as long as head hair 5, without visible spicules. Abdomen: Integument spicular-pilose. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI with three or four branches; hair III-6, 0.60 times as long as short branch of hair 11-6; hair VI-6, 0.80 times as long as short branch of that hair. Comb of 25 to 35 rather broad,

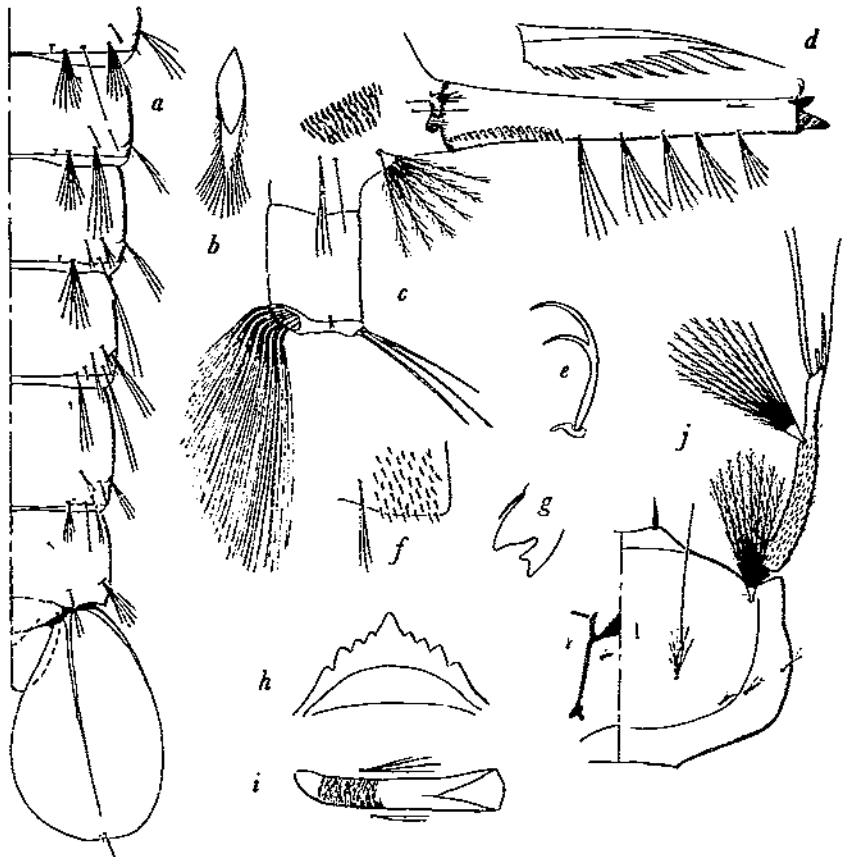


FIGURE 7.—*Culex (Melanoconion) hastagurii* Dyar and Knab: *a*, Dorsal view of posterior abdominal segments of pupa; *b*, comb scale from posterior row; *c*, terminal abdominal segments of larva; *d*, subapical pecten spine; *e*, terminal air-tube hook; *f*, armature of anal ring; *g*, ventral mandibular teeth; *h*, mentum; *i*, pupal trumpet; *j*, ventral (left) and dorsal (right) views of head of larva.

apically-fringed scales in three rows, scales in posterior row 1.1 times as long as those in anterior row; individual scale short, with fringe about as long as the base, without an intervening narrow portion between. Proportions of anal ring 14×18 , with a darkly pigmented anterior border; armature consisting of a broad patch of single spines covering the posterior dorso-lateral surface, and not confined to the posterior border; dorsal hair of dorsal brush with a single shorter branch, 1.3 times as long as anal ring, ventral brush 2.3 times as long as ring; gills four, 2.0 times as long as ring, tapering to blunt points. Air-tube index 6.2 to 6.5; tube with or without a median ring of infuscation near the middle; four or five pairs of ventral tufts, the anterior pair 2.4 times as long as width of air tube at point of insertion, posterior pair 2.2 times as long as tube width at insertion; pecten of 14 to 18 separated spines on basal third of tube, subapical spine 1×6 with 8 to 12 fringing spines growing longer toward the apex; terminal hook with strong secondary hook on basal half, 0.70 times as long as air tube width at tip; acns normal.

Pupa.—Cephalothorax: Trumpet 4.5 times as long as width at tip, the lateral borders tapering evenly from a rather broad base; pinna 1.4 times as long as width, cleft at base 0.33 times as long as pinna itself, distal margin noticeably evaginated. Hair 1 four- or five-branched, 1.4 times as long as hairs

2 and 3, which are triple and subequal. Hairs 4 and 5 triple or four-branched and subequal, hairs 6 and 7 double, the former 0.5 and the latter 2.3 times as long as hair 5. Hair 8 four- or five-branched, 0.4 times as long as trumpet; hair 9 double and 0.25 times as long as trumpet. Metathorax: Hair 10 eight- to twelve-branched, 0.7 times as long as the single hair 11; hair 12 four-branched, 0.55 times as long as hair 11. Abdomen: Hair I-7 triple, 0.33 times as long as hair I-6; hair II-4 single, 2.0 times as long as hair II-2, which has about 15 branches; hairs 5 and 6 on segment II triple or four-branched, the former 1.3 times as long as the latter. Hairs 4 and 6 on segment IV single or double, subequal; hair V-4 double, 1.5 times as long as hair V-6, which has four to six branches. Hair 5 on segment IV five- or six-branched, attaining basal two-thirds of following segment; hair V-5 distinctly heavier, double, equaling or exceeding posterior tergite by one-tenth its length; hair VI-5 attaining basal three-fourths of following tergite, heavy and double. Hairs 5 and 6 on segment VII single or double, subequal. Hair 8 on segments III through VI triple or four-branched; hair VII-8 about half as long as these hairs, triple and distinctly heavier; hair VIII-8 with five or six heavy branches, about 1.75 times as long as hair VII-8, inserted anterior to postero-lateral corner, which is pointed but not prolonged. Paddle hair eight, 3.0 times as long as minute paddle hair 7.

Material.—Panamá: Three larval skins, two pupal skins (R); Surinam: Two larvae, three pupae (USNM); Colombia: One larva, one pupa (USNM); Venezuela: Two larvae, one pupa (USNM); one larval skin (R). Brazil: Six larvae, eight pupae (USNM).

Distribution and habitat.—Mexico, Panamá, Costa Rica, Trinidad, Surinam, Colombia, Venezuela. Several of the specimens studied were taken from an open backwash with grassy margins, a floating plant called "berro," and clear but tea-colored water.

Taxonomic discussions.—Of the recorded synonyms, the following facts have been brought to light: *Culex sicilyis* as described by Dyar (1928) does not fit the above description in having a single head hair 5. The writer has not seen the larvae used for Dyar's description, so he cannot compare them with *abominator*, to which this synonym may run in the key. Dyar states that the males of *sicilyis* are quite comparable to those of *cuclys*, the latter being listed by both Dyar (1928) and Rozeboom and Komp (18, p. 87) as a synonym of *bastagarius*. It may be that *sicilyis* actually differs from this species by other larval characters described by Dyar. Dyar's description of the Venezuelan *innominatus* is actually that of a larva whose identity is unknown to the writer, since the form does not correspond to any of the larvae or available descriptions. The writer has therefore considered this as Species B. It is certainly not that of *bastagarius*, which has apically fringed comb scales.

Root's specimen (Dyar 1928) No. 24 *d* or *e* is apparently the larva of *bastagarius*, although no further description is given. Bonne and Bonne-Wepster (1925) have described a similar larva that agrees well with the writer's specimens of *bastagarius*. Root's specimen No. 24 *e* or *d* (Dyar 1928) belongs to a species whose identity is unknown, since Dyar's information is entirely inadequate to allow it to be placed in the key. Root's own description of the larva (1927) does not fit that of *bastagarius* because of the pointed comb scales. This specimen may be the same species as the one Dyar had from Venezuela. Dyar's description of *bastagarius* (1928) appears to be actually of that species, although he states the air-tube index to be about 8.0 instead of the 6.5 to 7.0 the author has recorded. Unfortunately, the larval mounts of the synonyms discussed above have been lost and are not available for examination.

CULEX (MELANOCONION) BATESI Rozeboom and Komp

(Figs. 8 and 9)

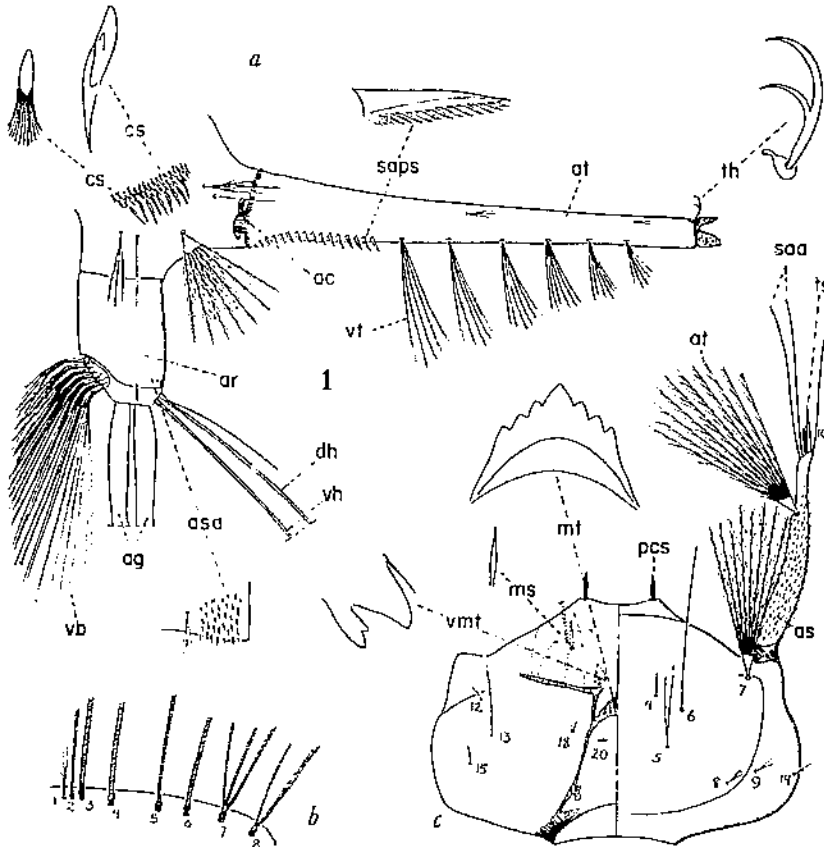


FIGURE 8.—*Culex (Melanoconion) batesi* Rozeboom and Komp: *a*, Terminal abdominal segments of larva; *b*, dorsal prothoracic hairs of larva; *c*, ventral (left) and dorsal (right) views of head of larva; *ac*, acus; *ag*, anal gills; *ar*, anal ring; *as*, antennal shaft; *asa*, anal segment armature; *at*, air tube, antennal tuft; *cs*, comb scale; *dh*, dorsal hair of dorsal tuft; *ms*, maxillary spine; *mt*, mentum; *pcs*, preclypeal spine; *saa*, subapical antennal spines; *saps*, subapical pecten spine; *th*, terminal air-tube hook; *ts*, terminal spine; *vb*, ventral brush; *vh*, ventral hair of dorsal tuft; *vmt*, ventral mandibular teeth (anterior and posterior); *vt*, ventral air-tube tufts.

Culex batesi Rozeboom and Komp, 1948, Jour. Parasitol. 34: 404; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 48.

Larva.—Head: Preclypeal spines the same length as one-half the distance between their bases; hair 4 single or double, slight, closer to each other than to hair 6; hair 5 double or triple, 0.50 times as long as hair 6, with a few long, very fine spicules on outer half; hair 6 single, distal half extending beyond anterior margin of head, spicules short; hair 7 eight- to twelve-branched, splenulate; hair 18 double or triple, the same length as hair 20 which has five or six branches. Anterior ventral mandibular tooth as long as width at base, the posterior ventral tooth narrower and shorter, with a notch at tip; maxillary spine 0.80 times as long and 0.66 times as wide as preclypeal, darkly pigmented; mentum a broad shouldered central tooth with three smaller, blunt teeth each side,

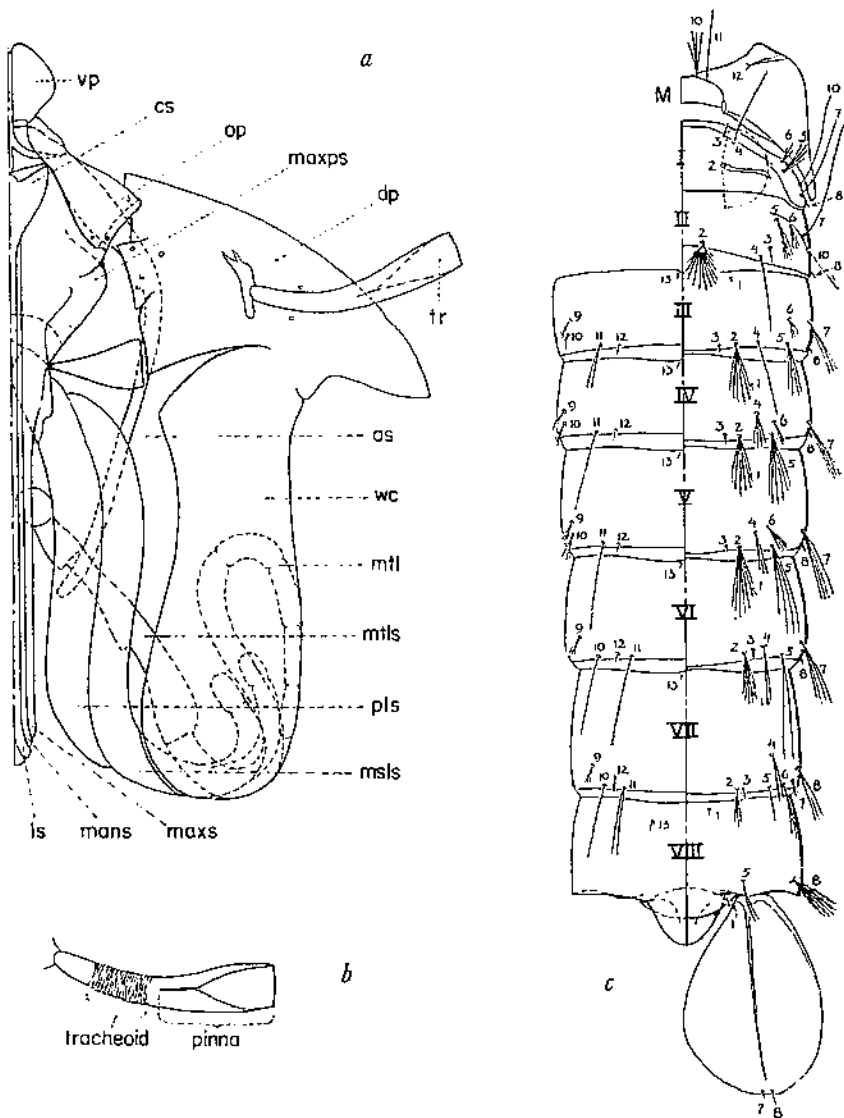


FIGURE 9.—*Culicoides (Melanoconion) halesi* Rozeboom and Koump: *a*, Cephalothorax; *b*, pupal trumpet; *c*, ventral (left) and dorsal (right) view of metathorax and abdomen; *as*, antennal sheath; *cs*, clypeal sheath; *dp*, dorsal plate; *ls*, labral sheath; *mans*, mandibular sheath; *maxps*, sheath of maxillary palp; *maxs*, maxillary sheath; *msls*, sheath of mesothoracic leg; *mtl*, metathoracic leg; *mtls*, metathoracic leg sheath; *op*, ocular plate; *pls*, prothoracic leg sheath; *tr*, trumpet; *vp*, vertical plate; *wc*, wing case.

sometimes a small, well-removed fourth. Antenna entirely infuscated except for a light band encircling middle third of shaft; subapical spines 1.3 times as long as hair 10; hair 10, 3.0 times as long as terminal spine. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-4)-1-1-1-3-2; prothoracic hair 3, 2.0 times as long as head hair 5, spiculate; prothoracic hair 10 double. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI triple or four-branched, hair III-6 0.70 times as long as short branch of hair II-6, hair VI-6 0.80 times as long as short branch of that hair. Comb of two or three irregular anterior rows of small apically fringed scales and one posterior row of 6 to 9 long, pointed scales, the latter 2.0 times as long as the former, the bases of both kinds of scales as long or longer than the free portions. Proportions of anal ring destroyed in mount; armature consisting of a triangular patch of short but pointed spicules covering the posterior dorso-lateral surface, not confined to the posterior border; dorsal hair of dorsal brush with one or two branches, the longest 1.3 times as long as ring; ventral brush 2.2 times as long as ring; gills four, about four times as long as anal ring. Air-tube index 6.3 to 6.7, without a central ring of infuscation; five to six pairs of ventral tufts, the anterior pair 2.5 times as long as width of air tube at point of insertion, the posterior pair 1.3 times as long as air tube width at insertion; pecten of 15 to 19 well-spaced spines on basal third of tube, the subapical spine 1 x 5, with 12 to 16 fringe teeth becoming progressively longer toward the apex; terminal hook 0.60 times as long as width of tube at tip, with a very strong secondary hook inserted on basal half; acus normal.

Pupa.—Cephalothorax: Trumpet four times as long as width at apex, the lateral margins tapering gradually from a narrow base; pinna 1.25 times as long as wide, the cleft at base 0.20 times as long as pinna, the distal margin distinctly evaginated at middle. Hair 1, four- or five-branched, 2.25 times as long as six-branched hair 2 and 1.5 times as long as double hair 3. Hair 5, five- or six-branched, 2.25 times as long as hair 4, which is triple or four-branched; hairs 6 and 7 double, the former 0.45 and the latter 1.25 times as long as hair 5. Hair 8 four-branched, 0.4 times as long as trumpet; hair 9 double, 0.3 times as long as trumpet. Metathorax: Hair 10 six- to eight-branched, 0.8 times as long as single hair 11; hair 12 triple or four-branched, 0.6 times as long as hair 11. Abdomen: Hair I-7 single, 0.85 times as long as hair I-6; hair II-4 single, 2.25 times as long as hair II-2, which has about 15 branches; hairs 5 and 6 on segment II triple or four-branched, the former 1.9 times as long as the latter; hair IV-4 six-branched, 1.4 times as long as hair IV-6, which is double or triple; hair V-4 triple, 1.4 times as long as hair V-6, which is five- or six-branched. Hair IV-5, six- to eight-branched, subequal to hair V-5, which is four- to six-branched, both these hairs attaining basal two-thirds of following tergites; hair VI-5 with only two heavier branches, attaining the basal three-fourths of tergite VII. Hair VII-6 double, 1.7 times as long as single hair VII-5. Hair 8 on segments III through VI triple to five-branched; hair VII-8 distinctly heavier, triple, 0.75 times as long as hair VI-8; hair VIII-8 five-branched, and distinctly spiculate, 0.8 times as long as hair VII-8, inserted anterior to the postero-lateral corner, which is pointed but not drawn out into a projection posteriorly. Paddle hair 8 only 2.0 times as long as paddle hair 7.

Material.—Colombia: Five larvae, five pupae, two of these associated with USNM paratypes (USNM), seven larval and pupal skins, three of each associated with paratypes (R).

Distribution and habitat.—Colombia. Specimens examined were collected from partly shaded, shallow margin of a stream, and from pools and swamps.

Taxonomic discussion.—*Culex batesi* is one of four species whose larvae possess both pointed and apically fringed comb scales. It may be separated from *aikeni* by the anterior ventral air-tube tuft which is over 2.5 times as long as the width of the tube at the point of insertion, from *chrysonotum*, in having a glabrous abdominal integument and by the other characters given in the key, and from *zeteki* by the long ventral air-tube tufts and the branching of head hair 5. The male appears to be very close to that of *bonneti*, but the larvae of the two species are easily separable by the comb characters.

CULEX (MELANOCONION) BONNETI Senevet

(Fig. 10)

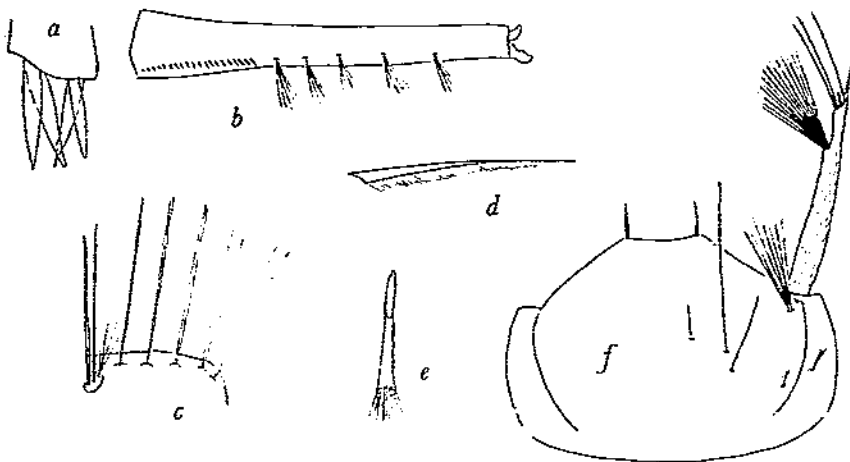


FIGURE 10.—*Culex (Melanoconion) bonneti* Senevet: a, Anal segment and gills; b, air tube; c, prothoracic hairs 1 through 8; d, pecten spine; e, comb scale; f, dorsal view of head. Redrawn from Floch and Abonnenc (1945).

Culex bonneti Senevet, 1938, Inst. Pasteur d'Algérie, Arch. 16: 187; Floch and Abonnenc, 1945, Inst. Pasteur de la Guyane et du Ter. de l'Inini 110: 31.

Larva.—Head: Hair 4 single, slight; hair 5 single, almost two-thirds the length of hair 6, and nearly attaining anterior border of head; hair 6 single, distal third extending beyond anterior margin of head. Antenna normal; sub-apical spines subequal; hair 10 nearly as long as subapicals; terminal spine one-fourth to one-third that of hair 10. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-3-5)-1-1-1-2-2; prothoracic hair 3 not one-half as long as head hair 5. Abdomen: Integument largely glabrous. Hair 6 on segments III through VI triple. Armature of anal ring apparently consisting only of enlarged denticulated combs, no single spines being present. Comb of several rows of about 45 apically fringed scales in several rows. Air-tube index 5.3; no median infuscation on tube; five pairs of ventral tufts; pecten of about 23 spines placed very close to each other.

Material.—No specimens available for study. The description was taken entirely from that of Floch and Abonnenc (1945).

Distribution and habitat.—Guadeloupe. From pools in sugarcane fields, bodies of water covered with vegetation and from roadside ditches.

Taxonomic discussion.—Floch and Abonnenc (1945) state that females of this species may easily be confused with those of *thomasi*, but the lack of extensive areas of single spines on the anal ring, the relatively small prothoracic hair 3, and the lack of a median air-tube infuscation adequately separate *bonneti* from that species.

CULEX (MELANOCONION) CARCINOPHILUS Dyar and Knab

(Fig. 11)

Culex carcinophilus Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 220; Dyar, 1928, The Mosquitoes of the Americas, p. 320; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 88.

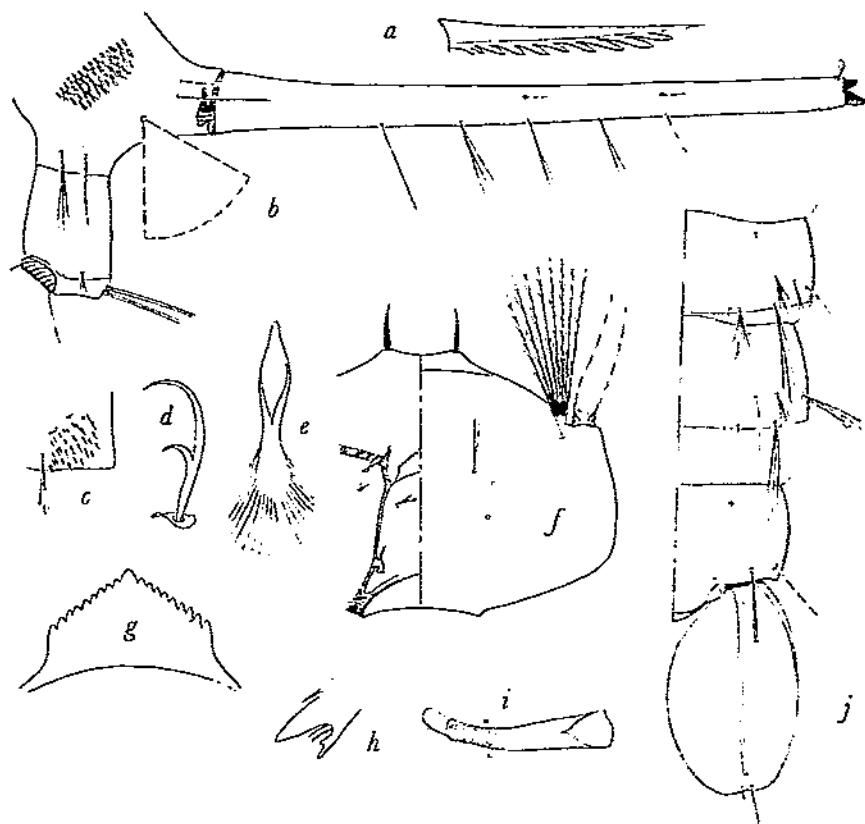


FIGURE 11.—*Culex (Melanoconion) carcinophilus* Dyar and Kuab: *a*, Subapical pecten spine; *b*, terminal abdominal segments of larva; *c*, armature of anal ring; *d*, terminal air-tube hook; *e*, comb scale from posterior row; *f*, ventral (left) and dorsal (right) views of head; *g*, mentum; *h*, ventral mandibular teeth; *i*, pupal trumpet; *j*, segments IV, V, and VIII of pupal abdomen (dorsal).

Larva.—Head: Preclypeal spines longer than one-half the distance between them; hair 4 long, forked beyond middle, as close to socket of hair 6 as is hair 5; hairs 5 and 6 missing (Dyar 5). Upper tuft large, six-haired, exceeding anterior edge of head, lower single, long, distal half extending beyond anterior margin of head; hair 7 with eight branches, spiculate; hair 18 slightly shorter than hair 20. Anterior ventral mandibular tooth much longer than width at base, posterior ventral tooth quite narrow, with a narrow anterior projection distinctly removed from tip; maxillary spine 1.25 times as long and 0.5 times as wide as preclypeal, not darkly pigmented; mentum a broad central tooth and about nine quite small each side. Antennae missing (Dyar 1928: "... antennae long, rather slender"). Thorax: integument spicular-pilose, the spicules light and not dense. Prothoracic hair formula (1-1-?)-1-1-1-3-2. Abdomen: Integument glabrous. Hair I-6 double, hair I-7 single; hair II-6 double; hair 6 on segments III through VI double to four-branched; hair VI-6 0.9 times as long as short branch of hair II-6. Comb of 50 to 60 apically fringed scales in three or four irregular rows, the scales in posterior row 1.4 times as long as those in anterior row, the bases of all scales 0.4 times as long as total length of scale. Proportions of anal plate destroyed in mount; armature of anal ring consisting of about 15 short spines in a triangular patch over the posterior dorso-lateral border; dorsal hair of dorsal brush with a single shorter branch, broken in the mount; ventral brush missing; gills four, 0.65 times as long as anal ring,

narrowly pointed. Air-tube index over 9.0; five pairs of extremely fine ventral tufts, the anterior pair single hairs, 1.7 times as long as width of air tube at point of insertion, posterior pair double or triple and the same length as tube width at insertion; pecten of 20 or 21 spines on basal fourth of tube, the subapical spine 4 x 18, with seven or eight broad blunt fringing teeth; terminal hook 0.5 times as long as width of tube at tip, with small secondary hook on basal third; acus normal.

Pupa.—Cephalothorax: Trumpet five times as long as width at apex, the lateral margins tapering evenly from the base; pinna as long as wide, 0.2 times as long as entire trumpet, the cleft at base extremely minute, the distal margin distinctly rounded. Hair 1 five- or six-branched, 0.7 times as long as triple hair 2 and 0.4 times as long as double hair 1, which is extremely long. Hair 5 five- or six-branched, 1.3 times as long as triple or four-branched hair 4, 1.5 times as long as single or double hair 6, the same length as triple hair 7. Abdomen: Hair IV-4 five- or six-branched, 1.6 times as long as hair IV-6 which is triple; hair V-4 extremely long and single, 2.0 times as long as four- or five-branched hair 6. Hair IV-5 five-branched, attaining basal 0.8 of the following tergite; hair V-5 triple, with heavier branches, sparsely spiculate, probably just attaining posterior margin of following tergite. Hair VIII-8 missing. Paddle hair 8, 3.0 times as long as paddle hair 7.

Material.—Haiti: One larva, two pupae (USNM); Puerto Rico: two larvae (USNM).

Distribution and habitat.—Haiti, Puerto Rico. Larvae are said to live in the water in crab holes along the shore.

Taxonomic discussion.—The larva of this species is easily separated from its close relatives, *distinguendus*, *nicceriensis*, and *maxinorca*, by having single hairs on the air tube in place of some of the ventral tufts, an extremely long head hair 5 (exceeding the anterior margin of the head), and a mentum with nine lateral teeth, a large number for a species of *Melanconion*. In at least one character, the extremely long, slender air tube, it resembles *opisthopus* of the Florida keys, which has also been found in crab holes. Tulloch (1937) collected specimens of a form from Lake Cartagena, Puerto Rico, which he called *carcinophilus*, but which differ markedly from that species. The writer has called this Species D.

CULEX (MELANOCONION) CHRYSNOTUM Dyar and Knab

(Fig. 12)

Culex chrysonotum Dyar and Knab, 1908, Proc. U. S. Natl. Mus. 35: 57; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 88.

Culex theobaldi Bonne and Bonne-Wepster, 1925, The Mosquitoes of Surinam, p. 295.

Culex aurilatus Senevet and Abonnenc, 1939, Inst. Pasteur d'Algérie Arch. 17: 94.

Larva.—Head: Pre-clypeal spines shorter than one-half the distance between them; hair 4 single or double, fine, closer to each other than to hair 6; hair 5 single or double, 0.50 times as long as hair 6, spiculation absent; hair 6 single, distal half extending beyond anterior margin of capsule, spiculate; hair 7 with 8 to 12 branches, spiculate; hair 20 five- to six-branched, 1.5 times as long as hair 18. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth narrower, with a notch at apex and nearly parallel sides; maxillary spine 2.0 times as long and 0.7 times as wide as pre-clypeal, slightly darkened; mentum a broad central tooth and five smaller each side, sometimes a small removed sixth. Antenna infuscated on constricted portion, which is 0.4 times as long as antenna itself; subapical spines inserted well below tip; subapical spines 1.1 times as long as hair 10; hair 10, 2.2 times as long as terminal spine. Thorax: Integument densely spicular-pilose. Prothoracic hair formula (1-1-2)-1-1-1-3-2; prothoracic hair 3 distinctly spiculate, 2.0 times as long as head hair 5. Abdomen: Integument densely spicular-pilose, almost as densely so as the thorax. Hair 1-6 double, hair 1-7 single; hair

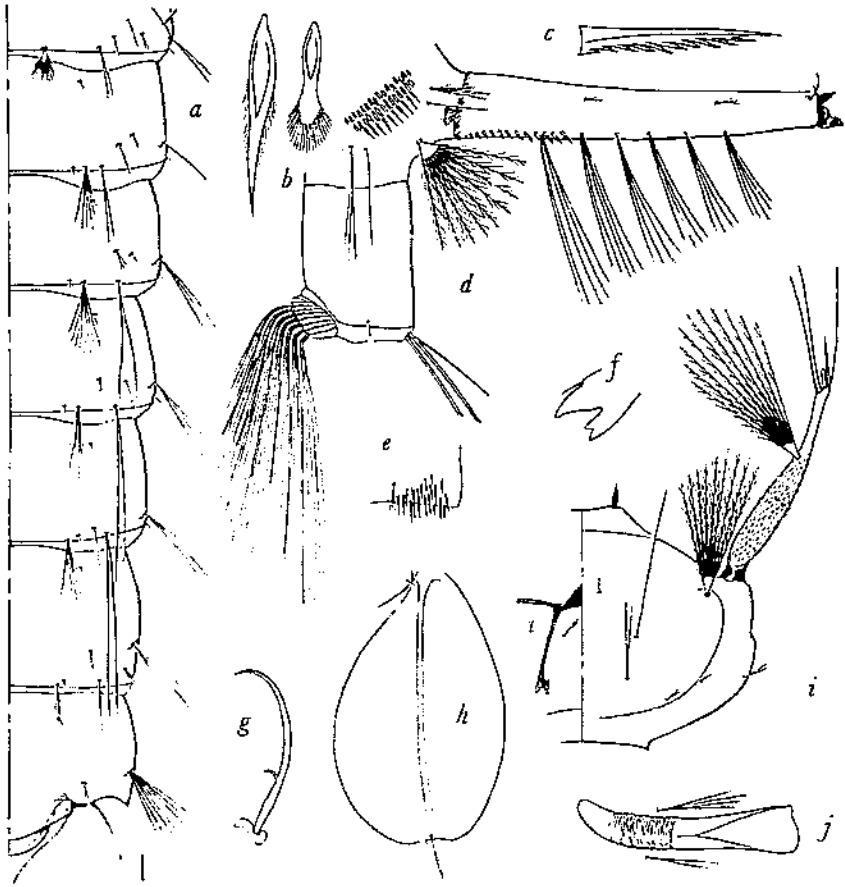


FIGURE 12.—*Culex (Melanoconion) chrysonotum* Dyar and Knab: *a*, Dorsal view of posterior abdominal segments of pupa; *b*, posterior (left) and anterior (right) comb scales; *c*, subapical pecten spine; *d*, terminal abdominal segments of larva; *e*, armature of anal ring; *f*, ventral mandibular teeth; *g*, terminal air-tube hook; *h*, pupal paddle; *i*, ventral (left) and dorsal (right) views of larval head; *j*, pupal trumpet.

11-6 double; hair 6 on segments III through VI triple or four-branched, hair III-6 0.9 times as long as short branch of hair 11-6, hair VI-6 the same length as short branch of that hair. Comb of one anterior row of 15 to 18 apically fringed scales, some of which tend to be pointed at their apices, and about 25 long pointed scales in two irregular posterior rows, the pointed scales each with a prominent lateral fringe, the bases of all scales shorter than the free portion. Proportions of anal ring 15 x 18, not noticeably expanded at apex; armature of ring consisting of about 20 very long, slender spines in a patch not confined to the posterior dorso-lateral margin; dorsal hair of dorsal brush with a single shorter branch 0.6 times as long as ring; ventral brush 2.9 times as long as ring; gills four, tapered to narrow points, 2.0 times as long as ring. Air-tube index 5.0 to 6.3, without a central ring of infuscation; five or six pairs of ventral tufts, the anterior pair 3.75 times as long as width of air tube at point of insertion, the posterior pair 1.6 times as long as tube width at insertion, the first or second anterior pairs within the pecten; pecten of 9 to 20 well-separated spines on basal fourth, subapical spine 1 x 8, with 15 fringing spines

growing larger toward apex but not attaining it; terminal hook 0.9 times as long as width of tube at apex, a minute secondary hook on basal third; acus without a dorsal projection.

Pupa.—Cephalothorax: Trumpet 4.5 times as long as width at apex, the lateral borders nearly parallel almost to the broad base; pinna 2.0 times as long as wide, cleft at base 0.12 times as long as pinna itself, distal border distinctly rounded on one side. Hairs 1 and 2 four- or five-branched, the former 3.0 times as long as the latter; hair 3 double or triple, 0.8 times as long as hair one. Hair 4 double, 0.5 times as long as hair 5, which is triple; hairs 6 and 7 double and triple, respectively, the former 0.8 and the latter 0.9 times as long as hair 5. Hair 8, 0.35 times as long as trumpet; hair 9, 0.25 times as long as trumpet. Metathorax: Hair 10, nine- to twelve-branched, 0.7 times as long as hair 11; hair 12 double, equal in length to hair 10. Abdomen: Hair 1-7 triple, 0.3 times as long as hair 1-6; hair 11-4 double, 1.75 times as long as hair 11-2, which has 15 to 20 branches; hairs 5 and 6 on segment II four- or five-branched, the former 1.5 times as long as the latter; hairs 4 and 6 on segment IV four- or five-branched, the former 2.0 times as long as the latter; hairs 4 and 6 on segment V double, the former 1.75 times as long as the latter. Hair IV-5 four- or five-branched, almost exactly as long as the following tergite; hair V-5 and VI-5 with two heavier branches, their distal thirds extending beyond the posterior margins of the following tergites. Hairs 5 and 6 on segment VII single, the latter 1.25 times as long as the former. Hair 8 on segments III through VI triple: hair VII-8 triple, the same length but the branches much heavier and heavily spiculate; hair VIII-8 eight-branched, the branches heavy, all spiculate and the same length as or only very slightly shorter than hair VII-8, inserted anterior to the posterolateral corner, which is drawn out to a distinct point. Paddle hair 8, 6.0 times as long as paddle hair 7.

Material.—Panamá: One larva (USNM); two larvae (K). Surinam: One larva, one pupa (USNM). Colombia: Three larvae, three pupae (USNM); 23 larvae and 14 pupae (R).

Distribution and habitat.—Honduras, Panamá, Surinam, Colombia, Venezuela. From muddy roadside pools, some containing *Eliocharis*.

Taxonomic discussion.—The larva of *chrysonotum* resembles those of *aikenii*, *zeteki*, and *batesi* in having both pointed and apically fringed comb scales. It may be readily separated from *aikenii* by the long ventral air-tube tufts, and from *batesi* by the spicular-pilose integument of the abdomen. This pilosity is almost as dense as that of the thorax.

Although Bonne and Bonne-Wepster (1925) considered that this species name is a synonym of *theobaldi*, not having seen the male of the latter species, they make no mention of the larval differences, especially those of the comb scales. The description of the larva of *aurilatus* given by Senevet and Abonnenc (1939) agrees very well with that given above.

See remarks under *theobaldi* regarding Lane's (1951) synonymy of this name with *spissipes*.

CULEX (MELANOCONION) COMATUS Senevet and Abonnenc

(Fig. 13)

Culex comatus Senevet and Abonnenc, 1939, Inst. Pasteur d'Algérie, Arch. 17: 103; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 88.

Larva.—Head: Wider than long, bulging on the sides. Preclypeal spines pigmented and sclerotized; hair 5 single, more slender than hair 6; hair 6 single, quite stout; hair 7 seven-branched. Antennal tuft on apical third, constricted beyond; numerous spines on all of basal portion, a few beyond. Thorax: Integument spicular-pilose, with rather long spicules. Prothoracic hair formula (1-1-2)-2-1-1-1-2-2. Abdomen: Integument spicular-pilose, the pilosity short except on segment VIII; hair 6 double on segments IV, V, and VI. Comb of rather long spines, somewhat constricted before the apex, each ending in a

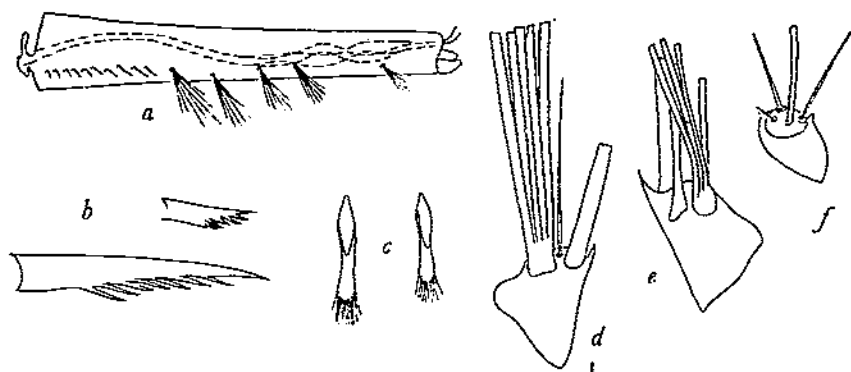


FIGURE 13.—*Culx (Melanoconion) comatus* Senevet and Abonnenc: a, Air tube; b, pecten spines; c, comb scales; d, metathoracic pleural group; e, mesothoracic pleural group; f, prothoracic pleural group. Redrawn from Senevet and Abonnenc (1939).

fringe. Posterior border of anal ring armed with numerous, rather short spines. Air-tube index 4.7; five pairs of ventral tufts, the anterior pair 1.25 times as long as width of air tube at point of insertion, posterior pair the same length or shorter than air tube width at insertion; pecten of several spines on basal third, the subapical spine with about seven subequal fringing teeth; terminal hook rather reduced.

Material.—No specimens available for study. The description was taken entirely from that of Senevet and Abonnenc (1939).

Distribution and habitat.—French Guiana. In inundated forest land.

Taxonomic discussion.—Although Senevet and Abonnenc (1939) state that this larva is identical with that of *tournieri*, their illustrations of both species show distinct differences. Both these species exit from the key in a group of forms which contains *bonneti*, *thomasi*, and *cransac*, all species that have relatively short ventral air-tube tufts. The comb scales of *comatus* appear to be longer than those of *tournieri*; in the former species at least some of the pecten spines are not branched clear to the base, and the air tube may have fewer tufts. The adults are distinctly different.

CULX (MELANOCONION) COMMEVYNSIS Bonne-Wepster and Bonne

(Fig. 14)

Culx commevynsis Bonne-Wepster and Bonne, 1919, *Insector Insectifera* Menstruus, 7: 176; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 89.

Larva.—Head. Preclypeal spines longer than one-half the distance between them; hair 4 single, slight, closer to socket of hair 6 than is hair 5; hair 5, 0.52 times as long as hair 6, triple, spiculation absent; hair 6 single, distal half extending beyond anterior margin of head, spiculation short and sparse; hair 7 multiple, spiculate; hair 18 triple, the same length as hair 20, which is four- to six-branched. Anterior ventral mandibular tooth as long as width at base, posterior ventral tooth narrower and longer, with a small anterior projection well removed from tip; maxillary spine 0.6 times as long as preclypeal, not darkened; mentum a broad central tooth with five smaller each side, sometimes a more distantly removed sixth. Antenna lightly infuscated on constricted portion, subapical spines 1.6 times as long as hair 10; hair 10, 2.0 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules short. Prothoracic hair formula (1-1-6-7)-2-1-1-3-2; prothoracic hair 3 the

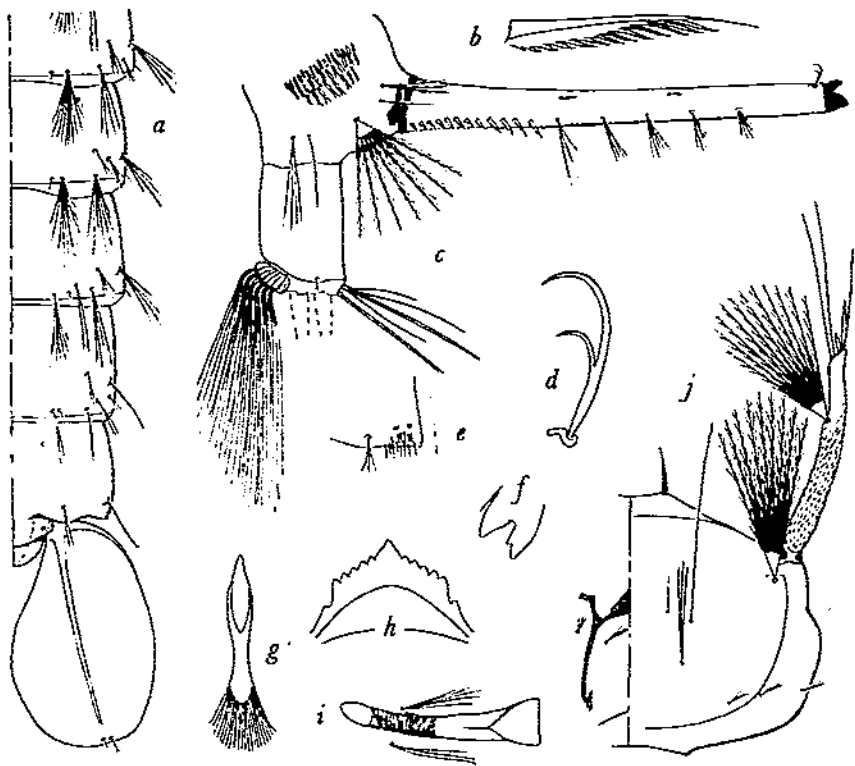


FIGURE 14.—*Culer (Melanoconion) commerynensis* Bonne-Wepster and Bonne: a, Dorsal view of posterior abdominal segments of pupa; b, subapical pecten spine; c, terminal abdominal segments of larva; d, terminal air-tube hook; e, armature of anal ring; f, ventral mandibular teeth; g, comb scale from posterior row; h, mentum; i, pupal trumpet; j, ventral (left) and dorsal (right) views of larval head.

same length as head hair 5, spiculation present but short. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI triple- or four-branched; hair 111-6, 0.75 times as long as short branch of hair 11-6; hair VI-6 the same length as short branch of this hair. Comb of 50 to 60 apically fringed scales in three or four irregular rows, scales in posterior row 2.0 times as long as those in anterior, the bases of all scales shorter than the free portions. Proportions of anal ring 12 x 17, not markedly expanded at apex; armature consisting of 8 to 10 long, single spines confined to the extreme posterior dorso-lateral border of the ring; dorsal hair of dorsal brush with one to three shorter branches, the longest the same length as ring; ventral brush 2.6 times as long as ring; gills destroyed in mounts. Air-tube index 6.7 to 7.0, the tube without any infuscation near center; four or five pairs of ventral tufts, the anterior pair 2.1 times as long as width of air tube at point of insertion, the posterior pair 1.4 times as long as tube width at insertion; pecten of 10 to 12 widely spaced spines on basal third, the spines becoming even more widely spaced posteriorly, subapical spine 1 x 8, with 12 to 16 fringing teeth becoming longer toward apex, but not attaining it; terminal hook 0.5 times as long as air-tube width at tip, with a long secondary spine on basal third; acus normal.

Pupa.—Cephalothorax: Trumpet 4.5 times as long as width at apex, the lateral margins nearly parallel on the basal three-fifths, where the trumpet then begins to flare toward the tip, the widest part being almost at extreme

tip; pinna as long as width at tip, cleft at base 0.5 times as long as pinna, distal margin straight. Hairs 1 and 2 five- or six-branched, the former 1.2 times as long as the latter; hair 3 double, the same length as hair 2. Hair 4 double, the same length as hair 5, which has four or five branches; hair 6 double, 0.5 times as long as hair 5; hair 7 triple, 1.25 times as long as hair 5. Hair 8 five-branched, 0.4 times as long as trumpet; hair 9 triple, the same length as hair 8. Metathorax: Hair 11 single, 1.1 times as long as hair 10, which is eight- to 10-branched; hair 12 quadruple, 1.2 times as long as hair 11. Abdomen: Hair I-7 triple, 0.45 times as long as hair 7; hair II-4 missing; hair II-2 with about 15 branches; hairs 5 and 6 on segment II triple, the former 2.7 times as long as the latter. Hair 4 on segment IV five- or six-branched, 2.0 times as long as hair 6 of that segment, which is triple; hair V-4 and V-6 triple- or four-branched, subequal. Hair 5 on segments IV and V six- to eight-branched, attaining the basal two-thirds of the following tergites; hair VI-5 four-branched and the same length, not markedly heavier than on the preceding segments. Hair VII-5 single, 1.2 times as long as hair VII-6, which is double. Hair 8 on segments III through VI four-branched; hair VII-8 a very heavy single hair about the same length as on preceding segments, without spiculation; hair VIII-8 single, heavy, the same length as hair VII-8. Paddle hair 8, 2.0 times as long as 7.

Material.—Colombia: Two larvae, two pupae (USNM); two larvae, two pupae (R).

Distribution.—Colombia.

Taxonomic discussion.—Rozeboom and Komp (1950) have stated their opinion that males of *commercyensis* and *dunni* may intergrade, and it appears that the larvae do so as well. *C. commercyensis* is difficult to run in the key, since its air-tube index is almost exactly 8.0 and its anterior ventral air-tube tufts are almost exactly 2.0 times as long as the width of the air tube at the point of their insertion. A final decision on the problem on intergradation awaits the accumulation of more material for study, but the fact that only one specimen of *commercyensis* was taken in a collection with a fairly large series of *dunni* leads one to suspect this not to be a really good species.

CULEX (MELANOCONION) COMMINUTOR DYAR

Culex comminutor Dyar, 1926, *Insector Inscilicet Menstruus*, 8: 20; Senevet and Abonnenc, 1939, *Inst. Pasteur d'Algérie. Arch.* 17: 88; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 89; Lane, 1951, *Ent. Soc. Wash. Proc.* 53: 334.

Larva.—Head: Wider than long, bulging on the sides. Preclypeal spines strong and heavily sclerotized; hair 5 double, shorter than hair 6, spiculate; hair 6 single, quite long; hair 7 with at least 12 branches, heavy. Antennal tuft a little beyond the middle, the apical part constricted; abundant strong and pointed spines covering entire basal portion and on basal portion of constriction. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-5-6)-1-1-1-3-2. Abdomen: Integument pilose only on last segments; hair 6 on segments IV, V and VI triple or four-branched. Comb of several rows of scales, each scale strongly developed, with a long, heavy central tooth and short barbules at the tooth base; armature of anal plate a small comb of five or six spines; air-tube index 8.9 (?), tube slightly constricted near the middle; six pairs of ventral tufts, the apical ones shortest; pecten of 14 long, pointed, regularly spaced spines occupying basal fourth of tube, each spine with short fringe; terminal hook recurved.

Material.—No specimens available for study. The description was taken entirely from that of Senevet and Abonnenc (1939).

Distribution and habitat.—Surinam. Larvae collected from a swamp.

Taxonomic discussion.—Although Rozeboom and Komp (1950) state that the name *productus* is a synonym of this species on the basis of the similarities existing in the male terminalia, the larva described for *productus* has an air-tube index of about 8.0, pointed rather than fringed comb scales, and head hair 5 in threes or fours rather than double. The writer believes this is a good species in spite of the similarities of the males, assuming that no error has been made in associating the specimens involved.

Lane (1951) has synonymized *distinguendus* with this species. The males of these two forms are shown by Rozeboom and Komp (1950) to be very closely related, but the larvae are so dissimilar that there can be little doubt as to their identity.

(*CULEX* (MELANOCONION) *CONSPIRATOR* Dyar and Knab

(Fig. 15)

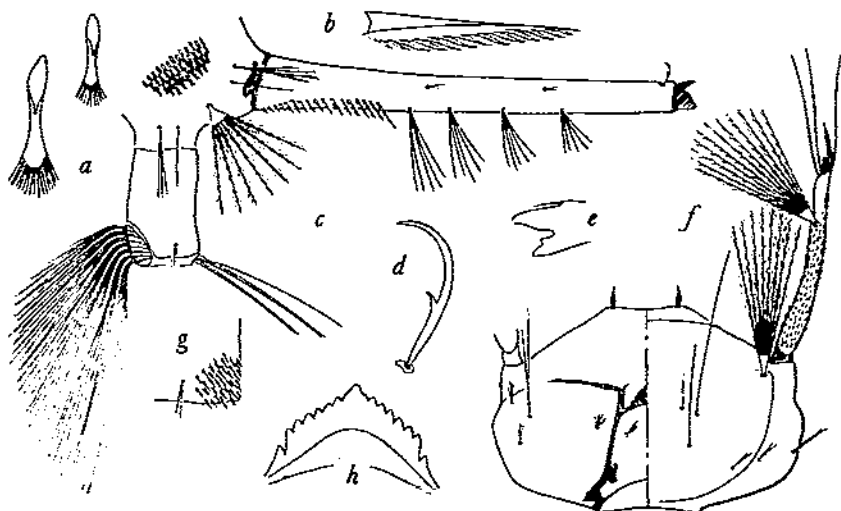


FIGURE 15.—*Culex (Melanoconion) conspirator* Dyar and Knab: a, Comb scales; b, subapical pecten spine; c, terminal abdominal segments of larva; d, terminal air-tube hook; e, ventral mandibular teeth; f, ventral (left) and dorsal (right) views of larval head; g, armature of anal ring; h, mentum.

Culex conspirator Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 217; Dyar, 1928, The Mosquitoes of the Americas, p. 306.

Culex dysmathes Dyar and Ludlow, 1921, Insector Insectiae Menstruus 9: 47.

Culex holoneus Dyar, 1921, *ibid.*, p. 35.

Culex paratacmon Dyar, 1921, *ibid.*, p. 100.

Culex merodacmon Dyar, 1921, *ibid.*, p. 100.

Culex fatuator Dyar and Shannon, 1924, Insector Insectiae Menstruus 12: 47.

Culex moroneus Dyar, 1927, Insector Insectiae Menstruus 13: 22.

Culex macaronensis Dyar and Nunez-Tovar, 1926, Insector Insectiae Menstruus 14: 153.

Culex inducens Root, in Dyar, 1928, The Mosquitoes of the Americas, p. 307.

Larva.—Head: Preelypeal spines the same length as one-half the distance between them; hair 4 single or double, slight, closer to socket of hair 6 than is that of hair 5; hair 5 single (rarely double), 0.60 times as long as hair 6, spiculation long and sparse; hair 6 single, distal 0.4 extending beyond anterior margin of head, spiculation sparse and extremely fine, hair 7 six- to ten-branched,

spiculate; hairs 18 and 20 subequal and both with four to six branches. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth shorter than anterior, with anterior projection well removed from tip; maxillary spine 0.6 times as long and as heavy as preclypeal, rather darkly pigmented; mentum of five to seven small teeth on either side of a larger, shouldered central one, the distal-most teeth somewhat removed. Antenna infuscated at base and from slightly below insertion of tuft to extreme apex; subapical spines 1.2 times as long as hair 10; hair 10, 2.3 times as long as terminal spine. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-2-3)-2-1-1-3-2; prothoracic hair 3, 1.2 times as long as head hair 5, spiculate. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI triple; hair III-6, 0.66 times long as short branch of hair 11-6; hair VI-6 the same length as short branch of that hair. Comb of 40 to 45 apically fringed scales in three or four irregular rows, those in the posterior row 1.5 times as long as those in the anterior, free portion of individual scale 1.5 times as long as the base. Proportions of anal ring 12 x 16; armature consisting of a large, dense patch of single, long spines covering the posterior dorso-lateral surface of the ring, oriented along the length of the ring rather than across its width; dorsal hair of dorsal brush with a single shorter branch 1.5 times as long as ring; ventral brush 2.0 times as long as ring; gills four, tapered, the same length as ring. Air-tube index 6.5 to 7.0, the tube slightly curved, without any sign of median infuscation; four or five pairs of ventral tufts, the anterior pair 2.0 times as long as width of air tube at point of insertion, posterior pair 1.45 times as long as width of tube at insertion; pecten of 13 to 22 touching teeth on basal third of tube, subapical tooth 0.70 times as long as air tube width at insertion, 1 x 8, with 12 to 15 subequal fringing teeth to extreme tip; terminal hook 0.55 times as long as tube width at tip with a short, delicate secondary spine on basal half; acus normal.

Material.—Panamá: Three larvae, one pupa (USNM); two larvae (K); eight larvae (R). Honduras: One larva (USNM).

Distribution and habitat.—México, Salvador, Costa Rica, Panamá, Colombia, Ecuador, Venezuela. Dyar (1928) states these to occur in ground pools of various nature.

Taxonomic discussion.—This species may be recognized by the combination of the characters given in the key. Most of the names proposed for this species have been done so on the basis of male terminalia, which the writer has not seen.

CULEX (MELANOCNIX) COPPENAMENSIS Bonne-Wepster and Bonne

(Fig. 16)

Culex coppenamensis Bonne-Wepster and Bonne, 1919, *Insecta Insectaria Mensuris* 7: 173; Bonne and Bonne-Wepster, 1925, *The Mosquitoes of Surinam*, p. 309; Dyar, 1928, *The Mosquitoes of the Americas*, p. 314.

Larva. Head: Rounded, broad. Hair 4 single, about 0.75 times as long as hair 6, delicate; hair 6 single, not attaining anterior margin of head; hair 7 stout, multiple. Mentum with a central tooth and eight lateral ones. Antenna spicular, a large tuft at outer third, part beyond slender; one long apical and two long subapical spines. Abdomen: Integument slightly spicular. Comb a triangular patch of about 30 scales, each tooth pointed and with an apical fringe. Anal segment longer than wide; dorsal hair of dorsal brush with one shorter branch longer than anal ring; gills missing. Air-tube index about 6.0. Five pairs of ventral air-tube tufts hardly diminishing in length, the anterior pair about 1.25 times as long as width of air tube at point of insertion, posterior pair not as long as air-tube width at insertion; pecten of 16 teeth on basal 0.4 of tube, each tooth with numerous fringing spines; terminal hook recurved.

Material.—No specimens available for this study. The description was taken entirely from that of Bonne and Bonne-Wepster (1925).

Distribution and habitat.—Surinam. Larvae collected in a ground pool.

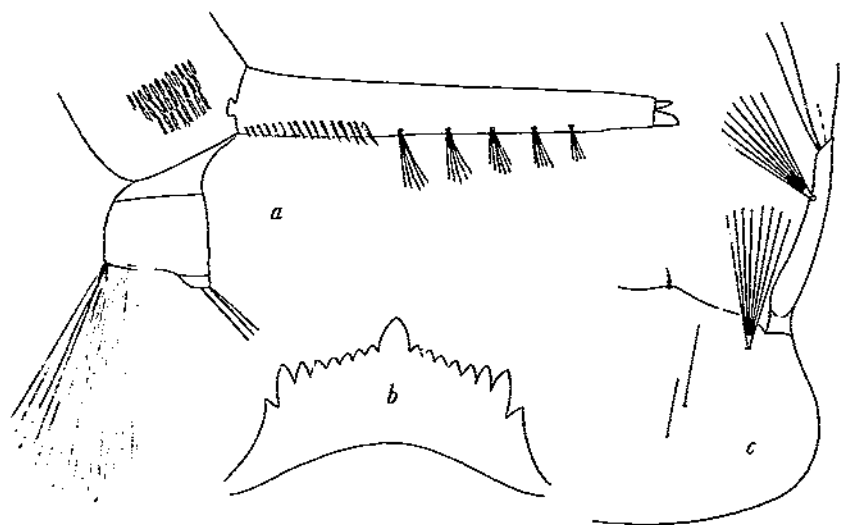


FIGURE 16.—*Culex (Melanoconion) coppenamensis* Bonne-Wepster and Bonne; a, Terminal abdominal segments of larva; b, mentum; c, dorsal view of larval head. Redrawn from Bonne and Bonne-Wepster (1925).

Taxonomic discussion.—An apparently rare species whose larva has been provisionally placed in the key on the basis of the comb scales, which Bonne and Bonne-Wepster (1925) state is “. . . pointed with an apical fringe.” They have not adequately illustrated this character, making a definite determination of its relationships impossible at the present time.

CULEX (MELANOCONION) CRYBDA Dyar

Culex crybda Dyar, 1924, *Insector Inscitiae Menstruus* 12: 184; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 89.

Taxonomic discussion.—Specimens of this species, or of *taeniopus*, were not seen in this study. However, Rozeboom and Komp (1950) state: “. . . The larva of the species here described as *taeniopus* is apparently indistinguishable from that of *crybda*, but the pupal trumpet of *taeniopus* is aberrant for a *Melanoconion*, as it is widened and flattened at the tip, with a peculiar transverse cleft; that of *crybda* is normal, long and funnel-shaped. The terminalia of the two species are apparently indistinguishable. . .”

CULEX (MELANOCONION) DECORATOR Dyar and Knab

(Fig. 17)

Culex decorator Dyar and Knab, 1906, *N. Y. Ent. Soc. Jour.* 14: 207; Howard, Dyar, and Knab, 1915, *Mosquitoes of North and Central America and the West Indies*, 3, p. 427; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 98.

Larva.—Head: Subquadrate, broad, widest through eyes, a large notch at insertion of antenna; head hair 5 triple; hair 6 single; hair 7 multiple. Maxilla with a stout articulated spine at outer third; mental plate rather small, triangular, with a large thick central tooth and six on each side, the first four

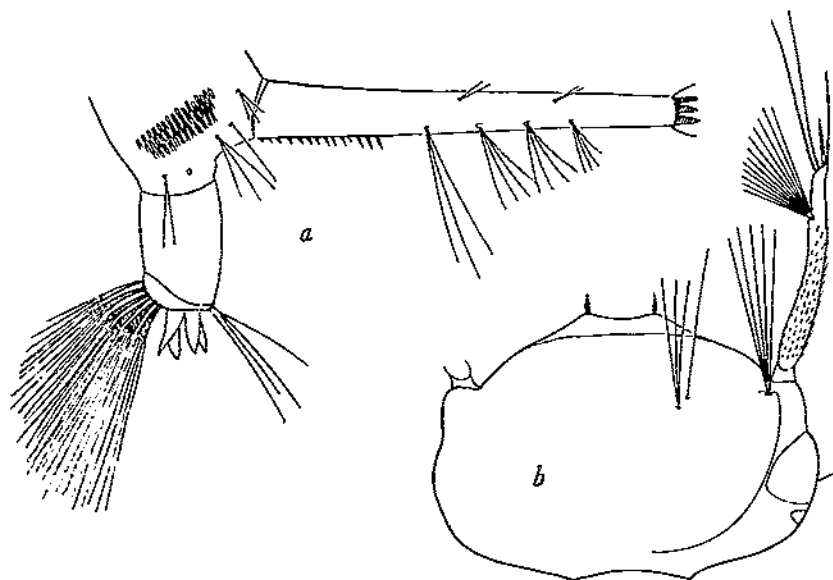


FIGURE 17.—*Culex (Melanoconion) decorator* Dyar and Knab: *a*, Terminal abdominal segments of larva; *b*, dorsal view of larval head. Redrawn from Howard *et al.* (1915).

closely spaced, the fifth projecting and separate, sixth small. Antenna large, thick, spined on basal two-thirds, with a large tuft from a notch, two long setae almost at tip, a long seta, a short one and a digit at tip. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through V triple, on segment VI double. Comb of many fringed spines in a triangular patch, single spine elongate and widened at tip. Anal segment about twice as long as wide; dorsal hair of dorsal brush with two short branches; ventral brush well developed; gills four, very small, not half as long as anal segment, tapered. Air-tube index 7.0 or more; pecten on basal fourth, single spine short and coarsely serrate on ventral side; four pairs of ventral tufts decreasing in length toward apex of tube.

Material.—No specimens available for study. The description was taken entirely from that of Howard *et al.* (1915).

Distribution and habitat.—Tobago Island (Trinidad). In joint of bamboo.

Taxonomic discussion.—This species, from the rather complete description of the mouthparts given by Howard *et al.* (1915), appears to be a true *Melanoconion* in having only five lateral mental teeth, a distinct posterior ventral mandibular tooth, and a full complement of prothoracic hairs. It is closely allied to *ocellatus* and *nigrimacula* in breeding in plant containers, but is easily separable from these by its triple head hair 5. This form exits with *mutator* in the key, but is distinguished from it by the long head hair 5 and its relatively short prothoracic hair 3.

CULEX (MELANOCONION) DISTINGUENDUS Dyar

(Fig. 18)

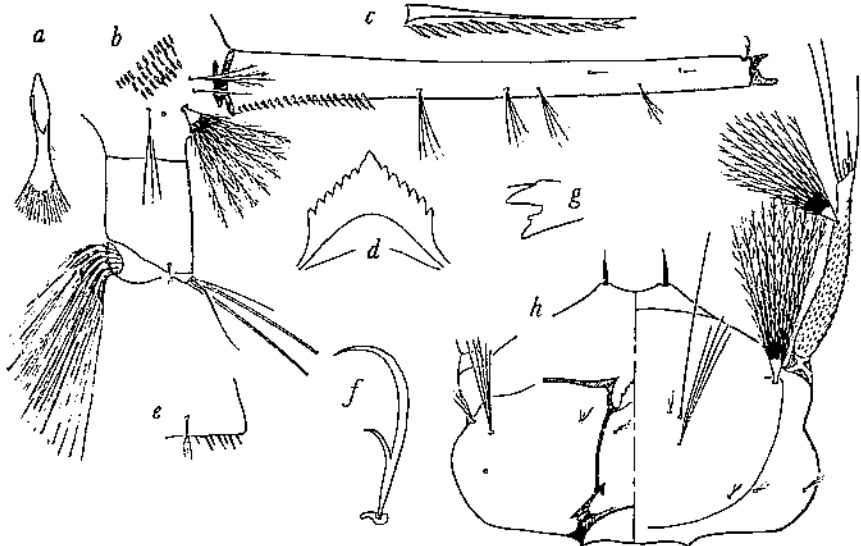


FIGURE 18.—*Culex (Melanoconion) distinguendus* Dyar: a, Comb scale from posterior row; b, terminal abdominal segments of larva; c, subapical pecten spine; d, mentum; e, armature of anal ring; f, terminal air-tube hook; g, ventral mandibular teeth; h, ventral (left) and dorsal (right) views of larval head.

Culex distinguendus Dyar, 1928, *The Mosquitoes of the Americas*, p. 305; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 89; Lane, 1951, *Ent. Soc. Wash. Proc.* 53: 334.

Culex alcocki Lane (not Bonne-Wepster and Bonne), 1936, *Rev. Mus. Paul.* 20: 180.

Larva.—Head: Preclypeal spines longer than one-half the distance between them; hair 4 double, minute, closer to socket of hair 6 than is hair 5; hair 5 four-branched, 0.6 times as long as hair 6, distinctly attaining or exceeding anterior margin of head, spiculation very long nearly to base; hair 6 single, distal 0.4 extending beyond anterior margin of head, with long spicules nearly to base; hair 7 six- or seven-branched, spiculate; hairs 18 and 20 nearly subequal. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth same length but slightly narrower, with an anterior projection distinctly removed from tip; maxillary spine missing; mentum of six subequal teeth on either side of a broad shouldered central tooth. Subapical antennal spines 1.3 times as long as hair 10; hair 10, 2.8 to 3.0 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules short. Prothoracic hair formula (1-1-5-6)-2-1-1-3-2; prothoracic hair 3, 0.9 times as long as head hair 5, the branches somewhat more slender. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI double or triple; hair VI-6, 0.8 times as long as short branch of hair II-6. Comb of 30 to 35 apically fringed scales in three or four irregular rows, scales in posterior row 1.75 times as long as those in anterior row, free portion of individual scale 1.4 times as long as base. Proportions of anal ring destroyed in mount, but longer than wide, with fairly darkly pigmented anterior border; armature consisting of six or seven single, rather stout spines confined to extreme posterior dorso-lateral border; dorsal hair of dorsal brush with two shorter branches, the longest 0.9 times as long as ring; gills four, slender, 2.5

times length of ring. Air-tube index 8.5 to 9.0, without a distinct ring of infuscation near center; six delicate, irregularly spaced ventral tufts, anterior tuft 2.1 times as long as width of air tube at point of insertion, posterior tuft 1.7 times as long as tube width at insertion; pecten of 18 spines on basal fourth, the spines well-separated, subapical spine 1 x 8, with 10 to 15 subequal fringing teeth; terminal hook 0.7 times as long as air tube width at tip, with secondary spine arising from basal third; acus normal.

Material.—Colombia: One whole-mounted larva (R).

Distribution and habitat.—Panamá, Colombia, Brazil. Specimen examined was collected from a small, densely shaded jungle pool.

Taxonomic discussion.—This species is apparently very closely related to *nicoerensis*, both in the male and larval stage. Both have very long air tubes without infuscation, but *distinguendus* has only about half as many comb scales and its anterior ventral air-tube tufts are longer, as shown in the key. Roseboom and Komp (1950) state that the males of this species are closely related to those of *maxinocca*. This is true of the larvae as well, but many points of difference exist between these two species in the larval stage.

See Lane (1951) regarding the synonymy of this species with *communitor*, and the remarks under that species.

CULEX (MELANOCNION) DUNNI Dyar

(Fig. 19)

Culex dunni Dyar, 1918, *Insector Inscitiae Menstruus* 6: 123; Dyar, 1928, *The Mosquitoes of the Americas*, p. 341.

Culex ruffini Dyar and Shannon, 1924, *Insector Inscitiae Menstruus* 12: 143.
Culex caedrus Root, 1927, *Amer. Jour. Hyg.* 7: 580.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them, greatly tapered to fine points; hair 4 fine, single, rarely double; hair 5 triple to seven-branched, not spiculate, 0.5 times as long as hair 6; hair 6 single, distal third extending beyond anterior margin of head, spiculation extremely fine and sparse; hair 18 single to triple, longer than hair 20, which is four- or five-branched. Anterior ventral mandibular tooth broad at base, posterior ventral tooth longer, with a small anterior projection; maxillary spine 0.5 times as long and heavy as preclypeal, not heavily pigmented; mentum a broad shouldered central tooth and five smaller each side, sometimes a well separated sixth. Antenna lightly infuscated on constricted portion; subapical spines 1.4 times as long as hair 10; hair 10, 3.0 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules short; prothoracic hair formula (1-1-5-7)-2-1-1-(2-4)-(2-3); prothoracic hair 3 almost exactly the same length as head hair 5. Abdomen: Integument bare. Hair I-6 double; hair I-7 single, hair II-6 double; hair 6 on segments III through VI triple to five-branched. Comb of 30 to 40 apically fringed scales in three or four irregular rows, scales in posterior row 2.0 times as long as those in anterior row, the bases of all scales shorter than the free portions. Proportions of anal ring 13 x 16, with a fairly heavily sclerotized anterior border; armature consisting of six to eight heavy spines confined to extreme posterior dorso-lateral margin; dorsal hair of dorsal brush with two or three shorter branches, the longest 1.2 times as long as ring; ventral brush 2.2 times as long as ring. Air-tube index 8.0 to 8.8; infuscated in a dark band at middle; four or five pairs of ventral tufts, the anterior pair 1.5 times as long as width of tube at point of insertion, posterior pair the same length as width of tube at insertion; pecten of 11 to 15 spines on basal fourth of tube, none touching, each spine about 1 x 5, the subapical spine with about 12 apically spaced fringe teeth; terminal hook strongly recurved with a strong secondary hook on basal fourth; acus normal.

Pupa.—Cephalothorax: Trumpet 8.0 times as long as width at tip, the lateral borders nearly parallel distad of the tracheoid portion; pinna 1.6 times as long as wide, the cleft at base 0.12 times as long as pinna, distal border with a distinct notch. Hair 1 four- or five-branched, 1.25 times as long as hairs 2 and 3, which are subequal; hair 2 four- or five-branched, hair 3 double. Hair 4 double, sub-

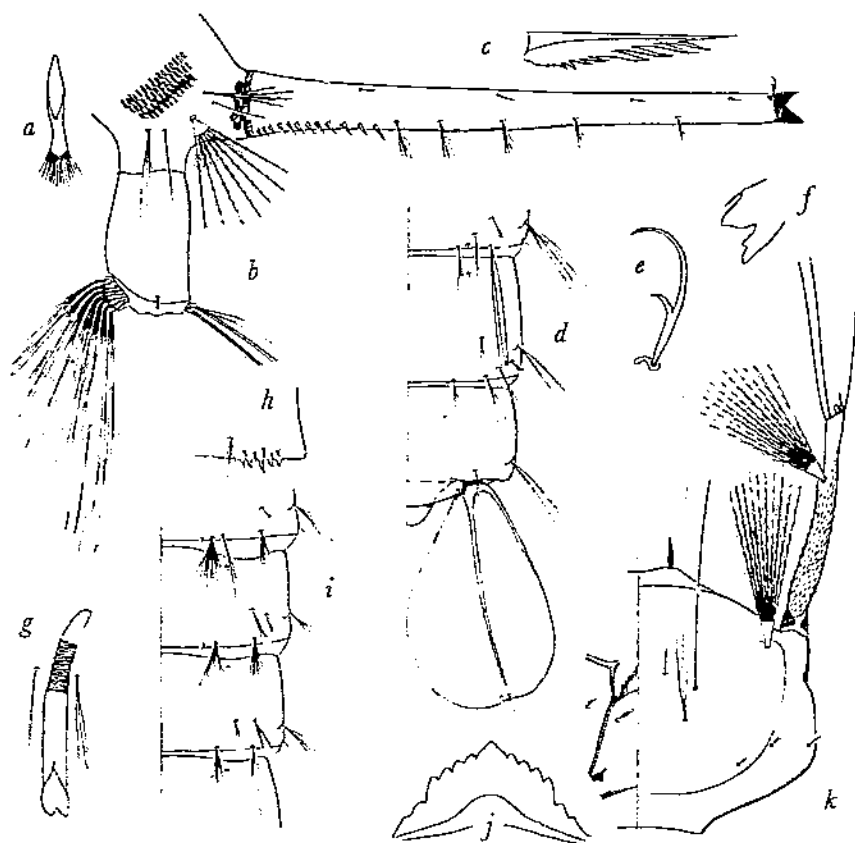


FIGURE 19. *Culicid (Melanconion) dunnii* Dyar: a, Comb scale from posterior row; b, terminal abdominal segments of larva; c, subapical pecten spine; d, dorsal view of terminal abdominal segments of pupa; e, terminal air-tube hook; f, ventral mandibular teeth; g, pupal trumpet; h, armature of anal ring; i, dorsal view of segments III, IV, and V of pupa; j, mentum; k, ventral (left) and dorsal (right) views of larval head.

equal to hair 5, which is five-branched; hairs 6 and 7 double or triple, the former 0.5 times as long as hair 5, the latter subequal to hair 5. Hair 8 triple, 0.5 times as long as trumpet; hair 9 single, 0.4 times as long as trumpet. Metathorax: Hair 10 with 9 to 12 branches, 0.7 times as long as single hair 11; hair 12 triple or four-branched, 0.8 times as long as hair 11. Abdomen: Hair I-7 double, 0.33 times as long as hair I-6; hair II-4 double, 1.6 times as long as hair II-2, which has 20 to 22 branches, hairs II-5 and II-6 four- to six-branched, the former nearly 2.0 times as long as the latter; hair IV-4 four- to six-branched, 2.0 times as long as hair IV-6, which is triple; hair V-4 four- to six-branched, subequal to hair V-6, which is triple. Hair IV 5 six- to eight-branched, attaining basal two-thirds of the following tergite; hair V-5 four- to five-branched, attaining basal three-fourths of following tergite; hair VI-5 with three heavier branches, attaining posterior margin of following tergite. Hair VII-6 double, 1.75 times as long as hair VII-5, which is triple. Hair 8 on segments III through VI four-, sometimes five-branched; hair VII-8, 0.7 times as long as hair VI-8, with two rather heavy, bare branches; hair VIII-8 double, subequal to hair VII-8, bare, the branches rather heavy, inserted anterior to postero-lateral corner, which is slightly pointed. Paddle hair 8, 2.0 times as long as hair 7.

Material.—Panamá: 12 whole-mounted larvae, two larval skins (R). Colombia: Three larvae, three pupae (USNM); nine larval, nine pupal skins, some associated with males (R).

Distribution and habitat.—Panamá, Surinam, Colombia, Brazil. Larvae apparently occur in permanent ponds.

Taxonomic discussion.—*Culex dunni* may be separated from other closely related species by characters given in the key. See remarks under *commeynensis* for its relationship to that species. Dyar (1928) has stated that *ensiformis* is a synonym of *dunni*, but Rozeboom and Komp (18, p. 98) have pointed out the more probable identity of *ensiformis* with *zeteki*. The illustration presented by Senevet and Abonnenc (1939) of the larva of *ensiformis*, indicating that all comb scales are pointed, leads to the conclusion that *zeteki* (as *ensiformis*) is really different from *dunni*. The Bonne's (3, p. 272) description of *ensiformis* larvae corresponds well with the specimens seen in this study that are associated with males of *zeteki*.

CULEX (MELANOCONION) EASTOR Dyar

(Fig. 20)

Culex eastor Dyar, 1920, Insector Insectifera Menstruus 8: 71; Dyar, 1924, Insector Insectifera Menstruus 12: 184; Dyar, 1928, The Mosquitoes of the Americas, p. 323; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 90.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them; hair 4 single, minute; hair 5 single, 0.75 times as long as hair 6, extremely finely spiculate; hair 6 single, the distal two-fifths extending beyond anterior margin of head, spicules present but short; hair 18 with two extremely long branches and one or two shorter ones between them. Mandible with anterior tooth longer than width at base, posterior ventral mandibular tooth about the same length as anterior with a small internal secondary tooth; maxillary spine 0.6 times as long and as wide as preclypeals; mentum a single broad shouldered tooth, six smaller each side, and a poorly developed seventh laterally. Antenna infuscated at extreme base; subapical spines 1.5 times as long as hair 10; hair 10, 2.0 times as long as apical spine. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-3)-2-1-1-3-2; prothoracic hair 3 about the same length as head hair 5. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI triple or four-branched. Comb of about 45 apically fringed scales in four irregular rows, all scales about the same length. Proportions of anal ring about 13 x 19, anterior margin not noticeably infuscated; armature consisting of a patch of long subequal spines over the posterior dorso-lateral surface and not confined to posterior margin; dorsal hair of dorsal brush with a single shorter branch 1.1 times as long as anal ring; ventral brush 2.6 times as long as ring; gills four, 1.5 times as long as ring, tapering at ends. Air-tube index 7.6 to 8.0; in some specimens a lightly infuscated ring slightly beyond the center, in others only the ventral portion of this ring present; five pairs of ventral tufts, anterior pair 1.7 times as long as width of air tube at point of insertion, posterior pair 1.3 times the tube width at insertion; pecten of 13 to 18 spines, the subapical spine about 1 x 5 with about 15 fringing teeth; terminal hook with a secondary spine arising from its base, 0.5 times as long as primary; anus normal.

Pupa.—Cephalothorax: Trumpet 6.0 to 6.5 times as long as width at tip, the lateral borders tapering gradually from a rather narrow base; pinna 1.25 times as long as width at tip, cleft at base 0.2 times as long as pinna, distal border only very slightly evaginated. Hair 1 triple; hairs 2 and 3 missing or not observable. Hairs 4, 6, and 7 double; hair 4, 1.2 times as long as hair 5, which is five- or six-branched; hair 6, 0.6 and hair 7, 1.4 times as long as hair 5. Hairs 8 and 9 triple and double, respectively, subequal in length. Abdomen: Hair V-5 and VI-5 double, the branches heavy and bare, the former attaining basal seven-

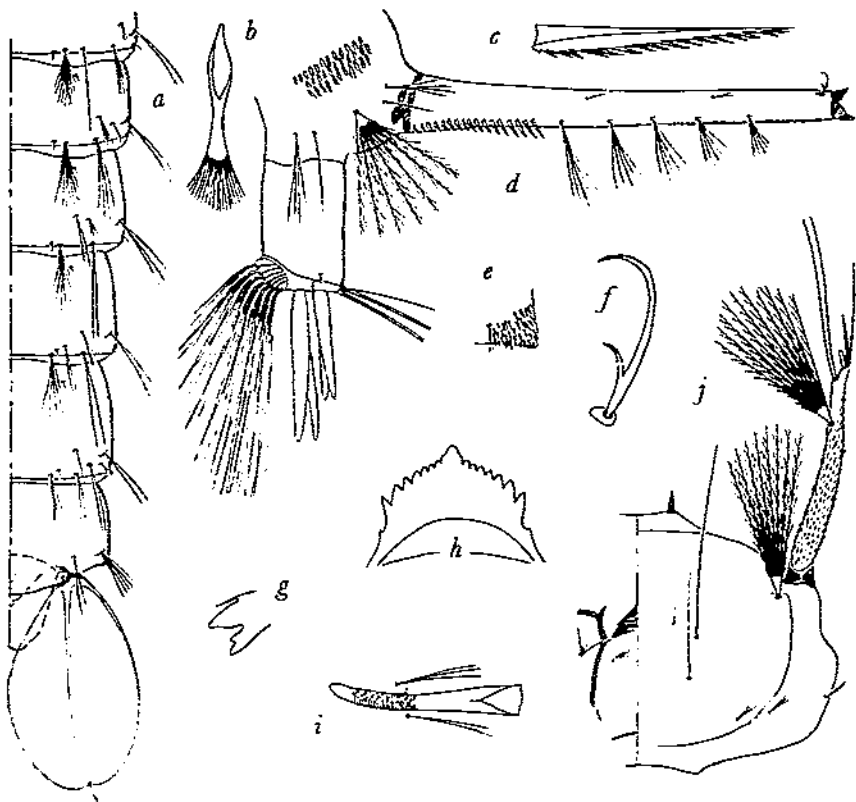


FIGURE 20.—*Uteva (Melanoconton) castor* Dyar: a, Dorsal view of posterior abdominal segments of pupa; b, comb scale from posterior row; c, armature of anal ring; d, terminal abdominal segments of larva; e, subapical pecten spine; f, terminal hook of air tube; g, ventral mandibular teeth; h, mentum; i, pupal trumpet; j, ventral (left) and dorsal (right) views of larval head.

eights of following tergite, the latter the basal three-fourths of following tergite. Hairs 5 and 6 on segment VII double, the latter 1.3 times as long as the former. Hair 8 on segments III through VI double or triple; hair VII-8 only very slightly shorter, double, the branches heavy and bare; hair VIII-8 with four or five heavy, heavily spiculate branches which are 0.8 times as long as those of hair VII-8, inserted anterior to postero-lateral corner, which is drawn out to a sharp point. Paddle hair 8, 2.0 times as long as hair 7.

Material.—Panamá: Two larval, two pupal skins (USNM); one larval, five pupal skins, some associated with males (R).

Distribution and habitat.—(Guatemala, Panamá. Collected "... in a swamp" (Rozeboom, personal notes).

Taxonomic discussion.—The larva of *castor* possesses a long air tube and differs from other members of this group in having prothoracic hair 3 longer than hair 5, which is long and single, and abdominal hair 1-7 single. Another striking character of this species is the very long branches of head hair 18.

CULEX (MELANOCONION) EDUCATOR Dyar and Knab

(Fig. 21)

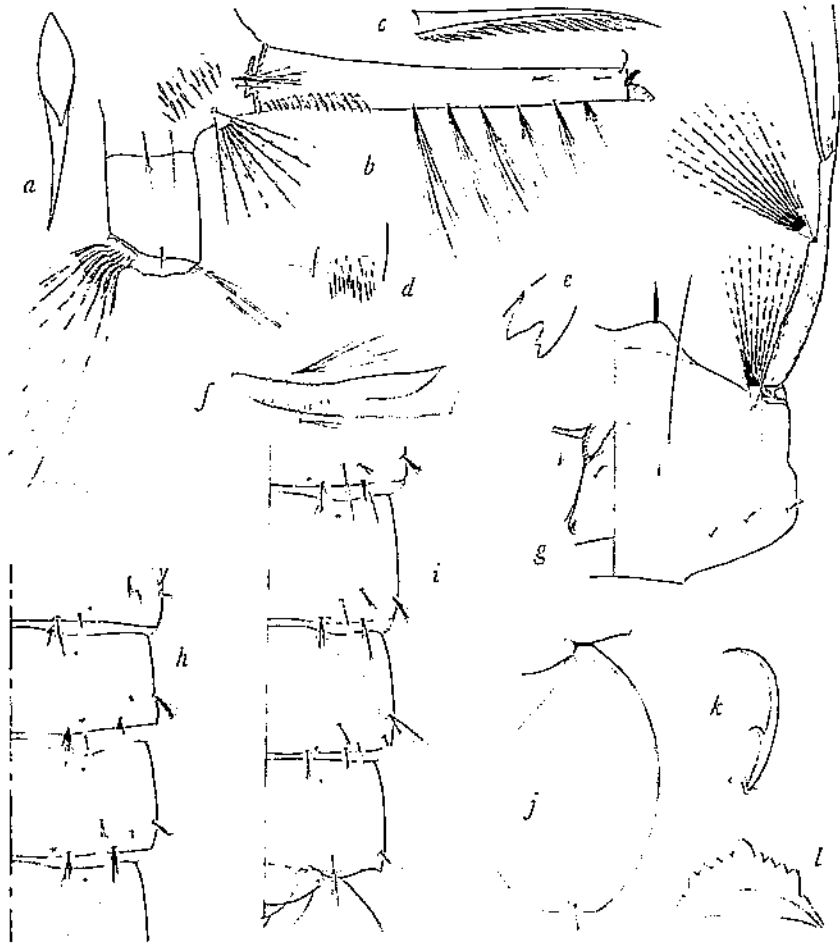


Figure 21.—*Culex (Melanoconion) educator* Dyar and Knab: *a*, Comb scale from posterior row; *b*, terminal abdominal segments of larva; *c*, subapical pecten spine; *d*, armature of anal ring; *e*, ventral mandibular teeth; *f*, pupal trumpet; *g*, ventral (left) and dorsal (right) views of larval head; *h*, segments II, III, and IV of pupal abdomen; *i*, segments V, VI, VII, and VIII of pupal abdomen; *j*, pupal paddle; *k*, terminal hook of air tube; *l*, mentum.

Culex educator Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 217; Bonne-Wepster and Bonne, 1923, Insector Insectifera Menstruus 11: 125; Root, 1927, Amer. Jour. Hyg. 7: 586; Dyar, 1928, The Mosquitoes of the Americas, p. 325; Komp, 1937, Ent. Soc. Wash. Proc. 37: 7.

Culex apateticus Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 321.

Culex rarus Dyar, 1920, Insector Insectifera Menstruus 8: 73.

Culex hibatus Dyar, 1920, Insector Insectifera Menstruus 8: 74.

Culex anetes Dyar and Ludlow, 1922, Mil. Surg. 1: 63.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them, tapered at outer third; hair 4 minute, single or double; hair 5 single or double, 0.7 times as long as hair 6, spicules present but short; hair 6 single, distal 0.5 extending beyond anterior margin of head, distinctly spiculate; hair 7 multiple, the individual branches thickened at the middle; hair 13 short, single to triple; hair 18 double to four-branched and about the same length as hair 20, which is four- to seven-branched. Anterior ventral mandibular tooth broad at base, posterior ventral tooth with a smaller tooth set somewhat back from extreme tip; maxillary spine same length as preclypeals, very stout at base and tapered to a point, dark; mentum a large central tooth and five smaller each side, the fifth sometimes minute. Antenna infuscated at base of constricted portion; constricted portion elongated, about one-third the length of the antenna; subapical spines 1.1 times as long as hair 10; hair 10, 2.2 times as long as terminal spine. Thorax: Integument heavily spicular-pilose, the spines long and stout. Prothoracic hair formula (1-1-5-11):2-1-1-3-2; prothoracic hair 3, 1.4 times as long as head hair 5, heavily and distinctly spiculate; hair 4 usually double, rarely single. Abdomen: Integument bare. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI three- or four-branched. Comb of about 15 long, pointed scales in two irregular rows, each scale with a lateral fringe part way to the tip. Proportions of anal ring 14 x 18; armature consisting of a narrow patch of single spines confined to posterior dorso-lateral margin; dorsal hair of dorsal brush with two or three shorter branches, the longest 0.8 times as long as anal ring, the shortest 0.5 times as long as the longest; ventral brush 2.5 times as long as ring; gills four, 0.8 times as long as ring, gently tapered. Air-tube index 5.5 to 6.4, slightly infuscated near middle; five or six pairs of ventral tufts, the anterior pair 4.7 times as long as width of air tube at point of insertion, posterior pair 2.4 times tube width at insertion; pecten of 12 to 17 spines on basal fourth of tube, subapical spine 1 x 5, increasing in length markedly from the base, fringed nearly all the way to the tip; terminal hook stout, small secondary spine on basal fourth.

Pupa.—Cephalothorax: Trumpet 5.0 times as long as width at tip, the lateral borders tapering gradually to a point near the base of the pinna, incurved slightly from here to tip; pinna 1.4 times as long as width at tip, cleft at base 0.12 times as long as pinna, distal margin distinctly evaginated at center. Hairs 1 and 2 four- or five-branched, the former 1.1 times as long as the latter; hair 3 triple, 0.6 times as long as hair 1. Hair 4 triple, 0.55 times as long as five- to seven-branched hair 5; hair 6 triple, 0.7 times as long as hair 5; hair 7 double, 0.9 times as long as hair 5. Hair 8 five- to seven-branched, a large hair, 0.7 times as long as trumpet; hair 9 double, 0.25 times as long as trumpet. Metathorax: Hair 10 with about 15 branches, 0.7 times as long as hair 11, which is single; hair 12 triple, 0.85 times as long as hair 11. Abdomen: Hair I 7 triple, 0.5 times as long as hair I 6; hair II-4 double, 0.8 times as long as the long hair II 2, which has about 12 branches that exceed basal half of following tergite; hair II 5 with six or seven branches, 1.4 times as long as hair II 6, which is triple; hairs 2 and 4 on segment III subequal, the former with about 12 branches, the latter double; hair IV 4 four- or five-branched, 2.5 times as long as hair II 6, which is triple; hair V-4 double, about 1.4 times as long as hair V 6; hairs 5 and 6 on segment VII double, the latter 1.5 times as long as the former. Hair IV 5 seven- to nine-branched, attaining basal two-thirds of segment following; hair V-5 six-branched, attaining basal three-fourths of following tergite; hair VI 5 four-branched, the branches heavy, bare, attaining basal five-sixths of following tergite. Hair 8 on segments III through VI four- to six-branched; hair VII-8 with four heavily spiculate branches, 0.8 times as long as hair VI 8; hair VIII-8 with four heavily spiculate branches, subequal in length to hair VII 8, inserted anterior to postero-lateral corner which is drawn out into a sharp point. Paddle hair 8, 6.0 times as long as hair 7.

Material.—Costa Rica: 17 larvae, 10 pupae (USNM). Colombia: Three larval, three pupal skins, all associated with males (USNM); five larval, four pupal skins, some associated with males (R).

Distribution and habitat.—Costa Rica, Panamá, Surinam, Colombia, Venezuela. The larva is said by Root (1927) to occur in weedy jungle pools, and is reported by Rozeboom (personal notes) along open grassy margins of small streams.

Taxonomic discussion.—The larvae of *psatharus*, *educator*, and Species A are the only ones in this subgenus for which a large, transparent, pouch-like gill at the base of the antenna has been described. This structure is apparently absent in cast skins, but one of the small sclerites between the head and the antenna is elongated and very darkly pigmented, a distinguishing mark of skins of this species when used in conjunction with the other characters given in the key. The synonyms given above have been described from males, the immature stages of which have not been seen in this study.

CULEX (MELANOCONION) ECGYMON Dyar

(Fig. 22)

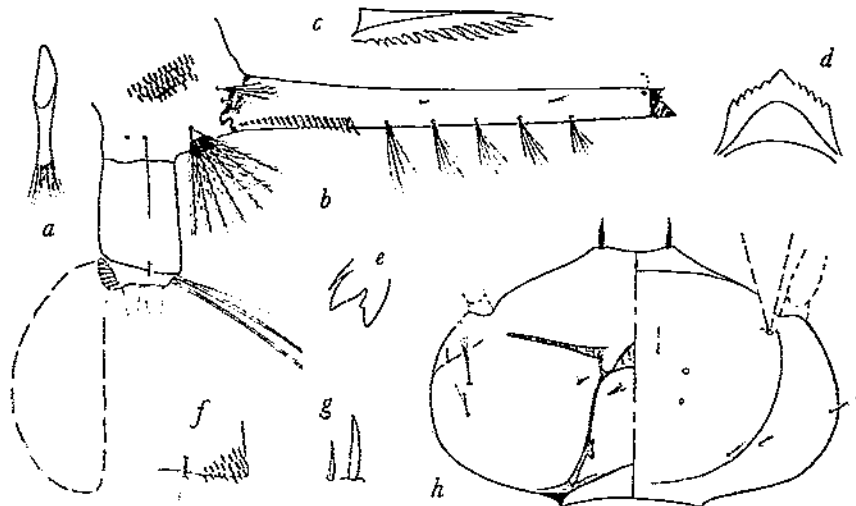


FIGURE 22.—*Culex (Melanocion) egyptum* Dyar: a, Comb scale from posterior row; b, terminal segments of abdomen of larva; c, subapical pecten spine; d, mentum; e, ventral mandibular teeth; f, armature of anal ring; g, maxillary (left) and preclypeal (right) spines; h, ventral (left) and dorsal (right) views of larval head.

Culex egyptum Dyar, 1923, *Insector Insectiae Menstruus* 11: 67; Dyar, 1928, *The Mosquitoes of the Americas*, p. 292.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them, blunt; hair 4 very fine, double; hairs 5 and 6 missing; hair 18 four- to six-branched, small and delicate; hair 20 four- to six-branched, about the same size as hair 18. Anterior ventral mandibular tooth broad at base, posterior ventral tooth slender, sharply pointed, with a very small secondary tooth distinctly removed from the tip; maxillary spine 0.6 times as long and wide as preclypeals, not darkly pigmented; mentum a broad shouldered central tooth and five lateral teeth each side becoming progressively larger, and a minute sixth. Antennae missing. Thorax: Integument moderately spicular-pilose. Prothoracic hair formula (1-1-6)-1 1 1-3 2. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI double or triple. Comb of 40 to 45 apically fringed scales in three or four irregular rows, those in posterior row 2.0 times as long as those in anterior row, bases of all scales shorter than the free portions. Proportions of anal ring destroyed in mounting; armature consisting of a triangular patch of spines on posterior dorso-lateral surface; dorsal hair of dorsal brush 1.5 times as long as ring; ventral brush and gills missing. Air-tube index 7.0, without an infuscated

ring near center; five pairs of ventral tufts, the anterior pair 2.0 times as long as width of air tube at point of insertion, posterior pair 1.2 times tube width at insertion, all the ventral tufts delicate; pecten of 18 to 20 touching spines, each with 10 to 12 quite coarse ventral teeth which become longer apically; terminal hook missing; acus normal.

Material.—Panamá: One larval skin presumably associated with an adult (USNM).

Distribution and habitat.—Panamá. According to Dyar (1928), the larva was collected from a stream full of vegetation and containing fish, and in a small cove of Gatun Lake full of leaves and choked with *Pistia*.

Taxonomic discussion.—Apparently the specimen seen in this study was the one used by Dyar (1928) for his description. *Egrymon* has not been placed in the key with the other long air-tube forms, since its air-tube index is distinctly less than 5.0. It may be that this species is more properly associated with Species E, *dunni*, and *com-meynensis*.

A skin labeled "Panamá, November 21, 1934" was determined as being this species from Dyar's keys and description, but it differs in several major respects from the true *egrymon* described above. Since it is not associated with a male, this latter has been termed Species E.

CULEX (MELANOCONION) ELEVATOR Dyar and Knab

(Fig. 23)

Culex elevator Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 217; Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 414; Dyar, 1928, The Mosquitoes of the Americas, p. 308; Komp, 1935, Ent. Soc. Wash. Proc. 28: 64; Wirth, 1945, Ent. Soc. Wash. Proc. 47: 203; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 91.

Culex opateticus Howard, Dyar, and Knab (part), 1915, Mosquitoes of North and Central America and West Indies, v. 3, p. 321.

Culex domarum Dyar and Shannon, 1924, Insector Inscitiae Menstruus 12: 46.

Larva.—Head: Pre-clypeal spines shorter than one-half the distance between them; hair 4 single or double, fine; hair 5, 0.5 times as long as hair 6, single or double, spiculation extremely sparse and short; hair 6 single, distal third extending beyond anterior margin of head, spiculation short; hair 13 long, triple or four-branched, attaining the basal fourth of antennal shaft; hair 18 four- to six-branched, about the same length as hair 20, which is six- to eight-branched. Anterior ventral mandibular tooth narrow, the posterior ventral tooth about the same width as the anterior, with a blunt secondary removed from tip; maxillary spine as long or longer than pre-clypeals, but much narrower and tapered from base to a sharp point; mentum a wide central tooth, five lateral teeth each side and a much smaller sixth. Antenna infuscated at extreme base of shaft and on constricted portion; hair 10 distinctly shorter than subapical spines, terminal spine 0.25 times as long as hair 10. Thorax: Integument spicular-pilose, the individual spicules heavy at their bases. Prothoracic hair formula (1-1-3-5)-1-1-1-2 1; prothoracic hair 3, 0.3 times as long as head hair 5, little or no spiculation. Abdomen: Integument very lightly spicular-pilose across the middle of each segment. Hair 1 6 double; hair 1 7 single; hair 11 6 double; hair 6 on segments III through VI triple- or four-branched; comb of 50 to 60 apically fringed scales in three or four irregular rows, those in posterior row 1.4 times as long as those in anterior row. Proportions of anal ring 12 x 78, with a lightly sclerotized anterior border; armature consisting of a narrow patch of spines nearly confined to posterior dorso-lateral border; dorsal hair of dorsal brush with a single shorter branch 1.6 times as long as anal ring; ventral brush 2.3 times as long as ring; gills 4, 0.6 to 0.75 times as long as ring. Air-tube index 5.6 to 6.4, not infuscated in a ring near the middle; five pairs of ventral tufts, the anterior pair 2.3 times as long as width of air tube at point of insertion, posterior pair 1.4 times as long as tube width at insertion; pecten of 14 to 20 overlapping

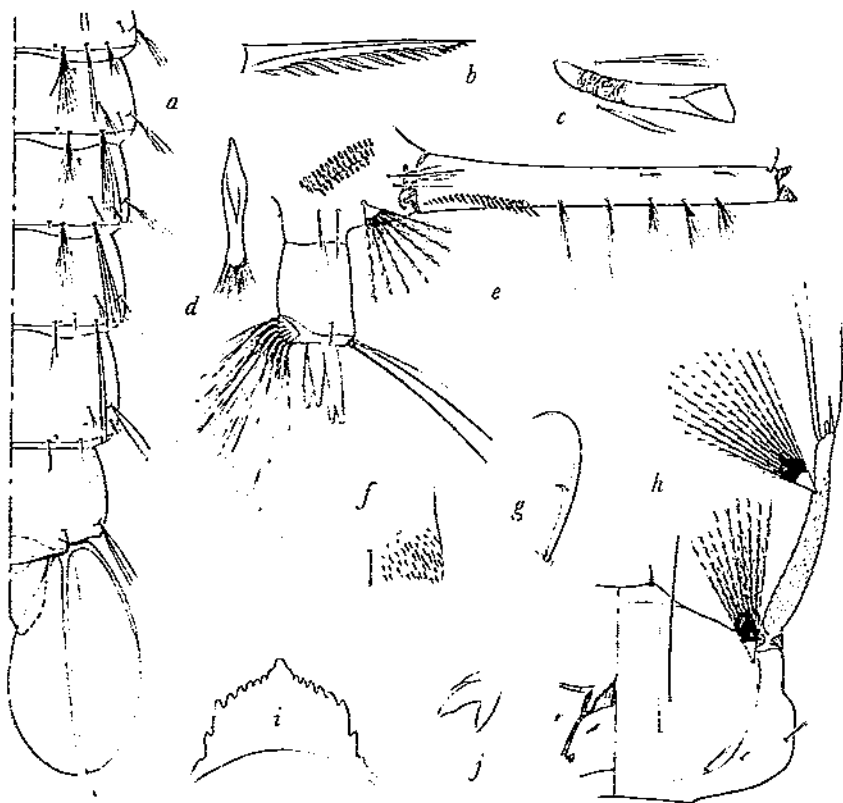


FIGURE 23.—*Cutex (Melnorion) elevator* Dyar and Knab: *a*, dorsal view of segments III through VIII of pupal abdomen; *b*, subapical pecten spine; *c*, pupal trumpet; *d*, comb scale from posterior row; *e*, terminal abdominal segments of larva; *f*, armature of anal ring; *g*, terminal hook of air tube; *h*, ventral (left) and dorsal (right) views of head of larva; *i*, mentum; *j*, ventral mandibular teeth.

spines (at least touching) on basal third of tube, subapical spine 1×8 , with about 15 subequal fringing teeth; terminal hook with a slight secondary hook on basal 0.35; acus normal.

Pupa.—Cephalothorax: Trumpet 4.5 times as long as width at tip, the lateral borders tapering gradually to tip from base; pinna 1.3 times as long as width at tip, cleft at base 0.15 times as long as pinna, distal margin at an angle to the center line of the trumpet, an evagination on one side. Hair 1 triple, 1.4 times as long as hair 2, which is five- or six-branched; hair 3 four- or five-branched, 0.7 times as long as hair 1. Hairs 4 and 5 four- or five-branched, the former 0.9 times as long as the latter; hairs 6 and 7 double, the former 1.3 and the latter 1.3 times as long as hair 5. Hair 8, 0.6 times as long as trumpet, triple; hair 9 double, 0.55 times as long as trumpet. Metathorax: Hair 10 missing; hair 11 single, 1.1 times as long as hair 12, which is triple. Abdomen: Hair 1-7 single, 0.5 times as long as hair 1-6; hair 11-4 double, 1.4 times as long as hair 11-2, which has about 20 minute branches; hairs 5 and 6 on segment 11 triple, the former 1.4 times as long as the latter; hairs 2 and 4 on segment 111 subequal, the former six- to eight-branched, the latter double; hair 4 on segment 1V four- or five-branched, 2.0 times as long as double hair 1V-6; hair V 4 double, 1.6 times as long as hair V-6, which is four- or five-branched; hair VII-6 single, 1.3 times as long as hair 5, which is double. Hair 1V 5 with five to seven branches, barely exceeding posterior margin of following tergite; hair V 5 four-branched, spicu-

late, exceeding posterior margin of following tergite by 0.1 its length; hair VI-5 heavy, double, spiculate, just attaining posterior margin of following tergite. Hair 8 on segments III through VI triple; hair VII-8 double, the branches heavy and with a few heavy spicules near base, as long as hair VI-8, hair VIII-8 triple, the branches heavy and with long, heavy spicules, as long as hair VII-8, inserted anterior to postero-lateral corner, which is drawn out into a sharp point; hair VIII-5 a long, single hair 0.33 times as long as paddle. Paddle hair 8, 6.0 times as long as hair 7.

Material.—Panamá: One larva, one pupa (USNM); 15 larvae, seven pupae, six of each in a group association with males (R). Puerto Rico: Two larvae (P). Costa Rica: Seven larvae, five pupae (USNM). Venezuela: One larva (USNM).

Distribution and habitat.—Florida, Costa Rica, Panamá, Colombia, Brazil. Collected in Florida from brackish water in association with limestone and mangrove. Dyar (1928) reports this species from ". . . ground and rock pools."

Taxonomic discussion.—The larva of this species is one of the few in this subgenus distinguished by the unusual prothoracic hairs 7 and 8, which are double and single, respectively. The long maxillary spines, five lateral mental teeth, and fine fringing; long entire length of pecten spine separate this species from *colambidis*.

CULEX (MELANOCONION) ERRATICUS (Dyar and Knab)

(Figs. 24 and 25)

Mochlostyrax erraticus Dyar and Knab, 1906, N. Y. Ent. Soc. Jour., 14: 227.

Culex principis Dyar and Knab, 1907, N. Y. Ent. Soc. Jour., 15: 202.

Culex cyberti Dyar and Knab, 1907, *ibid.*, p. 214.

Culex larvator Pazos, 1908, Acad. de Cienc. Med., Fis. y Nat., Habana, An. 14: 426.

Culex abominator Dyar and Knab (part), 1909, *Smithson. Misc. Collect.*, 52: 257.

Culex trachiteampa Dyar and Knab, 1909, *Canad. Ent.*, 11: 101.

Culex mutator Howard, Dyar, and Knab, 1915, *Mosquitoes of North and Central America and the West Indies*, v. 3, p. 422.

Culex peribolus Dyar and Knab, 1917, *Insector Insectifera Menstruus* 5: 181.

Culex pose Dyar and Knab, *ibid.*, p. 182.

Culex moorei Dyar, 1918, *Insector Insectifera Menstruus* 6: 108.

Culex peccator Dyar and Barrett (not Dyar and Knab), 1918, *Insector Insectifera Menstruus* 6: 119.

Culex degustator Dyar and Knab, 1921, *Insector Insectifera Menstruus* 9: 39.

Culex homopus Dyar and Ludlow, 1921, *Insector Insectifera Menstruus* 6: 40.

Culex barinquii Root, 1922, *Amer. Jour. Hyg.*, 2: 400.

Culex torati Evans, 1924, *Ann. Trop. Med. and Parasitol.*, 18: 367.

Culex erraticus (Dyar and Knab): King and Bradley, 1937, *Ent. Soc. Amer. Ann.*, 30: 345.

Larva.—Head: Preelypeal spines longer than half the distance between them; hair 4 fine, single, closer to hair 6 than to each other; hair 5 triple to eight-branched, the branches of unequal length, 0.43 times as long as hair 6, no visible spiculation; hair 6 single, distal 0.5 extending beyond anterior margin of head, spiculation long; hair 7 with 10 to 13 branches; hair 18 with four to six branches, shorter than hair 20, which has six to nine branches. Anterior ventral mandibular tooth extremely broad, posterior ventral tooth as long as anterior but narrower and with an apical notch; maxillary spine as long or longer than the preelypeal but 0.66 times as wide; mentum a broad central tooth and four or five smaller lateral teeth. Antenna infuscated on the constricted portion; subapical spines distinctly removed from extreme tip of antenna; hair 10, 0.9 times as long as subapicals, terminal spine 0.25 times as long as hair 10. Thorax: Integument spicular-pilose, the spicules dense and long. Prothoracic hair formula (1 1 6 10) 1 1 1 3 2; hair 3, 1.7 times as long as head hair 5, spiculation short. Abdomen: Integument heavily spicular-pilose, nearly as heavily so as the thorax. Hair 1-6 double; hair 1-7 single; hair 11-6 double or triple; hair 6 on segments III through VI three- to five-branched; hair 11 6, 0.75 times as long as short branch of hair 11 6; hair

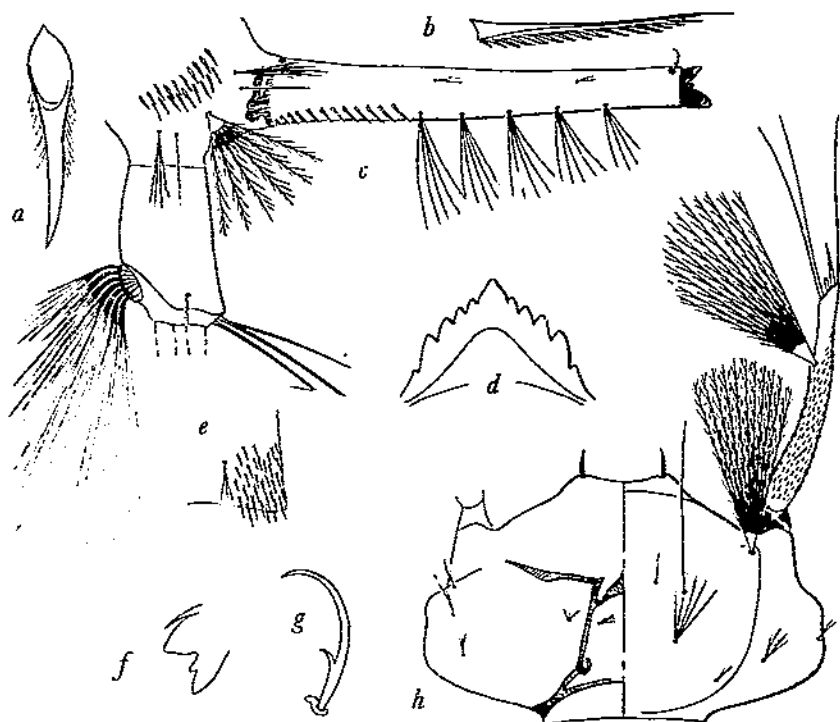


FIGURE 24.—*Culex (Melanoconion) erruticus* (Dyar and Knab): a, Comb scale from posterior row; b, subapical pecten spine; c, terminal abdominal segments of larva; d, mentum; e, armature of anal ring; f, ventral mandibular teeth; g, terminal hook of air tube; h, ventral (left) and dorsal (right) views of larval head.

VI-6 the same length as short branch of this hair. Comb of two irregular rows of 11 to 29 long, pointed scales, the individual scale fringed along the lateral edges of the base, especially at its junction with the free portion, the bases of the scales shorter or longer than the free portions. Proportions of anal ring 16 x 22, becoming slightly wider toward the apex, armature consisting of a dense but narrow patch of long, narrow spines confined to posterior dorso-lateral margin; dorsal hair of dorsal brush with one or two shorter branches, the longest 2.0 times as long as anal ring; ventral brush 2.8 times as long as ring; gills 4, about 0.5 times as long as ring. Air-tube index 5.2 to 6.2, the tube slightly bent and not infuscated near center; four to six pairs of ventral tufts, anterior pair 2.2 times as long as width of air tube at point of insertion, the posterior pair 1.8 times as long as width of tube at insertion; pecten of 12 to 17 spines on basal third of tube, the spines separated, subapical spine 1 x 5, with 12 to 20 smaller basal fringing spines becoming longer apically, without any fringe on apical third of scale; terminal hook stout, with a very fine secondary hook on basal fifth; acus normal.

Pupa.—Cephalothorax: Trumpet 6.0 times as long as width at tip, the lateral borders nearly parallel distad of the tracheoid portion; pinna long, 2.2 to 2.5 times as long as wide, the open lateral portion narrow, cleft at base 0.1 times as long as pinna, distal margin with a slight evagination. Hair 1 four- or five-branched, 2.0 times as long as hairs 2 and 3, which are subequal and triple. Hair 4 triple, 0.5 times as long as hair 5, which has five or six branches; hair 6 triple, 0.6 times as long as hair 5; hair 7 double or triple, slightly longer than hair 5. Hair 8 four- or five-branched, 0.33 times as long as trumpet; hair 9 double, 0.3 times as long as trumpet. Metathorax: Hair 10 six-

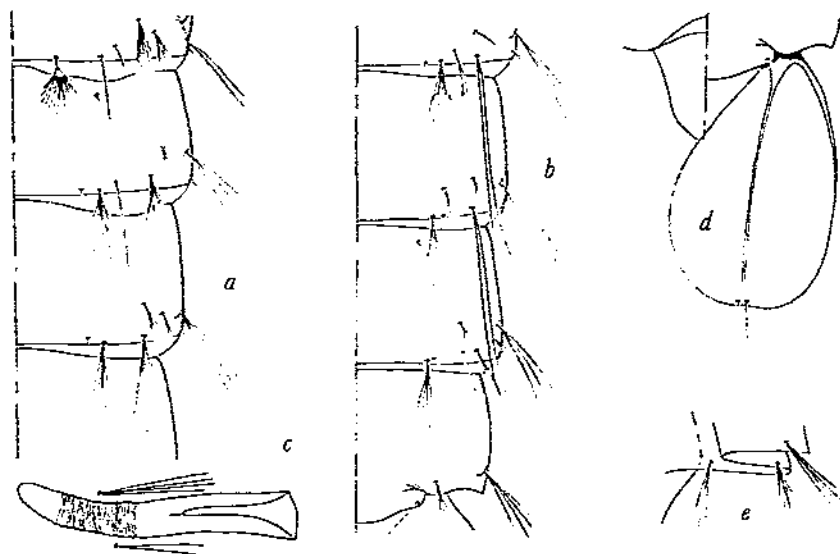


FIGURE 25.—*Culex (Melanoconton) erraticus* (Dyar and Knab): *a*, Segments II, III, and IV of pupal abdomen; *b*, segments V through VIII of pupal abdomen; *c*, pupal trumpet; *d*, pupal paddle; *e*, pupal hairs 1, 2, and 3.

to ten-branched, 0.7 times as long as hair 11, which is double or triple, 0.6 times as long as hair 11, which is double. Abdomen: Hair I-7 triple, 0.5 times as long as hair I-6; hair II-1 single, 1.2 times as long as hair II-2, which has nearly 40 branches; hairs 5 and 6 on segment II with four to six branches, the former 2.0 times as long as the latter; hair III-4 single, 0.9 times as long as hair III-2, which has seven to nine branches; hairs 4 and 6 on segment IV four-branched, the former 1.25 times as long as the latter; hair V-4 double, 1.5 times as long as four-branched hair V-6. Hair IV-5 with five or six strongly spiculate branches, attaining basal two-thirds of following tergite; hair V-5 and VI-5 double, strongly spiculate, the branches heavy, distal fourth of both hairs extending beyond posterior margin of following sternites. Hair 8 on segments III through VI triple or four-branched; hair VII-8 only very slightly shorter, triple, the branches bare but heavy; hair VIII-8 with four or five spiculate, heavy branches, 0.9 times as long as hair VII-8, inserted anterior to postero-lateral corner, which is drawn out into a distinct point. Paddle hair 8, 2.5 times as long as hair 7.

Material.—Alabama: One larva (Q). Florida: Two larvae (Q). Kentucky: Five larvae (Q). Oklahoma: 42 whole-mounted larvae, six larval skins, some of which are associated with males (R). Georgia: 18 larvae (USPHS). Puerto Rico: One pupal skin (R); 53 larvae, one pupa (USNM); 62 larvae, 41 pupal skins (P). Panamá: One larva (USNM). Nicaragua: Two larvae, one pupa (USNM). Venezuela: Six larvae, six pupae (USNM). Brazil: One larva (USNM).

Distribution and habitat.—Southeastern United States, Mexico, Honduras, Panamá, Cuba, Puerto Rico, British Guiana, Venezuela. The larvae occur in a variety of breeding places.

Taxonomic discussion.—King and Bradley (1937) have re-examined the material in the U. S. National Museum representing most of the synonyms listed above. They state, “. . . no marked differences are to be found between *erraticus* and various forms such as

leprincei, *invocator*, *trachycampa*, *borinqueni*, *tovari*, and *trachycampa*, described from the tropical Americas . . . the U. S. species *egberti*, *peribleptus*, *pose*, *degustator*, and *homeopas* are probably the same as *erraticus*." *Culex erraticus* is the only United States *Melanoconion* whose larva has a heavily spicular-pilose abdomen and long, pointed comb scales.

CULEX (MELANOCONION) EVANSAE Root

(Fig. 26)

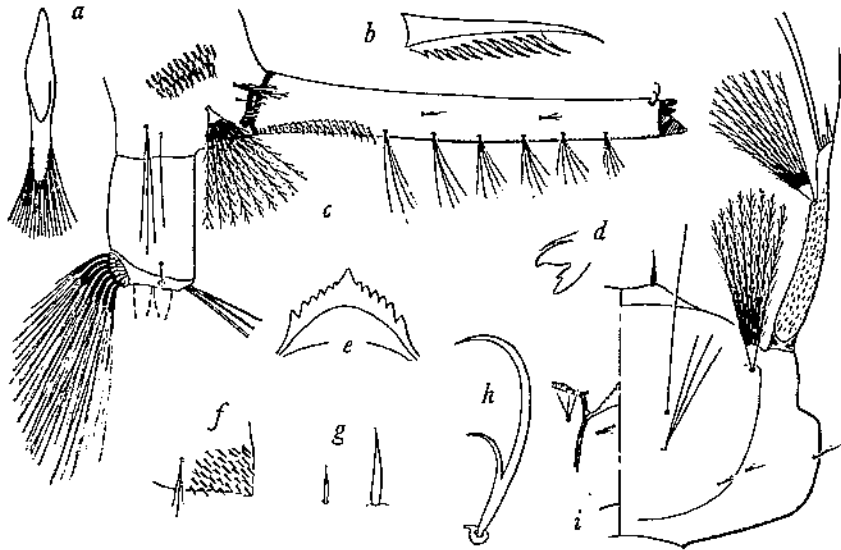


FIGURE 26.—*Culex (Melanoconion) evansae* Root: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal abdominal segments of larva; d, ventral mandibular teeth; e, mentum; f, armature of anal ring; g, maxillary (left) and preclypeal (right) spines; h, terminal hook of air tube; i, ventral (left) and dorsal (right) views of larval head.

Culex evansae Root, 1927, Amer. Jour. Hyg. 7: 593; Dyar, 1928, The Mosquitoes of the Americas, p. 320; Senevet and Abonnenc, 1938, Inst. Pasteur d'Algérie, Arch. 7: 86.

Larva.—Head: Preclypeal spines as long or longer than one-half the distance between them; hair 4 single, fine; hair 5 double or triple, 0.6 times as long as hair 6 but not attaining anterior margin of head, not spiculate; hair 6 single, the distal 0.4 extending beyond anterior margin of head, spiculation short but present; hair 7 nine-branched, spiculate; hair 18 triple, 0.3 times as long as hair 20, which has six to nine branches. Anterior ventral mandibular tooth with a rather broad base, the posterior ventral tooth narrower with a small projection somewhat removed from the tip; maxillary spine 0.5 times as long as preclypeal, darkly pigmented; mentum a broad shouldered central tooth and six smaller on each side. Antenna infuscated on basal fourth of shaft and basal sixth of constricted portion; subapical spines 1.1 times as long as hair 10; hair 10, 3.0 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules short. Prothoracic hair formula (1-1-7)-2-1-1-3-2; hair 3 missing. Abdomen: Integument of only the last four segments short-pilose. Hair I-6 double; hair I-7 single, hair II-6 double; hair 6 on segments III through VI double or triple. Comb of about 35 apically fringed scales in three or four irregular rows, those in posterior row 1.5 times as long as those in anterior row, the bases of all scales the same length or about 0.9 times as long

as free portions. Proportions of anal ring 14 x 18, noticeably widened posteriorly; armature consisting of a small patch of small, stout, well-separated spines on the posterior dorso-lateral surface, the patch oriented more or less along the length of the anal ring rather than across the width; dorsal hair of dorsal brush with a single branch 2.0 times as long as anal ring; ventral brush 2.5 times as long as ring; gills badly distorted in the mount. Air-tube index 6.0 to 6.5, the tube noticeably curved; infuscated just beyond center in a narrow ring; six pairs of ventral tufts, the anterior pair 1.8 to 2.0 times as long as width of air tube at point of insertion, posterior pair almost exactly the same length as air-tube width at point of insertion; pecten of 16 to 18 spines on basal fourth, the spines touching, subapical spine about 1 x 5, with from 12 to 16 fringing spines; terminal hook stout with a strong secondary hook on basal 0.33; acus normal.

Material.—Brazil: Two larval skins, one of which is associated with USNM 40628 (USNM).

Distribution and habitat.—French Guiana, Brazil. In small jungle pools.

Taxonomic discussion.—Root's original description of the larva of this species is somewhat misleading in stating that the comb scales possess a delicate terminal point. No such character exists on the specimens in the U. S. National Museum collection, all the scales having a rounded terminal fringe. The description by Senevet and Abonnenc (1939) of the larva agrees well with that of Root in important respects, but they show somewhat longer ventral air-tube tufts than occur on Root's specimens from Brazil.

Culex evansue belongs in the group with apically fringed comb scales and short ventral air-tube tufts. Since no specimens of *thomasi* have been seen in this study, and since Floch and Abonnenc (1945) present no worded description of that species, the writer is unable to satisfactorily separate the two forms in the key.

CULEX (MELANOCONION) GRAVITATOR Dyar and Knab

(Fig. 27)

Culex gravitator Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 218; Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 448; Dyar, 1928, The Mosquitoes of the Americas, p. 334; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 98.

Larva.—Head: Rounded, widest through the eyes; a large notch at insertion of antennae, front margin arcuate; hair 5 single, about two-thirds as long as hair 6; hair 6 single, distal half extending beyond anterior margin of head; hair 7 multiple. Maxillary spine stout, inserted close to the suture; mental plate small, triangular, with a large stout central tooth and six smaller on each side, the two basal ones larger. Antenna large, slightly curved, basal two-thirds thick and well-spined, a large tuft from a notch, two long setae nearly at tip, a long seta, a short one and a digit at tip. Thorax: Integument spicular-pilose. Abdomen: Integument glabrous. Hair 6 on segments III through VI triple. Comb of many apically fringed spines in a large triangular patch, the individual spine elongate and widened at tip. Anal segment nearly twice as long as wide; dorsal hair of dorsal tuft with a single shorter branch; ventral brush well developed; gills four, shorter than anal ring, tapered. Air-tube index 6.5; five large ventral tufts becoming shorter towards apex of tube; pecten of long teeth on basal third of tube, single teeth coarsely serrate on ventral side.

Material.—No specimens available for study. The description was entirely from that of Howard, Dyar, and Knab (1915).

Distribution and habitat.—Córdoba, México. From leaf bases of Bromeliaceae.

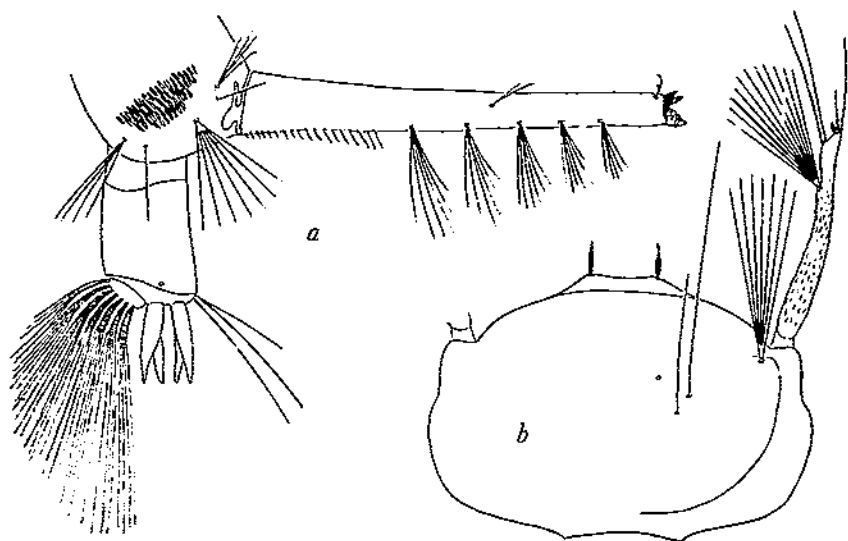


FIGURE 27.—*Culex (Melanoconion) gravitator* Dyar and Knab: *a*, Terminal segments of abdomen of larva; *b*, dorsal view of larval head. Redrawn from Howard et al. (1915).

Taxonomic discussion.—This species is another plant breeder but, like *decorator*, has a mental plate with relatively few teeth, and mandibular teeth as in *Melanoconion*. It exists in the key with *conspirator* or *intricatus*, but doubtfully there, because the characters of the prothoracic hairs are not known. Howard, Dyar, and Knab's (1915) description will not separate this form with certainty from those species, but it is distinct from *ocellatus* and *nigrimacula*, also plant breeders, by the type of comb and single head hair 5. It apparently is closely related to *decorator*, also described originally from a larva. The affinities await further clarification with accumulation of associated specimens for study.

CULEX (MELANOCONION) HUMILIS Theobald

(Fig. 28)

Culex humilis Theobald, 1901, Monograph of the Culicidae, 2: 336; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 98.

Larva.—Head: Preclypeal spines much shorter than one-half the distance between them; hair 4 double, the length not visible, with fine branches; hair 5 at least double, but the branches obscured; hair 6 missing; hair 7 missing; hair 18 double; hair 20 triple, the same length but both rather long. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth somewhat shorter and much narrower, with a distinct notch at tip; maxillary spine 1.7 times as long and 0.6 times as wide as preclypeal, darkly pigmented; mentum a slender central tooth and six smaller each side. Antenna infuscated on entire constricted portion; terminal and subapical spines broken. Thorax: Integument heavily spicular-pilose. Prothoracic hair formula (1-1-?) - 1(?) - 1-3-2; prothoracic hair 3 not visible. Abdomen: Integument distinctly spicular-pilose. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI double or triple; hair VI-6 the same length as short branch of hair II-6. Comb of 25 to 30 apically fringed scales in a narrow, triangular patch three rows deep, individual scale with base shorter than free portion, scales in posterior

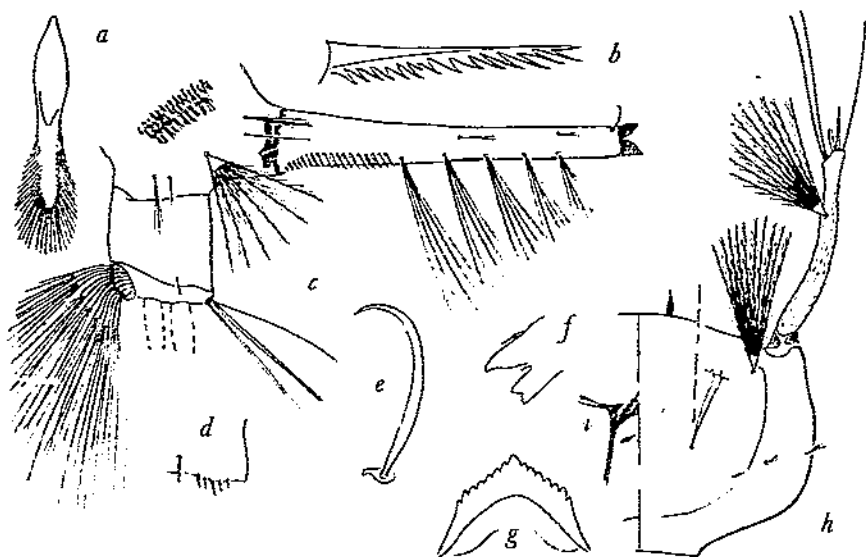


FIGURE 28.—*Culex (Melanoconion) humilis* Theobald: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal abdominal segments of larva; d, armature of anal ring; e, terminal hook of air tube; f, ventral mandibular teeth; g, mentum; h, ventral (left) and dorsal (right) views of larval head.

row 1.25 times as long as those in anterior. Proportions of anal ring destroyed in mount; armature consisting of six to eight short but sharp single spines confined to extreme postero-lateral margin; dorsal hair of dorsal brush with a single shorter branch 1.3 times as long as anal ring; ventral brush 3.2 times as long as ring; four gills, 2.0 times as long as ring. Air-tube index 5.0 to 5.5, tube without indication of median infuscation; four pairs of ventral tufts, anterior pair 3.3 times as long as width of tube at point of insertion, posterior pair 2.0 times as long as tube width at insertion; pecten of 12 large, well-separated spines on basal third, subapical spine 1×5 , with 10 to 15 fringing teeth, the basal smaller than the apical; terminal hook 0.7 times as long as tube width at tip, with extremely minute secondary on basal third, or none at all; acus not visible.

Material.—Brazil: One larval skin associated with a female (USNM).

Distribution and Habitat.—Brazil. Slide examined labeled, “. . . puddles in bed of stream.”

Taxonomic discussion.—It is possible that this form is the same as *sursumptor*, the only real difference being the pilosity of the abdominal integument. In *sursumptor* this pilosity is present on all segments but is confined to the midportion of each segment and is sparse with delicate spicules, whereas in *humilis* it is distinctly more dense than this, being almost as dense as that of the thorax.

The skin examined for this species is associated with an adult female, and it is said that a male specimen is housed in the British Museum. The terminalia of this specimen has not been mounted, and it is not known what skins, if any, may be associated with it. There is a very poorly mounted pupal skin with that of the larva in the material examined. The trumpet is so like that of *sursumptor* that the same illustration serves for both forms.

CULEX (MELANOCONION) IMPLICATUS Senevet and Abonnenc

(Fig. 29)

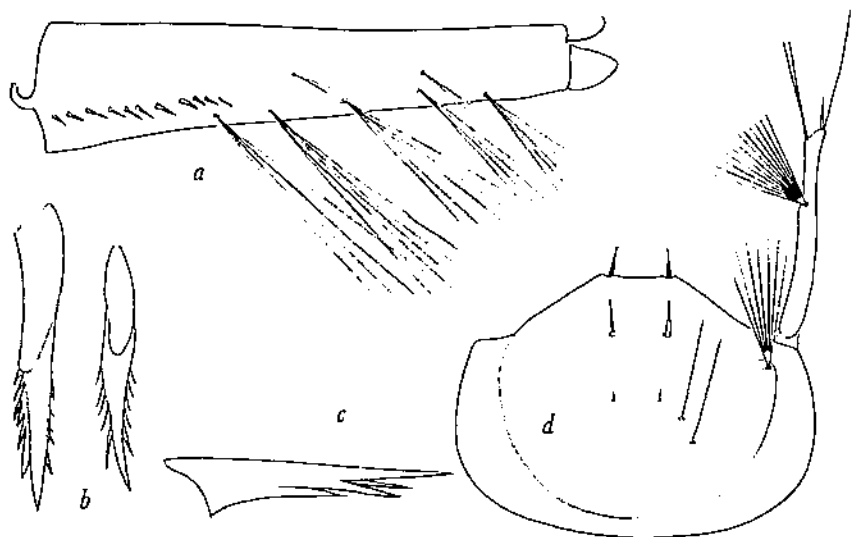


FIGURE 29.—*Culex (Melanoconion) implicatus* Senevet and Abonnenc: *a*, Air tube; *b*, comb scales; *c*, pecten spine; *d*, dorsal view of larval head. Redrawn from Senevet and Abonnenc (1939).

Culex implicatus Senevet and Abonnenc, 1939, Inst. Pasteur d'Algérie, Arch. 17: 100; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 91; Lane, 1951, Ent. Soc. Wash. Proc. 53: 334.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them, stout and pigmented; hair 4 fine, closer to hair 6 than to each other; hair 5 single, shorter than hair 6; hair 6 single, just attaining anterior margin of head capsule; hair 7 not attaining constriction of antenna. Maxillary spine nearly as long as the preclypeals. Antenna pigmented on the constricted portion; not more than five or six spicules on the constricted portion. Thorax: Integument spicular-pilose, the spicules long. Prothoracic hair formula: (1-1-5)-2-1-1-3-2; hair 3 with five branches, length not noted. Abdomen: Integument spicular-pilose on all segments. Hair 6 on segments IV through VI triple. Comb of many scales in several rows, the individual scale elongated, with a strong central spine and a lateral fringe becoming longer and stronger toward the tip. Posterior border of anal plate entirely covered with long, fine spines. Air-tube index 3.8 (more probably in the neighborhood of 5.0); five pairs of ventral tufts, the anterior pair within the pecten and about 3.0 times the width of the air tube at point of insertion, posterior pair about 2.0 times the width of the air tube at point of insertion; pecten of 8 to 15 incurved spines, ventrally fringed.

Material.—No specimens available for study. The description was taken entirely from that of Senevet and Abonnenc (1939).

Distribution and habitat.—French Guiana. Larvae in the cavities of rocks regarded as "polissoirs" of a prehistoric epoch, peculiar to French Guiana.

Taxonomic discussion.—The larva of this species possesses apically pointed comb scales, and appears from the description of Senevet and Abonnenc (1939) to be related, at least in air-tube characters, to *mistrura*, from which it may be separated by the few fringing teeth of the pecten spines, the laterally fringed comb scales and the single head

hair 5. Rozeboom (personal notes) indicates that the male is close to *inadmirabilis*, the larva of which has not been seen in this study.

Lane (1951) calls this species *nigrescens*. The writer has not seen the larva of the latter form, but there are distinct differences in the male terminalia between the two species.

CULEX (MELANOCONION) INHIBITATOR Dyar and Knab

(Fig. 30)

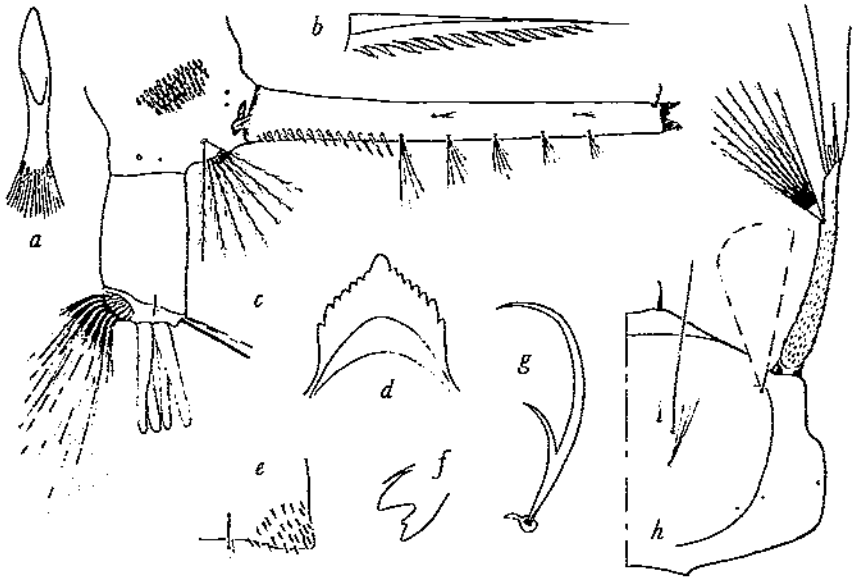


FIGURE 30.—*Culex (Melanoconion) inhibitor* Dyar and Knab: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal abdominal segments of larva; d, mentum; e, armature of anal ring; f, ventral mandibular teeth; g, terminal hook of air tube; h, dorsal view of head of larva.

Culex inhibitor Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 207; Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3; p. 391; Dyar (part 1, 1928, The Mosquitoes of the Americas, p. 317; King and Bradley, 1937, Ent. Soc. Amer. Ann. 30: 349.

Culex investigator Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3; 381.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them; hair 4 very fine, single or double, closer to hair 6 than is hair 5; hair 5 triple- or four-branched, rather fine, 0.45 as long as hair 6; hair 6 long, distal half extending beyond anterior margin of the head, without visible spiculation; ventral hairs obscured. Anterior ventral mandibular tooth as long as width at base, posterior ventral tooth more slender, with a small anterior projection somewhat removed from the tip; maxillary spine not visible; mentum with a stout central tooth and six to eight lateral teeth becoming larger distally. Antenna not infuscated except at extreme base of shaft; hair 10, 0.9 times as long as subapicals; terminal spine 0.4 times as long as hair 10. Thorax: Integument spicular-pilose, the spicules coarse but not dense. Prothoracic hair formula (1-1-6)-1-1-1-3-2; hair with six branches, 1.2 times as long as head hair 5. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair II-6 double, hair 6 on segments III through V double. Comb of many spines in a triangular patch, the individual spine elongate, widened at tip with an apical fringe. Proportions of anal plate 14 x 26; armature consisting of a patch

of short, stout spines on posterior dorso-lateral surface, not confined to the margin; dorsal hair of dorsal brush with a single smaller branch; ventral brush missing; gills 4, narrow but rather bluntly tipped, 0.7 as long as anal ring. Air-tube index 6.5 to 7.0, without any fuscation near the center; five pairs of ventral tufts, the anterior pair 2.0 as long as width of air tube at point of insertion, posterior pair 0.5 times as long as the anterior pair; pecten of 15 long spines on basal third, the subapical spine with about nine coarse, subequal fringing spines; terminal hook and acus not visible.

Material.—West Indies: Three larval skins associated with males (R): nine larvae (USNM). Panamá: Two larval skins (USNM). México: One larval skin ("type of *investigator*. J & K.") (USNM).

Distribution and habitat.—México, West Indies. Howard, Dyar, and Knab (1915) report this species from a slowly running, clear, cold spring.

Taxonomic discussion.—Up to the time of the report of King and Bradley (1937) on this and other species of *Melanconion*, the synonymy of this species had long been confused, and its identity with *erraticus* had been in much doubt, due in part, no doubt, to the strongly spicular-pilose abdomen of the larva. King and Bradley definitely determined that *inhibitor* is a distinct species on the basis of the male terminalia, and that the larva, although at first glance resembling *erraticus*, differs from it in many respects, notably in its apically fringed comb scales and other well-defined characters.

CULEX (MELANCONION) INTRINCATUS Bréthes

(Fig. 31)

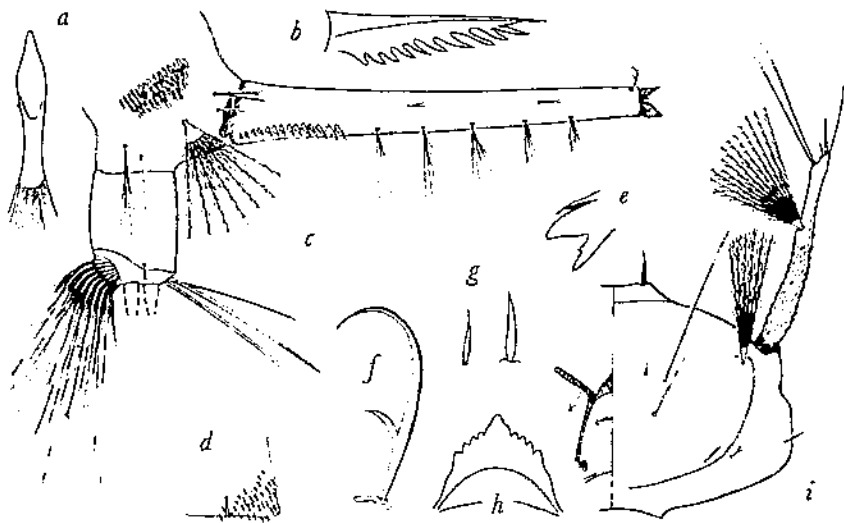


FIGURE 31.—*Culex (Melanconion) intricatus* Bréthes: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal abdominal segments of larva; d, armature of anal ring; e, ventral mandibular teeth; f, terminal hook of air tube; g, maxillary (left) and preclaypal (right) spines; h, mentum; i, ventral (left) and dorsal (right) views of larval head.

Culex intricatus Bréthes, 1906, Buenos Aires Mus. Soc. de Hist. Nat. An. 28: 214; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 92.

Culex virilis Dyar, 1920, Insector Inscitiae Menstruus 8: 78.

Culex cenus Root, 1927, Amer. Jour. Hyg. 7: 590.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them, rather blunt; hair 4 fine, double, closer to hair 5 than to each other; hair 5 fine, single, no visible spiculation, 0.75 times as long as hair 6, nearly but not quite attaining anterior margin of head; hair 6 single, the distal half extending beyond anterior margin of head, spiculation short and sparse; hair 7 seven- or eight-branched, spiculate; hair 18 double, about 2.0 times the length of hair 20, which has five or six branches. Anterior ventral mandibular tooth about as long as width at base, posterior ventral tooth narrower but slightly longer, with a notch at tip; maxillary spine about 0.7 times as long and broad as preclypeals, darkly pigmented; mentum a broad shouldered central tooth and five smaller lateral teeth on each side, the center of the plate transparent. Antenna lightly infuscated on extreme base and on constriction; subapical spines distinctly removed from the apex; hair 10, 0.9 times as long as subapical spines; terminal spine 0.33 as long as hair 10. Thorax: Integument covered with fine, short, dense spicules. Prothoracic hair formula (1-1-2-3)-2-1-1-3-2; hair 3, 1.3 times as long as head hair 5. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single, hair 11-6 double; hair 6 on segments III through VI all three-branched; hair III-6, 0.66 times as long as short branch of hair II-6; hair VI-6 the same length as short branch of this hair. Comb of about 40 apically fringed scales in three or four irregular rows, those in anterior row about 0.9 times as long as those in posterior row, bases of all scales about the same length as the free portions. Anal plate about as long as wide (skin spread in the mount); armature consisting of a patch of single spines not confined to the posterior dorso-lateral border; dorsal hair of dorsal brush with a single branch 0.3 times as long as anal ring; ventral brush 2.8 times as long as ring; gills destroyed in mount. Air-tube index 6.0, tube without an area of infuscation near the middle; five pairs of ventral tufts, the anterior pair 2.3 to 2.5 times as long as width of air tube at point of insertion, posterior pair 1.2 times as long as width of air tube at insertion; pecten of 13 to 15 spines on basal third of tube, the spines touching, subapical spine about 1 x 5, with 6 to 10 stout, fringing teeth; terminal hook 0.6 times as long as width of air tube at tip, with slender secondary spine at basal fourth; acus normal.

Material.—Surinam: One larval skin (USNM).

Distribution and habitat.—Surinam to Brazil. Root (1927) has collected *canus* from jungle pools, in the pools of a roadside ditch, and the side eddies of a river.

Taxonomic discussion.—The larva used for this description is presumably associated with a male from Surinam. Rozeboom and Komp (1950) indicate that Dyar's (1920) description of both the male and larva of *virilis* is actually that of *curlye* Dyar and Shannon, which is a synonym of *hastagurinus*.

Intricatus keys out near *conspirator* and possesses, like that species, a double prothoracic hair 4. *Culex gravitator* also appears to be closely related to *intricatus*, but the branching of the prothoracic hairs of the former species is not known.

CULEX (MELANOCONION) IOLAMBIDIS Dyar

(Fig. 32)

Culex iolambidis Dyar, 1918, Insector Insectinae Menstruus 6: 165; Pratt and Seabrook, 1952, Ent. Soc. Wash. Proc. 54: 27.

Culex equinivalis Lane, 1951, Ent. Soc. Wash. Proc. 53: 334.

Larva.—Head: Preclypeal spines longer than one-half the distance between them; hair 4 short, single, definite, closer to hair 6 than is hair 5; hair 5 typically single (if branched, then not to extreme base), 0.5 times as long as hair 6, without spiculation; hair 6 single, distal half extending beyond anterior margin of head, spiculation extremely fine. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth much shorter, but as wide at base as anterior; maxillary spine not visible; mentum with a broad central tooth and six smaller lateral ones becoming larger distally. Antenna infuscated on extreme base and on constricted portion; hair 10, 0.7 times as long as subapical spines; terminal spine 0.33 times as long as hair 10. Thorax: Integument spicular-

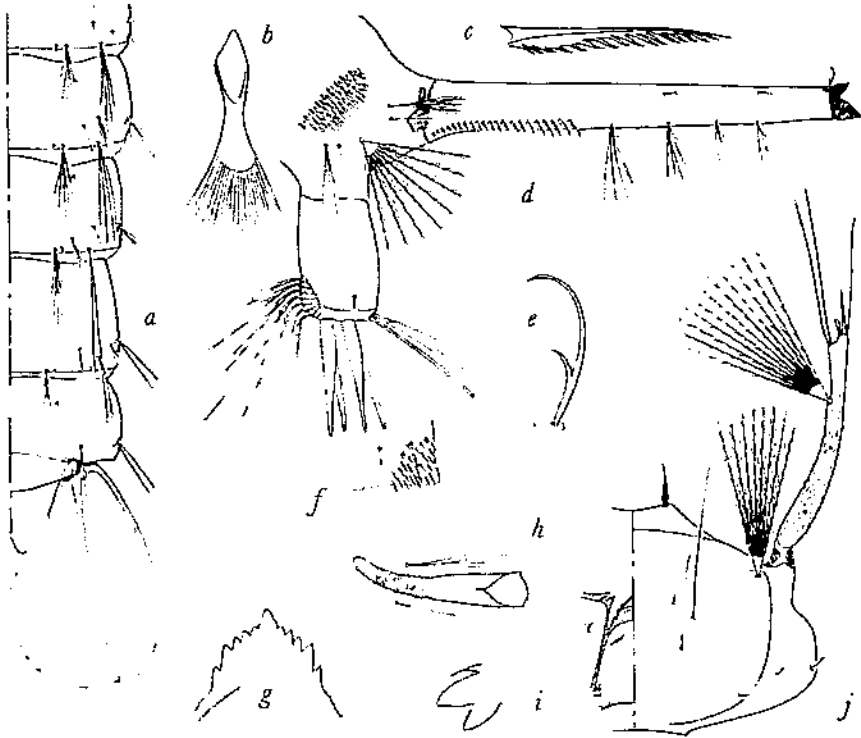


FIGURE 32.—*Culex (Melanoconion) tolambdis* Dyar: a, Dorsal view of segments IV through VIII of pupa; b, comb scale from posterior row; c, subapical pecten spine; d, terminal abdominal segments of larva; e, terminal hook of air tube; f, armature of anal ring; g, mentum; h, pupal trumpet; i, ventral mandibular teeth; j, ventral (left) and dorsal (right) views of larval head.

pilose, but not densely so. Prothoracic hair formula (1-1-3-7)-1-1-1-3-2; prothoracic hair 3, 1.1 times as long as head hair 5, spiculate. Abdomen: Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI three- or four-branched; hair III-6, 0.6 times as long as short branch of hair II-6; hair VI-6, 1.7 times as long as short branch of this hair. Comb of 40 to 45 apically fringed scales in three or four irregular rows, the scales in the anterior row 0.5 times as long as those in posterior row. Proportions of anal ring 13 x 18, anal ring distinctly wider near the apex; armature consisting of a dense patch of single scales not confined to the posterior dorso-lateral margin; dorsal hair of dorsal brush with one or two shorter branches, the longest of which is 0.8 times as long as ring; ventral brush 2.0 times as long as ring; gills 4, each tapering to a blunt point, 0.66 times as long as ring. Air-tube index 6.4 to 7, without a central ring of infuscation; four or five pairs of ventral tufts, the anterior pair 2.0 times as long as air-tube width at point of insertion, posterior pair 1.3 times as long as air-tube width at insertion; pecten of 15 to 20 teeth on basal third of tube, teeth nearly touching, subapical spine about 1 x 8, with two or three coarse fringing teeth at base and about ten finer fringing teeth near apex; terminal hook with a minute secondary spine on basal sixth; acus normal.

Pupa.—Cephalothorax: Trumpet 4.5 times as long as wide at distal end, the lateral margins tapering gradually from a narrow base; pinna only very slightly longer than wide, cleft at base 0.15 times as long as pinna, distal border distinctly eyaginated and sinuate. Hairs 1 and 2, four- or five-branched, the former 1.6 times as long as the latter; hair 3 double, 0.9 times as long as hair 1. Hair 4 double, 0.9 times as long as hair 6, which is triple; hair 7 double, 2.0 times as

long as hair 4; hair 5 missing. Hair 8, 0.6 times as long as trumpet; hair 9 double, 0.45 times as long as trumpet. Metathorax: Hair 10 missing; hair 11 single, 0.9 times as long as hair 12, which is double. Abdomen: Hair 1-7, 0.75 times as long as hair 1-6; hair 11-4 single, 2.25 times as long as hair 11-2, which has 10 to 12 branches; hairs 11-5 and 11-6 four- to six-branched, the former 1.5 times as long as the latter; hair 11-4 single, 1.5 times as long as hair 11-2, which has six or seven branches; hair IV-4 small, triple, 0.6 times as long as hair IV-6; which has five to seven branches; hair V-4 missing; hair V-6 four- or five-branched; hair VII-5 missing; hair VII-6 double. Hairs IV-7 and V-5 four-branched, the former extending to basal three-fourths of following tergite, the latter just attaining posterior margin of following tergite; hair VI-5 heavier, double, bare, the branches just attaining posterior margin of following tergite. Hair 8 on segments III through VI triple; hair VII-8 double, bare, the branches heavier and 1.3 times as long as hair VI-8; hair VIII-8 heavy, double, a few heavy long spicules, inserted anterior to the postero-lateral corner, which is drawn to a blunt, though distinct, point. Paddle hair 8, 5.0 times as long as hair 7.

Material.—Florida: Three larvae, one pupal skin (R). Panamá: Four larvae (R); one larva (USNM); two larvae, four pupal skins (P).

Distribution and habitat.—Florida, Panamá. Pratt and Seabrook (1952) report collecting the larvae at rims of pools or in water held in the bases of elevated roots of mangrove in Florida.

Taxonomic discussion.—Pratt and Seabrook (1952) state that this species is closely related to *clavator* and separated from it by the air-tube index of 5.9. The writer is not certain that this is an entirely reliable character, since specimens of *isambidis* have an air-tube index of 6.4 to 7.0, somewhat closer to that of *clavator*. The first four segments of the abdomen of the former species are bare, whereas those of *clavator* are minutely spicular-pilose. This species is also close to *eductor*, but the writer has not seen the altered sclerite at the base of the antenna that is apparently diagnostic of the latter species. Pratt also states that, while *eductor* is a strictly fresh water breeder, *isambidis* is found only in brackish-water situations.

Equin irialis is synonymized with this species by Lane (1951). The writer has not seen larval descriptions or specimens of the former species.

CULEX (MELANCONION) KUMMI Komp and Rozelboom

(Fig. 33)

Culex Kummi Komp and Rozelboom, 1951, Ent. Soc. Wash. Proc. 53: 139.

Larva.—Head: Pre-lytcal spines longer than one-half the distance between them; hair 1 triple, about 0.3 times as long as hair 5 but extremely fine; hair 5 triple, 0.54 times as long as hair 6, spiculation long and distinct; hair 6 single, distal half extending beyond anterior margin of head, spiculation long and very fine; hair 7 with seven or eight branches; hair 18 four- or five-branched, shorter than hair 20, which is five- or six-branched. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth about 0.6 times as wide at base as anterior but longer, with a small anterior secondary tooth distantly removed from the tip; mentum a broad shouldered central tooth and six lateral teeth, the sixth distinctly smaller than the others; maxillary spine 0.5 times as long and 0.23 times as wide as pre-lytcal. Antenna infuscated on basal fourth of shaft and at the insertion of the antennal tuft; hair 10, 0.9 times as long as subapical spines, spine 0.33 times as long as hair 10. Thorax: Integument spicular-pilose, the spicules short. Prothoracic hair formula (1 1 2 11) 1 1 1 3 2; hair 3, 1.3 times as long as head hair 5. Abdomen: Integument bare. Hair 1-6 with one long and two shorter branches; hair 1-7 single; hair 11-6 with one long and one short branch; hair 6 on segments III through VI double to four-branched;

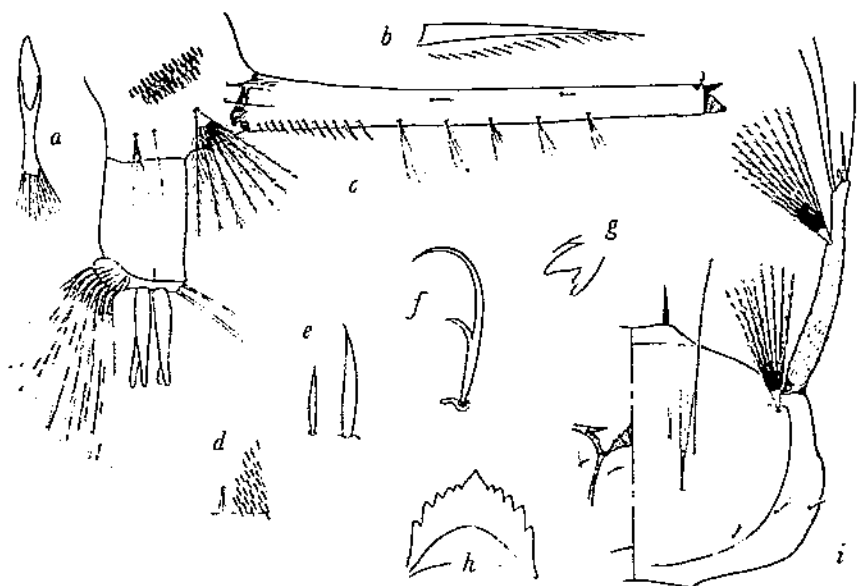


FIGURE 33. *Culex (Metanoconion) kummi* Komp and Rozeboom: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal segments of abdomen of larva; d, armature of anal ring; e, maxillary (left) and preclypeal (right) spines; f, terminal hook of air tube; g, ventral mandibular teeth; h, mentum; i, ventral (left) and dorsal (right) views of larval head.

hair III-6, 0.8 times as long as short branch of hair II-6; hair VI-6, 0.9 times as long as short branch of this hair. Comb of 35 to 40 apically fringed scales in three or four irregular rows, their bases all shorter than the free portions. Proportions of anal plate 14 x 10, without a heavily pigmented anterior border; armature consisting of a small patch of single, short, well-spaced spines not confined to the posterior dorso-lateral border; dorsal and ventral brushes lacking; gills 4, 0.9 to 1.0 times as long as anal ring. Air-tube index 8.0, with a ring of infuscation near the middle of the tube; four pairs of fine ventral tufts, anterior pair 1.4 times as long as width of air tube at point of insertion, posterior pair 1.2 times as long as air-tube width at insertion; pecten of 13 to 15 spines on basal fourth of tube, the teeth barely touching, subapical spine about 1 x 8 with 15 or 16 fringing teeth becoming somewhat longer apically; terminal hook missing; dorsal projection of acus with an extremely narrow connection with the basal portion.

Material.—Panamá: One larval skin mounted on the same slide with an associated male (USNM).

Distribution and habitat.—Panamá. Larvae collected from swamps.

Taxonomic discussion.—The larval skin of this species was apparently overlooked when the male was described, having been found mounted on the same slide with one of several unidentified male terminalia in the collection of the U. S. National Museum, and marked by W. H. W. Komp as "N. Sp." The larva has a very long air tube and somewhat resembles *dunnii*, *commercynensis*, and Species C in having a many-branched prothoracic hair 3.

CULEX (MELANOCONION) LATISQUAMA (Coquillett)

(Fig. 34)

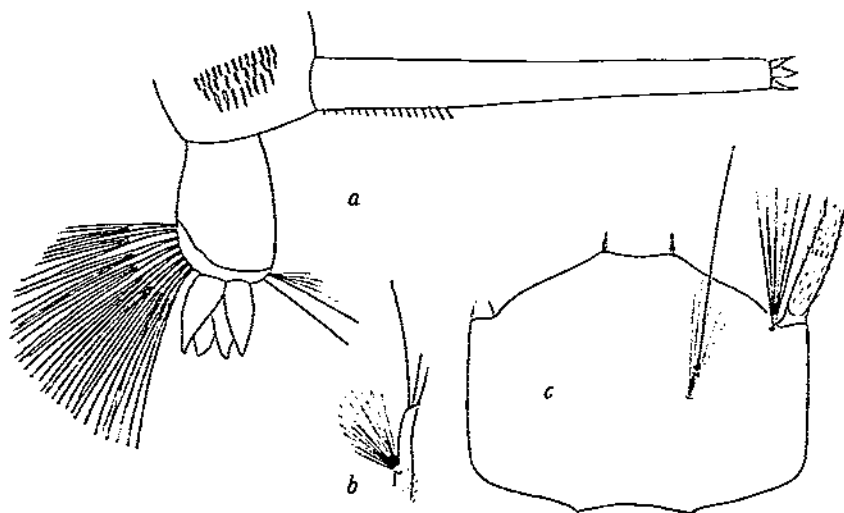


FIGURE 34.—*Culex (Melanoconion) latisquama* (Coquillett): *a*, Terminal abdominal segments of larva; *b*, terminal portion of antenna; *c*, dorsal view of larval head. Redrawn from Dyar (1928).

Tinolestes latisquama Coquillett, 1906, Ent. Soc. Wash. Proc. 7: 185.

Culex latisquama Howard, Dyar, and Knab, 1913, Mosquitoes of North and Central America and the West Indies, v. 3, p. 303; Bonne and Bonne-Wepster, 1925, The Mosquitoes of Surinam, p. 278; Dyar, 1928, The Mosquitoes of the Americas, p. 336.

Larva.—Head: Head transverse, rounded quadrate. Hair 5 four-branched, attaining anterior margin of head and 0.5 times as long as hair 6; hair 6 single, distal half extending beyond anterior margin of head. Antenna large, darkly infuscated, tuft at outer third, part beyond more slender, basal part spiculate. Abdomen: Comb a large patch of spines, the anterior-most small, the posterior ones long. (Appears to have both fringed and pointed scales, but Dyar's description leaves this point in doubt.) Dorsal hair of dorsal brush with four very short branches; gills not as long as anal ring, pointed. Air-tube index about 10.0; tufts obsolete; pecten of about 17 spines extending to the basal third of tube.

Material.—No specimens available for study. The description was taken entirely from that of Dyar (1928).

Distribution and habitat.—Panamá, Costa Rica, Surinam. Reported by Dyar (1928) and Bonne and Bonne-Wepster (1925) to occur in crab holes.

Taxonomic discussion.—The following quotation is made from Dyar (1928): ". . . This peculiar *Culex* shows all the essential structures of *Deinocerites* in an incipient form. The adult antennae are not elongated, and the larvae do not show the head pouches. It represents in *Culex* the departure point of the origin of *Deinocerites*, and it should be noted that the association with crab holes is already established."

Although the association with crab holes may lend support to the relationship with *Dinocerites*, the same habitat has been reported for at least one other species. The larval description of Bonne and Bonne-Wepster obviously represents the same form that Dyar described in 1928, although the former authors state that there seems to be some doubt about the accuracy of the association between male and larva.

CULEX (MELANOCONION) LUCIFUGUS Komp

(Fig. 35)

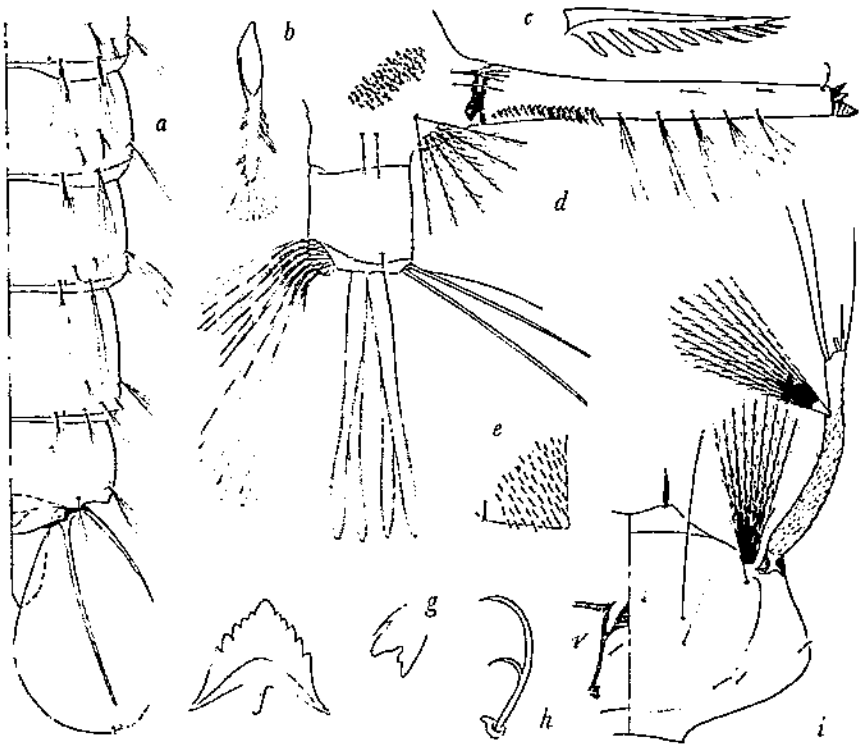


FIGURE 35.—*Culex (Melanoconion) lucifugus* Komp: a, Dorsal view of segments IV through VIII of pupal abdomen; b, comb scale from posterior row; c, subapical pecten spine; d, terminal abdominal segments of larva; e, armature of anal ring; f, mentum; g, ventral mandibular teeth; h, terminal hook of air tube; i, ventral (left) and dorsal (right) views of larval head.

Culex lucifugus Komp, 1936, Ent. Soc. Amer. Ann. 29: 331; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 92.

Larva.—Head: Preclypeal spines longer than one-half the distance between them, sharply pointed, hair 4 closer to center line than to hair 6, very fine, single or double; hair 5 single (rarely double), 0.5 times as long as hair 6, bare; hair 6 spiculate, distal third extending beyond anterior margin of head; hair 7 multiple, with six to nine branches; hair 18 prominent, with three to five branches. Maxillary spine 0.6 times as long and as wide as preclypeals; mentum a strong central tooth and six smaller each side; anterior ventral mandibular tooth slightly longer than width at base, posterior ventral mandibular tooth slender, about the same length as anterior, with a small accessory on inner surface

slightly removed from tip. Subapical spines 1.2 times as long as hair 10; hair 10, 2.5 times as long as terminal spine. Thorax: Sparsely spicular-pilose. Prothoracic hair formula (1-1-4-5)-1-1-1-2-2; prothoracic hair 3, 0.2 times as long as hair 2 and about the same length as head hair 5. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI triple or four-branched. Comb a patch of about 40 apically fringed scales in three or four irregular rows, the scales in posterior row 1.5 times as long as those in anterior row, bases of the posterior scales about 0.3 times as long as total length. Anal plate longer than wide, slightly widened near apex; armature consisting of a fairly heavy patch of heavy spines covering a rather large area on the posterior dorso-lateral surface of ring; outer hair of dorsal brush with one or two shorter branches; ventral tuft 2.8 times as long as ring; gills four, about 2.0 times as long as ring. Air-tube index 6.0 to 7.0, without a median ring of infuscation; pecten on basal third of tube, with 15 to 20 teeth, the subapical one about 1 x 6 with fringing teeth becoming finer toward the apex; five or six pairs of ventral tufts, the anterior 3.2 times as long as width of air tube at point of insertion, posterior 1.5 times as long as tube width at insertion; terminal hook with an extremely small secondary spine on basal half; acus normal.

Pupa.—Cephalothorax: Trumpet 4.5 times as long as wide at distal end; the lateral borders tapering evenly from base; pinnæ 1.2 times as long as wide, cleft at base 0.2 times as long as pinnæ, distal margin slightly sinuate. Hairs 1 and 2 triple, the former 2.4 times as long as the latter; hair 3 double, 0.6 times as long as hair 1. Hairs 4 and 5 triple, the former 0.6 times as long as the latter; hairs 6 and 7 double, hair 6, 0.5 and hair 7, 0.75 times as long as hair 5. Hair 8 triple, 0.5 times as long as trumpet; hair 9 double, 0.4 times as long as trumpet. Metathorax: Hair 10 six- to eight-branched, 0.9 times as long as hair 11, which is single; hair 12 double, 0.8 times as long as hair 11. Abdomen: Hair 1-7 triple, 0.45 times as long as hair 1-6; hair 11-4 double, 1.2 times as long as hair 11-2, which has 15 branches; hairs 11-5 and 11-6 triple or four-branched, subequal; hair 11-4 double, 1.2 times as long as hair 11-2, which has six or seven branches; hair 1V-1 six-branched, 1.2 times as long as hair 1V-6, which is double; hairs V-4 and V-6 subequal, the former triple, the latter with five or six branches; hairs VII-5 and VII-6 subequal and both double. Hairs IV-5 and V-5 both four- or five-branched and not especially heavy, bare, the former nearly and the latter completely attaining posterior margin of following segments; hair VI-5 double, heavy, very lightly spiculate, distinctly attaining posterior margin of following tergite. Hair 8 on segments III through VI double or triple; hair VII-8 triple, 0.7 times as long as hair VI-8, bare, the branches rather heavy; hair VIII-8 triple, subequal in length to hair VII-8, heavily spiculate, inserted anterior to postero-lateral corner of segment, which is bluntly but distinctly acuminate. Paddle hair 8, 3.0 times as long as hair 7.

Material.—Colombia: Three larval skins, three pupal skins, all associated with males (USXM); 20 larvae and larval skins, 12 pupal skins, some of which are associated with males (R).

Distribution and habitat.—Trinidad, Colombia, Venezuela. Larvae examined in this study collected from a partly shaded stagnant pool in a stream bed and from a forest stream.

Taxonomic discussion. Although the larva of this species resembles that of *sursumptor* to a marked degree, the two may be distinguished by a number of characters. *C. lucifugus* possesses long, smooth, pointed preclypeal spines, simple labral hairs and a glabrous abdomen, whereas the larva of *sursumptor* has short, blunt, rugose preclypeal spines, dendritic labral hairs, and an extremely fine but distinct pilosity over the entire abdomen. All the larvae of *lucifugus* examined had long anal gills, these being half again as long as those of *sursumptor*. Other differences may be found in the anal plate, which exhibits a stronger spiculation than that of *sursumptor*.

CULEX (MELANOCONION) MAXINOCCA Dyar

(Fig. 36)

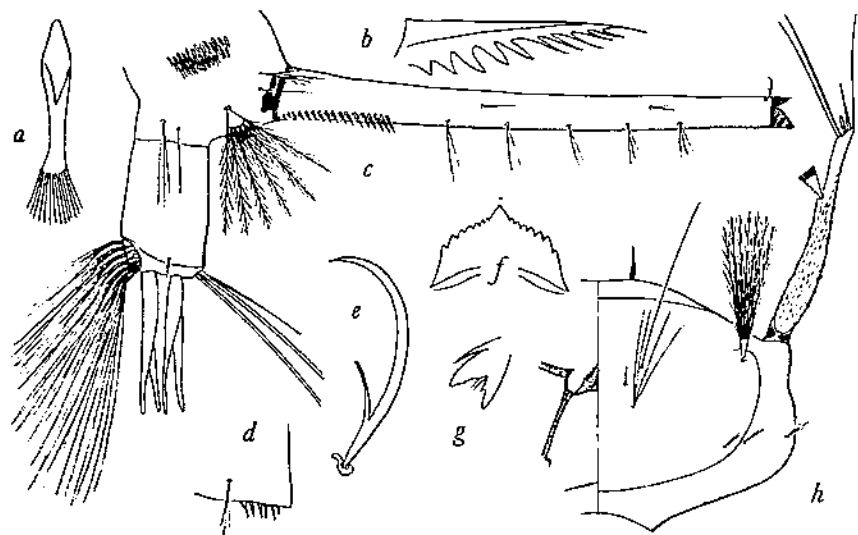


FIGURE 36.—*Culex (Melanoconion) maxinocca* Dyar: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal abdominal segments of air tube; d, armature of anal ring; e, terminal hook of air tube; f, mentum; g, ventral mandibular teeth; h, ventral (left) and dorsal (right) views of larval head.

Culex maxinocca Dyar, 1920, *Insector Insectivae Menstruus* 8: 71; Dyar, 1928, *The Mosquitoes of the Americas*, p. 323; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 92.

Culex (osimus) Dyar, 1920, *Insector Insectivae Menstruus* 8: 71.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them; hair 4 missing; hair 5 four-branched, 0.7 times as long as hair 6, just attaining anterior margin of head, spiculation heavy and long; hair 6 single, distal half extending beyond anterior margin of head, spiculation long and heavy; hair 7 seven-branched, heavily spiculate; hair 18 double, the same length as hair 20, which is four- or five-branched. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth as wide at base as anterior tooth and the same length, but more sharply pointed, with a small secondary tooth distantly removed from tip; no maxillary spine visible, even in clear mounts of cast skins; mentum of seven lateral teeth on each side of a broad central one. Antenna very slightly infuscated over entire surface; hair 10, 0.9 times as long as subapical spines; terminal spine 0.33 (times as long as hair 10). Thorax: Integument spicular-pilose, the spicules short. Prothoracic hair formula (1-1-2-3)-2-1-1-3-2; prothoracic hair 3, 0.75 times as long as head hair 5. Abdomen: Integument minutely and obscurely spicular. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI double to four-branched; hair III-6, 0.75 times as long as short branch of hair II-6; hair VI-6, 0.90 times as long as short branch of this hair. Comb of 40 to 43 apically fanned scales in three or four irregular rows, the scales in the anterior row 0.75 times as long as those in posterior row, bases of all scales shorter than free portions. Proportions of anal plate distorted in the mount; armature consisting of six to eight stout spines confined to the extreme posterior dorso-lateral margin of anal ring; dorsal hair of dorsal brush with a single branch the same length as ring, ventral brush 2.5 times as long as ring; gills 4, tapered, 1.0 to 1.2 times as long as ring. Air-tube index 8.0 to 10.0, tube infuscated in a wide band at middle; five pairs of ventral tufts,

all very fine, the anterior pair 1.25 times as long as width of air tube at point of insertion, posterior pair 1.0 to 1.2 times as long as air-tube width at insertion; pecten of 17 to 20 spines on basal fifth of tube, the spines touching, each spine with two or three large basal teeth and four to eight finer apical teeth in the fringe; terminal hook 0.60 times as long as width of air tube at tip, without any secondary spine; acus normal.

Material.—Surinam: Four larval skins, presumably associated with males (USNM).

Distribution and Habitat.—Surinam. "The larvae probably occur in ground pools" (Dyar 1928).

Taxonomic Discussion.—Rozeboom and Komp (1950) state that the males of this species are very closely related to those of *distinguendus*. There are similarities between males of this species and *nicceriensis*. This appears to be one of the instances in which the larval relationships parallel those of the males, in that the larval stages of these three species are similar. The air-tube tufts of *maxinooeca* and *nicceriensis* are very short, those of *distinguendus* being longer. There is no median air-tube infuscation in *nicceriensis*, whereas such a ring is present in the specimens of *maxinooeca* examined for this study.

CULEX (MELANOCONION) MISTURA Komp and Rozeboom

(Fig. 37)

Culex mistura Komp and Rozeboom, 1951, Ent. Soc. Wash. Proc. 53: 124.

Larva.—Preclypeal spines as long or slightly longer than one-half the distance between them; hair 4 single, short; hair 5 double to four-branched, 0.45 times as long as hair 6, a few fairly long lateral spicules apically; hair 6 single, distal 0.25 extending beyond anterior margin of head, spiculation present but extremely short; hair 7 eleven- to thirteen-branched, densely spiculate; hair 18 double or triple, about the same length as hair 20, which is four- to six-branched. Anterior ventral mandibular tooth as long as width at base, posterior ventral tooth as long as the anterior and about the same width at base but more sharply pointed, with a minute secondary tooth removed from the tip; maxillary spine 0.5 times as long and 0.6 times as stout as preclypeals, darkly pigmented; mentum of five lateral teeth on each side of a broad, central one. Antenna infuscated at base of shaft and in region of insertion of antennal tuft; subapical spines 0.8 times as long as antenna itself; hair 10, 0.66 times as long as subapical spines; terminal spine 0.50 times as long as hair 10. Thorax: Infegument spicular-pilose, the individual spicules broad at their bases. Prothoracic hair formula (1-1-6-0)-2-1-1-3-4-2; prothoracic hair 3, 2.2 times as long as head hair 5, spiculate; prothoracic hair 7 with occasionally 5 branches. Abdomen: Infegument glabrous. Hair I-6 double; hair I-7 single, hair II-6 double; hair III-6 four- or five-branched, 0.95 times as long as short branch of hair II-6; hair 6 on segments IV to VI triple or four-branched, the last named the same length as short branch of hair II-6. Comb of five to eight long, pointed scales in one or two irregular rows, those on air-tube side not markedly shorter than those on anal segment side, the bases of all scales shorter than free portions, the base of each scale with an extremely fine lateral fringe. Proportions of anal plate 15 x 17; armature consisting of a very narrow patch of 10 to 12 long, slender spines confined to the posterior dorso-lateral margin of the ring; dorsal hair of dorsal brush with two to four short branches, the longest about 1.25 times as long as ring; ventral brush 2.8 times as long as ring; gills destroyed in mount. Air-tube index 5.2 to 6.0, a slight infuscation at the tip of tube, but none in a ring near the center; five to six pairs of ventral tufts, the anterior pair at or just inside the pecten and 3.75 times as long as width of air tube at point of insertion, posterior pair 2.0 times as long as air-tube width at insertion. Pecten of 8 to 14 well-separated spines on basal third of tube, apical spine about 0.55 times as long as air-tube width, subapical spine about 1 x 5, both of the latter with 30 to 40 minute fringing teeth, tending to become longer and heavier toward the apex, but not attaining it; terminal hook 0.7 times as wide as tube at tip, with very strong secondary spine on basal two-thirds, acus normal.

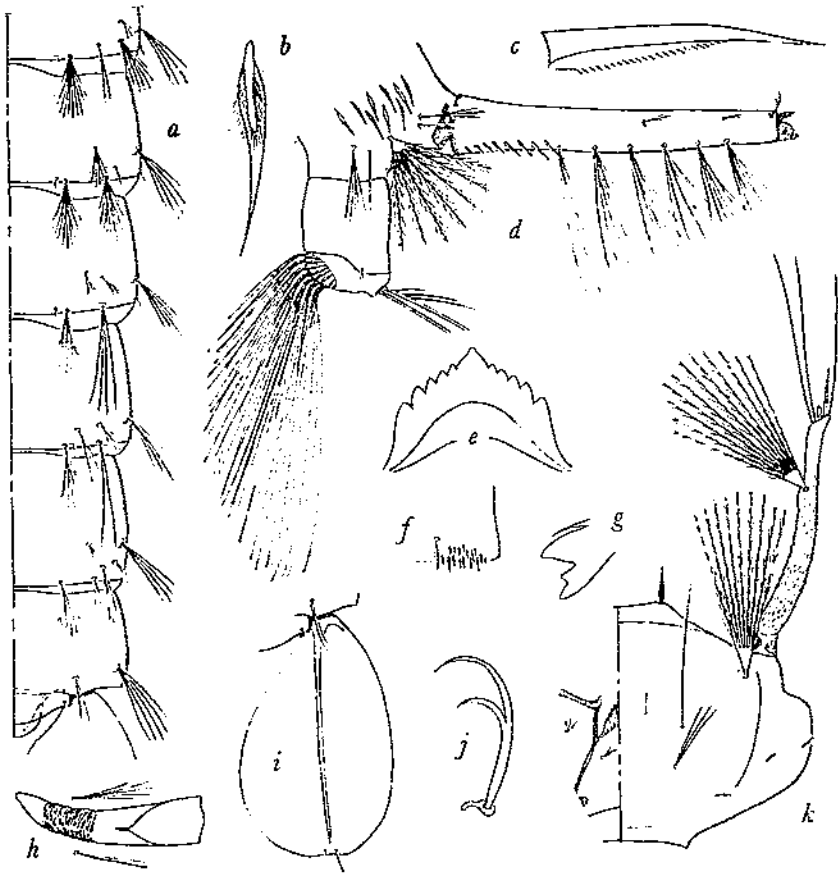


FIGURE 37.—*Gulex (Mclanocion) mistura* Komp and Rozeboom: *a*, Dorsal view of segments III through VIII of pupal abdomen; *b*, comb scale; *c*, subapical pecten spine; *d*, terminal abdominal segments of larva; *e*, mentum; *f*, armature of anal ring; *g*, ventral mandibular teeth; *h*, pupal trumpet; *i*, pupal paddle; *j*, terminal hook of air tube; *k*, ventral (left) and dorsal (right) views of larval head.

Pupa.—Cephalothorax: Trumpet 4.0 times as long as greatest width, lateral margins tapering evenly to tip from a rather broad base; piuma 1.5 times as long as wide, cleft at base 0.1 times as long as piuma, distal margin with a median evagination. Hair 1 five- or six-branched, 1.5 times as long as hair 2, which is triple; hair 3 triple, 0.8 times as long as hair 1. Hairs 4 and 5 triple or four-branched, the former 0.9 times as long as the latter; hairs 6 and 7 triple or four-branched, the former 0.9 times as long as hair 5, the latter subequal in length to hair 5. Hair 8 four- to six-branched, 0.45 times as long as trumpet; hair 9 double, 0.35 times as long as trumpet. Metathorax: Hair 10 six- to eight-branched, 0.8 times as long as hair 11, which is single with a very stout base; hair 12 with four branches, subequal in length to hair 10. Abdomen: Hair I-7 triple or four-branched, 0.25 times as long as hair I-6; hair II-4 double, 0.9 times as long as hair II-2, which has 10 to 15 branches; hairs II-5 and II-6 four- to six-branched, subequal in length; hair III-4 double, subequal in length to hair III-2, which has seven to nine branches; hair IV-4 four- to six-branched, 1.5 times as long as hair IV-6, which is a stout spine-like hair; hairs V-4 and V-6 four-branched and subequal. Hair V-5 with 8 to 10 branches, attaining the basal half of following tergite; hairs V-5 and VI-5 attaining basal two-thirds of following tergites,

distinctly spiculate; the former four-branched, the latter with only two branches thickened at the base. Hairs 5 and 6 on segment VII triple, the latter 2.0 times as long as the former. Hair 8 on segments III through VI four- or five-branched; hair VII-8 four-branched, subequal in length to hair VI-8, distinctly spiculate; hair VIII-8 with four or five branches, 1.3 times as long as hair VII-8, distinctly spiculate, inserted anterior to the postero-lateral corner which is drawn into a point posteriorly. Paddle hair 8, 2.0 times as long as hair 7.

Material.—Colombia: One larval skin, two pupal skins, both associated with male paratypes (USNM); three larval skins, two pupal skins, all associated with males (USNM); thirteen larvae and larval skins, nine pupal skins (R).

Distribution and habitat.—Colombia. From grassy margins of an open, clear-water pond in pasture.

Taxonomic discussion.—Although Komp and Rozeboom (1951) state that the male of this species is very close to that of the Bonne's description of *nigericensis*, the larvae of these two species are very distinct, that of *mistura* having the comb scales all pointed, and long ventral tufts on a short air tube. It has been suggested that *mistura* is actually a species of *Mochlostyrax* on the basis of the gently curved posterior margin of the air tube and the long, dense air-tube tufts, but it is the writer's feeling that it is more properly associated with the *Melanoconion* species because of its lack of other *Mochlostyrax* characters. It may actually represent a point in the subgenus *Melanoconion* that serves to connect the two subgenera phylogenetically.

CULEX (MELANOCONION) MULRENNANI Basham

(Fig. 38)

Culex mulrennani Basham, 1948, Edl. Soc. Amer. Ann. 41: 2.

Larva.—Head: Preclypeal spines longer than one-half the distance between them; hair 4 slight and short, single to triple, closer to hair 6 than to each other; hair 5 double or triple, 0.45 times as long as hair 6, spiculation absent; hair 6 single, distal half extending beyond anterior margin of head, spiculation extremely slight; hair 7 seven-branched, spiculate; hairs 18 and 20 about the same length. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth longer and somewhat narrower, with a distinct notch at tip; maxillary spine 1.5 times as long and wide as preclypeal; mentum a broad central tooth and four smaller lateral teeth, a fifth lateral somewhat larger and more distantly removed from the others. Antenna slightly infuscated on constricted portion; hair 10, 0.70 times as long as subapical spines, terminal spine 0.9 to 1.1 times as long as hair 10. Thorax: Integument spicular-pilose, the spicules very fine, short and sparse. Prothoracic hair formula (1-1-3-4)-1-1-1-3-2; prothoracic hair 3, 2.0 times as long as head hair 5. Abdomen: Integument glabrous or only very obscurely spicular-pilose. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI triple. Comb of 45 to 55 apically fringed scales in three or four irregular rows, bases of all scales 0.5 times as long as free portions. Proportions of anal plate 13 x 18; armature consisting of a triangular patch of single spines not confined to the posterior dorso-lateral margin of ring; dorsal hair of dorsal brush with two shorter branches, the longest 0.5 times as long as the dorsal hair itself, the shorter branch 0.5 times as long as the longer; ventral brush 2.5 times as long as the ring; gills four, 0.5 times as long as ring, tapering and pointed. Air-tube index 5.5 to 7.0; lightly infuscated in a ring near middle of tube; five or six pairs of ventral tufts, the anterior pair 2.5 times as long as width of tube at point of insertion, posterior pair 2.0 times as long as air-tube width at insertion; pecten of 16 to 20 spines on basal fourth of tube, subapical spine 1 x 5, with distinctly separated fringing teeth; terminal hook 0.5 times as long as width of tube at tip, a fine secondary hook on basal half; acus normal.

Pupa.—Small, approximately four times as long as wide. Trumpet 5.5 times as long as apical width, edges of apical truncation scalloped with a distinct notch at the base . . . dark pigmented band on basal third.

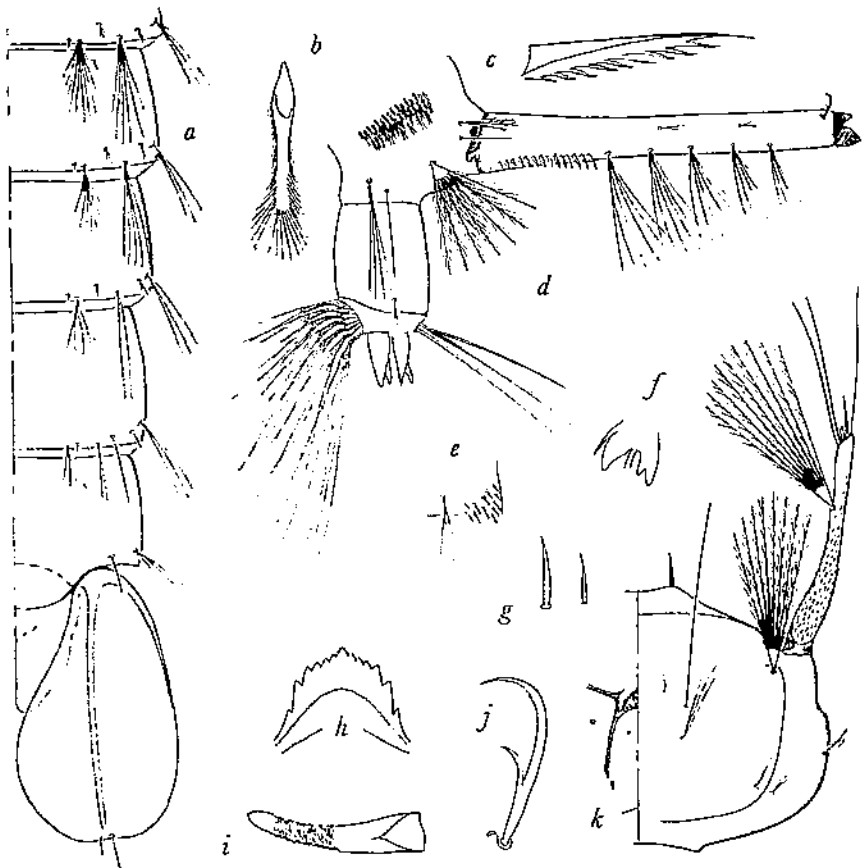


FIGURE 38.—*Culex (Melanoconion) mulrennani* Basham: *a*, Dorsal view of segments IV through VIII of pupal abdomen; *b*, comb scale from posterior row; *c*, subapical pecten spine; *d*, terminal abdominal segments of larva; *e*, armature of anal ring; *f*, ventral mandibular teeth; *g*, preclypeal (left) and maxillary (right) spines; *h*, mentum; *i*, pupal trumpet; *j*, terminal hook of air tube; *k*, ventral (left) and dorsal (right) views of larval head.

Material.—Florida: Seven whole-mounted larvae, four larval skins, presumably associated with males (M). The description of the pupa was taken entirely from that of Basham (1948).

Distribution and Habitat.—Florida. Basham (1948) reports this species as having been taken from holes in limestone formations.

Taxonomic Discussion.—Basham (1948) has given a very good account of the larva of this species. Her description of the pupa is sketchy, but her illustration, from which the plate in this study is redrawn, provides supplementary characters. Since the writer has not seen pupal specimens, they have not been included in the key to pupae.

As noted in the taxonomic discussion of *abominator*, there appears to be some relationship to that species and to *peccator* and *anips*. The writer has been unable to separate this larva from certain specimens of *phlogistus*, a more tropically distributed form.

CULEX (MELANOCONION) MUTATOR Dyar and Knab

(Fig. 39)

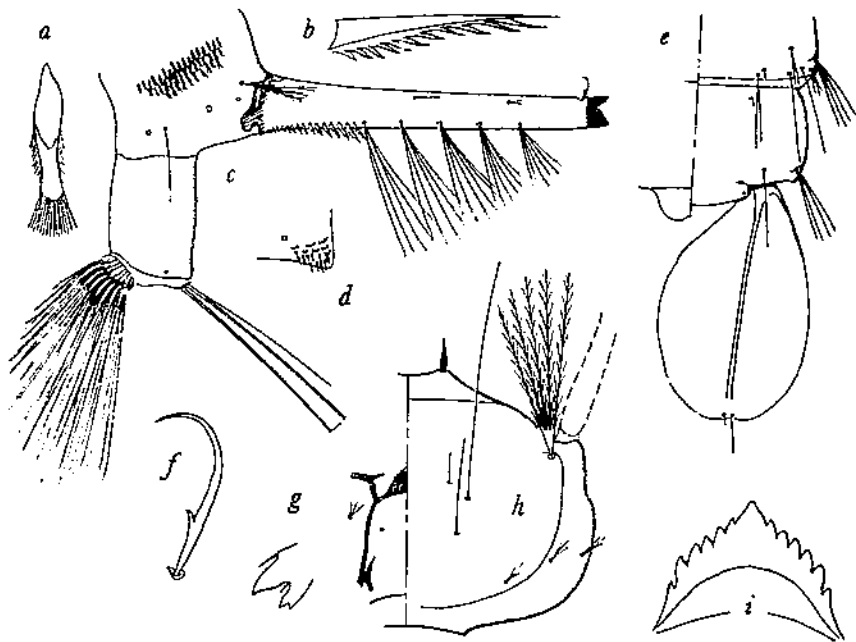


FIGURE 39.—*Culex (Melanoconion) mutator* Dyar and Knab: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal abdominal segments of larva; d, armature of anal ring; e, dorsal view of segments VII and VIII of pupal abdomen; f, terminal hook of air tube; g, ventral mandibular teeth; h, ventral (left) and dorsal (right) views of larval head; i, mentum.

Culex mutator Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 216; Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 422; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann., 43: 93.

Larva.—Head: Preclypeal spines stout, sharply pointed, shorter than one-half the distance between them; hair 4 minute, as close to hair 6 as is hair 5; hair 5 double or triple, 0.53 times as long as hair 6; hair 6 single, distal half extending beyond anterior margin of head, spiculation sparse and very short; hair 7 seven- to eight-branched, spiculate; hair 18 with two long branches and as long as hair 20, which is four-branched. Anterior ventral mandibular tooth as long as width at base, posterior tooth distinctly shorter and narrower than anterior, with a notch at apex; maxillary spine 1.3 times as long and 0.75 times as wide as preclypeals, not darkly pigmented; mentum of ~~the~~ lateral teeth on each side of a central tooth which is not much larger than the laterals. Antenna missing. Thorax: Integument spicular-pilose, the spicules dense and long. Prothoracic hair formula (1-1-3-4)-1-1-1-2-2; prosthoracic hair 3, 1.2 times as long as head hair 5. Abdomen: Integument spicular-pilose, the spicules minute. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI triple; hair III-6, 0.75 times as long as short branch of hair II-6, hair VI-6 the same length as short branch of this hair. Comb of 25 to 35 apically fringed scales in three or four irregular rows, those in anterior row 0.66 times as long as those in posterior row, base of individual scale shorter than free portion. Proportions of anal plate destroyed in mount; armature consisting of a narrow patch of 8 to 10 short spines confined to the posterior dorso-lateral margin of the ring; dorsal hair of dorsal brush with a single shorter branch 1.4 times as long as

ring; ventral brush 2.5 times as long as ring; gills four, 0.7 times as long as ring, tapered to narrow points. Air-tube index 5.0 to 6.0, without a ring of infuscation near the middle of the tube; five or six pairs of ventral tufts, the anterior pair at or within the pecten, 2.75 times as long as width of air tube at point of insertion, posterior pair 2.3 times as long as air-tube width at insertion; pecten of 18 to 20 spines on basal third of tube, the spines touching, subapical tooth 0.4 times as long as width of air tube at insertion, with about 15 fringing teeth, the apical ones tending to be longer and more widely spaced, fringed to the tip; terminal hook 0.6 times as long as width of tube at tip, an extremely fine secondary hook on basal third; acus with a narrow dorsal projection.

Pupa.—Abdomen: Hairs 5 and 6 of segment VII single, subequal in length, 1.3 times as long as hair VII-2, which is double, nearly attaining posterior margin of tergite of segment VIII; hair VII-8 four-branched, 1.2 times as long as hair VII-2, spicules sparse but long; hair VIII-8 with four heavy branches, subequal in length to hair VII-8, heavily spiculate, inserted anterior to the posterolateral corner, which is not drawn out to a distinct point; hair VIII-5 subequal to hair VIII-8, double. Paddle hair 8, 5.0 times as long as hair 7.

Material.—Mexico: Two larval skins, 1 pupal skin (Knab 259c and Knab 259f) (USNM).

Distribution and habitat.—Córdoba, México. In rock pools of a stream bed in a ravine (Howard, Dyar, and Knab, 1915).

Taxonomic discussion.—According to Howard *et al.* (1915), these specimens bear the same locality and date as the specimen which they describe in detail. Rozeboom and Komp (1950) select as a lectotype Knab No. 259b, with which this must almost certainly be associated. The writer has seen a specimen from Dr. Rozeboom's collection labeled *Culex mutator* that was determined from the description and illustration of Dyar (1928), but which is more similar to *craticus*, yet differs from the latter species markedly. This has been called Species C.

CULEX (MELANOCONION) NICCERIENSIS Bonne-Wepster and Bonne

(Fig. 40)

Culex nicceriensis Bonne-Wepster and Bonne, 1920, *Insector Insectifera Menstruus* 7: 174; Bonne and Bonne-Wepster, 1925, *The Mosquitoes of Surinam*, p. 289; Dyar, 1928, *The Mosquitoes of the Americas*, p. 303; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 95.

Larva.—Head: Preclypeal spines nearly as long as distance between them; hair 4 single, slight, as close to hair 6 as is hair 5; hair 5 five-branched, 0.55 times as long as hair 6, just attaining anterior margin of head, distinctly spiculate; hair 6 single, distal half extending beyond anterior margin of head, distinctly spiculate; hair 18 four-branched, shorter than hair 20, which is six-branched. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth slightly longer but the same width as the anterior, with a small secondary tooth quite close to the base; maxillary spine 0.25 times as long as preclypeal, not heavily pigmented; mentum of seven lateral teeth on either side of a strong central one. Antenna spiculate but not infuscated, hair 10, 0.80 times as long as subapical spines; terminal spine 0.40 times as long as hair 10. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-1)-2-1-1-3-2; prothoracic hair 12, 1.25 times as long as hair 8 of that segment. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI triple. Comb of 55 to 60 apically fringed scales in three or four irregular rows, the scales in the anterior row 0.85 times as long as those in posterior row, bases of the latter about 0.75 times as long as free portion. Proportions of anal ring 15 x 19, anterior margin of the ring narrowly darkened; armature consisting of six or seven long slender spines confined to the extreme posterior dorso-lateral margin of ring; dorsal hair of dorsal brush with two shorter branches, the longer of these subequal to the length of anal plate; ventral brush 2.1 times as long as ring; gills missing. Air-tube index 9.0, without a central ring of infuscation; seven irregularly spaced ventral tufts, the anterior tuft 1.75 times as long as air-tube width at point of insertion, posterior tuft 1.2 times as long as tube

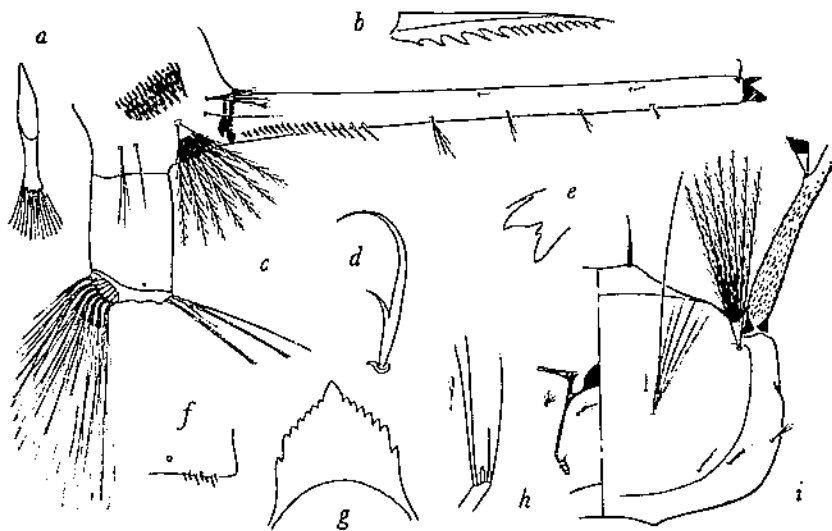


FIGURE 40.—*Culex (Melanoconion) nicceriensis* Bonne-Wepster and Bonne: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal abdominal segments of larva; d, terminal hook of air tube; e, ventral mandibular teeth; f, armature of anal ring; g, mentum; h, terminal portion of antenna; i, ventral (left) and dorsal (right) views of larval head.

width at insertion, all ventral tufts fine and without visible spiculation; pecten of 17 or 18 spines on basal 0.30 of tube, spines nearly touching each other, subapical spine about 1×5 , with three to six strong basal fringing teeth and five to ten finer ones extending to extreme tip; terminal hook at basal third; acus normal.

Material.—Venezuela: One larva (USNM).

Distribution and habitat.—Surinam, Venezuela. Occurs in ground pools.

Taxonomic discussion.—The larva of this species appears to be very closely related to those of *distinguendus*, *dumi*, and *maxinocca*, being distinguished from them by the key characters.

CULEX (MELANOCONION) NIGRIMACULA Lane and Whitman

(Fig. 41)

Culex nigrimacuta Lane and Whitman, 1943, Rev. de Ent. 14: 303; Lane, 1951, Ent. Soc. Wash. Proc. 73: 334.

Larva.—Head: Wider than long. Hair 4 single, reduced; hair 5 nearly as long as hair 6, with eight or nine branches, distinctly extending beyond anterior margin of head; hair 6 single, distal half extending beyond anterior margin of head; hair 7 long, multiple, not attaining anteanal constriction. Antenna with multiple tuft on apical fourth, with three long terminal hairs and a small spine. Thorax: Prothoracic hair formula (1-1-27)-1- (information incomplete). Abdomen: Integument glabrous. Comb a triangular patch of several rows of slender scales. Anal plate longer than wide; armature consisting of "long spicules;" dorsal half of dorsal brush without a shorter branch; gills pointed, longer than the segment. Air-tube index 8.0; four pairs of ventral tufts, double or triple, anterior pair 4.5 times as long as width of air tube at insertion, posterior pair 2.5 times width of tube at insertion; pecten on basal third of tube, with seven or eight rather long spines.

Pupa.—Cephalothorax: Trumpet about 15 times as long as greatest width, slender, curved, somewhat expanded apically, and slightly sclerotized basally;

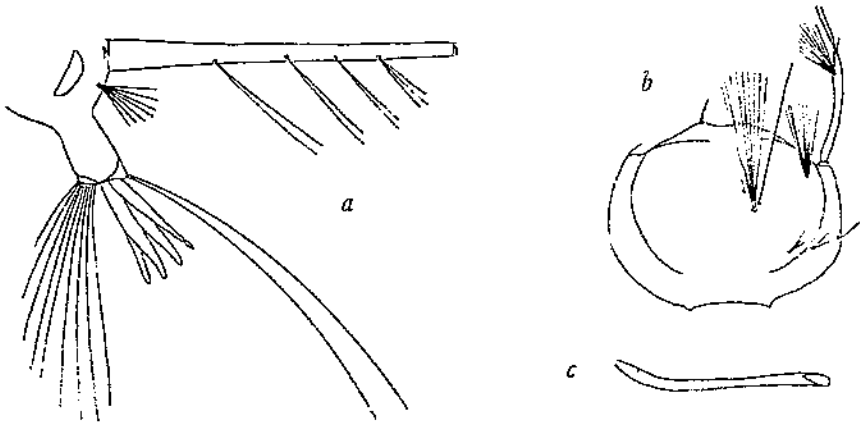


FIGURE 41.—*Culex (Melanoconion) nigrimacula* Lane and Whitman: *a*, Terminal abdominal segments of larva; *b*, dorsal view of larval head; *c*, pupal trumpet. Redrawn from Lane and Whitman (1943).

dorsal hair groups with hairs long and double. Abdomen: Hair 5 of segments II and III about the same length as the segment, simple; hair 5 of segments IV, V, and VI about two times as long as their respective segments and four- or five-branched; hair 8 of segments VII and VIII double and very long; paddles rounded, more than twice as long as segment VIII, with minute terminal hairs.

Material.—No specimens available for study. The descriptions were taken entirely from those of Lane and Whitman (1943).

Distribution and habitat.—Brazil. In the bases of the larger leaves of bromeliads.

Taxonomic discussion.—One of the few species in the subgenus found breeding in plant containers, this species resembles those of *Microculex* in several important respects in all stages, i. e. the long air tube with double or triple tufts, the long, many-branched head hair 5, the extremely long slender trumpet of the pupa, and certain characters of the male terminalia. The latter place this species definitely in the subgenus *Melanoconion*. On the basis of males, Lane (1951) synonymizes *punctiscapularis* with this species, but the larvae of the former species have not been described, nor are they available for this study.

CULEX (MELANOCONION) OCELLATUS Theobald

(Fig. 42)

Culex ocellatus Theobald, 1903, Monograph of the Culicidae, v. 3, p. 222; Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 446; Dyar, 1928, The Mosquitoes of the Americas, p. 351; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 94.

Culex automartus Root, 1927, Amer. Jour. Hyg. 7: 531; Dyar, 1928, The Mosquitoes of the Americas, p. 295; Pessoa and Galvao, 1935, Rev. Biol. Hyg. 6: 82.

Larva.—Head: Wider than long. Hair 4 single, quite long, fairly stout; hair 5 with eight to 10 branches, nearly as long as hair 6, distal half extending beyond anterior margin of head, spiculate; hair 6 single, distal two-thirds extending beyond anterior margin of head; hair 8 about four times as long as hair 9. Mentum a broad shouldered central tooth with eight smaller lateral teeth. Antenna with multiple tuft on apical fourth, three long terminal hairs and a spine. Abdomen: Integument glabrous. Comb of about 16 long pointed scales in several rows, the anterior scales shorter than the posterior, all scales with a fine lateral fringe. Anal plate wider than long; armature consisting of a spiculate "comb;"

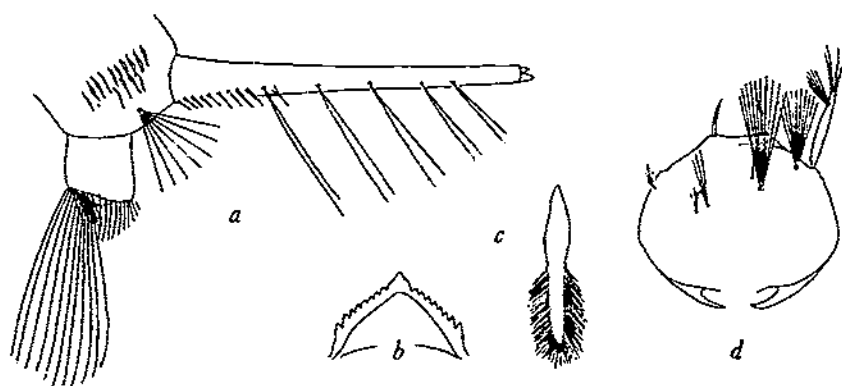


FIGURE 42.—*Culex (Melanoconion) ocellatus* Theobald: *a*, Terminal abdominal segments of larva; *b*, mentum; *c*, comb scale; *d*, dorsal view of larval head. Redrawn from Pessôa and Galvão (1935).

dorsal hair of dorsal brush with short branches. Air-tube index 7.0; four or five pairs of double or triple ventral tufts, the anterior pair at least 3.0 times as long as width of air tube at point of insertion; pecten of about 10 very long, fine spines on basal third of tube.

Pupa.—Cephalothorax: Trumpet more heavily sclerotized beyond the base, about 17 times as long as greatest width, slender, curved, expanded apically; dorsal cephalothoracic hair group with one long double hair, the others long and triple. Abdomen: Hairs of first two abdominal segments inserted in transparent tubercles; hairs 2 and 4 of segment II much longer than the segment; hair 5 of segment III, 1.5 times as long as the segment; hair 5 on segments IV, V, and VI double and more than two times as long as the segment; hair VII-8 double or triple, short; hair VIII-8 double or triple and longer; paddles more than twice as long as eighth segment.

Material.—No specimens available for study. The descriptions were taken entirely from those of Pessôa and Galvão (1935).

Distribution and habitat.—Brazil. In leaf bases of epiphytic bromeliads.

Taxonomic discussion.—Lane and Whitman (1943) have described the true *Microculex*, with which *ocellatus* has long been confused in the literature, as *Culex (Microculex) stonei*. The description of Howard et al. (1915) is obviously that of *stonei*. Independently, Root (1927) described the true *Culex (Melanoconion) ocellatus* as *automartus*, and it is from the larval description of that species given by Pessôa and Galvão (1935) that the present one is taken. It agrees with that of Lane and Whitman and is more complete.

Rozeboom and Komp (1950) state that Lane and Whitman may have had *punctiscapularis* before them when describing this species. Lane (1951) synonymizes *punctiscapularis* with *nigrimacula*, but larvae of neither species have been available for this study.

CULEX (MELANOCONION) OPISTHOPUS Komp

(Fig. 43)

Culex opisthopus Komp, 1926, *Insector Insectine Menstruus* 14: 44; Pratt, Wirth, and Denning, 1945, *Ent. Soc. Wash. Proc.* 47: 245.

Culex mychonde Komp, in Dyar, 1928, *The Mosquitoes of the Americas*, p. 295.

Larva.—Head: Preclipeal spines longer than one-half the distance between them; hair 4 long, fine, double, as close to hair 6 as is hair 5; hair 5 five-

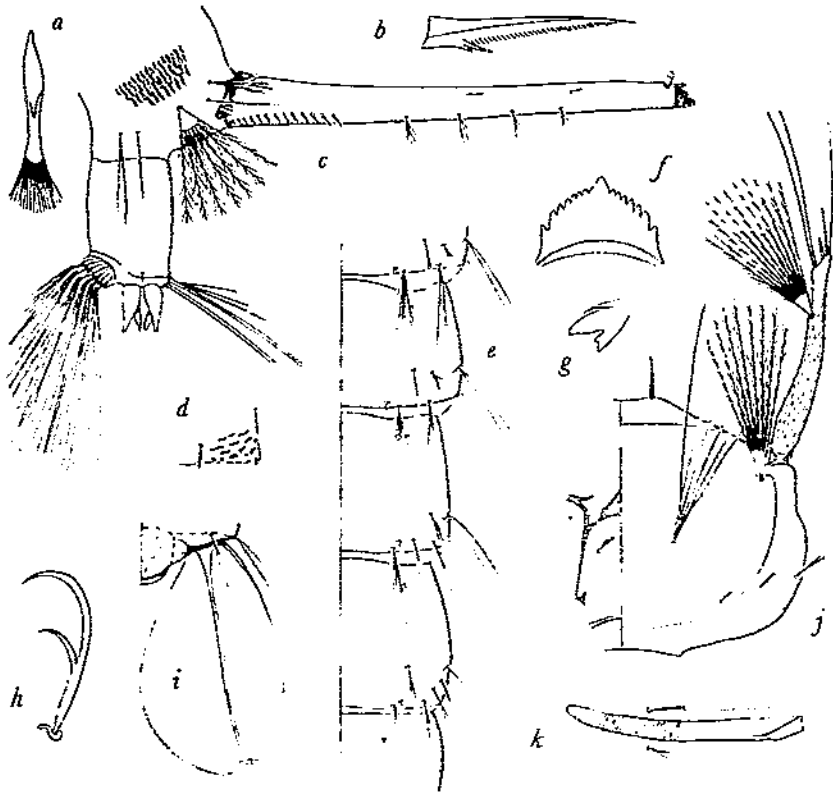


FIGURE 43.—*Culica (Melanoconion) opisthopus* Komp; a, Comb scale from posterior row; b, subapical pecten spine; c, terminal abdominal segments of larva, d, armature of anal ring; e, segments IV through VIII of pupal abdomen; f, mentum; g, ventral mandibular teeth; h, terminal hook of air tube; i, pupal paddle; j, ventral (left) and dorsal (right) views of larval head; k, pupal trumpet.

to six-branched, 0.5 times as long as hair 6, extending beyond the anterior margin of head; hair 6 single, distal third extending beyond anterior margin of head, finely spiculate to base; hair 18 double or triple, about the same length as hair 20, which is four- or five-branched. Anterior ventral mandibular tooth as wide at base as long, the posterior tooth much shorter and narrower, with a small projection at the tip, making the posterior tooth appear to be notched; maxillary spine apparently lacking, there being no socket for its insertion; mentum a single, broad, shouldered central tooth with six smaller lateral teeth gradually increasing in size, sometimes a much smaller seventh. Antenna infuscated throughout; hair 10, 0.90 times as long as subapical spines, terminal spine 0.25 times as long as hair 10. Thorax: Integument spicular-pilose, the spicules short and minute. Prothoracic hair formula (1-1-5-6) 2-1 1-3-2; prothoracic hair 3, 0.63 times as long as head hair 5; prothoracic hair 8 rarely triple. Abdomen: Integument glabrous. Hairs I-6, I-7, and II-6 all double; hair 6 on segments III through VI triple- to five-branched; hair III-6, 0.50 times as long as short branch of hair II-6; hair VI-6, 0.60 times as long as short branch of this hair. Comb of 40 to 60 apically fringed scales in three or four irregular rows, scales in the anterior row 0.55 times as long as those in posterior row, bases of all scales the same length as or shorter than free portions. Proportions of anal plate 13 x 19, slightly wider at middle than at base; armature consisting only of the enlarged spinulets appearing in groups, without any single spines whatever; dorsal hair of dorsal brush with four to eight short branches, the

longest about 1.5 times as long as ring; ventral brush almost exactly 2.0 times as long as ring; gills four, tapering from broad bases to narrow points. Air-tube index 8.0 to 10.0, tube slightly expanded at tip, with a ring of dark infuscation at extreme base but none near center; four pairs of very fine ventral tufts, the anterior pair 1.2 times as long as width of tube at point of insertion, posterior pair the same width as tube at insertion; pecten of 9 to 12 teeth on basal fourth, the spines well separated, subapical spine with a strong basal fringing tooth and 20 to 30 extremely fine fringing teeth continuing to extreme apex; terminal hook with a strong secondary hook on basal half; dorsal projection of acus extremely narrow.

Pupa.—Cephalothorax: Trumper 9 to 10 times as long as width at distal end, the lateral margins nearly parallel from the proximal end of the tracheoid portion of the tip; pinna 1.3 times as long as width at distal end, cleft at base 0.2 to 0.25 times as long as pinna, distal margin flat. Hairs 1, 2, and 3 triple, hair 1 the longest, hair 2, 0.6 times as long as hair 1, hair 3, 0.8 times as long as hair 1. Hair 4 triple, 0.75 times as long as hair 5, which is four-branched; hair 6 double, 0.6 times as long as hair 5; hair 7 triple, 1.2 times as long as hair 5. Hair 8 and 9 triple, the former 0.8 times as long as trumpet, hair 9, 0.4 times as long. Metathorax: Hair 10 double, 0.95 times as long as hair 11, which is also double; hair 12 four-branched, subequal in length to hair 10. Abdomen: Hair 1-7, 0.7 times as long as hair 1-6, single; hair 11 4 double, nearly attaining posterior margin of the following tergite, 2.0 times as long as hair 11 2 which has six to eight branches; hair 11 5 triple, 3.0 times as long as hair 11 6, which has four or five branches; hair 11 4 five-branched, subequal in length to hair 11 2; hair VI double, 2.0 times as long as hair IV 6, which has five branches; hair V-4 double, 2.5 times as long as hair V 6, which has five or six branches; hair VII 6 double, 2.0 times as long as triple hair VII 5. Hair IV 5 and V 5 light, four- or five-branched, subequal, attaining slightly more than basal half of following tergite, hair VI 5 double, subequal to hairs VI 2 and VI-4 in length, attaining basal half of following tergite. Hair 8 on segments III through VI double, occasionally triple; hair VII 8 a single or double hair, 0.4 times as long as hair VI 8, bare; hair VIII 8 double, bare, 1.4 times as long as hair VII 8, inserted on the extreme postero-lateral corner of the segment, which is not prolonged into a sharp point. Hair VIII 5 double, 1.1 times as long as hair VIII 8. Paddle hair 8 minute, only very slightly longer than hair 7.

Material. Florida: One larva (USNM). Puerto Rico: One larva, one pupa (USNM); 17 larvae and 11 pupae (P).

Distribution and habitat. Florida, Honduras, Panamá, Puerto Rico. From a sluggish stream and its pools in Puerto Rico, and from holes of the crab *Cardisoma gualanum* Latr. in a cypress and maple swamp (Pratt et al., 1945).

Taxonomic discussion. The larva of *opisthopus* is distinctive in being the only species with a double abdominal hair I 7. It has a long air tube with short ventral tufts, a character similar to that of *latisquama*, with which it shares the crab-hole habitat.

CULEX (MELANOCONION) PECCATOR Dyar and Knab

(Fig. 44)

Culex peccator Dyar and Knab, 1909, *Smithson. Misc. Collect.* 52: 256; Dyar and Barrett, 1918, *Insectora Insectivea Menstruus* 6: 110; Dyar, 1928, *The Mosquitoes of the Americas*, p. 300; King and Bradley, 1937, *Ent. Soc. Amer. Ann.* 30: 350; Wirth, 1945, *Ent. Soc. Wash. Proc.* 57: 291.

Culex incriminator Dyar and Knab, 1909, *Smithson. Misc. Collect.* 52: 257.

Larva. Head: Preelypeal spines the same length as half the distance between them; hair 4 single, extremely fine, 0.50 times as long as hair 5, closer to hair 6 than is hair 5; hair 5 double or triple, 0.51 times as long as hair 6; hair 6 single, distal half extending beyond anterior margin of head, spiculate on apical three-fourths; hair 7 nine- or ten-branched, hairs 18 and 20 long enough to attain premaxillary suture. Anterior ventral tooth of mandible longer than width at base, posterior ventral tooth narrower and shorter, with a large closely appressed projection removed from extreme tip; maxillary spine

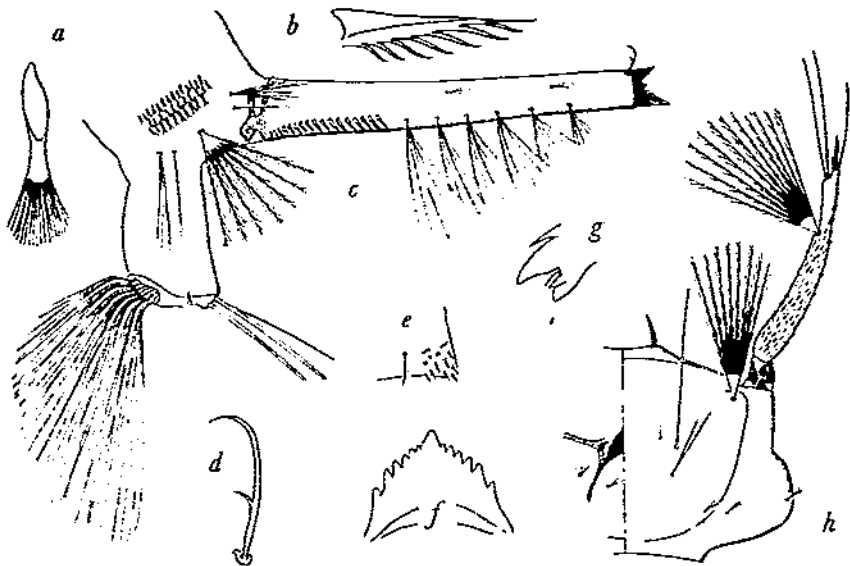


FIGURE 44.—*Culicx (Mclauconion) pectorator* Dyar and Knab: a, Comb scale from posterior row; b subapical pecten; c, terminal abdominal segments of larva; d, terminal hook of air tube; e, armature of anal ring; f, mentum; g, ventral mandibular teeth; h, ventral (left) and dorsal (right) views of head.

0.66 times as long and wide as preclypeal; mentum a broad shouldered central tooth with six or seven lateral teeth increasing markedly in size posteriorly, the last somewhat removed. Hair 10, 0.75 times as long as subapical spines, terminal spine 0.50 times as long as hair 10. Thorax: Integument sparsely spicular-pilose. Prothoracic hair formula (1-1-4-6)-1-1-1-3-2; hair 3, 1.30 times as long as head hair 5. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI double or triple; hair III-6, 0.8 times as long as short branch of hair II-6; hair VI-6 the same length as short branch of that hair. Comb of 30 to 40 small, apically fringed scales in three or four irregular rows, those in posterior row about 1.2 times as long as those in anterior row, bases of all scales shorter than the free portions. Proportions of anal plate 15 x 18; armature consisting of a small triangular patch of 8 to 10 single spines in a patch near the posterior dorso-lateral border; dorsal hair of dorsal brush with one to three shorter branches, the longest 1.0 to 1.3 times as long as anal ring; ventral brush 2.75 times as long as ring; gills four, the same length as ring, tapered to blunt points. Air-tube index 5.0 to 6.2, apex of the tube slightly expanded; five pairs of ventral tufts, the anterior pair 2.0 times as long as width of air tube at point of insertion, posterior pair 1.5 times the width of tube at insertion; pecten of 13 to 17 broad spines on basal fourth, the spines nearly touching, subapical spine about 1 x 4, with 8 or 10 prominent fringing teeth; terminal hook 0.60 times as long as air-tube width at tip, with a short, delicate secondary on basal third; acus normal.

Material.—Puerto Rico: Five larvae (R).

Distribution and habitat.—Southeastern United States, Puerto Rico. According to King and Bradley (1937), this species is commonly found in grassy pools in association with *Culex (Neoculex) apicalis*.

Taxonomic discussion. Dyar (1928) gives an incorrect description of the larva. The original description of the larva by Dyar and Barrett (1918) is actually that of *erraticus*, according to King and Bradley (1937).

CULEX (MELANOCONION) PHLOGISTUS Dyar

(Fig. 45)

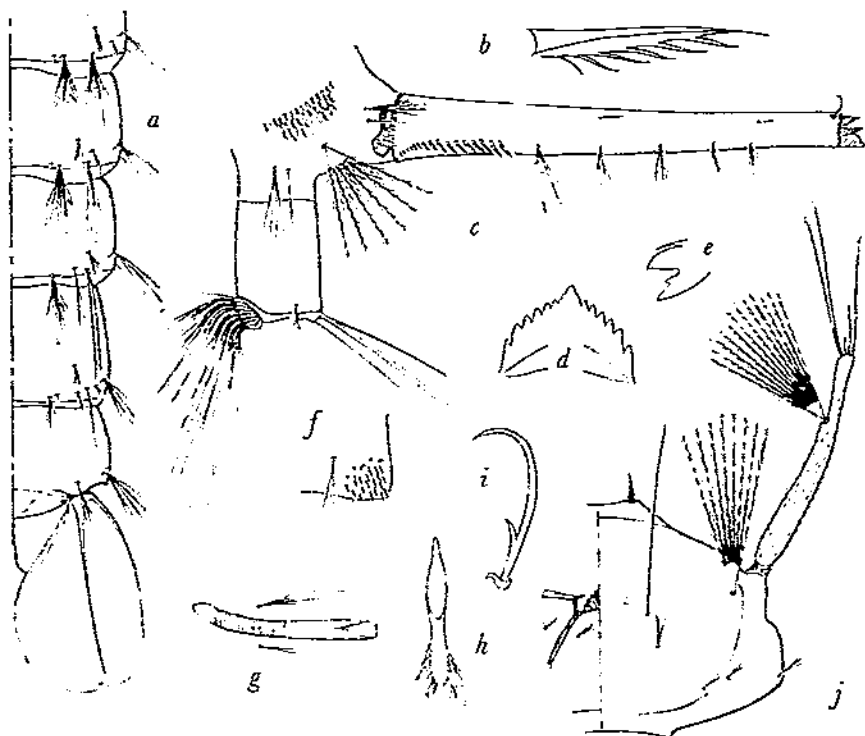


FIGURE 45.—*Culex (Melanoconion) phlogistus* Dyar: *a*, Dorsal view of abdominal segments IV through VIII of pupa; *b*, subapical pecten spine; *c*, terminal segments of abdomen of larva; *d*, mentum; *e*, ventral mandibular teeth; *f*, armature of anal ring; *g*, pupal trumpet; *h*, comb scale from posterior row; *i*, terminal hook of air tube; *j*, ventral (left) and dorsal (right) views of head.

Culex phlogistus Dyar, 1920, *Insector Insularum Menstruus* 8: 61.

Culex oedipus Root, 1927, *Amer. Jour. Hyg.* 7: 588; Dyar, 1928, *The Mosquitoes of the Americas*, p. 309.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them; hair 4 double, minute, closer to hair 6 than is hair 5; hair 5 four- to seven-branched, 0.16 times as long as hair 6, without spiculation; hair 6 single, distal 0.4 extending beyond anterior margin of head, with line spiculation; hair 7 eight- to eleven-branched, spiculate; hair 18 triple to five-branched, same length as hair 20, which is five- to seven-branched. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth nearly as wide at base, but slightly longer than, anterior tooth, with a small anterior projection distinctly removed from the tip; maxillary spine 0.75 times as long and thick as preclypeals, very darkly pigmented; mentum a broad central tooth with five or six smaller lateral teeth, becoming progressively larger except the last, which is somewhat removed. Antenna lightly infuscated at base of shaft and on base of constricted portion; hair 10, 0.75 times as long as subapical spines, terminal spine 0.4 times as long as hair 10. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-6-10)-3-1-3-3-2; prothoracic hair 3, 1.5 times as long as head hair 5. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI

mostly four-branched (sometimes triple); hair III-6, 0.60 times as long as short branch of hair II-6, hair VI-6 the same length as short branch of that hair. Comb of about 40 apically fringed spines in a triangular patch of three or four irregular rows, the scales in the posterior row 2.0 times as long as those in anterior, free portion of individual scale 1.5 times as long as base. Propo- tions of anal plate 15 x 18, ring nearly the same width throughout, with a darkly pigmented anterior border; armature consisting of a rather broad tri- angular patch of 18 to 22 single spines not confined to the posterior dorso-lateral border; dorsal hair of dorsal brush with a single shorter branch 1.3 times as long as ring; ventral brush 2.2 times as long as ring; gills four, 1.55 times as long as ring, long, slender, and narrowly pointed. Air-tube index 6.0 to 7.1, tube infuscated in a band near middle; four to six pairs of ventral tufts, the anterior pair 1.75 times as long as width of air tube at point of insertion, pos- terior pair the same length as width of tube at insertion; pecten of 15 to 17 spines on basal fourth, the spines touching, subapical spine about 1 x 6, with six to eight fringing spines not continuing to the extreme apex; terminal hook with fine secondary hook on basal third; acus normal.

Pupa.—Cephalothorax: Trumpet 7.5 times as long as greatest width, the lateral borders nearly parallel from proximal end of tracheoid portion to base of pinna, the tip slightly but distinctly narrower; pinna 1.3 times as long as width of tube at base of pinna, cleft at base 0.2 to 0.25 times as long as pinna, distal margin straight. Hairs 1 and 2 triple, the latter 2.0 times as long as the former; hair 3 four- or five-branched, 0.6 times as long as hair 1. Hairs 4 and 5 four- or five-branched, subequal in length; hair 6 double, 0.8 times as long as hair 5; hair 7 triple, 2.0 times as long as hair 5. Hair 8 with six or seven branches, 0.4 times as long as the trumpet; hair 9 triple, 0.35 times as long. Metathorax: Hair 10 with 10 to 12 branches, 0.85 times as long as hair 11, which is single; hair 12 triple or four-branched, 0.5 times as long as hair 11. Abdomen: Hair I-7 triple, 0.4 times as long as hair 1 6; hair II-4 double, 1.4 times as long as hair II-2, which is 12- to 15-branched; hair III-4 double, 1.3 times as long as hair III-2, which has 10 to 12 branches; hairs IV-4 and IV-6 four- to six-branched, the former 2.0 times as long as the latter; hair V-4 triple or four-branched, 1.25 times as long as five- to six-branched hair V-6; hairs VII-5 and VII-6 double, the latter 2.6 times as long as the former. Hair IV-5 with 9 to 13 fine branches, subequal in length to hair IV-2; attaining basal two-thirds of the following tergite; hair V-5 four- to five-branched, attain- ing basal three-fourths of the following tergite; hair VI-5 double, somewhat heavier, attaining basal three-fourths of the following tergite. Hair 8 on seg- ments III through VI triple or four-branched; hair VII-8 triple or four- branched, 0.6 times as long as hair VI-8, bare, the branches somewhat heavier; hair VIII-8 with four to five heavy branches 1.2 times as long as those of hair VII-8, only sparsely spiculate, inserted anterior to the postero-lateral corner, which is drawn out into a distinct point. Paddle hair 8, 2.0 times as long as hair 7.

Material.—Colombia: Three larval and three pupal skins (USNM); twelve larval and pupal skins, some of which are associated with females (R). Venezuela: Ten larval and pupal skins, some of which are presumably associated with males (R).

Distribution and habitat.—Panamá, Surinam, Colombia, Vene- zuela, Brazil. From edges of a shaded roadside borrow-pit, and from jungle pools (Root, 1927).

CULEX (MELANOCONION) PLECTOPORPE Root

(Fig. 46)

Culex plectoporpe Root, 1927, Amer. Jour. Hyg. 7: 589; Senevet and Abonnenc, 1939, Inst. Pasteur d'Algérie, Arch. 17: 62.

Larva.—Head: Wider than long, a strong angular swelling laterally, generally pigmented except on this angular portion. Preclypeal spines stout. Antenna with a tuft at apical three-fourths, the portion beyond strongly constricted, spicu- late on basal portion. Thorax: Integument spicular-pilose. Prothoracic hair for- mula (1-1-11)-1-1-1-3-2. Abdomen: Integument spicular-pilose. Hair 6 four-branched on segments IV, V, and VI. Comb a mass of spines superim-

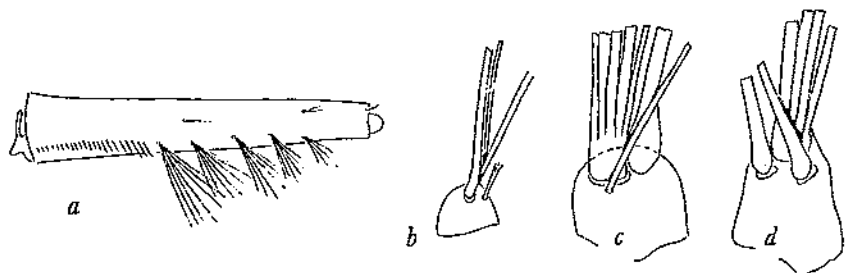


FIGURE 46.—*Culex (Melanoconion) plectoporpe* Root: a, Air tube; b, prothoracic pleural hairs; c, mesothoracic pleural hairs; d, metathoracic pleural hairs. Redrawn from Senevet and Abonnenc (1939).

posed on mounting. Armature of small sharply pointed spines "covering posterior border." Air-tube index 4.5; five pairs of ventral tufts on the apical two-thirds of tube beyond pecten; pecten of 19 spines on basal third of tube, each finely fringed on ventral side.

Material.—No specimens available for study. The description was taken entirely from that of Senevet and Abonnenc (1939).

Distribution and habitat.—French Guiana, Brazil. Root (1927) collected his specimens from a ditch and some small pools full of grass and water weeds.

Taxonomic discussion.—Senevet and Abonnenc (1939) state that this species is similar to *serratimarge*, except that *plectoporpe* has prothoracic hair 3 eleven-branched (in the only specimen seen by them), that of *serratimarge* being four- to six-branched. Since these authors do not describe head hairs 5 or 6, the position of this species in the key remains uncertain.

CULEX (MELANOCONION) PRODUCTUS Senevet and Abonnenc

(Fig. 47)

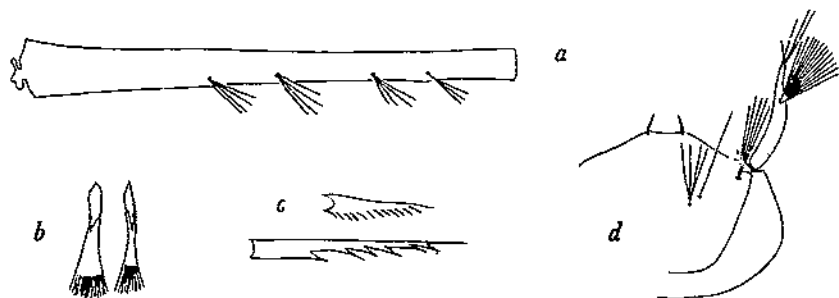


FIGURE 47.—*Culex (Melanoconion) productus* Senevet and Abonnenc: a, Air tube; b, comb scales; c, pecten spines; d, dorsal view of head. Redrawn from Senevet and Abonnenc (1939).

Culex productus Senevet and Abonnenc, 1939, Inst. Pasteur d'Algérie Arch. 17: 107; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 89.

Larva.—Head: Wider than long, moderately bulging on the sides; preclypeal spines slender, as long as the distance between them; hair 5 triple or four-branched, 0.65 times as long as hair 6, just attaining anterior margin of head; hair 6 single, distal half extending beyond anterior margin of head; hair 7 eight-branched. Antennal tuft at base of outer third, numerous spines near base

which are long and finely pointed, these more thinly scattered on the constricted portion. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-2)—(no further information). Abdomen: Integument bare, except on segment VII. Comb of many scales in at least three rows, each scale fanning out from the middle and fringed at apex. Posterior border of anal plate with six or seven strong spines; dorsal hair of dorsal brush with three shorter branches. Air-tube index 7.4 to 8.7, tube slightly expanded at apex; three or four reduced ventral tufts, the anterior tuft only slightly longer than width of air tube at point of insertion; pecten of 14 or 15 rather long pointed spines on basal fourth of tube, the apical tooth somewhat detached, each spine with six or seven ventral fringing teeth.

Material.—No specimens available for study. The description was taken entirely from that of Senevet and Abonnenc (1939).

Distribution and habitat.—French Guiana. Taken from a watering can containing a small amount of water. The fourth instar larva did not pupate until almost 4 weeks after it was taken in early February.

Taxonomic discussion.—Although Rozeboom and Komp (1950) synonymize *productus* with *comminutor*, stating that these two forms cannot be separated by means of the male terminalia, Senevet and Abonnenc's (1939) description of the larva of the former species differs so strikingly from that of *comminutor* that the writer has placed them here as distinct species. The principal larval differences lie in the comb scales, the air-tube index, and the short air-tube tufts.

CULEX (MELANOCONION) PSATHARUS Dyar

(Fig. 48)

Culex psatharus Dyar, 1920, *Insector Insectifae Menstruus* 8: 173; Dyar, 1928, *The Mosquitoes of the Americas*, p. 296; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 95.

Larva.—Head: Preclypeal spines stout, much shorter than one-half the distance between them; hair 4 single or double, minute, closer together than to hair 5; hair 5 double, fine, 0.33 times as long as hair 6, spiculation not visible; hair 6 single, distal 0.25 extending beyond anterior margin of head, spiculation not visible; hair 7 five- to seven-branched, very light; hair 18 single, shorter than hair 20, which is double or triple. Anterior ventral mandibular tooth slightly longer than broad, with a small projection on anterior margin well removed from tip; posterior ventral tooth the same length but much narrower with a notch at apex; maxillary spine 0.60 times as long and 0.33 times as wide as preclypeals, not darkened; mentum a broad shouldered central tooth and five or six smaller lateral ones. Antenna infuscated lightly on basal 0.25 of shaft and more darkly on basal 0.66 of constriction; subterminal spines markedly removed from tip; hair 10, 0.9 times as long as subapical spines, terminal spine 0.50 times as long as hair 10. Thorax: Integument spicular-pilose, the spicules sparse and short. Prothoracic hair formula (1-1-1)-2-2-2-2-2; prothoracic hair 3, 5.0 times as long as head hair 5. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; II-7 double; hair 6 double on segments III and IV, single on segments V and VI, all longer than the short branch of hair II-6. Comb of about 40 apically fringed scales in three or four irregular rows, scales of the anterior row not markedly shorter, but somewhat wider, than those in posterior row, individual scale with no evident free portion except the fringe, which arises from the base. Proportions of anal plate 15 x 18, the dorsal and ventral surfaces lightly infuscated; armature consisting of a large triangular patch of spines not confined to the posterior dorso-lateral margin but spread over the surface; dorsal hair of dorsal brush with a single smaller hair 1.5 times as long as ring; ventral brush 2.5 times as long as ring; gills absent. Air-tube index 5.0 to 5.3, tube lightly infuscated along most of length, but especially so at the ends and near the middle, where the infuscation does not form a complete ring; five pairs of ventral tufts, the anterior pair within the pecten, or nearly so, and 2.30 times as long as width of air tube at point of insertion, posterior pair 1.10 times as long as tube width at insertion; pecten of 13 to 16 widely spaced spines on basal third, subapical

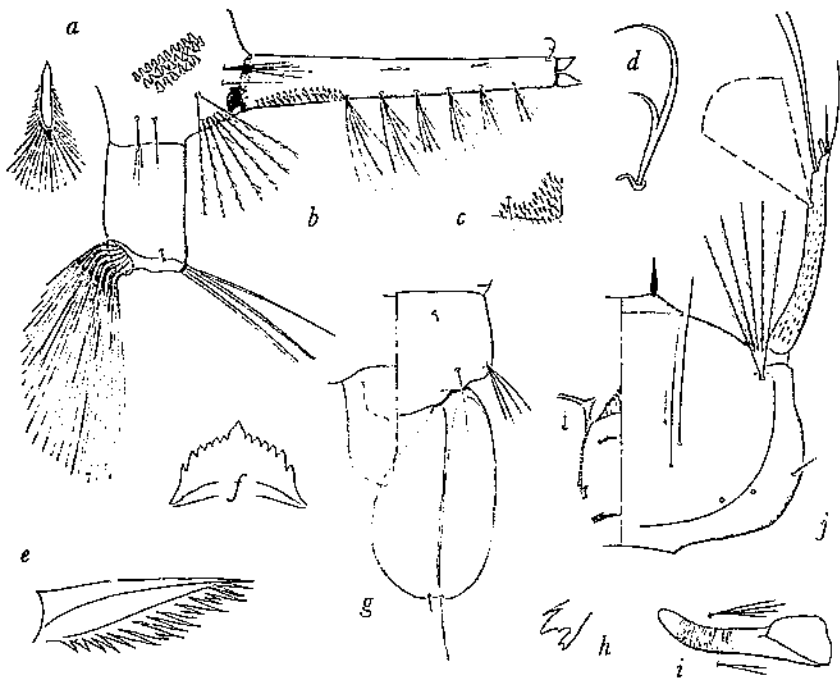


FIGURE 48.—*Culex (Melanoconion) psathurus* Dyar: a, Comb scale from posterior row; b, terminal segments of air tube; c, armature of anal ring; d, terminal hook of air tube; e, subapical pecten spine; f, mentum; g, segment VIII and paddle of pupa; h, ventral mandibular teeth; i, pupal trumpet; j, ventral (left) and dorsal (right) views of head.

spine about 1×6 , the fringe consisting of 15 to 20 jagged, uneven teeth to tip; terminal hook 0.60 times as long as width of tube at tip, with secondary hook on basal 0.4; acus without a club-shaped dorsal projection.

Pupa.—Cephalothorax: Trumpet about 4.0 times as long as widest portion, the lateral margins nearly parallel from proximal portion of tracheoid portion to near tip, where the edges of the open portion of the pinna flare out to the tip; pinna 1.5 to 1.6 times as long as greatest width at extreme tip, distal border curved distinctly outward. Abdomen: Postero-lateral corner of eighth tergite rounded, not produced into a posterior projecting point; hair VIII-8 inserted very close to the postero-lateral border on the rounded portion, four-branched, heavily spiculate, 0.8 times as long as single hair VIII-5. Paddle hair 8 long, about 0.33 times the length of the paddle and 5.0 times as long as hair 7.

Material.—Canal Zone: Two larval skins, one pupal skin, associated in a group with males with same data (USNM).

Distribution and habitat.—Panamá (known only from the Atlantic side). Bred from brackish pools in the jungle.

Taxonomic discussion.—The larva of this species differs in many respects from those of other *Choeroparpa*. It is one of the three species so far studied that has an antennal "gill" (see discussion of *educator*) and is alone in having prothoracic hair 3 single and extremely long, and comb scales without an intermediate shaft in the free portion the apical fringe apparently arising directly from the posterior margin of the base.

CULEX (MELANOCONION) SARAMACCENSIS Bonne-Wepster and Bonne

(Fig. 49)

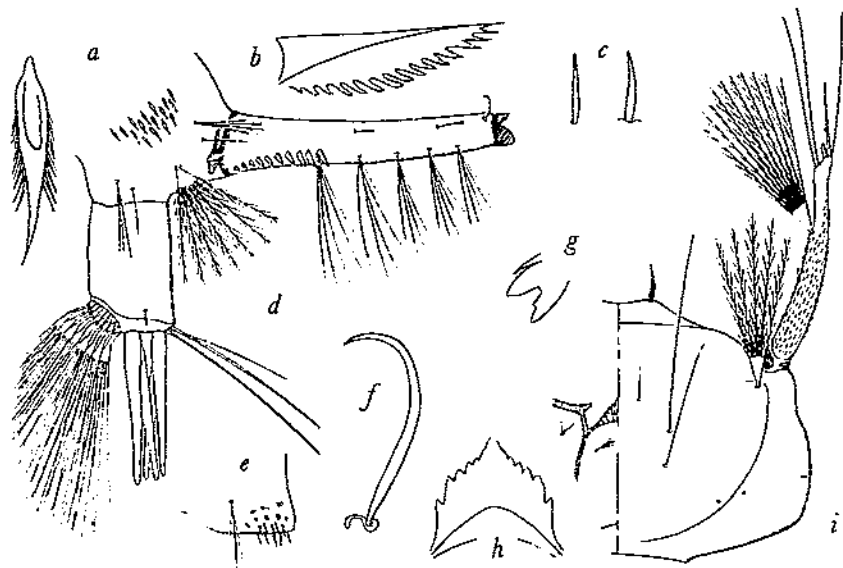


FIGURE 49.—*Culex (Melanoconion) saramaccensis* Bonne-Wepster and Bonne: a, Comb scale from posterior row; b, subapical pecten spine; c, maxillary (left) and preclypeal (right) spines; d, terminal segments of abdomen of larva; e, armature of anal ring; f, terminal hook of air tube; g, ventral mandibular teeth; h, mentum; i, ventral (left) and dorsal (right) views of head of larva.

Culex saramaccensis Bonne-Wepster and Bonne, 1919, *Insector Insectiae Meustruus* 7:172; Bonne and Bonne-Wepster, 1925, *The Mosquitoes of Surinam*, p. 305; Dyar, 1928, *The Mosquitoes of the Americas*, p. 304; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43:96.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them; hair 4 single, fine, closer to each other than to hair 6; hair 5 single or double (if double, not so to extreme base), 0.75 times as long as hair 6, no visible spiculation; hair 6 single, distal third extending beyond anterior margin of head, spiculation present but short; hair 7 six- or seven-branched, spiculate; hair 18 double, distinctly shorter than hair 20, which is triple to five-branched. Anterior ventral mandibular tooth slightly longer than width at base, posterior ventral tooth about the same length but narrower, with an anterior projection distinctly removed from the tip; maxillary spine the same length as, but more slender than, preclypeals, darkly pigmented; mentum a blunt, broad central tooth with four or five smaller lateral teeth, becoming noticeably larger distally. Antenna not noticeably infuscated; subapical spines 1.2 times as long as hair 10; hair 10, 2.0 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules long. Prothoracic hair formula (1-1-3-4)-2-1-1-3-2; prothoracic hair 3, 1.2 times as long as head hair 5, spiculate. Abdomen: Integument as densely spicular-pilose as the thorax. Hair 7-6 double; hair 1-7 single; hair 11-6 double, hair 6 on segments III and IV triple or four-branched; hair 111-6, 0.5 times as long as short branch of hair 11-6; hair VI-6, 0.66 times as long as short branch of this hair. Comb of 14 to 16 very dark spines in three irregular rows, all spines the same length, the individual spine sharply pointed and with a lateral fringe which becomes coarser toward the apex, but not attaining it. Proportions of anal ring destroyed in mounts of skins; armature consisting of 8 to 10 long, single spines confined in a very narrow patch to the extreme posterior dorso-lateral border;

dorsal hair of dorsal brush with one or two shorter branches, the longest 1.2 times as long as anal ring; ventral brush 2.5 times as long as ring; gills four, about 1.5 times as long as ring and narrowly pointed. Air-tube index 4.0 to 5.0, the tube relatively wide at tip, with no infuscation at center; five or six pairs of ventral tufts, the anterior pair within the pecten and 3.2 times as long as width of air tube at point of insertion, posterior pair 2.5 times as long as tube width at insertion; pecten of 9 to 12 spines on basal third of tube, spines well separated, subapical spine 1 x 5, with 10 to 15 fringing teeth; terminal hook 0.75 times as long as tube width at tip, without any secondary hook; acus with an extremely slender dorsal projection.

Material.—Surinam: Three larval skins (USNM).

Distribution and habitat.—Surinam. The larvae were found in rock pools in the Surinam River and in water containers near the river.

Taxonomic discussion.—According to Rozeboom and Komp (1950) this is apparently a rare species. The larval description of Bonne and Bonne-Wepster (1925) agrees very well with the specimen I have seen. The larva may be recognized by the heavily spicular-pilose abdomen and the pointed comb scales with very heavy lateral fringing.

CULEX (MELANOCONION) SERRATIMARGE Root

(Fig. 50)

Culex serratimarge Root, 1927, Amer. Jour. Hyg. 7: 589; Dyar, 1928, The Mosquitoes of the Americas, p. 312; Senevet and Abonnenc, 1930, Inst. Pasteur d'Algérie, Arch. 17: 85.

Larva.—Head: Preclypeal spines much longer than one-half the distance between them; hair 4 single or double, extremely fine, very slightly farther from hair 6 than is hair 5; hair 5 double, 0.55 times as long as hair 6, without spiculation; hair 6 single, distal 0.58 extending beyond anterior margin of head, lightly spiculate; hair 7 seven- to eight-branched, spiculate; hair 13 triple or four-branched, same length as head hair 5; hair 20, 0.50 as long as hair 18. Anterior ventral mandibular tooth slightly longer than width at base, posterior ventral tooth narrower and longer than anterior, with an anterior projection well removed from tip; maxillary spine 0.50 times as long as preclypeals; mentum with five to seven lateral teeth on either side of a large, blunt central tooth, the lateral teeth becoming larger distally. Antenna lightly infuscated at base of constricted portion; hair 10, 0.70 times as long as subapical spines, terminal spine 0.28 times as long as hair 10. Thorax: Integument densely spicular-pilose. Prothoracic hair formula (1-1-4-6)-1-1-1-3-2; prothoracic hair 3, 1.5 times as long as head hair 5, lightly spiculate. Abdomen: Integument glabrous on segments I and II, lightly spicular-pilose on remaining segments. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI triple or four-branched; hair VI-6 about 0.75 times as long as long branch of hair II-6. Comb of 30 to 35 apically fringed scales in three or four irregular rows, the scales in posterior row about 2.0 times as long as those in anterior row, free portion of individual scale about 1.2 times as long as fixed base. Proportions of anal plate 13 x 19; armature of ring consisting of a triangular patch of 13 to 18 single spines not confined to the posterior dorso-lateral border; dorsal hair of dorsal brush with a single shorter branch 0.8 times as long as anal ring; ventral brush 1.9 times as long as ring; gills four (shape and length destroyed in mounts). Air-tube index 6.1 to 6.2, tube with a distinct infuscated ring near center; six pairs of ventral tufts, the anterior pair 2.9 times as long as width of air tube at point of insertion, posterior pair 1.45 times as long as tube width at insertion; pecten of 15 to 18 spines on basal 0.30 of tube, the spines nearly touching, subapical spine 1 x 6, with about 15 fringe teeth that are extremely short at base and become longer apically, scale not fringed entirely to tip; terminal hook 0.60 times as long as width of tube at tip, a minute secondary hook on basal fourth; acus normal.

Pupa.—Cephalothorax: Trumpet 7.0 times as long as width at tip, the lateral margins tapering evenly from a rather narrow base to the tip; pinna 1.2 times

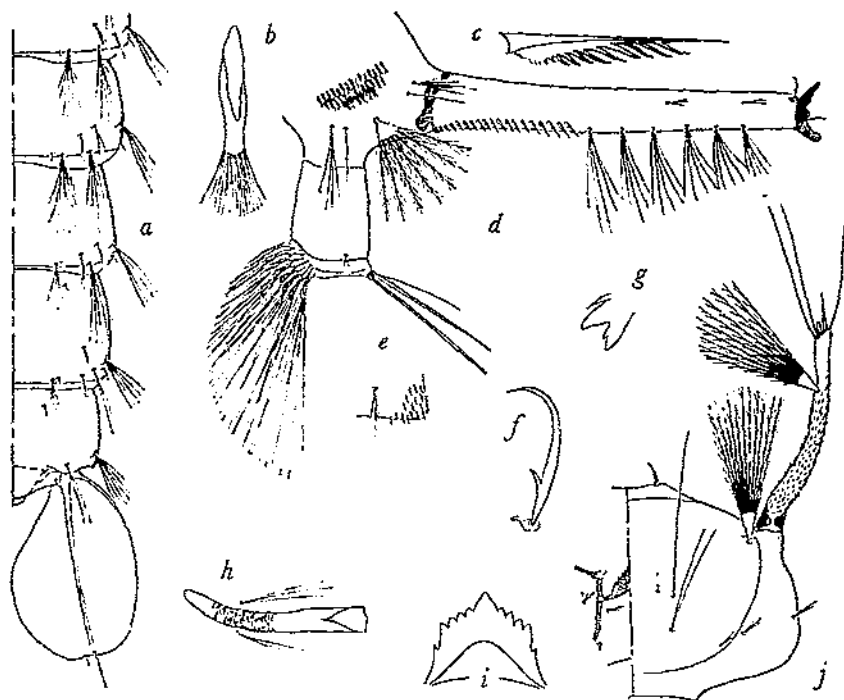


FIGURE 50.—*Culca (Melanoconion) serratimarge* Root: *a*, Dorsal view of segments IV through VIII of abdomen of pupa; *b*, comb scale from posterior row; *c*, subapical pecten spine; *d*, terminal segment of abdomen of larva; *e*, armature of anal ring; *f*, terminal hook of air tube; *g*, ventral mandibular teeth; *h*, pupal trumpet; *i*, mentum; *j*, ventral (left) and dorsal (right) views of head of larva.

as long as width at tip, cleft at base 0.2 times as long as pinna itself, distal margin evaginated at center. Hair 1 triple, 1.4 times as long as hair 2, which has five or six branches; hair 3 double, 1.2 times as long as hair 1. Hairs 4 and 5 four- or five-branched, the latter 1.5 times as long as the former; hair 6 four- or five-branched, subequal in length to hair 4; hair 7 double; 1.2 times as long as hair 5. Hair 8, 0.45 times as long as trumpet, four- or five-branched; hair 9 double, 0.25 times as long as trumpet. Metathorax: Hair 10 six- to eight-branched, subequal in length to hair 11, which is single; hair 12 double, 0.7 times as long as hair 11. Abdomen: Hair I-7 with four branches, 0.4 times as long as hair I-6; hair II-4 double, 1.8 times as long as hair II-2, which has 20 to 22 branches; hairs II-5 and II-6 subequal, both four- or five-branched; hair III-4 double, 1.2 times as long as hair III-2, which is eight- to ten-branched; hair IV-4 four-branched, 1.2 times as long as triple hair IV-6; hairs V-4 and V-6 both triple and subequal in length. Hairs IV-5 and V-5 six- or seven-branched, the branches fine, attaining basal two-thirds of following tergite; hair VI-5 triple or four-branched, slightly heavier, attaining basal two-thirds of following tergite. Hair VII-6 double, 2.3 times as long as triple hair 5. Hair 8 on segments III through VI triple or four-branched; hair VII-8 with six heavy branches, heavily spiculate, subequal in length to hair VII-8, inserted anterior to postero-lateral corner, which is drawn out to a sharp but short point. Paddle hair 8, 4.0 times as long as hair 7.

Material.—Colombia: One larval, one pupal skin, associated with a male (USNM); two larval and pupal skins (R).

Distribution and habitat.—Panamá, French Guiana, Brazil. The material examined for this study was collected from the edges of a

shaded roadside borrow pit in the vicinity of fernlike plants or trees, or from the bank itself.

Taxonomic discussion.—The larval description given by Senevet and Abonnenc (1939) agrees in all important respects with the specimens the writer has seen, and indicates its close relationship with *plectoporce*, from which it may be distinguished by the much fewer branches of prothoracic hair 3.

CULEX (MELANOCONION) SIMULATOR Dyar and Knab

(Fig. 51)

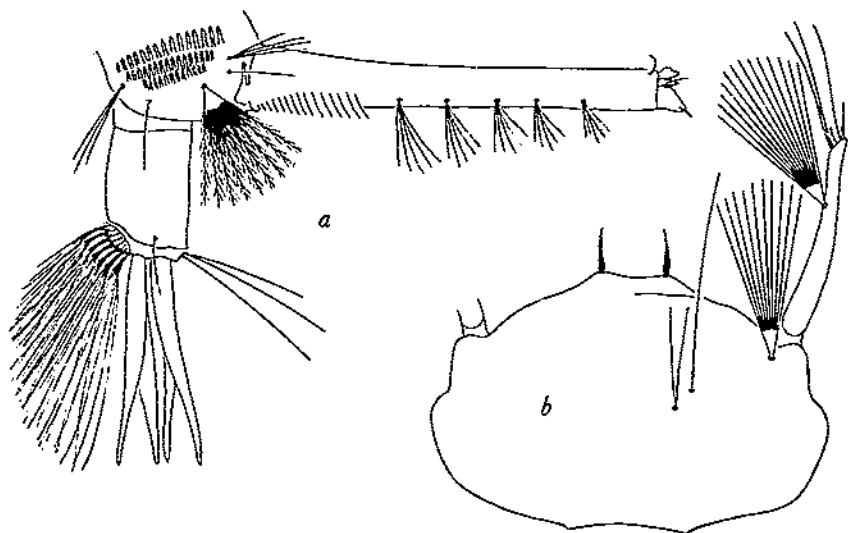


FIGURE 51.—*Culex (Melanoconion) simulator* Dyar and Knab: a, Terminal segments of abdomen of larva; b, dorsal view of head. Redrawn from Howard *et al.* (1915).

Culex simulator Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 218; Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 302; Dyar, 1928, The Mosquitoes of the Americas, p. 333; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 98.

Larva.—Head: Rounded, widest through eyes, narrowed before, a large notch at insertion of antennae, front margin arcuate; hair 5 double; hair 6 single; hair 7 multiple. Mental plate triangular, rather small, with a large broad central tooth and seven on each side, the fifth distinct and slightly projecting. Antenna large and thickened, slightly curved and spined on basal two-thirds, with a large tuft from a notch; apically, three long setae, a short one and a digit. Thorax: Integument spicular-pilose. Abdomen: Integument glabrous. Hair I-6 double; hair 1-7 single; hair 11-6 single; hair 6 on segments III through VI double. Comb of numerous apically fringed spines in a patch about three rows deep, individual spine elongate and widened at tip. Anal segment twice as long as wide; dorsal hair of dorsal tuft with a single short branch; ventral brush well developed; gills four, longer than the anal segment, regularly tapered. Air-tube index 6.0, tube a little widened toward tip; five pairs of ventral tufts beyond pecten; pecten long, reaching to basal third, single teeth coarsely serrate on ventral side.

Material.—No specimens available for study. The description was taken entirely from that of Howard, Dyar, and Knab (1915).

Distribution and habitat.—Trinidad. "The larvae live in swamps in forest" (Howard, Dyar, and Knab, 1915).

Taxonomic discussion.—This species appears to be a true *Melanoconion*, with the mental teeth becoming larger distally, a ventral posterior mandibular tooth present, well developed ventral air-tube tufts, and an air-tube index of 6.0. It may be very easily separated from all other *Melanoconion* by the single abdominal hair II-6, which is always double in other forms. It appears to be a close relative of *decorator* and *gravitator* and presumably can be distinguished from them by the abdominal hair character. It differs from *coppenamensis* (see Dyar, 1928) in having all the comb scales apically fringed.

CULEX (MELANOCONION) SURSUMPTOR Dyar

(Fig. 52)

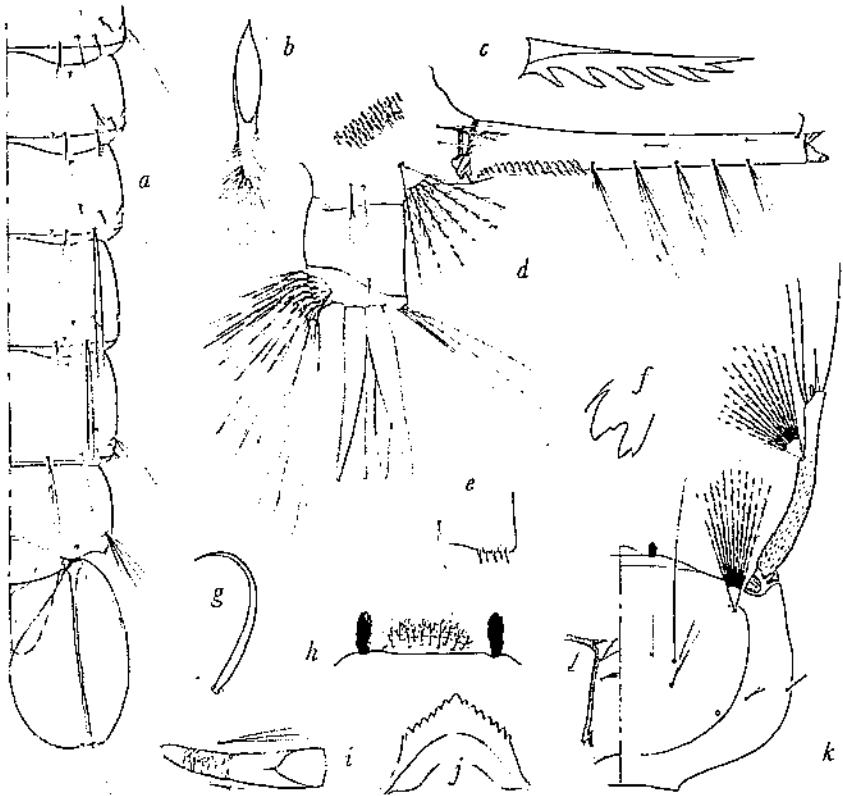


FIGURE 52.—*Culex (Melanoconion) sursumptor* Dyar; *a*, Dorsal view of segments III through VIII of abdomen of pupa; *b*, comb scale from posterior row; *c*, subapical pecten spine; *d*, terminal segments of abdomen of larva; *e*, armature of anal ring; *f*, ventral mandibular teeth; *g*, terminal hook of air tube; *h*, preclypeus and labrum of larva; *i*, pupal trumpet; *j*, mentum; *k*, ventral (left) and dorsal (right) views of head of larva.

Culex sursumptor Dyar, 1924, *Insector Insectilae Menstruus* 12: 123; Dyar, 1928, *The Mosquitoes of the Americas*, p. 329.

Culex ligator Dyar, 1924, *Insector Insectilae Menstruus* 12: 123.

Larva.—Head: Labrum with light but distinct dendritic hairs; preclypeal spines blunt and distinctly rugose, about half as long as distance between them;

hair 4 single to triple, fine; hair 5 usually double, 0.5 times as long as hair 6, with extremely fine spicules; hair 6 single, spiculate; hair 7 with 9 to 11 branches. Hair 13, 0.8 times as long as hair 5, triple or four-branched; hair 18 double or triple, attaining premaxillary suture. Maxillary spine 2.2 times as long as pre-clypeals; mentum with about six uniformly sized teeth on each side of a large central one. Antennal tuft and constriction 0.65 times the distance from the base; subapical spines inserted distinctly below apex: as long as hair 10; hair 10, 2.5 times as long as terminal spine. Thorax: Integument densely spicular-pilose. Prothoracic hair formula (1-1-2-5)-1-1-1-2-2; hair 3 about 0.2 times as long as hair 2. Abdomen: Integument lightly pilose with extremely fine spicules over the entire surface. Hair I 6 double; hair I-7 single; hair II-6 double. Comb a patch of 20 to 30 apically fringed scales in three or four irregular rows, scales in posterior row 1.2 times as long as those in anterior; bases of posterior scales 0.5 times as long as scale itself. Proportions of anal ring 13 x 16, about the same width throughout; armature of single spines confined to the extreme posterior border of ring; outer hair of dorsal brush with one or two small branches; ventral brush 2.0 times as long as ring; gills four, 1.5 to 2.0 times as long as ring. Air-tube index 5.0, the tube very slightly bent at apical two-thirds; five or six pairs of ventral tufts, the anterior pair over 3.2 times as long as width of tube at point of insertion, posterior 0.4 times as long as anterior; pecten occupying basal fourth of siphon with 14 to 18 teeth, subapical spine about 1 x 5 with four to six fringing teeth; terminal hook strongly recurved, with no secondary hook whatever; acus normal.

Pupa.—Cephalothorax: Trumpet 4.1 times as long as width at tip, the lateral margins gradually tapering to the tip from the base; pinna rather square, 1.25 times as long as greatest width, cleft at base 0.2 times as long as pinna, distal margin very slightly rounded. Hair 1 long, double or triple, 2.5 times as long as hair 2, which is four- or five-branched; hair 3 double, 0.7 times as long as hair 1. Hair 4 short, double, 0.6 times as long as hair 5 which is triple; hairs 6 and 7 double, the former 0.55 times as long as hair 5, the latter 1.2 times as long as hair 5. Hair 8, 0.5 times as long as trumpet, hair 9, 0.3 times as long as trumpet, both hairs double. Metathorax: Hair 10, 10- to 12-branched, 0.8 times as long as hair 11, which is single and distinctly expanded at its base; hair 12 triple, 0.6 times as long as hair 11. Abdomen: Hair I 7 double, 0.4 times as long as hair I-6; hair II 4 double, 1.4 times as long as hair II-2, which has about 20 branches; hair II-5 four- or five-branched, 2.0 times as long as triple hair II 6; hair III 4 double, 0.9 times as long as hair II 2, which has only three or four branches; hairs IV 4 and IV-6 four- or five-branched, the former 1.5 times as long as the latter; hair V-4 double, 1.5 times as long as hair V 6, which has four or five branches; hairs 5 and 6 on segment VII single, the former 1.2 times as long as the latter. Hair IV-5 triple or four-branched, the branches not especially heavy but attaining posterior margin of following tergite; hair V-5 and VI 5 double, the branches heavy, the former exceeding posterior margin of following tergite by one-fourth its length, the latter just attaining posterior margin of following tergite. Hair 8 on segments III through VI single; hair VII 8 double the branches heavy, 0.6 times as long as hair VI 8, each branch with three or four long spines; hair VIII 8 with four to six heavy branches subequal in length to hair VII 8, the spicules long but sparse, inserted anterior to posterior lateral corner, which is drawn out into a sharp but short point. Paddle hair 8, 4.0 times as long as hair 7.

Material.—Columbia: Seven larval skins, two pupal skins, some associated with males (USNM); four larval and four pupal skins (R); Venezuela: One larval skin (USNM).

Distribution and habitat.—Columbia. Specimens examined in this study were collected from ". . . a small puddle of still water in main stream bed with filamentous green algae and few mats of algal scum." (Rozeboom, personal notes.)

Taxonomic discussion.—The larva of *sursumptor* resembles most closely that of *lucifugus*, from which it is easily distinguished by the short, blunt, rugose, pre-clypeal spines, the dendritic labral hairs, and the presence of an extremely fine pilosity of short but distinct spicules over the entire abdominal surface. The posterior portion of the anal plate is more extensively covered by discontinuous rows of fine spicules

than is that of *lucifugus*, nearly attaining the posterior margin. Dyar's (1924) description of the larva of *ligator*, since shown to be this species, agrees well with the author's observation of the larva of *sursumptor*.

CULEX (MELANOCONION) TAENIOPUS Dyar and Knab

Culex taeniopus Dyar and Knab, 1907, N. Y. Ent. Soc. Jour. 15: 100; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 96.

Taxonomic discussion.—No larvae of this species were available for this study, so that the confusion surrounding its true identity must remain. However, Rozeboom and Komp (1950) state, “. . . The larva of the species here described as *taeniopus* is apparently indistinguishable from that of *crybda*.”

CULEX (MELANOCONION) THEOBALDI Lutz

(Fig. 53)

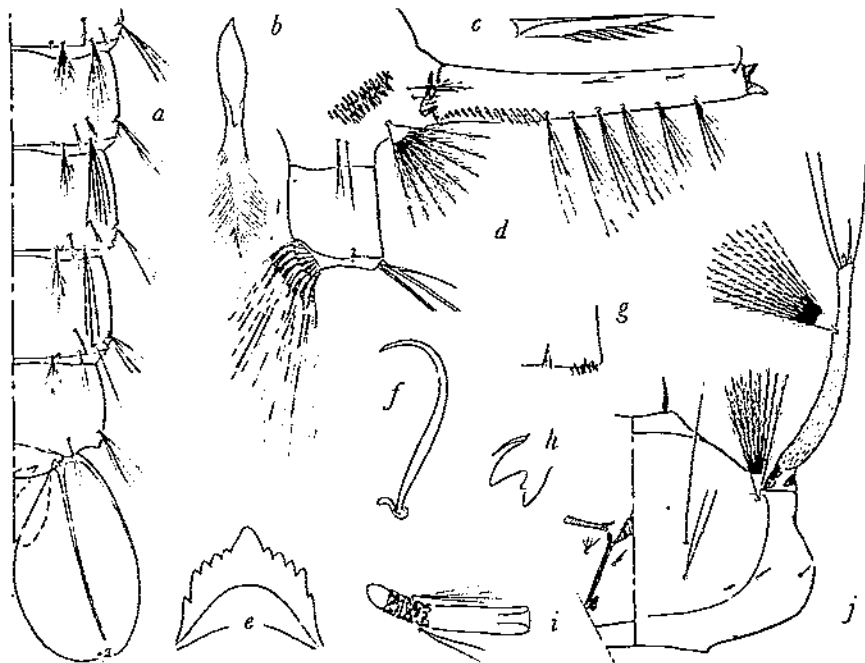


FIGURE 53.—*Culex (Melanoconion) theobaldi* Lutz: a, Dorsal view of segments IV through VIII of abdomen of pupa; b, comb scale from posterior row; c, sub-apical pecten spine; d, terminal segments of abdomen of larva; e, mentum; f, terminal hook of air tube; g, armature of anal ring; h, ventral mandibular teeth; i, pupal trumpet; j, ventral (left) and dorsal (right) views of head of larva.

Culex theobaldi Lutz, 1904, Mosquitoes of Brazil, p. 39; Dyar, 1928, The Mosquitoes of the Americas, p. 327; Lane, 1951, Ent. Soc. Wash. Proc. 53: 334. *Neomelanoconion chrysothorax* Newstead and Thomas, 1910, Ann. Trop. Med. and Parasitol. 4: 145.

Larva.—Head: Preclypeal spines as long or longer than one-half the distance between them; hair 4 minute, double, closer to each other than to hair 6;

hair 5 single, 0.63 times as long as hair 6, distal third extending beyond anterior margin of head, spiculation present but extremely short; hair 7 nine- or ten-branched, spiculate; hair 18 triple or four-branched, the outer two branches heavier than the central one or two, longer than hair 20, which is six- or seven-branched. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth the same length but narrower, with a small projection distinctly removed from tip; maxillary spine 0.50 times as long and broad as pre-clypeals; mentum a broad, blunt central tooth and four rather blunt lateral teeth each side, sometimes a small, separated fifth. Antenna infuscated at basal fourth of shaft and basal third or half of constricted portion; subapical spines 1.5 times as long as hair 10; hair 10, 2.2 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules very wide at extreme base. Prothoracic hair formula (1-1-5-8)-2-1-1-3-2; prothoracic hair 3, 1.8 times as long as head hair 5; hair 7 sometimes double; prothoracic hair 10 and sometimes hair 9 double or triple. Abdomen: Integument glabrous. Hair 1-6 double; hair 1-7 single; hair 11-6 double; hair 6 on segments III through VI double to four-branched; hair III 6 0.75 times as long as short branch of hair 11-6, hair VI-6 0.90 times as long as short branch of that hair. Comb of 15 to 30 small apically fringed scales in two irregular rows, individual scale with lateral fringe extended from extreme base clear around posterior margin of scale, leaving little free portion except the fringe itself. Anal plate proportions 12 x 16, darkly pigmented on anterior border of ring; armature consisting of 8 to 10 single spines in a very narrow patch confined to the extreme posterior dorso-lateral border; dorsal hair of dorsal brush with one to three shorter branches, the longest 0.89 times as long as anal ring; ventral brush 2.2 times as long as ring; gills developed in mounts. Air-tube index 5.0 to 6.0, dark infuscation occupying middle third of tube; five or six pairs of ventral tufts, the anterior pair 4.3 times as long as width of air tube at point of insertion, posterior pair 2.2 times as long as tube width at insertion; pecten of 12 to 14 separated spines on basal third of tube, subapical spine 1 x 7, with six to eight fringing teeth nearly all the same size and not extending to apex; terminal hook 0.7 times as long as air tube width at tip, without a secondary hook whatever; aens with rather narrow dorsal projection.

Pupa.—Cephalothorax: Trumpet 6.0 times as long as greatest width, the lateral margins nearly parallel on distal half; pinna not as in true *Melanoconion*, but with a parallel-sided opening whose proximal closure is not possible to determine, no cleft at base of pinna, the distal margin straight. Hair 1 extremely long, four-branched, 2.3 times as long as four- or five-branched hair 2; hair 3 double, 0.7 times as long as hair 1. Hair 4 short, triple, 0.6 times as long as hair 5, which is five- or six-branched; hair 6 double, 0.7 times as long as hair 5; hair 6 triple, 1.2 times as long as hair 5. Hair 8, 0.45 times as long as trumpet, triple; hair 9 double, 0.4 times as long as trumpet. Metathorax: Hair 10 seven-branched, subequal in length to hair 11, which is single and enlarged at its base; hair 12 double, 1.2 times as long as hair 11. Abdomen: Hair I 7 triple, 0.4 times as long as hair 1-6; hair 11-4 double, subequal in length to hair 11 2, which has 12 to 15 branches; hair III 4 double, subequal in length to hair III 2, which has 10 to 12 branches; hairs IV 4 and IV-6 triple or four-branched, the former 1.5 times as long as the latter; hairs V 4 and V 5 subequal in length, the former double, the latter four- or five-branched; hair VII-6 single, 2.0 times as long as double hair VII 5. Hair IV-5 with five or six branches, not especially heavy, attaining basal two-thirds of following tergite; hair V-5 five-branched, attaining basal five-sixths of following tergite, the branches heavier; hair VI 5 double or triple, the branches heavy, just attaining margin of following tergite. Hair 8 on segments III through VI four- or five-branched; hair VII 8 four-branched, the branches heavy, 0.7 times as long as hair VI 8; hair VIII 8 five- to six-branched, the branches heavy and 1.2 times as long as hair VII 8, spiculation long and dense, inserted anterior to postero-lateral corner, which is drawn to a short, sharp point. Paddle hair 8, 2.0 times as long as hair 7.

Material.—Colombia: One larval and one pupal skin (USNM); two larval and two pupal skins, all associated with males (R).

Distribution and habitat.—Colombia, Brazil, Venezuela. From a shaded roadside borrow-pit among fernlike plants.

Taxonomic discussion.—This is another of the instances in which the separation and recognition in this subgenus apparently depends

on the larval characters. Rozeboom and Komp (1950) state that the terminalia of this species are identical with that of *educator*. Both larvae have pointed comb scales, but those of *theobaldi* are fringed clear around the tip, whereas the lateral fringing of *educator* scales does not extend beyond the free portion.

Lane (1951) states that both *chrysonotum* and *theobaldi* are synonymous with *spissipes*, the last-named species being closely related to *dunni* and *zeteki*. In view of the distinct differences between the males of these species as shown by Rozeboom and Komp (18, p. 97), it is assumed that Lane may be in error in this respect.

CULEX (MELANOCONION) THOMASI EVANS

(Fig. 54)

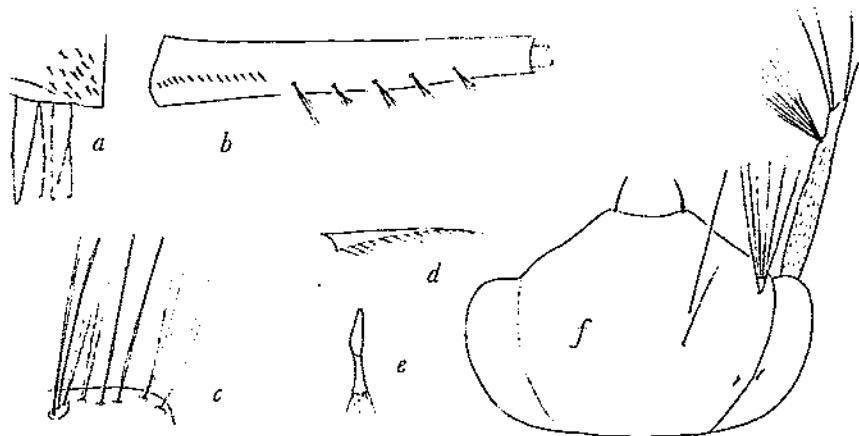


FIGURE 54.—*Culex (Melanoconion) thomasi* Evans: a, Armature of anal ring; b, air tube; c, anterior dorsal prothoracic hairs; d, pecten spine; e, comb scale; f, dorsal view of head. Redrawn from Senevet and Abonnenc (1939).

Culex thomasi Evans, 1924, Ann. Trop. Med. and Parasitol., 18: 372; Senevet and Abonnenc, 1939, Inst. Pasteur d'Algérie, Arch. 17: 98; Floch and Abonnenc, 1945, Inst. Pasteur de la Guyane et du Ter. de l'Inini 110: 34; Lane, 1951, Ent. Soc. Wash. Proc. 53: 334.

Larva.—Head: Wider than long, lateral swellings pronounced and angular. Preclypeal spines strong and heavily sclerotized; hair 5 single, rarely double, slender, about 0.66 times as long as hair 6 and nearly attaining anterior margin of head; hair 6 single, distal third extending beyond anterior margin of head, spiculate; hair 7, 12-branched, spiculate. Antennal tuft on apical third, spicules long, pointed and numerous on all of shaft and basal part of constricted portion. Thorax: Integument densely spicular-pilose. Prothoracic hair formula (1-1-3) - 2-1-1-3-2; prothoracic hair 3 slightly longer than head hair 5. Abdomen: Integument glabrous, except on posterior portion of segment VIII. Hair 6 on segments IV to VI triple. Comb of a number of apically fringed spines in at least three rows, those in posterior row longer than those in anterior. Armature of anal ring consisting of a broad patch of single spines; dorsal hair of dorsal tuft with two short branches. Air-tube index 2.8 to 4.6 (shown to be longer in their illustration): an infuscated ring "on narrow portion" of air tube; five pairs of ventral tufts, none before the pecten, diminishing in length posteriorly; pecten of long, pointed, regularly spaced spines, each with fine fringe ventrally.

Material.—No specimens available for study. The description was taken entirely from that of Senevet and Abonnenc (1939).

Distribution and habitat.—Gundeloupe, French Guiana, Brazil. Floch and Abonnenc (1945) report this species from marshes always in association with vegetation.

Taxonomic discussion.—Floch and Abonnenc (1945) present somewhat sketchy illustrations of this larva but no worded description, and since the author has seen no specimens, he is unable to separate it from *tourneri*. The description of Senevet and Abonnenc (1939) is somewhat misleading in stating that the anal-ring armature consists of six to eight small single spines instead of the broad patch as reported by Floch and Abonnenc (1945).

Lane (1951) synonymizes *tourneri* with this species on the basis of the similarities in male terminalia. Until specimens of larvae of these two species are available, the question of the synonymy must remain unsettled.

CULEX (MELANOCONION) TOURNIERI Senevet and Abonnenc

(Fig. 55)

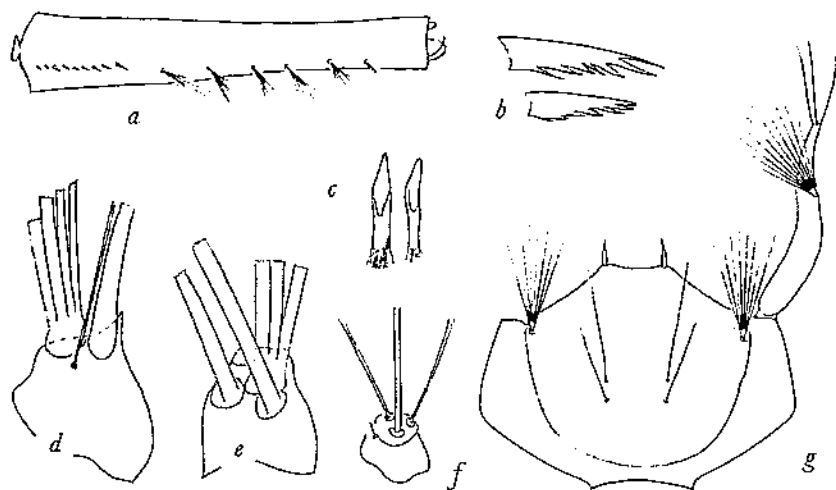


FIGURE 55.—*Culex (Melanoconion) tourneri* Senevet and Abonnenc: a, Air tube; b, pecten spines; c, comb scales; d, metathoracic pleural hairs; e, mesothoracic pleural hairs; f, prothoracic pleural hairs; g, dorsal view of head of larva. Redrawn from Senevet and Abonnenc (1939).

Culex tourneri Senevet and Abonnenc, 1939, Inst. Pasteur d'Algérie, Arch. 17: 105; Rozeluum and Komp, 1950, Ent. Soc. Amer. Ann. 43: 97; Lane, 1951, Ent. Soc. Wash. Proc. 53: 334.

Larva.—Head: Hair 5 single, about two-thirds as long as hair 6, more slender; hair 6 single, stout; hair 7 eight-branched, not quite attaining constriction of antenna. Antenna spined as usual, hair 10 distinctly shorter than subapical spines. Abdomen: Comb of many spines all fringed at their apices. Air-tube index about 5.0; six pairs of ventral tufts, the anterior pair 1.25 times as long as width of air tube at point of insertion, posterior pair less than air-tube width; pecten of nine spines, each with seven or eight ventral fringing teeth.

Material.—No specimens available for study. The description was taken entirely from that of Senevet and Abonnenc (1939).

Distribution and habitat.—French Guiana. Collected in flooded forest land.

Taxonomic discussion.—The larva of this species keys out near *comatus* in a small group of forms with very short air-tube tufts. See remarks under *comatus*, which Senevet and Abonnenc (1939) state is identical with *tourneri* in the larval stage.

CULEX (MELANOCONION) YBARMIS Dyar

(Fig. 56)

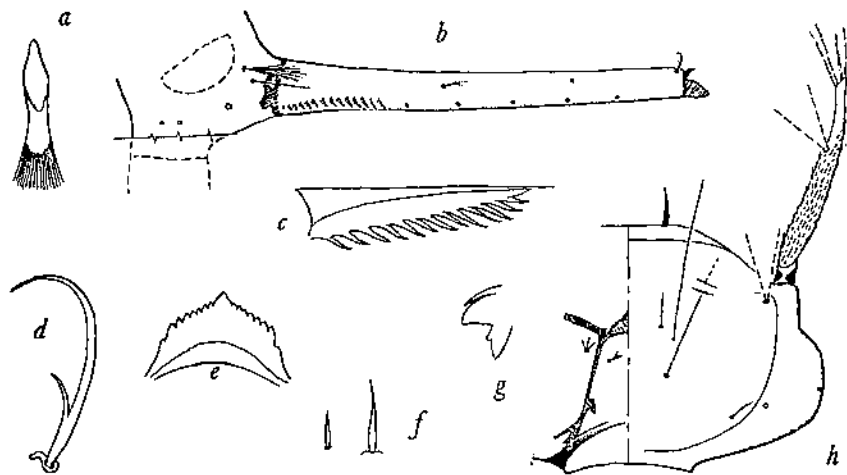


FIGURE 56.—*Culex (Melanoconion) ybarmis* Dyar: a, Comb scale; b, terminal segments of abdomen of larva; c, subapical pecten spine; d, terminal hook of air tube; e, mentum; f, maxillary (left) and preclypeal (right) spines; g, ventral mandibular teeth; h, ventral (left) and dorsal (right) views of head of larva.

Culex ybarmis Dyar, 1920, Insector Insectiæ Menstruus 8: 57; Dyar, 1928, The Mosquitoes of the Americas, p. 302; Komp, 1935, Ent. Soc. Wash. Proc. 37: 57. *Culex jonistes* Dyar, 1920, Insector Insectiæ Menstruus, 8: 76.

Larva.—Head: Preclypeal spines the same length as half the distance between them; hair 4 single, delicate, as close to hair 6 as is hair 5; hair 5 single, at least half as long as hair 6 (the single hair broken in the specimen), spiculation long; hair 6 single, distal half extending beyond anterior border of head, spiculation extremely long; hair 20 slightly longer than hair 18. Anterior ventral mandibular tooth shorter than width at base, posterior ventral tooth narrower at base, but longer than anterior, with a projection distinctly removed from tip; maxillary spine 0.60 as long and wide as preclypeal; mentum a broad shouldered central tooth and six or seven lateral teeth, the distal-most somewhat separated. Antenna infuscated on lower half of constricted portion, the spines at apex missing. Thorax: Integument spicular-pilose. Prothoracic hair formula (?-?-?)—?-?-?-?-?-?; prothoracic hair 3 missing. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI triple or four-branched; hair III-6, 0.66 times as long as short branch of hair II-6; hair VI-6, 0.75 times as long as short branch of that hair. Comb of a number of apically fringed scales in an undetermined number of rows, these characters destroyed in the mount. Anal segment missing altogether. Air-tube index 6.0 to 7.0, without infuscation in a ring near the center; all ventral tufts of tube missing; pecten of 14 to 15 teeth on basal fourth, the basal teeth touching, fringe of subapical spine consisting of 8 to 12 uniform teeth extending nearly to apex; terminal hook 0.55 times as long as air-tube width at tip, with fairly strong secondary on basal fourth; acus not visible in mount.

TB 1091 (1954)

USDA TECHNICAL BULLETINS

UPDATA

THE LARVAE AND PUPAE OF THE MOSQUITOES BELONGING TO COLEX SUBGENERA

FCOTE, R. H.

2 OF 2

Material.—Surinam: One larval skin associated with type No. 22734 (USNM).

Distribution and habitat.—Surinam. No data in the literature on breeding places or habits.

Taxonomic discussion.—The specimen from which this description was made is poorly mounted so that all characters are not clear. It may well be the same as that used by Dyar (1928). It is not known whether Dyar intended his illustration to represent apically pointed comb scales, since his drawing is not clear and he does not definitely state the point. This must have been his intention, however, for no larva has been seen in this study with as few apically fringed scales in the comb. In this event *ybarmis* runs in the key to Species E, and may actually be the same, although the single specimen of *ybarmis* has a single head hair 5, while Species E has this hair triple. The basal expansion of the comb scales seems somewhat similar to Dyar's illustration. Species E is described from a Root specimen taken in Brazil.

CULEX (MELANOCONION) ZETEKI Dyar

(Fig. 57)

Culex zeteki Dyar, 1918, Insector Inscitiae Menstruus 6: 122; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 98.

Culex loturus Dyar, 1918, Insector Inscitiae Menstruus 6: 214.

Culex ensiformis Bonne and Bonne-Wepster, 1925, The Mosquitoes of Surinam, p. 272; Senevet and Abonnenc, 1933, Inst. Pasteur d'Algérie, Arch. 17: 81.

Larva.—Head: Preclypeal spines longer than one-half the distance between them; hair 4 extremely fine, closer together than to socket of hair 6; hair 5 eight- to nine-branched, 0.43 times as long as hair 6, spiculation sparse but long; hair 6 single, distal half extending beyond anterior margin of head, spiculation long; hair 7 multiple, spiculate; hair 18 double; hair 20 five- to six-branched. Anterior ventral mandibular tooth as long as width at base, posterior ventral tooth distinctly longer, with a large anterior projection quite close to the tip; maxillary spine 0.4 times as long as preclypeal, not darkly pigmented; mentum a strong central tooth and five strong but smaller lateral teeth, the fifth smaller and somewhat detached. Antenna infuscated on constricted portion; subapical spines 1.3 times as long as hair 10; hair 10, 4.0 times as long as terminal spine. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-8-10)-2-1-1-3-1; prothoracic hair 3, 0.75 times as long as head hair 5. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI triple; hair III-6, 0.6 times as long as short branch of hair II-6; hair VI-6, 0.85 times as long as short branch of this hair. Comb of 18 to 20 small, apically fringed spines in a patch, and one row of 8 to 10 very long pointed spines among the apically fringed ones, with a dark area in the middle of each spine. Proportions of anal plate destroyed in mount; armature consisting of six to eight well separated single spines confined to the extreme postero-lateral margin; dorsal hair of dorsal brush with one shorter branch; ventral brush 2.5 times as long as anal ring; four gills, 1.5 times as long as ring. Air-tube index 9.3; tube without a trace of median infuscation; five pairs of ventral tufts, the anterior 1.8 times as long as width of air tube at point of insertion, posterior pair 1.2 times as long as width of tube at insertion; pecten of 11 widely separated spines on basal fourth, subapical spine 1 x 7, with a very fine ventral fringe on basal two-thirds; terminal hook 0.6 times as long as width of tube at tip, with very fine secondary on basal third; acus with a very slender dorsal projection flaring suddenly at extreme tip.

Material.—Surinam: Two larval skins, associated with males (USNM).

Distribution and habitat.—Panamá, Surinam. Bonne and Bonne-Wepster (1925) state larvae found in grassy, more or less permanent pools.

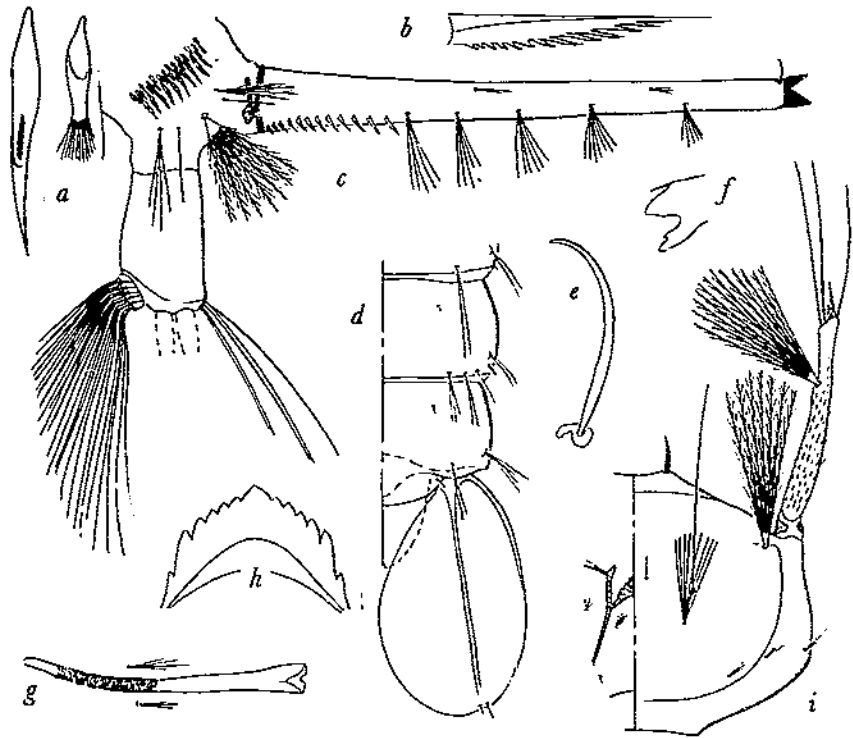


FIGURE 57.—*Culex (Melanoconion) zeteki* Dyar: a, Comb scales from posterior (left) and second (right) rows; b, subapical pecten spine; c, terminal segments of abdomen of larva; d, dorsal view of segments VI, VII, and VIII of abdomen of pupa; e, terminal hook of air tube; f, ventral mandibular teeth; g, pupal trumpet; h, mentum; i, ventral (left) and dorsal (right) views of head of larva.

Taxonomic discussion.—Rozeboom and Komp (1950) state that the Bonnes' *ensiformis* is *zeteki*, on the basis of male terminalia. The above description is taken from specimens collected by the Bonnes (1925) and presumably associated with adults described by them. The larva of this species is distinct in having two types of comb scales, although the phylogenetic relationships are not shown in the key to a full extent. The males of *dunni*, *commerynensis*, and *zeteki* are all closely related, and the larvae have a long slender air tube with short tufts. Senevet and Abonnenc (1939) give a misleading description in showing only the pointed type of comb scale, but they certainly were dealing with *zeteki*. The pupa is distinct in having an extremely long trumpet, as in *nigrimaculata* and *ocellatus*.

CULEX (MELANOCONION) Species A

(Fig. 58)

Larva.—Head: About as long as one-half the distance between them; hair 4 double, fine, closer to each other than to socket of hair 6; hair 5 triple, long, 0.8 times as long as hair 6, extending slightly beyond anterior margin of head, spiculate; hair 6 single, distal half extending beyond anterior margin of head; hair 7 with over 12 branches, strongly spiculate, the branches strongly expanded

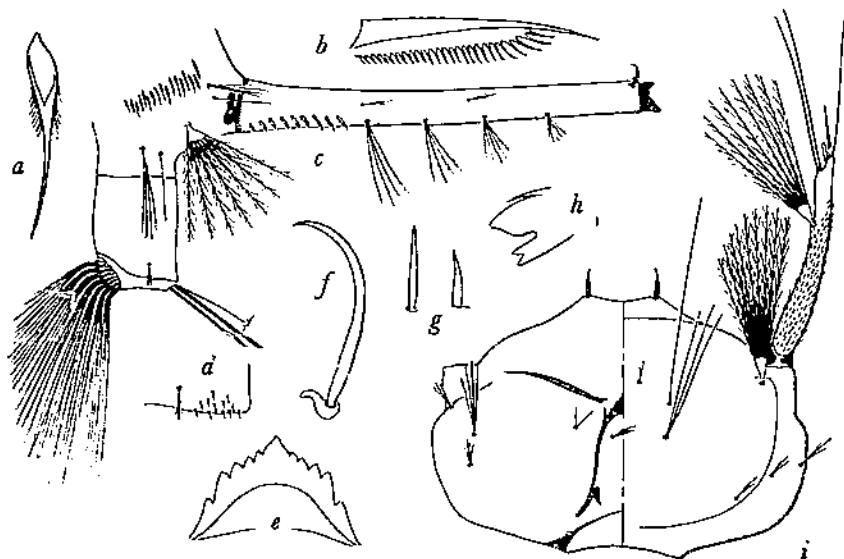


FIGURE 58.—*Cutix (Melanoconion) Species A*: a, Comb scale; b, subapical pecten spine; c, terminal segments of abdomen of larva; d, armature of anal ring; e, mentum; f, terminal hook of air tube; g, maxillary (left) and preclypeal (right) spines; h, ventral mandibular teeth; i, ventral (left) and dorsal (right) views of head of larva.

at their bases; hair 18 double; hair 20 triple or four-branched, these hairs the same length. Anterior ventral mandibular tooth as long as width at base; posterior tooth narrower and shorter, the sides nearly parallel, a notch at tip; maxillary spine 1.5 times as long as preclypeal, darkly pigmented; mentum a broad shouldered central tooth and five each side becoming distinctly larger distally, the fifth removed and smaller than the fourth. Antenna infuscated on constricted portion; subapical spines 1.2 times as long as hair 10; hair 10, 2.2 times as long as terminal spine. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-4-5)-1-1-1-3-2; prothoracic hair 3, 0.95 times as long as head hair 5. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI double or triple, heavy. Comb of 12 long, pointed spines in two irregular rows, the bases of the scales 0.33 times as long as free portion and greatly expanded. Proportions of anal plate destroyed in mount; armature consisting of 10 to 15 short but stout spines in a rather narrow patch very close to postero-lateral border; dorsal hair of dorsal brush with a single short branch broken in mount; ventral brush 2.5 times as long as anal ring; gills destroyed in mount. Air-tube index 7.0; without a median ring of infuscation; five pairs of ventral tufts, the anterior pair 2.2 times as long as air-tube width at point of insertion, posterior pair 1.5 times as long as tube width at insertion; pecten of 9 or 10 separated spines on basal fourth, subapical spine 1 x 5 with extremely short, fine fringing teeth near base, becoming longer near, but not attaining, apex; terminal hook 0.5 times as long as tube width at tip, without secondary hook whatever; acus normal.

Material.—Brazil: One unassociated larval skin (USNM).

Distribution and habitat.—Brazil. Larval habitat unknown.

Taxonomic discussion.—This form appears to be closely related to *educator* in the larval stage, but does not run with that species in the key due to the single prothoracic hair 4. It also possesses a head "gill." This larva may be distinguished from *educator* in having a triple head hair 5, prothoracic hair 3 the same length as head hair 5, and a longer air tube with considerably shorter tufts.

CULEX (MELANOCONION) Species B

(Fig. 59)

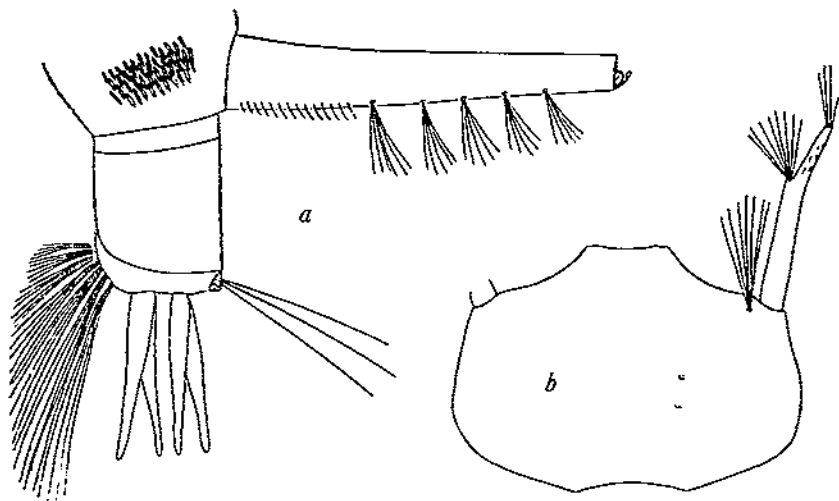


FIGURE 59.—*Culex (Melanoconion) Species B*: a. Terminal segments of abdomen of larva; b, dorsal view of head of larva. Redrawn from Dyar (1928).

Culex innominatus Dyar, 1928, *The Mosquitoes of the Americas*, p. 318.

Larva.—Head: Transverse, convex on the sides. Head hair 5 triple, small, delicate; hair 6 single, stout and long; hair 7 multiple. Antenna large, a tuft at outer third, the part beyond more slender, the basal part spiculate; white-banded centrally. Abdomen: Integument glabrous. Comb of long, sharp, narrow scales, each with single central point, in a narrow patch three rows deep in the middle. Anal segment longer than wide; dorsal brush with a single short branch; gills shorter than the segment, pointed. Air-tube index 6.0, the extreme tip not tapered; five ventral tufts decreasing in length outwardly; pecten reaching basal third.

Material.—No specimens available for study. The description was taken entirely from that of Dyar (1928).

Distribution and habitat.—Venezuela. Larval habitat not known.

Taxonomic discussion.—Dyar (1928) states that this unassociated larva differs from Root's specimens of reared and associated *innominatus* (= *bastagarius*) in having a small, delicate, triple head hair 5, comb in a three-row patch of narrow pointed scales, and a nearly completely glabrous abdominal integument. Since this description does not fit that of the *bastagarius* larvae seen in this study, and because it does not agree with any of the other larvae available in specimens or descriptions, it has been tentatively called Species B.

CULEX (MELANOCONION) Species C

(Fig. 60)

Larva.—Head: Preclypeal spines distinctly shorter than one-half the distance between them; hair 4 single, long, 0.25 times as long as hair 6; about as far apart as distance to socket of hair 6; hair 5 five-branched, 5.5 times as long as hair 6, without spiculation; hair 6 single, distal half extending beyond anterior margin of head, very finely spiculate; hair 7 eight-branched, the branches greatly expanded near their bases; hairs 18 and 20 subequal in length, the former five-

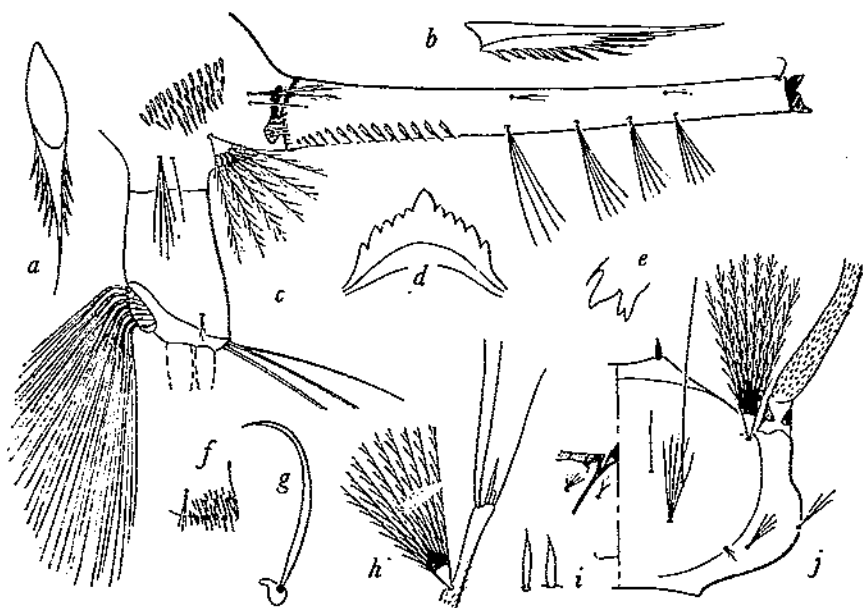


FIGURE 60.—*Culex (Melanoconion) Species O*: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal segments of abdomen of larva; d, mentum; e, ventral mandibular teeth; f, armature of anal ring; g, terminal hook of air tube; h, terminal portion of antenna; i, maxillary (left) and preclypeal (right) spines; j, ventral (left) and dorsal (right) views of head of larva.

or six-branched, the latter four- or five-branched. Anterior ventral mandibular tooth slightly longer than width at base, posterior ventral tooth the same length but narrower, the sides nearly straight, with notch at tip; maxillary spine 1.3 times as long as preclypeal, stout, dark; mentum a stout central tooth and five lateral teeth, the fifth slightly removed but rather large. Antenna infuscated from below insertion of tuft to extreme tip; subapical spines 1.2 times as long as hair 10; hair 10, 3.0 times as long as terminal spine. Thorax: Integument densely spicular-pilose. Prothoracic hair formula (1-1-5-7)-1-1-1-(3-4)-2; prothoracic hair 3, 1.25 times as long as head hair 5. Abdomen: Integument almost as densely spicular-pilose as the abdomen. Hair I-6 triple, with one large and two smaller branches; hair I-7 single; hair II-6 triple, with one large and two smaller branches; hair 6 on segments III through VI heavy, triple to five-branched; hair VI-6 the same length as short branches of hair II-6. Comb a large patch of 25 long pointed spines in two or three irregular rows, those on anal segment side of comb 2.0 times as long as those on air-tube side, each scale with heavy lateral fringe confined to base of free portion. Proportions of anal plate 15 x 25, distinctly wider near apex; armature consisting of 12 to 18 extremely long, sharply pointed spines in a narrow patch nearly confined to posterolateral border; dorsal hair of dorsal brush with one shorter branch 1.25 times as long as anal ring; ventral brush 2.6 times as long as anal ring; four gills, 0.6 times as long as anal ring. Air-tube index 7.3, the tube slightly curved anteriorly on distal third, with no indication of median ring of infuscation; eight irregularly spaced ventral tufts, anterior tuft 2.2 times as long as width of tube at point of insertion, posterior tuft 1.5 times as long as tube width at insertion; pecten of 12 to 13 separated spines on basal fourth, apical spine 0.66 times as long as tube width at insertion, subapical spine 1 x 7, ventral fringing teeth short but distinct at base, becoming extremely long apically, but not extending beyond basal half of spine; terminal hook 0.5 times as long as tube width at insertion, without secondary hook; ucus normal.

Material.—Panamá: One unassociated larval skin labeled "Juan Diaz, Jan. 4, 1935 (R)."

Distribution and Habitat.—Panamá. Larval habitat not shown.

Taxonomic Discussion.—This larva keys out to *mutator* in Dyar's key (5, p. 279), but resembles *erraticus* much more closely in having the densely spiculate abdominal integument and the anal ring covered with single hairs. It differs from *erraticus* in having a much longer air tube, a narrower anterior ventral mandibular tooth, and lateral hair 6 on abdominal segments I and II triple instead of double. The writer has hesitated to distinguish this specimen from *erraticus*, but since no associated male was available, the differences certainly deserve recognition.

CULEX (MELANOCONION) Species D

(Fig. 61)

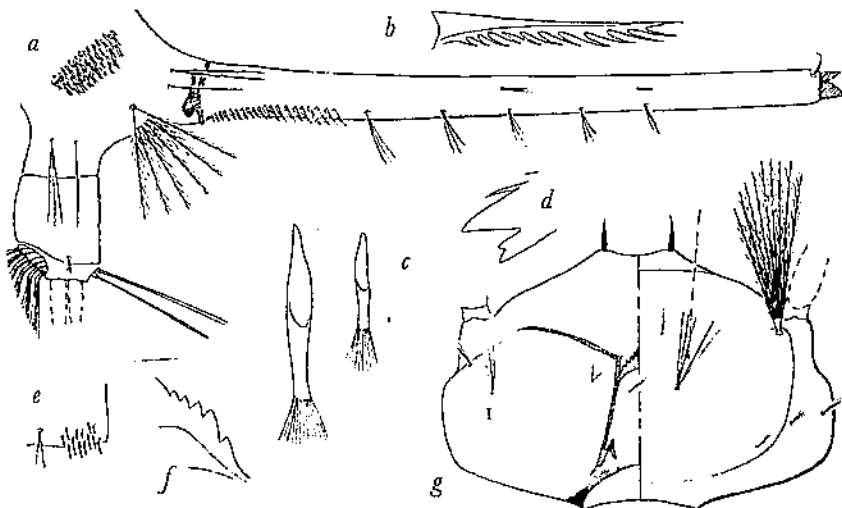


FIGURE 61.—*Culex (Melanoconion) Species D*: a, Terminal segments of abdomen of larva; b, subapical pecten spine; c, comb scales; d, ventral mandibular teeth; e, armature of anal ring; f, mentum; g, ventral (left) and dorsal (right) views of head of larva.

Culex carcinophilus Tullech (not Dyar and Knab), 1937, Puerto Rico Univ. Jour. Agr. 21: 148.

Larva.—Head: Preelypeal spines longer than one-half the distance between them; hair 4 fine, single, as close to each other as to socket of hair 6; hair 5 five- to seven-branched, 0.4 times as long as hair 6, without spiculation; hair 7 missing; hair 18 double; hair 20 triple, longer. Anterior ventral mandibular tooth distinctly longer than width at base, posterior ventral tooth longer than anterior, with a large anterior projection well removed from tip; maxillary spine 0.5 times as long and wide as preelypeal, not darkly pigmented; mentum a broad shouldered central tooth and five smaller each side, the fifth somewhat removed and smaller. Antenna missing. Thorax: Integument spiculate-pilose. Prothoracic hair formula (1-1-7)-2-1-1-(3-4)-2; prothoracic hair 3, 1.3 times as long as head hair 5. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI triple; hair VI-6, 0.6 times as long as short branch of hair II-6. Comb of 40 to 45 apically fringed scales in three or four irregular rows, scales in posterior row 2.5

times as long as those in anterior row, bases of all scales shorter than free portions. Proportions of anal plate 14×23 , the plate distinctly wider at apex; armature of 12 to 16 stout, sharply pointed spines in a very narrow patch nearly confined to postero-lateral border; dorsal hair of dorsal brush with one shorter branch 2.0 times as long as anal ring; ventral brush 1.9 times as long as ring; four gills, 0.4 times as long as ring, tapered to sharp points. Air-tube index 9.0, without an indication of infuscation near middle; four or five pairs of ventral tufts, anterior 1.25 times as long as width of air tube at point of insertion, posterior tufts may be single hairs, the same length as width of tube at insertion; pecten of 13 to 16 well-separated spines on basal fourth, subapical spine 1×8 , ventral fringe of almost subequal teeth extending nearly to apex; terminal hook 0.6 times as long as width of tube at tip, strong secondary spine on basal third; aeus normal.

Material.—Puerto Rico: Two larvae (R).

Distribution and Habitat.—Puerto Rico. Larval habitat not definitely known.

Taxonomic Discussion.—In 1937, Tulloch reported taking *Culex (Melanoconion) carcinophilus* larvae from Lake Cartagena, Puerto Rico. Apparently his determinations have been in error, for a study of the two specimens listed above and presumed to be the same reveals that they differ from *C. carcinophilus* Dyar and Knab by having a much shorter head hair 5, fewer mental teeth, a double prothoracic hair 4, and comb scales that, in the posterior row, are much longer than those of true *carcinophilus*.

CULEX (MELANOCONION) Species E

(Fig. 62)

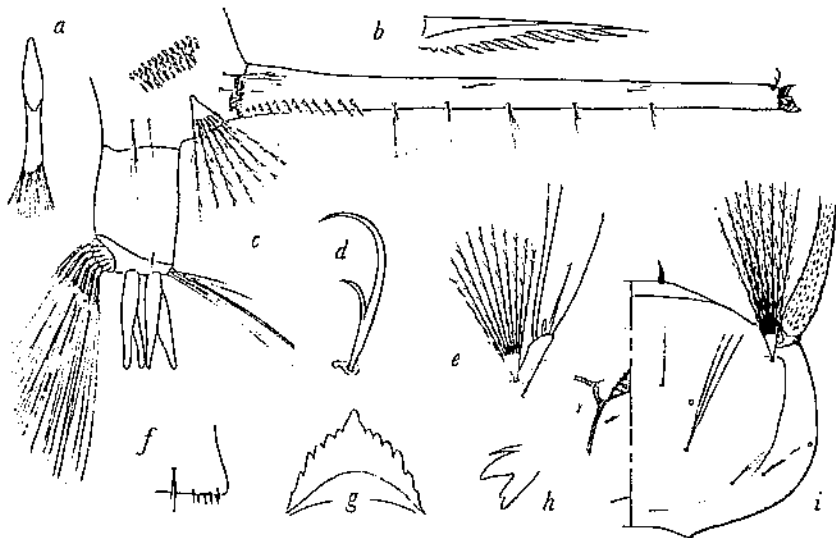


FIGURE 62.—*Culex (Melanoconion) Species E*: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal segments of abdomen of larva; d, terminal hook of air tube; e, terminal portion of antenna; f, armature of anal ring; g, mentum; h, ventral mandibular teeth; i, ventral (left) and dorsal (right) views of head of larva.

Larva.—Head: Preclypeal spines much shorter than one-half the distance between them; hair 4 fine, single, 0.45 times as long as hair 5, closer to socket of hair 6 than is hair 5; hair 5 four-branched, not quite attaining anterior mar-

gin of head, the branches with a few long spicules; hair 6 missing on both sides of specimen; hair 7 eight- to nine-branched; hair 18 double and the same length as hair 20, which is triple or four-branched. Anterior ventral mandibular tooth longer than width at base; posterior ventral tooth nearly as wide and longer than anterior, with a projection very close to the tip, making this tooth appear notched at tip; maxillary spine 0.55 times as long and wide as preclypeal; mentum of five or six lateral teeth on either side of a broad, shouldered central one, the distal-most teeth smaller than the others and further removed. Sub-apical antennal spines 1.2 times as long as hair 10; hair 10, 1.7 times as long as terminal spine. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-5-6)-1-1-1-3-2; prothoracic hair 3 the same length as head hair 5, spiculate; prothoracic hair 12 the same length as hair 8. Abdomen: Integument glabrous. Hair I-6 double; hair I-7 single; hair II-6 double; hair 6 on segments III through VI double or triple; hair VI-6 0.75 times as long as short branch of hair II-6. Comb of 50 to 55 apically fringed scales in three or four irregular rows, scales in posterior row 1.75 times as long as those in anterior row, base of individual scale 0.50 times the total length. Anal plate proportions destroyed in mount; armature of ring consisting of five or six very long spines confined to the extreme posterior dorso-lateral border; dorsal hair of dorsal brush with three shorter branches, the longest 0.8 times as long as anal ring; ventral brush 2.1 times as long as ring; gills four, 0.8 times as long as ring, tapered to narrow points from rather broad bases. Air-tube index 10.3, without trace of infuscated ring near center; eight irregularly inserted ventral tufts, all triple and rather fine, without spiculation, the basal tuft 1.6 times as long as width of air tube at point of insertion; pecten of 13 well separated spines on basal fourth of tube, subapical spine 1×7 , with eight to 12 fringing teeth which are short at the base and become longer toward the apex; terminal hook 0.60 times as long as air-tube width at tip, with stout secondary hook on basal fourth; anus normal.

Material.—Panamá: One larval skin, not associated with an adult (R).

Distribution and habitat.—Panamá. Larval habitat not known.

Taxonomic discussion.—This larval skin differs markedly from *egeymon* described by Dyar, the latter supposedly associated with a male terminalia. In many respects this specimen could be related to *dunni* or *atratus*, having the same type of mandible and anal segment armature, air-tube tufts, etc. It is felt that it is distinct from both these species, however, because of its extremely long air tube, from *dunni* in that it has absolutely no trace of infuscation on the air tube or head capsule, and from *atratus* by its fewer, more widely separated pecten spines.

CULEX (MELANOCONION) Species F

(Fig. 63)

Larva.—Head: Preclypeal spines much longer than one-half the distance between them; hair 4 short, fine, closer to socket of hair 6 than to each other; hair 5 double, 0.4 times as long as hair 6, without spiculation; hair 6 single, distal third extending beyond anterior margin of head, lightly spiculate; hair 6 eight- to ten-branched, spiculate; hair 18 double; hair 20 not visible. Anterior ventral mandibular tooth much longer than width at base, posterior ventral tooth as wide as anterior and slightly longer, with an anterior projection well removed from tip; maxillary spine 0.6 times as long and wide as preclypeal, very darkly pigmented; mentum a strong central tooth with six smaller, lateral teeth, the first four increasing in size, the distal two removed and smaller than the fourth. Antenna infuscated at base and from below insertion of tuft to extreme tip, leaving a light band at middle of shaft; subapical spine 2.0 times as long as hair 10; hair 10, 1.5 times as long as terminal spine. Thorax: Integument spicular-pilose. Prothoracic hair formula (1-1-5)-1-1-1-3-2; prothoracic hair 3 the same length as head hair 5. Abdomen: Integument glabrous. Hair I-6 double;

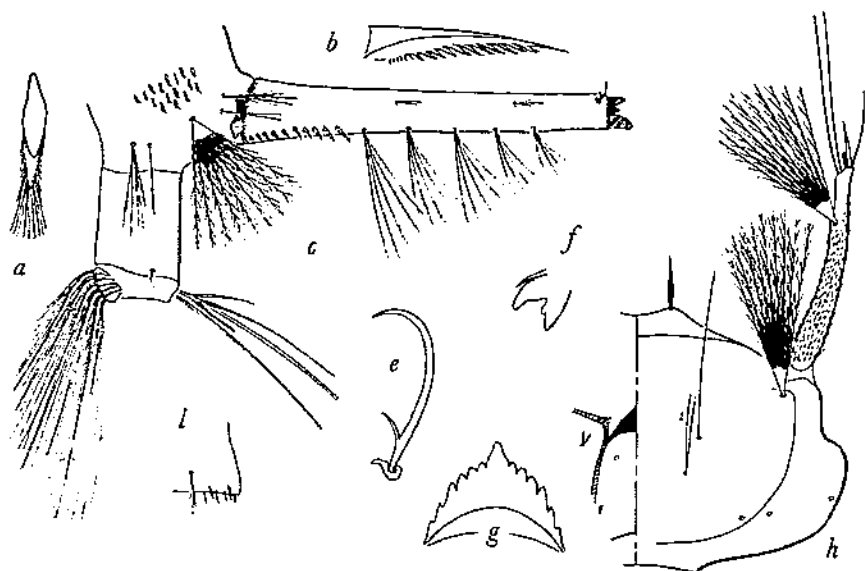


FIGURE 63.—*Culex (Melanoconion) Species F*: a, Comb scale from posterior row; b, subapical pecten spine; c, terminal segments of abdomen of larva; d, armature of anal ring; e, terminal hook of air tube; f, ventral mandibular teeth; g, mentum; h, ventral (left) and dorsal (right) views of larval head.

hair I-7 single; hair II-6 double; hair 6 on segments III through VI triple, fine, hair VI-6, 1.5 times as long as short branch of hair II-6. Comb of 9 to 14 small, distantly separated, apically fringed scales in two or three irregular rows, the scales without a free portion, the apical fringe arising along posterior border of base, base of each scale about as long as fringe, all scales subequal in length. Proportions of anal ring 13 x 15, distinctly wider at apex; armature of six to eight short, stout, lightly pigmented spines confined in an irregular row to the extreme postero-lateral border; dorsal hair of dorsal brush with three shorter branches, the longest of these 1.5 times as long as anal ring; ventral brush 2.6 times as long as ring; gills not visible. Air-tube index 5.5 to 6.0; tube without a median ring of infuscation; five pairs of ventral tufts, the anterior pair 3.0 times as long as width of air tube at point of insertion, posterior pair 2.0 times as long as width of tube at insertion; pecten of 11 well separated spines on basal third, subapical spine 1 x 5, the ventral fringe extremely fine at extreme base, becoming somewhat longer and coarser toward tip, which it nearly attains; terminal hook 0.6 times as long as tube width at tip, with a very small secondary hook arising on basal fourth of primary; acus normal.

Material.—Colombia: One whole-mounted larva (R).

Distribution and habitat.—Colombia. Larvae in small but deep and permanent seepage pools open to the sun.

Taxonomic discussion.—This unassociated larva runs to *bastagurius* in the key by virtue of its unusual comb scales. It differs from that species, however, by the double head hair 5 and by the anal ring armature, which is composed of six to eight spines confined to the posterior border of the ring.

SPECIES OF MOCHLOSTYRAX

KEYS TO THE IMMATURE STAGES

Larvae

1. Comb a patch of 45 to 60 apically fringed scales in three or four rows..... 2
 Comb a single or irregular double row of not more than 20 long pointed scales, or if scales fringed, then in an even row of 18 to 20..... 3
- 2 (1). Head hair 4 with about nine heavy branches..... *venillifer* Komp
 Head hair 4 double, slight..... *alogistus* Dyar
- 3 (1). Comb an even row of 14 to 18 very long slender scales, all with narrow apical fringe; head hair 4 large, dendritic..... Species G
 Comb a single or irregularly double row of eight to 16 very long slender scales all ending in sharp points; head hair 4 single or branched in two from base..... 4
- 4 (3). Head hair 4 with nine to 12 spiculate branches; head hairs 5 and 6 both triple- or four-branched, subequal and spiculate.....
 *caudelli* Dyar and Knab
 Head hair 4 extremely fine, double- to four-branched; head hair 5 minute, or with one to three branches that are one-half to two-thirds the length of head hair 6..... 5
- 5 (4). Head hair 5 minute, multiple, not as long as head hair 8..... 6
 Head hair 5 single or double, almost two-thirds the length of head hair 6..... 7
- 6 (5). Preelypeal spines shorter than one-half the distance between them; maxillary spine about two-thirds the length of preelypeal.....
 *roofi* Rozeboom
 Preelypeal spines longer than one-half the distance between them; maxillary spine hair-like and nearly as long as preelypeal..... Species H
- 7 (5). Ventral fringe of pecten spine with coarse teeth nearly to apex.....
 *unicornis* Root
 Ventral fringe of pecten spine with extremely minute teeth, becoming distinctly longer and coarser toward apex..... *pilosus* Dyar and Knab
 *innorator* Evans, *foliafer* Komp and Rozeboom

Pupae

1. Posterior margin of abdominal segment 9 with a median invagination, leaving two distinct lateral arms..... 2
 Posterior margin of abdominal segment IX normally rounded..... 4
- 2 (1). Trumpet with a distinct constriction near base of pinna and before tip..... Species I
 Sides of trumpet straight or gently rounded, and expanding gradually to the tip..... 3
- 3 (2). Lateral arms of ninth tergite bluntly rounded..... *alogistus* Dyar
 Lateral arms of ninth tergite drawn out to fairly sharp points.....
 *foliafer* Komp and Rozeboom
- 4 (1). Branches of hair IV-5 no longer, darker, or heavier than those of hair IV-2..... 5
 Branches of this hair markedly longer, darker, and heavier than those of hair IV-2..... 6
- 5 (4). Lateral spiculation prominent on branches of hairs V-5 and VI-5.....
 *roofi* Rozeboom
 Lateral spiculation absent on these hairs..... *unicornis* Root
- 6 (4). No detectable lateral spiculation on branches of hair 5 on segments IV, V, and VI.....
 *caudelli* Dyar and Knab
 Distinct lateral spiculation on the branches of these hairs.....
 *pilosus* Dyar and Knab

DISCUSSION OF THE SPECIES

CULEX (MOCHLOSTYRAX) ALOGISTUS Dyar

(Fig. 64)

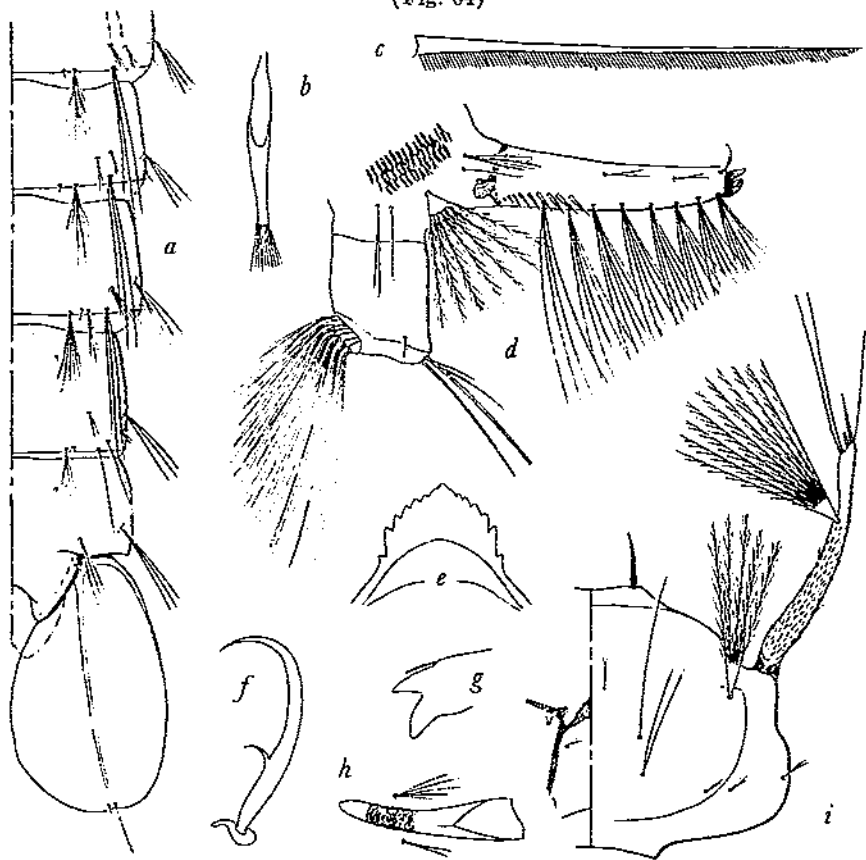


FIGURE 64.—*Culex (Mochlostyrax) alogistus* Dyar: a, Dorsal view of segments IV through VIII of abdomen of pupa; b, comb scale from posterior row; c, subapical pecten spine; d, terminal segments of abdomen of larva; e, mentum; f, terminal hook of air tube; g, ventral mandibular teeth; h, pupal trumpet; i, ventral (left) and dorsal (right) views of head of larva.

Culex alogistus Dyar, 1918, *Insector Inscitiae Menstruus* 6: 126; Bonne and Bonne-Wepster, 1925, *The Mosquitoes of Surinam*, p. 309; Dyar, 1928, *The Mosquitoes of the Americas*, p. 228; Rozeboom and Komp, 1950, *Ent. Soc. Amer. Ann.* 43: 87; Komp and Rozeboom, 1951, *Ent. Soc. Wash. Proc.* 53: 122. *Culex megapus* Root, 1927, *Amer. Jour. Hyg.* 7: 595.

Larva.—Head: Preclypeal spines the same length as distance between them; hair 4 double, but not to extreme base; 0.3 times as long as hair 6, spiculate; hair 5 double, 0.5 times as long as hair 6, the spicules extremely fine or absent; hair 6 single, barely exceeding anterior margin of head; hair 7 six-branched, spiculate; hair 20 four- to six-branched, long, the two hairs touching at midline. Posterior ventral mandibular tooth longer than anterior, not with a secondary tooth, blunt; maxillary spine slender, 0.6 times as long as preclypeal, slender; mentum a large central tooth and five smaller lateral ones each side.

a sixth somewhat larger than these and somewhat removed. Antenna infuscated along entire length except for middle third of shaft; subapical spines 2.5 times as long as hair 10; hair 10, 1.8 times as long as terminal spine. Thorax: Spiculation extremely light and sparse. Prothoracic hair formula (1-1-4-5)-2-1-1-2-1; hair 3 four- or five-branched, 1.3 times as long as head hair 5. Abdomen: Integument glabrous. Hair 6 on segments III through VI double; hair VI-6, 1.3 times as long as hair III-6. Comb of about 50 apically fringed scales in three or four irregular rows, those in posterior row 1.2 times as long as those in anterior, the bases of all scales shorter than the free portions. Anal ring slightly longer than wide; anterior border narrowly infuscated; dorsal brush a long hair and two much shorter ones, the longest of the short ones 1.2 times as long as anal ring; ventral brush 3.0 times as long as ring. Air-tube index nearly 4.0; seven pairs of ventral tufts, the anterior pair longer than length of air tube, the three anterior pairs inside pecten; pecten of 12 long, narrow spines on basal half of tube, subapical spine narrow, about 1 x 17, ventral fringe distinct and of many fine, even teeth; terminal hook 0.6 times as long as width of air tube at point of insertion, strongly curved, heavy at base, with strong secondary tooth on basal third.

Pupa.—Cephalothorax: Hairs 1 and 3 long, triple or four-branched; hair 2 half as long as hair 3, four-branched; hairs 5 and 7 the same length, triple or four-branched; hair 4 one-half as long as hair 7; hair 6 one-third as long. Trumpet about four times as long as width near tip, the tube noticeably flared on the middle half of the pinna and constricted somewhat at the tip. Metathorax: Hair 11 single and the longest; hair 10 slightly over one-half the length of hair 11, five- or six-branched; hair 12 nearly as long as hair 11, triple or four-branched. Abdomen: Hair II-2 slightly less than one-half the length of hair II-4, the latter single or double and extending about one-half way along segment III; hair 10 double, one-fourth again as long as hair III-7; hair III-2 five- or six-branched, slightly over one-half as long as the double hair III-4; hair 2 of segments IV, V, and VI five- or six-branched, extending about one-half the way along the following segment; hair 5 of segments IV, V, and VI with one or two long branches extending past, and one shorter branch barely attaining, posterior margin of following segment; hair VII-2 four-branched, about one-half as long as hairs VII-5 and VII-6, the former single, the latter double; hair VII-8 triple, heavy, almost three-fourths as long as width of segment, not spiculate; hair VIII-5 triple, three-fourths as long as hair VIII-8, which is triple but heavier and subapical in position. Posterior margin of ninth tergite with a median indentation; hair IX-1 indistinct. Paddle hair 7 about one-tenth the length of hair 8.

Material.—Panamá: One larval, one pupal skin (USNM).

Distribution and habitat.—Panamá, Surinam, Colombia, Brazil. Taken from sunny seepage pools.

Taxonomic discussion.—Rozeboom and Komp (1950) state that the type male of the Bonnes' is associated with a larval skin which has ". . . a few comb scales in a row . . ." but this situation is complicated by the fact that one of their specimens, definitely *alogistus*, is associated with a larval skin in which the comb scales are in a patch, as in *reaxillifer*. It is this latter specimen (#431.3) that the author has taken for the larva properly associated with *alogistus*, since the type male was one of a series of individual rearings in which some of the skins were obviously mixed, as attested by the fact that Komp and Rozeboom (1951) found one of the larval skins to be a *Culex* (*Culex*). Further, the writer has discovered that an error has been made in associating pupal skins of several other *pilosus*-like forms in this series. It is my feeling that the association made by Rozeboom in his #431.3 may be somewhat more reliable than the Bonnes' in this particular instance. The larval skins mentioned by Komp and Rozeboom (1951) are from Mojingo Swamp, rather than from the male locality, Almirante, and are described as Species G below.

Although the larva of only one other species, *vevillifer* Komp, has the comb in a patch of 3-4 rows of scales, these two species are easily distinguished by head hair 4, that of *alogistus* dividing into two branches from a single stem about one-fourth the distance from the socket, that of *vevillifer* with about nine branches from the base. Other differences are minute but will be found in their respective descriptions.

The pupa of this species may be distinguished by the form of the posterior margin of the ninth tergite, which is centrally invaginated to form two blunt, short lateral arms. The ninth tergite covers the basal two-thirds of segment X in the male, no females having been seen in this study. There appear to be altogether three forms whose pupae bear this character. *C. alogistus* can be distinguished from *foliafer*, one of these forms, in having the lateral arms of the ninth tergite very bluntly rounded, and from Species II, the other form, in having no constriction in the trumpet within the pinna.

CULEX (MOCHLOSTYRAX) CAUDELLI (Dyar and Knab)

(Fig. 65)

Mochlostyrax caudelli Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 224.

Culex caudelli (Dyar and Knab) Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, 3, p. 395; Dyar, 1928, The Mosquitoes of the Americas, pp. 228, 287.

Culex multispinosus Bonne-Wepster and Bonne, 1919, Insector Inscitiae Menstraus 7: 177; Bonne and Bonne-Wepster, 1925, The Mosquitoes of Surinam, p. 312.

Larva.—Head: Preclypeal spines as long as one-half the distance between them; hair 4 with 9 to 12 branches from the base, 0.5 times as long as hair 5, spiculate; hair 5 and 6 subequal in length, triple, distinctly spiculate; hair 6 not attaining anterior margin of head; hair 7 seven-branched, spiculate; hair 18 four- to five-branched, hair 20 six- to seven-branched, these two hairs subequal in length. Anterior ventral mandibular tooth slightly longer than width at base, posterior ventral tooth much wider and longer than anterior; maxillary spine not present; mentum a wide shouldered central tooth and six on each side, growing larger distally except the last, which is detached and smaller than the fifth. Antenna infuscated on basal fourth of shaft and basal half of constricted portion; subapical spines 2.2 times as long as hair 10; hair 10, 2.0 times as long as terminal spine. Thorax: Integument rather sparsely spicular-pilose. Prothoracic hair formula (1-?-6)-?-?-?-2-2; prothoracic hair 3, 0.8 times as long as head hair 5. Abdomen: Integument glabrous. Hairs I-6, II-6 and I-7 triple; hair III-6 triple, 0.85 times as long as short branches of hair II-6; hairs IV-6 through VI-6 double; hair VI-6 the same length as short branches of hair II-6. Comb of 12 to 16 long, pointed spines in a single, rather even row, those on the side nearest the anal segment 2.0 times as long as those on the air tube side, bases of all scales shorter than free portion, each scale with extremely light fringe. Proportions of anal ring destroyed in mounting; dorsal hair of dorsal brush with two short branches the same length as anal ring; ventral brush 2.25 times as long as ring; four gills, about 2.0 times as long as ring. Air-tube index 3.0 (specimen mashed). Fifteen ventral tufts, the three anterior pairs inside pecten, anterior tuft longer than the air tube; pecten of 10 to 11 spines on basal half of tube, subapical spine about 1 x 8, with 15 to 20 ventral fringing spines, subequal in length and thickness; terminal hook 0.8 times as long as tube width at insertion, with a rather stout secondary hook on basal third; acus slightly elongated in an anterior-posterior direction.

Pupa.—Cephalothorax: Hairs 1, 2, and 3 long, hair 1 double, hair 2 the same length but heavier, hair 3 slightly longer and five-branched; hairs 5, 6, and 7 nearly the same length, but increasing slightly in length in that order, all with three to six branches; hair 4 four-branched, about one-half as long as hair 7; trumpet about five and one-half times as long as width at tip of pinna, the tube

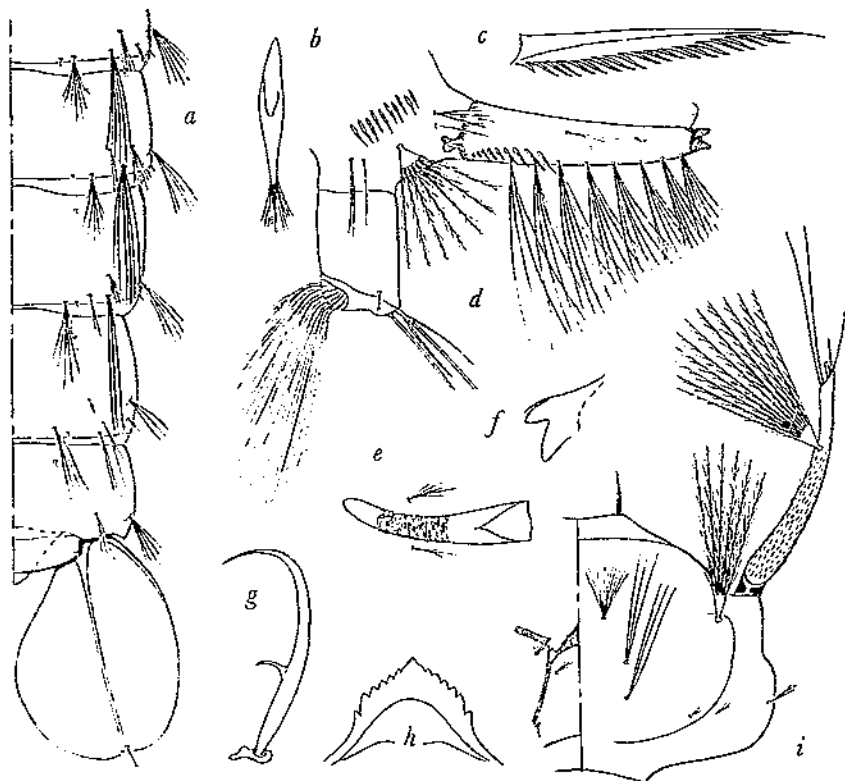


FIGURE 65.—*Culicx (Mochlostyraw) caudelli* (Dyar and Knab): *a*, Dorsal view of segments IV through VIII of abdomen of pupa; *b*, comb spine; *c*, subapical pecten spine; *d*, terminal segments of abdomen of larva; *e*, pupal trumpet; *f*, ventral mandibular teeth; *g*, terminal hook of air tube; *h*, mentum; *i*, ventral (left) and dorsal (right) views of head of larva.

gradually flaring at the tip, the pinna about one-fourth the total length of trumpet. Metathorax: Hair 11 long, single; hair 10 nine- to ten-branched, somewhat shorter than hair 11; hair 12 the same length as hair 10, four-branched. Abdomen: Hair II-2 ten- to twelve-branched; hair II-4 slightly longer, single; hair II-8 triple, 0.66 times as long as hair III-7; hair III-2 eight-branched, 0.75 times as long as the single hair III-4; hair 2 on segments IV and V eight-branched, attaining one-half the following segment; hair VI-2 five-branched but slightly longer and heavier; hair IV-5 six-branched, not quite attaining posterior margin of segment V; hair 5 on segments V and VI heavy, five- and three-branched respectively, just attaining posterior margins of the segments following; hairs 2, 5, and 6 on segment VII all about the same length and double to four-branched; hair VII-8 not one-half as long as width of segment VII, triple, the spiculation long and distinct; hair VIII-5 triple, 1.25 times as long as hair VIII-8, which is five-branched and slightly longer than one-half the width of segment. Posterior margin of ninth tergite rounded; hair IX-1 minute but distinct; paddle hair 7 minute; hair 8 stout at base, 6.0 to 7.0 times as long as hair 7.

Material.—Trinidad: Two larvae (USNM). Panamá: Five larvae (K). Colombia: One larval, one pupal skin, both associated with a female (R). Venezuela: One larva (USNM).

Distribution and habitat.—Trinidad, Surinam, Brazil. From open or partly shaded ponds.

Taxonomic discussion.—Although the larval and pupal skin described above is associated with an adult female, there is little doubt that this is *caudelli*, since the larva corresponds very well with the descriptions given by Howard *et al.* (1915), Bonne and Bonne-Wepster (1925), and Dyar (1928). Komp and Rozeboom (14, p. 122) have compared material of *multispinosus* with the Bonne's type, which proved to be *caudelli*, and the Bonne's description of the larva is almost certainly that of the latter species. This is the only species of *Mochlostyrax* in which head hair 6 is divided, and in which head hairs 5 and 6 are the same length and weight. It may be separated from all other species by this character alone.

In addition to the characters given in the key for the separation of *caudelli* and *alogistus* pupae, it will be noted that the former species has cephalothoracic hair 2 nearly as long as hair 1, and that hair 5 on segments IV, V, and VI have a different type of branching.

CULEX (MOCHLOSTYRAX) FOLIAFER Komp and Rozeboom

(Fig. 66)

Culex foliafer Komp and Rozeboom, 1951, Ent. Soc. Wash. Proc. 53: 121.

Larva.—Head: Preclypeal spines extremely long, tapering at apical third, longer than one-half the distance between them; hairs 4, 5, and 6 missing but the socket of head hair 5 almost as large as that of hair 6; hair 7 seven-branched; hair 13 with 13 branches. Posterior ventral tooth of mandible without secondary projection, much broader at base and longer than anterior tooth; maxillary spine 0.4 times as long as preclypeal, but of the same general proportions; mentum with a broad central tooth, six rather large teeth on each side, the first rather closely appressed to the central one, the sixth slightly removed from the remainder, a very small seventh sometimes present. Antenna infuscated at base of shaft, constricted portion almost half the broader portion; terminal spine 0.5 times as long as constricted portion, the remaining terminal hairs and spines missing. Thorax: Spiculation sparse and fine. Prothoracic hair formula (1-1-4-6)-2-1-1-2-2. Abdomen: Integument glabrous. Hair 6 on segments III through VI double to four-branched. Comb of eight or nine slender pointed scales in a single row, those on anal segment end of row 1.5 times as long as those on air tube end, base of shortest scale about same length as free portion, base 0.3 times as long as total length of longest scale, all scales with only a faint trace of lateral fringe. Anal plate longer than wide, surface covered with irregular rows of minute spines, the triangular button of anal ring on the extreme posterior margin; dorsal hair of dorsal brush missing; ventral hair single; ventral brush missing. Air-tube index 3.0; a light infuscation along dorsal margin of air tube; surface covered by discontinuous rows of minute flat projections; 19 ventral tufts present, the basal longer than air tube; pecten of six or seven spines on basal third of tube, each with very fine ventral fringe becoming coarser distally; terminal hook strongly curved anteriorly, stout at base, with strong secondary hook on basal half.

Pupa.—Cephalothorax: Trumpet about 3.8 times as long as width at pinna tip, gradually flaring out with relatively straight sides to the tip, pinna about as long as wide, the cleft at its base present but extremely minute. Abdomen: Hair VI-5 as in *alogistus*, with two long branches exceeding, and one shorter branch not attaining posterior margin of segment VII; hair VII-8 double or triple, not as long as one-half the width of the segment, spiculation very fine or lacking; hair VIII-5 double, slightly longer than hair VIII-8, which is triple to five-branched and very shortly but distinctly spiculated. Posterior border of ninth tergite somewhat as in *alogistus* with a deep central invagination, leaving two lateral arms which are rather sharply pointed and cover the basal two-thirds of segment X in the male (females not seen). Paddle hair 7 minute, about 0.2 times the length of hair 8.

Material.—Surinam: One larval, one pupal skin, associated with type male No. 59869 (USNM).

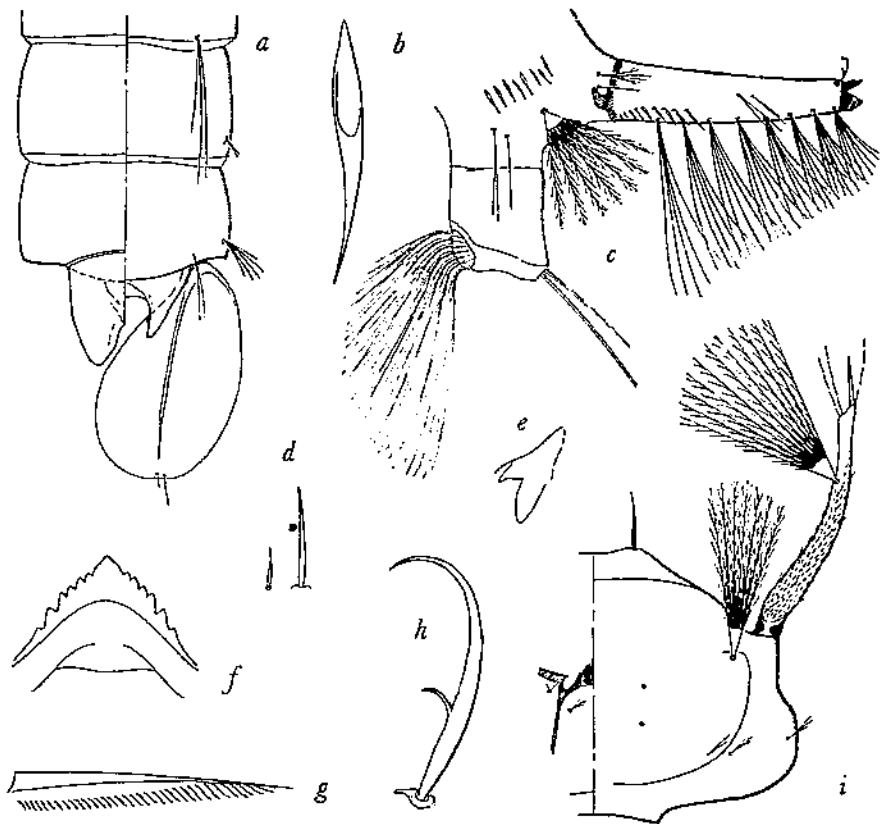


FIGURE 66.—*Oulex (Mochlostyrax) foliafer* Komp and Rozeboom: *a*, Dorsal view of segments VI, VII, and VIII of abdomen of pupa; *b*, comb scale; *c*, terminal segments of abdomen of larva; *d*, maxillary (left) and preclypeal (right) spines; *e*, ventral mandibular teeth; *f*, mentum; *g*, subapical pecten spines; *h*, terminal hook of air tube; *i*, ventral (left) and dorsal (right) views of head of larva.

Distribution and habitat.—Surinam. Larval habitat not known.

Taxonomic discussion.—Dyar (5, p. 287) lists *multispinosus* as a synonym of *caudelli*, since the type male, not associated with a larval skin, is identical to the latter species. The Bonnet's mount of male terminalia #H, which was mistakenly identified as *multispinosus* by Dyar, and which has an associated larval and pupal skin described above, is now known to be *foliafer*. This situation is described at length by Komp and Rozeboom (1951).

Since the specimens before the writer lack head hairs 4, 5, and 6, its true affinities must remain in doubt. However, a minute examination reveals the fact that the socket of head hair 5 is nearly as large as that of hair 6, removing the possibility that this hair is as minute as that in *rooti* or Species H (see below). Characters of most of the remaining body parts fall well within the range of variation observed for *pilosus*, the only species in the subgenus represented by a considerable series of specimens.

The male pupa of *foliafer* possesses a ninth tergite similar to that of *alogistus*, but the lateral arms resulting from the evagination of the posterior border end in much sharper points than do those of the former species. The trumpet of *foliafer* tapers gradually to its greatest width at its extreme distal end, instead of flaring at the middle of the pinna, or having a constriction there.

CULEX (MOCHLOSTYRAX) INNOVATOR Evans

(Fig. 67)

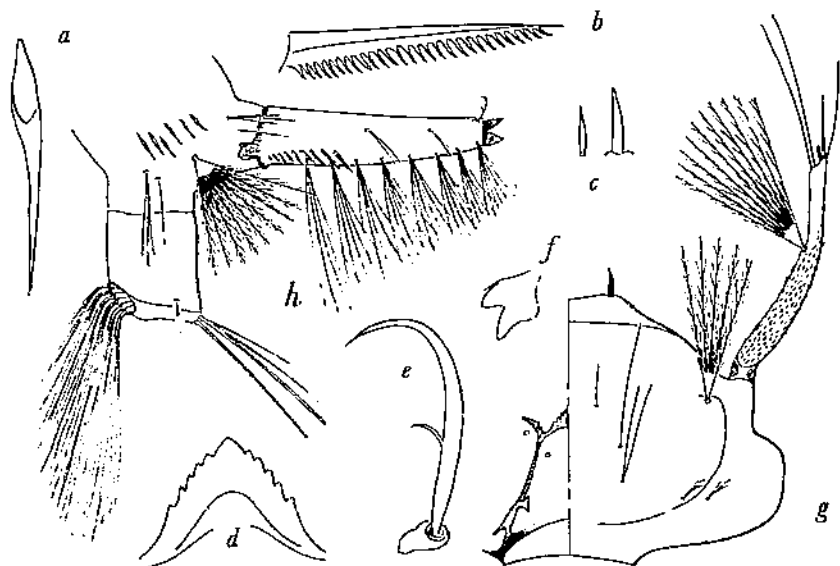


FIGURE 67.—*Culex (Mochlostyrax) innovator* Evans: a, Comb scale; b, subapical pecten spine; c, maxillary (left) and preclypeal (right) spines; d, mentum; e, terminal hook of air tube; f, ventral mandibular teeth; g, ventral (left) and dorsal (right) views of head of larva; h, terminal abdominal segments of larva.

Culex innovator Evans, 1924, Ann. Trop. Med. and Parasitol. 18: 373; Root, 1927, Amer. Jour. Hyg. 7: 594.

Larva.—Similar to *pilosus* in all important respects.

Material.—Brazil: Two whole-mounted larvae (R).

Distribution and Habitat.—Brazil. Larval habitat not definitely known.

Taxonomic discussion.—The only specimens seen by the writer are two whole-mounted larvae taken by Root near Porto das Caixas from a river flat marsh stated to be “. . . the place . . . from which *innovator* was bred” (Root, 1927). These specimens, then, are not definitely associated, and it is not known what circumstances other than that cited above prompted Root to identify these specimens as *innovator*, since the two larvae, in all respects, even to details of arrangement, length, and branching of dorsal abdominal hairs, fall well within the range of variation of *pilosus*. These specimens must be considered either as those of *pilosus*, and therefore misidentified, or as being inseparable from *pilosus* as larvae. The male terminalia of *innovator* and of *pilosus* are not easily confused.

CULEX (MOCHLOSTYRAX) PILOSUS (Dyar and Knab)

(Fig. 68)

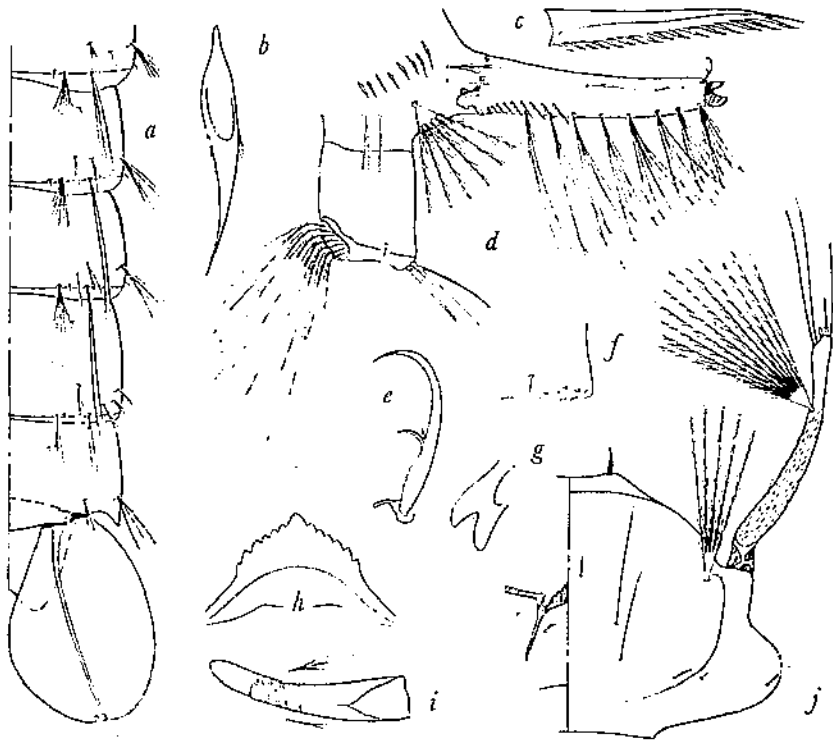


FIGURE 68.—*Culex (Mochlostyrax) pilosus* (Dyar and Knab): a, Dorsal view of segments IV through VIII of abdomen of pupa; b, comb scale; c, subapical pecten spine; d, terminal segments of abdomen of larva; e, terminal hook of air tube; f, armature of anal ring; g, ventral mandibular teeth; h, mentum; i, pupal trumpet; j, ventral (left) and dorsal (right) views of head of larva.

- Mochlostyrax pilosus* Dyar and Knab, 1906, N. Y. Ent. Soc. Jour. 14: 224.
Mochlostyrax cubensis Dyar and Knab, *ibid.*, p. 225.
Mochlostyrax floridensis Dyar and Knab, 1906, Biol. Soc. Wash. Proc. 19: 171.
Mochlostyrax jamaicensis Graham, 1906, *Canad. Ent.* 38: 318.
Culex agitator Dyar and Knab, 1907, N. Y. Ent. Soc. Jour. 15: 100; Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 390.
Culex hesitator Dyar and Knab, 1907, N. Y. Ent. Soc. Jour. 15: 205; Rozeboom and Komp, 1950, Ent. Soc. Wash. Ann. 43: 91.
Culex reductor Dyar and Knab, 1909, *Smithsn. Misc. Collect.* 52: 257; Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 402.
Culex deceptor Dyar and Knab, 1909, *Smithsn. Misc. Collect.* 52: 257.
Culex ignobilis Dyar and Knab, 1909, Ent. Soc. Wash. Proc., 11: 39.
Culex pilosus (Dyar and Knab) Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 399; Dyar, 1928, The Mosquitoes of the Americas, p. 290; King and Bradley, 1937, Ent. Soc. Amer. Ann. 30: 353; Wirih, 1945, Ent. Soc. Wash. Proc. 47: 205; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 94; Lane, 1951, Ent. Soc. Wash. Proc. 53: 334.

Culex floridanus Howard, Dyar, and Knab, 1915, Mosquitoes of North and Central America and the West Indies, v. 3, p. 408.

Culex mastigia Howard, Dyar, and Knab, *ibid.*, p. 426.

Culex europincensis Bonne-Wepster and Bonne, 1920, Insecutor Inscitiae Menstruus 7: 177.

Culex colombicnsis Dyar, 1924, Insecutor Inscitiae Menstruus 12: 184.

Culex radiatus Senevet and Abonnenc, 1939, Inst. Pasteur d'Algérie, Arch. 17: 120.

Larva.—Head: preclypeal spines stout, about one-half as long as distance between them; hair 4 fine, single or double; hair 5 single or double, 0.8 to 0.9 times as long as hair 6, single or double, spicules sparse but long; hair 6 single, barely attaining anterior margin of head; hair 7 four- to seven-branched, spiculate; hairs 18 and 20 the same length, the former double to four-branched, the latter four- to seven-branched. Posterior ventral mandibular tooth broad at base, blunt at tip, without a secondary tooth; maxillary spine 0.6 times as long and wide as preclypeal, not darkly infuscated; mentum a broad shouldered central tooth and five smaller each side. Antenna infuscated at base of shaft and on basal half of constriction; constricted portion 0.3 times as long as total length of antenna; subapical spines markedly removed from extreme apex, 2.0 times as long as hair 10; hair 10, 2.0 times as long as terminal spine. Thorax: Integument spicular-pilose, the pile short and sparse. Prothoracic hair formula (1-1-3-5)-2-1-1-2-2 (rarely 3); hair 3 spiculate, 1.7 times as long as head hair 5, also longer than head hair 6. Abdomen: Hair 6 on segments III through VI double to four-branched. Comb a single irregular row of 8 to 13 long pointed scales, that on air tube end of row 0.6 times as long as that on anal segment end, no lateral fringing present, the bases of all scales about 0.75 times as long as scale itself. Anal plate considerably longer on dorsal than on ventral side; button present on extreme postero-lateral margin of ring; dorsal hair of dorsal brush with a single short branch about the same length as anal ring; ventral brush 3.0 times as long as ring; gills four, variable in shape and length. Air-tube index 3.0 to 3.5, base of tube with a darkly infuscated, heavily sclerotized ring; seven to nine pairs of ventral tufts, the basal pair 1.0 to 1.2 times as long as tube, the three anterior pairs within the pecten; pecten of 7 to 10 spines on basal third of air tube, subapical spine 1 x 9 or 1 x 10 with 20 to 30 fringing spines tending to become larger and coarser distally; terminal hook stout at base, strongly curved anteriorly, 0.8 times as long as width of tube at tip, with strong secondary hook on basal 0.4.

Pupa.—Cephalothorax: Hairs 1, 2, and 3 triple or four-branched, hair 1 long with stout branches, hairs 2 and 3 about the same length but both 0.5 times as long as hair 1; hairs 5 and 7 triple and subequal; hair 4 four-branched, 0.6 times as long as hair 7; hair 6 double, only slightly shorter than hair 7. Length of trumpet 4.0 times as long as width at tip, the sides tapering gradually, pinna about one-third the total length of trumpet. Metathorax: Hair 11 single; hair 10 six- to seven-branched, 0.8 times as long as hair 11; hair 12 triple, 0.5 times as long as hair 11. Abdomen: Hair II-2 six-branched, fine, attaining 0.3 of following tergite, 0.6 times as long as hair II-4, which is double; hair III-10, 0.8 times as long as hair III-7; hair III-2 seven-branched, 0.6 times as long as single hair III-4; hair 2 on segments III, IV, and V six- to nine-branched, all nearly the same length, reaching nearly half of the tergite following; hair IV-5 triple, just attaining posterior border of following tergite; hairs V-5 and VI-5 heavy, double, exceeding posterior border of following tergites by about one-fourth their lengths; hairs 2 and 5 on segment VII double or triple, subequal; hair VII-6 double, 0.7 times as long as hair VII-5; hair VIII-5 triple, distinctly shorter than hair VIII-8, the latter triple, its branches heavy at bases, with long distinct spiculation. Posterior border of ninth tergite gently rounded; hair IX-1 distinct but minute. Paddle hair 7 minute, about 0.12 times as long as hair 8.

Material.—Georgia: 24 larvae (USPHS). Florida: Six larvae (Q). Cuba: Six larvae (USNM). Bahamas: One larva (USNM). Honduras: One larva (USNM). Nicaragua: Two larvae (USNM). Puerto Rico: Two larvae (USNM); five larvae, nine pupae (P). Panamá: One larva, one pupa (K); 27 larvae, 22 pupae, some of which are associated with males (R). Venezuela: One larva

(USNM). Colombia: Three larval skins, three pupal skins, associated with males (USNM).

Distribution and habitat.—Southern U. S., Mexico, Panamá, West Indies, Honduras, Guianas, Colombia, Venezuela, Ecuador. Found mainly in temporary rain pools.

Taxonomic discussion.—Complete descriptions of the larvae and pupae of *pilosus* have been presented here because they apparently represent those for several other species. It has been stated that the supposed larvae of *innovator* are indistinguishable from this species, and the differences between *pilosus*, *hesitator*, and *foliafer* appear to be so small that the variation in the first-named species completely embraces the other two. It is easily separated from the rest of the species by the characters given in the key. Lane (1951) is probably correct in synonymizing *hesitator* with *pilosus*.

It was found that nearly all the larvae (about 25) so kindly lent for this study by Harry Pratt, and collected in the vicinity of Atlanta, Ga., have head hair 5 single, but in Rozeboom's reared material from Panama, this hair is double.

CULEX (MOCHELOSTYRAX) ROOTI Rozeboom

(Fig. 69)

Culex rooti Rozeboom, 1935, Ent. Soc. Amer. Ann. 28: 251; Rozeboom, 1936, *ibid.*, 29: 266, Rozeboom and Komp. 1950, *ibid.*, 43: 96.

Larva.—Head: Preclypeal spines shorter than one-half the distance between them; hair 4 single or double, minute, much closer to each other than to socket of hair 6; hair 5, 0.25 times as long as hair 6, the branches light, bare; hair 6 single, not attaining anterior margin of head; hair 7 five-branched, spiculate, light; hair 18 double to four-branched; hair 20 five- to six-branched, these two hairs subequal in length. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth much longer and wider; maxillary spine subequal in length to preclypeal, but about 0.5 times as wide, lightly pigmented; mentum a broad shouldered central tooth and four or five smaller ones, the fifth removed and smaller than the fourth. Antenna infuscated on basal third of shaft and basal half of constricted portion; subapical spines 1.5 times as long as hair 10; hair 10, 2.3 times as long as terminal spine. Thorax: Integument very finely spicular-pilose. Prothoracic hair formula (1-1-3)-1-1-1-2-1; prothoracic hair 3, 0.15 times as long as head hair 5. Abdomen: Integument glabrous. Hairs I-6, I-7, and II-6 all triple, each with one larger branch and two smaller ones; hair 6 on segments III through VI double to four-branched; hair III-6 subequal in length to short branches of hair II-6; hair VI-6, 1.5 times as long as short branches of this hair. Comb of six to eight long, pointed scales in an irregular row, the scales on anal segment end of row 2.0 times as long as those on air tube end, the bases of all scales 0.5 times as long as free portion. Proportions of anal plate 14 x 17, the ring wider beyond the middle; dorsal hair of dorsal tuft with or without a shorter branch which, if present, is 1.2 times as long as anal ring; ventral brush 3.0 times as long as ring; gills four, 2.0 times as long as ring. Air-tube index 3.2; eight pairs of ventral tufts, the anterior pair longer than air tube, posterior pair 2.8 times as long as tube width at point of insertion, at least the two anterior pairs within the pecten; pecten of six to nine long spines on basal third of tube, subapical spine 1 x 10, with many fine fringing teeth; terminal hook 0.85 times as long as width of tube at tip, with heavy secondary hook on basal third; acus with well defined anterodorsal knob.

Pupa.—Cephalothorax: Hairs 1 and 3 triple, subequal, rather slender and comparatively short; hair 2, 0.6 times as long as hair 3, four-branched; hairs 4, 5, 6, and 7 all triple to four-branched, hair 6 the longest, hair 4 about 0.4 times as long as hair 6, hairs 5 and 7 intermediate. Trumpet almost 5 times as long as width at tip of pinna, the sides tapering gradually to the tip, the pinna slightly more than one-third the total length of the trumpet. Metathorax: Missing from the single specimen available for study. Abdomen: Hair II-2 very small, six- or seven-branched, 0.7 times as long as hair II-4 which is double;

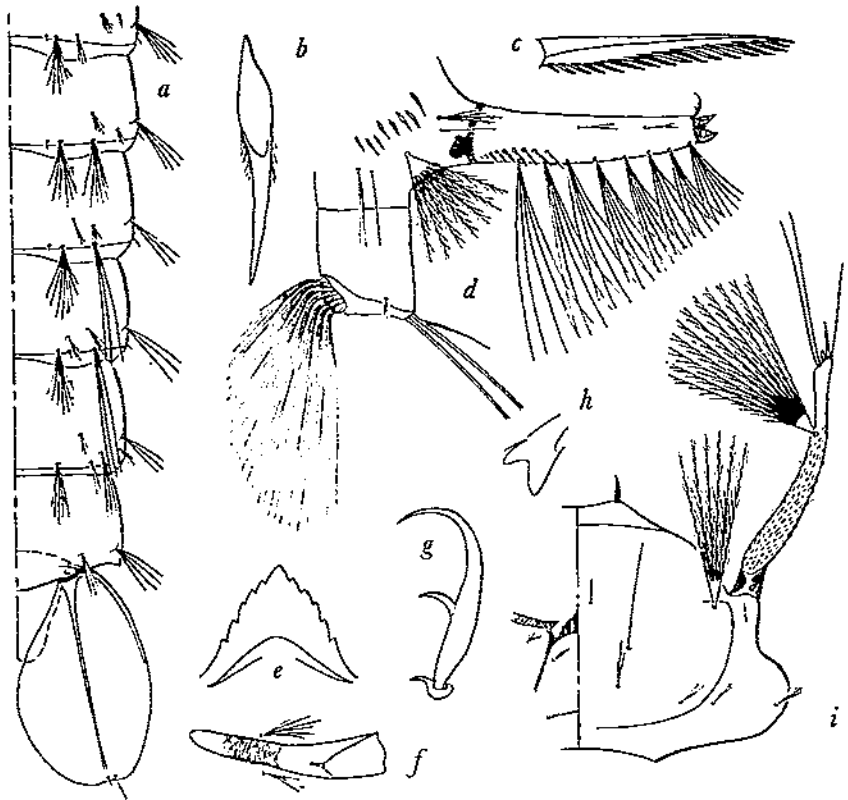


FIGURE 69.—*Culex (Mochlostyrax) rooti* Rozeboom: *a*, Dorsal view of segments III through VIII of abdomen of pupa; *b*, comb scale; *c*, subapical pecten spine; *d*, terminal segments of abdomen of larva; *e*, mentum; *f*, pupal trumpet; *g*, terminal hook of air tube; *h*, ventral mandibular teeth; *i*, ventral (left) and dorsal (right) views of head of larva.

hairs 3, 5, and 6 on segment II all very short; hair II-10 triple and almost as long as hair III-7; hair 2 on segments III, IV, V, and VI six- to eight-branched, all subequal in length, all attaining about one-half the following tergite; hair III-4 very small, triple, only 0.5 times as long as hair III-2 and shorter than hair II-4; hair III-5 with six rather heavy branches, only slightly longer than hair IV-2; hair 5 on segments V and VI heavy as in *pilosus*, triple, both somewhat exceeding the posterior border of the following tergites; hair VII-2 five-branched; 0.7 times as long as hair VI-2; hair VII-5 double, only 0.6 times as long as hair II-2; hair VII-6 longer than either of these, heavier, triple; hair VII-8 triple, the branches not heavy or spiculate; hair VIII-5 triple, distinctly shorter than hair VIII-8 which has four or five heavy branches which are distinctly spiculate. Posterior border of ninth tergite rounded; hair IX-1 minute. Paddle hair 7 minute, about 0.2 times as long as hair 8.

Material.—Panamá: Two larvae, one pupa (USNM); one larval skin (USNM); one whole-mounted larva, one larval skin (R); 28 larvae (K). Colombia: One pupal skin (R).

Distribution and habitat.—Panamá and Colombia. In temporary pools along a road.

Taxonomic discussion.—Rozeboom (1936) states, "The characteristics of the larva resemble those of *C. pilosus* in every important respect except that of the upper head hairs (head hair 5), which in *C. rooti* are triple and very small, being difficult to see, while in *C. pilosus* they are either double or single, and as large as the lower (head hair 6) hairs." The minute head hair 5 which reference is made separates *rooti* and Species H from all other members of this subgenus, in which head hair 5 is from two-thirds as long to as long as head hair 6.

Mochlostyrax Species H as described below is affixed to slide #F of the Bonnes' series discussed by Komp and Rozeboom (1951) to which reference is made in the previous discussion of *foliafer*. It is the only other form in the group that the author has seen that has a minute head hair 5. For remarks regarding the separation of these two species see the taxonomic discussion of Species H.

The pupa of *rooti* may be easily separated from that of *pilosus* by the spiculation on the branches of hair 5 of segments V and VI, and by the reduced hairs II-4 and VII-5. The pupa of this species is the only one that the writer has observed that has these two hairs smaller than hairs II-2 and VII-2, respectively.

CULEX (MOCHLOSTYRAX) UNICORNIS ROOF

(Fig. 70)

Culex unicornis Roof, in Dyar, 1928, The Mosquitoes of the Americas, p. 291; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 97.

Larva.—Head: Preelypeal spines shorter than one-half the distance between them; hair 4 single or double, fine, much closer to each other than to socket of hair 6; hair 5 single, 0.8 times as long as hair 6, long spicules on apical half; hair 6 single, just attaining anterior margin of head, spiculate, the spicules long; hair 7 six- or seven-branched, spiculate: hair 18 double or triple, hair 20 seven-branched, these two hairs subequal in length. Anterior ventral mandibular tooth slightly longer than width at base, posterior ventral tooth much longer and wider; maxillary spine 0.8 times as long as preelypeal, 0.5 times as wide; mentum a large shouldered central tooth and five or six smaller each side, the last somewhat removed and smaller. Antenna without sign of infuscation; subapical spines 1.5 times as long as hair 10; hair 10, 2.2 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules sparse and short. Prothoracic hair formula (1-1-3-4)-2-1-1-2-2; prothoracic hair 3, 1.7 times as long as head hair 5. Abdomen: Integument glabrous. Hairs I-6 and I-7 with three or four branches, if triple, then with two smaller branches and one larger, if four, with three smaller and one larger; hair II-6 triple, with two smaller branches and one larger; hair 6 on segments III through VI double; hair III-6, 0.9 times as long as shorter branches of hair II-6; hair VI-6, 1.2 times as long as shorter branches of this hair. Comb of six to seven long, pointed scales in an irregular row, those on anal segment end 1.7 times as long as those on air tube end, bases of all scales shorter than the free portions. Proportions of anal ring 16 x 38, the ring with a fairly heavily pigmented anterior border; dorsal hair of dorsal brush with one shorter branch 1.3 times as long as ring; ventral brush 2.2 times as long as ring; gills missing. Air-tube index 3.3 to 3.6; eight pairs of ventral tufts, the anterior pair longer than air tube; posterior pair 3.5 times as long as width of tube at tip, anterior two pairs within the pecten, pecten of eight to 10 well-separated spines on basal third of tube, subapical spine 1 x 2, with 20 to 25 fringing spines to extreme tip; terminal hook 0.95 times as long as width of tube at tip, with fairly stout secondary hook on basal third; acus normal for the subgenus.

Pupa.—Cephalothorax: Hairs 1, 2, and 3 all triple, hair 1 the longest, hairs 2 and 3 subequal and 0.75 to 3.0 times as long as hair 2; hairs 6 and 7 triple, hair 6, 0.5 times as long as hair 7; hair 4 double, slightly longer than hair 6; hair 5 four-branched, nearly as long as hair 7. Pupal trumpet about five times as long as width at pinna, the edges tapering gradually to the tip which is the widest

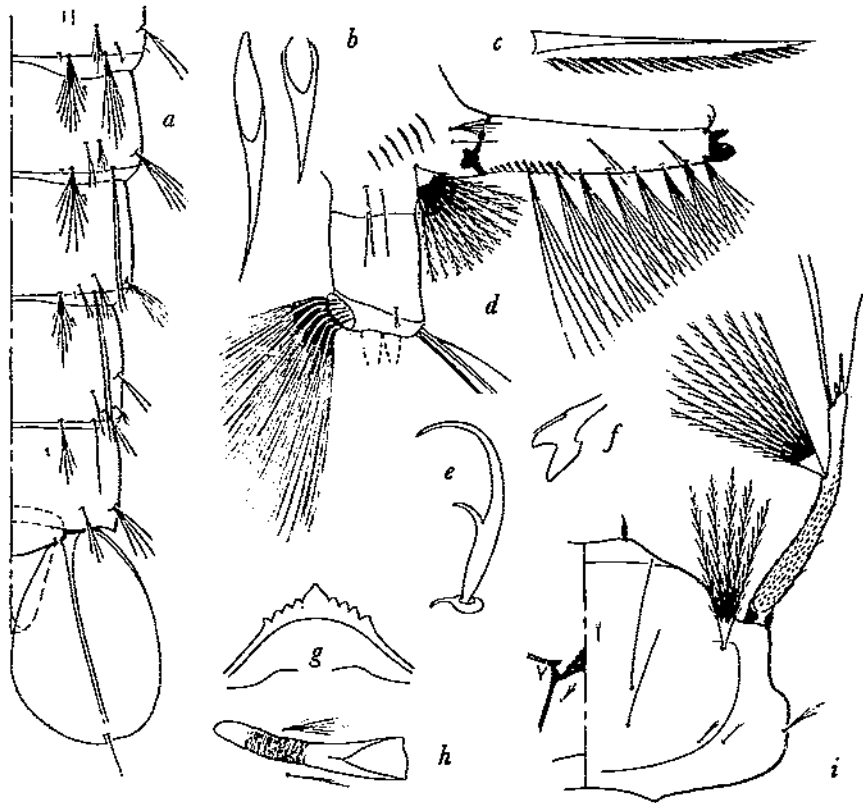


FIGURE 70.—*Culic (Mochlostyrax) unicornis* Root: *a*, Dorsal view of segments IV through VIII of abdomen of pupa; *b*, comb scales; *c*, subapical pecten spine; *d*, terminal segments of abdomen of larva; *e*, terminal air-tube hook; *f*, ventral mandibular teeth; *g*, mentum; *h*, pupal trumpet; *i*, ventral (left) and dorsal (right) views of head of larva.

point, the pinna about three-fourths the total trumpet length. Metathorax: Hair 11 single; hair 10 ten-branched, 0.6 times as long as hair 11; hair 12 four-branched, 0.8 times as long as hair 11. Abdomen: Hair II-2 with about 12 branches, very short; hair II-4 double, only slightly longer than hair II-2, attaining one-third of the following tergite; hair II-10 missing; hair 2 on segments III, IV, V, and VI with 8 to 10 branches, those on segments III, IV, and V exceed half of the following tergite; hair VI-2 slightly shorter; hair III-4 double, slightly shorter than hair III-2; hair IV-5 six-branched, 1.3 times as long as hair IV-2, attaining three-fourths of the following tergite; hair 5 on segments V and VI heavy, double, distinctly exceeding posterior margin of the following tergite; hair VII-2 four-branched, 0.75 times as long as hair VI-2; hair VII-5 single, 1.3 times as long as hair VII-2; hair VII-6 double and the same length as hair VII-2; hair VII-8 shorter and heavier than hair 8 on preceding segment; hairs 5 and 8 of segment VIII the same length, the former triple and delicate, the latter with heavy, distinctly spiculate branches; posterior border of ninth tergite gently rounded; hair IX-1 minute. Paddle hair 7 minute, hair 8, 15.0 times as long as hair 7 and 0.2 times as long as paddle.

Material.—Venezuela: One larval, one pupal skin (lectotype) (USNM).

Distribution and habitat.—Venezuela. From small puddles along the road (Root's personal notes).

Taxonomic discussion.—These specimens bear only one outstanding character which separates them from *pilosus*, *innovator*, *hesitator*, and *foliafer*. This is the ventral fringing of the pecten spines which, in *unicornis*, is composed of many rather coarse teeth along the entire length nearly to the tip, whereas in the other species mentioned this fringing is of extremely fine, rather irregular teeth along the basal half, becoming coarser and distinctly longer toward the apex. A careful study of these traits, under oil immersion if necessary, will show that the difference between these two types of spines are rather striking. The only reliable character for the separation of the pupa of *unicornis* is that presented in the key.

CULEX (MOCHLOSTYRAX) VEXILLIFER Komp

(Fig. 71)

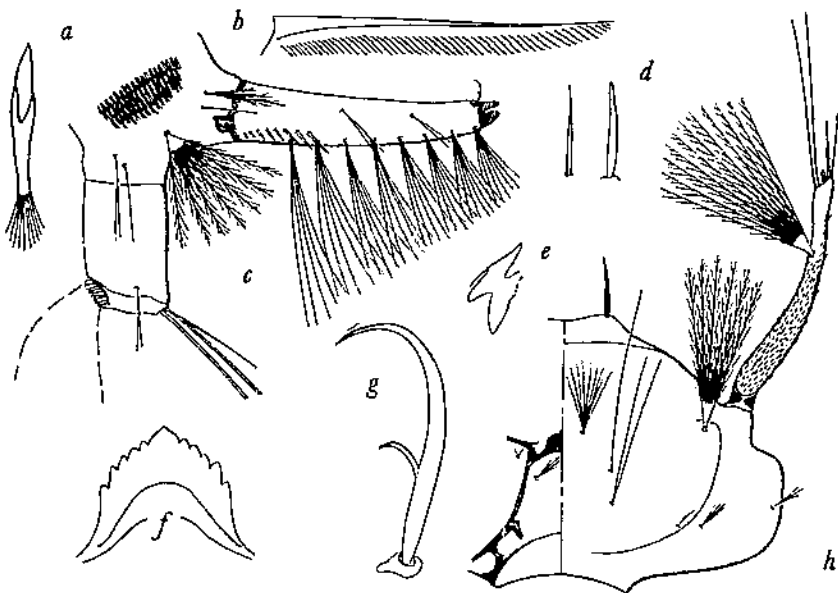


FIGURE 71.—*Culex (Mochlostyrax) vexillifer* Komp: *a*, Comb scale from posterior row; *b*, subapical pecten spine; *c*, terminal segments of abdomen of larva; *d*, maxillary (left) and preclypeal (right) spines; *e*, ventral mandibular teeth; *f*, mentum; *g*, terminal hook of air tube; *h*, ventral (left) and dorsal (right) views of head of larva.

Culex vexillifer Komp, 1936, Ent. Soc. Amer. Ann. 29: 320; Rozeboom and Komp, 1950, Ent. Soc. Amer. Ann. 43: 97.

Larva.—Head: Preclypeal spines about as long as one-half the distance between them; hair 4, 0.45 times as long as hair 5, with nine branches from the base, the branches distinctly spiculate, closer to each other than to socket of hair 6; hair 5 double, 0.8 times as long as hair 6, distinctly spiculate; hair 6 single, distal fourth or fifth extending beyond anterior margin of head, distinctly spiculate; hair 7 six-branched, spiculate; hair 18 double, hair 20 six-branched and longer than hair 18. Anterior ventral mandibular tooth longer than width at base, posterior ventral tooth longer and wider than anterior; maxillary spine nearly subequal in length to preclypeal, but much more slender, not darkly pigmented; mentum: a large, shouldered central tooth and four or five smaller each side, the last smaller and distantly removed from the rest. Antenna infus-

ated on basal fifth or sixth and on entire constricted portion; subapical spines 3.0 times as long as hair 10; hair 10, 0.95 times as long as terminal spine. Thorax: Integument spicular-pilose, the spicules short and not dense. Prothoracic hair formula (1-1-3)-1-1-1-2-2; prothoracic hair 3, 1.2 times as long as head hair 5. Abdomen: Integument glabrous. Hair I-6 triple or four-branched, if the former, with two smaller and one large branch, if the latter, with three smaller and one larger; hairs I-7 and II-6 triple, with two small branches and one larger; hair III-6 triple, subequal in length to short branches of hair II-6; hairs IV-6 through VI-6 double; hair VI-6, 1.5 times as long as short branches of II-6. Comb of 50 to 60 apically fringed scales in four irregular rows, forming a dense patch, scales in posterior row 1.3 times as long as those in anterior row, bases shorter than free portion. Proportions of anal ring 14 x 21, wider beyond the middle; dorsal hair of dorsal brush with one short branch 0.6 times as long as anal ring; ventral brush missing; gills four, 1.5 times as long as ring. Air-tube index 4.3; tube slightly darkened on apical half; eight pairs of ventral tufts, the anterior two or three pairs within the pecten, the anterior pair longer than air tube, posterior pair 0.33 times as long as anterior pair; pecten of 10 or 11 long, well-separated spines on basal half of tube, subapical spine 1 x 16, with many minute ventral fringing teeth; terminal hook 0.8 times as long as width of tube at tip, with strong secondary hook on basal fourth; acus with anterior knob halfway between dorsal and ventral border.

Material.—Canal Zone: Two larval skins (USNM).

Distribution and Habitat.—Panamá. ". . . Taken from water held between the buttressed roots of a tree overhanging a stream" (Komp, 1936).

Taxonomic Discussion.—The two larval skins used for this study, although unassociated with males, are unmistakable when compared with Komp's original description. This species, and *alogistus*, are the only two with apically fringed comb scales in a patch. In addition, *veallifer* possesses hair 10 about 0.3 times as long as the subapicals and only slightly longer than the terminal spine.

CULEX (MOCHLOSTYRAX) Species G

(Fig. 72)

Larva.—Head: Preelypeal spines short, shorter than one-half the distance between them; hair 4, 0.45 times as long as hair 5, dendritic, with about 20-25 terminal branches; hair 5 single or double, 0.9 times as long as head hair 6, spiculate on distal half; hair 6 single, barely attaining anterior margin of head, spiculate; hair 7 five-branched, spiculate; hair 18 three- to four-branched, small; hair 20 five- to six-branched, longer. Posterior ventral mandibular tooth broad, blunt, longer than anterior, with bare suggestion of a secondary tooth; maxillary spine the same length as, or longer than, preelypeal, hair-like, not heavier than head hair 5; mentum a broad central tooth with six smaller ones each side, the first of these closely appressed to the central one, a seventh tooth sometimes separated from the others. Antenna infuscated on basal half of shaft and from well below constriction to extreme apex, leaving a whitish band near middle of shaft; subapical spines subequal; hair 10, one-third the length of subapicals; terminal spine five-sixths the length of hair 10. Thorax: Integument spicular-pilose, the pile very short. Prothoracic hair formula (1-1-5-6)-1-1-1-2-2; hair 3, 0.6 times as long as head hair 5. Abdomen: Integument glabrous. Hair 6 on segments III and IV double, hair 6 on segments V and VI single. Comb of 15 to 18 long narrow scales in an even row, that on air tube end 0.5 times as long as that on anal segment end, the bases of all scales not less than half the total lengths, each scale with a small fringe at tip. Anal plate longer than wide, the anterior dorsal margin darkly pigmented; surface covered with discontinuous rows of minute spicules which become larger toward the posterior margin, the "button" present but not situated on the extreme margin; dorsal hair of dorsal tuft with two smaller unequal branches, the longer 1.5 times as long as ring; ventral brush 2.8 times as long as ring; gills 4, distinctly longer than the entire anal segment. Air-tube index about 4.0, tube not distinctly darkened, covered with discontinuous rows of minute scales; eight pairs of tufts, the anterior pair

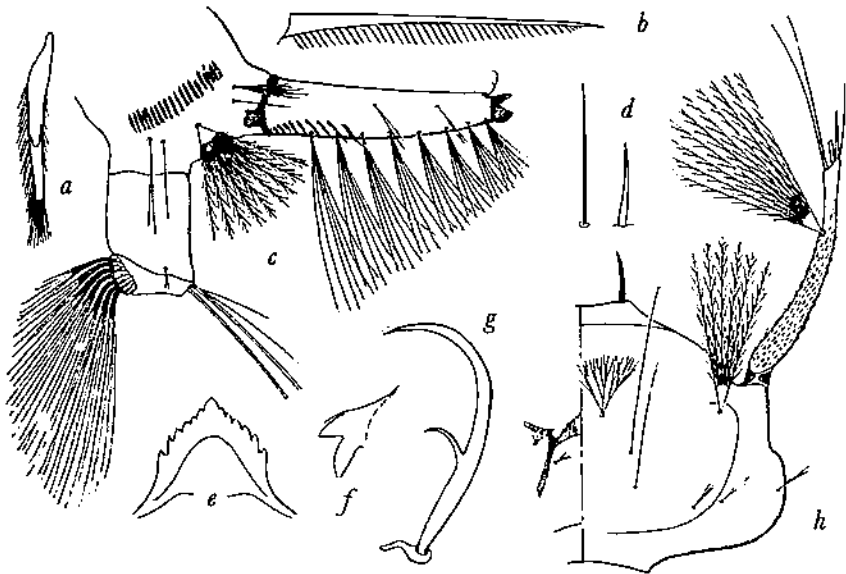


FIGURE 72.—*Culex (Mochlostyrax) Species G*: a, Comb scale; b, subapical pecten spine; c, terminal segments of abdomen of larva; d, maxillary (left) and preclypeal (right) spines; e, mentum; f, ventral mandibular teeth; g, terminal hook of air tube; h, ventral (left) and dorsal (right) views of head of larva.

as long as the air tube, the anterior three pairs within the pecten; pecten of 10 or 11 spines on basal half, subapical spine about 1×15 , the ventral fringe of about 30 to 40 uneven rather jagged spines tending to be slightly heavier and more regular distally; terminal hook 0.7 times as long as tube width at tip, heavy at base, strongly recurved, with rather strong secondary hook on basal two-fifths; acus normal.

Material.—Panamá: Three larval skins, not definitely associated (USNM).

Distribution.—Mojingo Swamp, Panamá. Specific larval habitat not known.

Taxonomic Discussion.—Until such times as all the aquatic stages in this subgenus are known, it is impossible to assign a specific name to all the larvae. At first glance, the comb scales, arranged in a single even row, appear to have pointed apices as in other species of the group, but closer examination reveals a very narrow tuft or fringe at the tip of each scale. In addition, head hair 4, unlike any member of this group, is dendritic as in many of the hairs of *Anopheles* larvae.

CULEX (MOCHLOSTYRAX) Species H

(Fig. 73)

Larva.—Head: Preclypeal spines long and slender, much longer than one-half the distance between them; hair 4 not visible; hair 5 minute, not as long as hairs 8 or 9, four-branched at middle or beyond; hair 6 single, barely attaining anterior margin of head, spiculate; hair 7 seven-branched, hair 18 double, small; hair 20 five- to six-branched, longer than hair 18. Posterior ventral mandibular tooth broad, blunt, slightly longer than anterior tooth; maxillary spine fine, hair-like, 0.6 times as long as preclypeal; mentum with a broad shouldered central

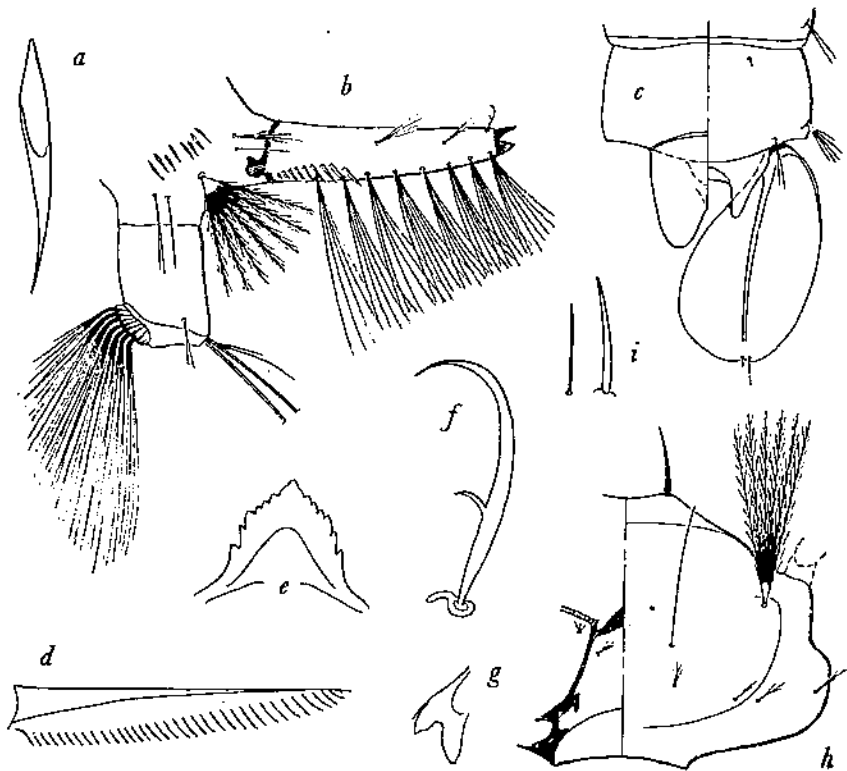


FIGURE 73.—*Culicoides (Mochlostyrax) Species H*: a, Comb scale; b, terminal segments of abdomen of larva; c, segments VII and VIII of abdomen of pupa; d, subapical pecten spines; e, mentum; f, terminal hook of air tube; g, ventral mandibular teeth; h, ventral (left) and dorsal (right) views of head of larva.

tooth and seven smaller teeth each side, the seventh slightly removed. Antennae missing. Thorax: Spiculation extremely fine and sparse. Prothoracic hair formula (1-1-6)-1-1-1-2-2; hair 3 six-branched, 0.5 times as long as head hair 6. Abdomen: Integument bare. Comb of eight long, pointed spines in a rather uneven row, bases of all spines 0.5 times as long as total length, none laterally fringed. Anal ring longer than wide, the proportions destroyed in mounting; button present near postero-lateral border; dorsal hair of dorsal brush with two shorter, unequal branches, the longer of these 1.1 times as long as anal ring; ventral brush 3.2 times as long as ring; gills four, about 3.5 times as long as ring. Air-tube index about 3.5, without infuscation, eight pairs of ventral tufts, the two or three anterior pairs within the pecten, the anterior tufts missing; pecten of about eight spines on basal third of tube, the subapical about 1 x 6, with fine, uneven ventral teeth becoming rather long at extreme tip; terminal hook stout at the base, strongly recurved, with strong secondary hook on basal half; acus normal.

Pupa.—Cephalothorax: Trumpet about five times as long as greatest width, the sides not gradually tapering to the tip but expanding just before the pinna as well as at the distal end, with a constriction between, the tracheoid portion extending nearly to base of pinna, pinna nearly three-tenths of the total trumpet length, the cleft at pinna base nearly three-fifths of pinna itself. Abdomen: Posterior border of ninth tergite with a median invagination resulting in two sharply pointed lateral arms.

Material.—Surinam: One larval and one pupal skin (USNM).

Distribution and habitat.—Surinam. Larval habitat not known.

Taxonomic discussion.—Included in a series of *Mochlostyrax* larvae from Surinam labeled #C, #E, #F, and #G in the collection of the U. S. National Museum, this is the larva labeled #F in the series. The associated male has been selected by Rozeboom and Komp (18, p. 87) as the lectotype of *alogistus*, but for reasons given in the discussion of that species above, the writer prefers to regard the larva #431.3 (with the comb scales in a patch) as that species. The male associated with #431.3 is very distinctly *alogistus*, whereas the larva is distinct in several respects from *vevillifer*, the only other species described as having the comb scales in a patch of three or four rows. Therefore, unless the male and larva of Rozeboom's #431.3 are mis-associated, it appears reasonable to regard this species as *alogistus* rather than the presumably associated male and larva of Surinam F.

Species H may be distinguished from *rooti* (the only two forms so far known with a minute head hair 5) by its very long preclypeal spines, which are separated by much less than twice the length of either and by the long, hairlike maxillary spine. *C. rooti* possesses very short preclypeal spines and maxillary spine about two-thirds the length and thickness of the preclypeals.

The mount of the only pupal skin of Species B available for this study has deteriorated to such an extent, and the specimen is so badly twisted, that details could not be ascertained with certainty. The terminal abdominal appendages are almost exactly the same as in *foliafer*, the lateral arms of the ninth tergite not quite so sharply pointed as in that species. The trumpet is much different, however, in having a distinct constriction near the middle of the pinna.

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