

CULEX - MOSQUITOES (1917) 1918

[Reprinted from *Insector Inscitiæ Menstruus*, Vol. V, Nos. 10-12, 1917]

THE GENUS CULEX IN THE UNITED STATES

(*Diptera, Culicidæ*)

By HARRISON G. DYAR AND FREDERICK KNAB

The small species of *Culex* of the southern United States, belonging to the groups *Melanoconion* and *Mochlostyrax*, were somewhat uncritically dealt with by us in the monograph,¹ due to our limited material and small knowledge of the forms in question and to the press of work caused by the multiplicity of species before us at that time. The species may be advantageously considered disconnectedly from the mass of tropical forms.

A number of errors have crept into our work, which we will first correct. In all these species the proboscis of the female is moderately swollen at the tip. In dried specimens the member becomes shrunken and sometimes distorted, so that the character is often far from evident, especially when the swelling is normally not very prominent. We were led by our observations on incomplete material to classify *abominator* and *peccator* under the heading "proboscis of female not swollen at tip," thereby introducing two serious errors. Again, *erraticus*, *floridanus*, and *agitator* were based upon larvæ. In our zeal to complete our work, we associated wrong adults in some cases. The adults assigned to *erraticus* are correct, but we did not recognize that they are identical with *abominator*, having already placed that species wrongly in regard to the proboscis. To *floridanus* we wrongly assigned adults of *incriminator*, separating them from our other *incriminator* by "eyes not white margined," not realizing that the difference was due in part to the condition of the specimens and in part to the deceptive nature of this character. The white margin is formed by scales, which may be abraded, or appear white or black according to the incidence of the light. To *agitator* we assigned adults of another Cuban species belonging to *Melanoconion*, whereas *agitator* is strictly a *Mochlostyrax*.

¹ Howard, Dyar and Knab, *The Mosq. N. and Cent. Am. and W. Ind.*, iii, 1915.

In respect to the larvæ, *abominator* is identical with *erraticus* and *agitator* with *floridanus*, though, through minor errors, we placed them separately in the tables.

Other corrections apply to *abominator*, *egberti*, and *mastigia*, which were described as possessing white abdominal bands. In *abominator* and *egberti* these consist of white central spots with a few scattered scales, and should be described as dotted; in *mastigia* the appearance of bands is illusory in the female, being due to the visibility of the pale integument and the pale bristles, and vanishes under sufficient magnification. The male in this species has distinct abdominal bands. Again *egberti* and *mastigia* are separated on the deceptive character of the white eye-margin, referred to above, which we would discard as unreliable.

This is a rather formidable series of mistakes in so small a group of species and naturally involves some changes in synonymy. We believe that the species are here placed on reliable characters.

The genus *Culex* as a whole, as it occurs in the United States, may be divided into subgenera on the characters afforded by the male genitalia. From this standpoint, *Deinocerites* represents only a section of *Culex*, while, on the other hand, *Culicella* and *Climacura* are plainly distinct genera, the former nearer to *Culiseta* than to *Culex*. We include them all in the following review:

TABLE OF SUBGENERA OF CULEX BY THE MALE GENITALIA

1. Unci undivided, conical.....	<i>Climacura</i>
Unci divided into paired plates.....	2
2. Harpes simple, few-toothed.....	<i>Culicella</i>
Harpes with numerous terminal spines.....	3
3. Harpes broad, membranous, without basal branch; unci lacking the second plate by degeneration.....	<i>Neoculex</i>
Harpes and unci not so formed.....	4
4. Harpes with a tuft of spines at tip.....	<i>Culex</i>
Harpes comb-shaped, the spines in a single row.....	5
5. First plate of the unci elongated and spatulate.....	<i>Deinocerites</i>
First plate of the unci triangular.....	6

Section CULEX Linnaeus

2. **Culex (Culex) corniger** Theobald.

Culex corniger Howard, Dyar and Knab, l. c., iii, 240, 1915.

This species reaches us only in southern Florida. It is a well marked form, remarkably variable in coloration as adult, yet with distinct and easily recognizable characters in larva and male genitalia. The lobes of the side piece have three rods, the central one very stout, followed by a leaf-like appendage with a very delicate seta beside it and a seta beyond.

The species ranges over the Antilles, Mexico, Central America and South America to Brazil, having essentially a tropical distribution.

3. **Culex (Culex) tarsalis** Coquillett.

Culex tarsalis Howard, Dyar and Knab, l. c., iii, 230, 1915.

This species is common throughout the west, especially in the arid regions, and extends eastward as far as Illinois, disappearing in the forested country and at high altitudes. The larva has the air tube with five paired tufts, but the tufts are crowded together on the ventral line, confused and alternating, so that the normal position of the subapical tuft as out of line with the others is obscured. The larvæ may be found in all sorts of stagnant water in the open, permanent or semi-permanent, containing vegetation. The male genitalia have the lobe of the side piece with three rods, the marginal one shorter, a seta, a leaf-like appendage and another seta. The second plate of the unci is curved, one arm membranous and finely dentate on the inner side, the other arm tooth-like; on the surface between these two arms are 4 to 6 teeth, more or less irregular in size; from the base of the plate arises a single long horn, exceeding the central tooth in length.

4. **Culex (Culex) stigmatosoma** Dyar.

Culex stigmatosoma Howard, Dyar and Knab, l. c., iii, 236, 1915.

This species is confined to the Pacific coast region and has not been found east of the Sierras. The larva has the air-tube with five paired tufts, the subapical one moved out of

line. They frequent essentially temporary pools, of not too transient a nature, such as are left in stream beds where the rivers go dry in the summer or greatly diminish in volume. These pools are without vegetation. The genitalia are essentially as in *tarsalis*, the lobe of the side piece having three rods, a seta, a leaf-like appendage and a seta; the second plate of the unci is modified in the same manner, but there are only two teeth on the central portion.

5. **Culex (Culex) erythrothorax** Dyar.

Culex erythrothorax Howard, Dyar and Knab, l. c., iii, 315, 1915.

This species inhabits the southern part of California, south of the San Bernardino-San Gabriel-Coast Ranges, the northernmost record being Salinas. It has not been found in the San Joaquin or Sacramento Valleys. The larvæ live in sloughs of permanent water among cat-tails and *Lemna*, the water often of considerable depth and containing fish. The larva is much as in *pipiens* and *quinquefasciatus*, but has a longer air-tube and the subdorsal abdominal hairs are in threes. The development is slow. The male genitalia have the lobe of the side piece with three rods, subequal, a leaf-like appendage, straight on one side, a stout seta beside it and a seta beyond; the second plate of the unci has the lower arm tooth-like, the upper arm similar, not membranous; between these some 8 teeth in two ranks, subequal, and a long horn from the base, exceeding the teeth.

6. **Culex (Culex) salinarius** Coquillett.

Culex salinarius Howard, Dyar and Knab, l. c., iii, 373, 1915.

This ranges over the United States east of the Great Plains, except the southern part, being absent from Florida and unrecorded from the Gulf coast. It is commonest in open marshes, especially near the sea, though it does not inhabit salt marshes nor require even slightly saline water. The air-tube of the larva is long and slender, the body glabrous. The male genitalia have the lobe of the side piece with three rods, the marginal one a little shorter, but as stout as the others, a

leaf-like appendage, straight on one side, with a seta beside it and a seta beyond; second plate of the unci produced into two arms, neither membranous, the upper long and pointed, the lower bent at a rounded right angle; between these are some six teeth of various sizes; the long horn-shaped process from the base is flattened and seems to form the third plate rather than a tooth of the second.

7. *Culex (Culex) palus* Theobald.

Culex similis and *C. palus* Howard, Dyar and Knab, l. c., iii, 339, 342, 1915.

There seems no doubt that the names *similis* and *palus* refer to the same species. Edwards's opinion, quoted by us, may be definitely accepted.

This species inhabits the West Indies, covering also most of southern Florida. The larvæ inhabit the pools in coral rock, so abundant in the islands and generally any water of a permanent or semi-permanent nature. They are not found in artificial receptacles. The air tube is very long and slender, the skin of the body covered with little spiculæ. The genitalia have the lobe of the side piece with three rods, the marginal one smaller, a leaf-like appendage and a rod-like seta, no second seta between the rods and the leaf; the second plate of the unci has the outer arm membranous and curved, but small and without teeth, being finely pectinate outwardly; at the base of this piece the plate forms a rounded angle with a characteristic pectination; a long horn arises from the base; inner arm of plate horn-like, and three or four teeth on the margin between the arms, of different sizes.

8. *Culex (Culex) restuans* Theobald.

Culex restuans Howard, Dyar and Knab, l. c., iii, 333, 1915.

This species inhabits the United States east of the Great Plains, extending from Canada to Florida. The larvæ inhabit all sorts of collections of water, especially of a somewhat foul character, having been found in rain barrels and old tins. The larva is recognizable from *pipiens* and *quinquefasciatus* by the peculiar antennæ, which are uniformly shaped and without the "notch" generally characteristic of *Culex*. The male

genitalia have the lobe of the side piece with three rods, the marginal one shorter, a seta, a leaf-like appendage and another seta; the second plate of the unci is curved, the corners drawn out into stout teeth, the upper one long, the basal one short, one denticule between. When mounted undisturbed, the parts appear enclosed in an elliptical basket or cage, with a bent cross-bar, the sides bidentate.

Culex brehmei, described by Knab (Proc. Biol. Soc. Wash., xxix, 161, 1916), proves to be a fallacious species, the adults being *restuans*, the larvæ *pipiens*, a wrong association having been made by the collector, whose statement was accepted without the proof afforded by isolations.

The name *Culex territans* Walker appears to be the oldest name for this species, according to F. W. Edwards of the British Museum; but Walker's description does not fit this species and the name has long been applied to another species. We therefore drop the name as unrecognizable in order to avoid the confusion that would ensue by its further use.

9. *Culex (Culex) quinquefasciatus* Say.

Culex quinquefasciatus Howard, Dyar and Knab, l. c., iii, 345, 1915.

This species extends over the whole of the warmer portion of the earth, having become dispersed by commerce in former days. In the United States it occupies the southern Atlantic seaboard to the District of Columbia, where it is common, but does not extend much farther north. In the Mississippi Valley it probably extends farther. It is absent from the Great Plains and the whole of the west, except in the lower Colorado Valley, having been taken in the Imperial Valley, California, and Yuma, Arizona, as an extension of its range in Mexico, where it is abundant. The species is semi-domesticated in habit, the larvæ occurring in numbers in all artificial collections of water about human habitations, less common in the open country in natural pools, but so occurring occasionally. The larva is very close to that of *pipiens*, differing in the slightly shorter air-tube, with less numerous pecten teeth, and in the presence of single subdorsal hairs on abdom-

inal segments 3 and 4, these being double in *pipiens*. The male genitalia have the lobe of the side piece with three rods, of which the central one is slenderer, and not the marginal one shorter, followed by two fine setæ and a filamentous rod, a leaf-like appendage and a seta. Harpes with a crown of spines, the basal appendage short and straight; unci of four plates; 1, triangular and strongly pigmented; 2, curved, with a longer and a shorter arm as in *restuans*, but thin and not tooth-like; 3, long and flat, exceeding the other pieces and curving to one side; 4, upright and straight, the pair joined by a bridge.

10. **Culex (Culex) pipiens** Linnaeus.

Culex pipiens Howard, Dyar and Knab, l. c., iii, 360, 1915.

This species is a native of Europe, presumably introduced into the United States by commerce. It is spread over the northern part of the eastern region, from Virginia to New Hampshire, westward to Illinois. The larvæ are found in artificial collections of water and also in the open in pools that are sufficiently foul. The genitalia have the lobes of the side piece with three rods, the marginal one stoutest, two setæ and a filament, a leaf-like appendage and another seta; the unci have four plates; 1, triangular and pigmented; 2, concave, short and broad, the angles rounded and scarcely produced; 3, long and flat, exceeding the other parts but slenderer than in *quinquefasciatus* and often outbent angularly; 4, stout and long, somewhat tubular with a truncated tip, outbent with the other plates.

What has been known as *Culex comitatus* Dyar and Knab (Monog., iii, 369, 1915) inhabits the coastal area of California and lower Sacramento Valley (Roseville). The differences pointed out between it and *pipiens* are slight, and there seems little doubt but that it is actually *pipiens*, independently introduced into California by commerce during the last century. In describing *comitatus*, all our comparisons were made with *quinquefasciatus* and it never occurred to us to consider *pipiens* specially in this connection. If it had, we would have seen that a new name was unnecessary.

Section MELANOCONION Theobald

11. *Culex* (*Melanoconion*) *erraticus* Dyar and Knab.

Melanoconion atratus Dyar (not Theobald), Journ. N. Y. Ent. Soc., xiii, 26, 29, 1905.

Mochlostyrax erraticus Dyar and Knab, Journ. N. Y. Ent. Soc., xiv, 223, 224, 1906.

Melanoconion atratus Coquillett (in part, not Theobald), U. S. D. A., Bur. Ent., Tech. ser. 11, 24, 1906.

Mochlostyrax erraticus Dyar, U. S. D. A., Bur. Ent., Circl. 72, 3, 1906.

Culex abominator Dyar and Knab, Smith. Misc. Colls., quart. iss., lii, 257, 1909.

Culex abominator Howard, Dyar and Knab, Monog., iii, 378, 1915.

Culex erraticus Howard, Dyar and Knab, Monog., iii, 382, 1915.

This species inhabits the Mississippi Valley region—Illinois, Arkansas, Louisiana, and Texas. The larva has a straight, rather long air-tube, body and tube minutely pilose; lateral comb of the eighth segment in an irregularly double row. They live in permanent bodies of water full of aquatic vegetation. The genitalia have the side pieces greatly swollen, the lobes divided and highly modified; the clasp filament is distorted, furnished on the outer margin with fine hair and a nearly solid crest; terminal spine strong and curved like a hook.

12. *Culex* (*Melanoconion*) *peccator* Dyar and Knab.

Culex peccator Dyar and Knab, Smith. Misc. Colls., quart. iss., lii, 256, 1909.

Culex incriminator Dyar and Knab, Smith. Misc. Colls., quart. iss., lii, 257, 1909.

Culex peccator Thibault, Proc. Ent. Soc. Wash., xii, 20, 1910.

Culex peccator Howard, Dyar and Knab, l. c., iii, 318, 1915.

Culex incriminator Howard, Dyar and Knab, l. c., iii, 409, 1915.

The species has been recorded from Arkansas, Mississippi, South Carolina, Georgia, and Florida. The larvæ and life habits are unknown. The male genitalia are as in *erraticus* but the clasp filament has a weak terminal spine, the crest feathered, not solid.

13. **Culex (Melanoconion) anips** Dyar.

Culex anips Dyar, Ins. Ins. Mens., iv, 48, 1916.

Known only from southern California. The larvæ live in pools of permanent water with cat-tails and *Lemna*, containing fish; the larva has not been described. The male genitalia are as in *erraticus*, the clasp filament terminating in a weak spine as in *peccator*, the outer margin with two hair patches, not forming a crest.

Section MOCHLOSTYRAX Dyar and Knab

14. **Culex (Mochlostyrax) egberti** Dyar and Knab.

Culex egberti Howard, Dyar and Knab, l. c., iii, 421, 1915.

Known only from Lake Okeechobee, Florida, from female adults; male, larva and life history unknown. This may prove to be the same as *floridanus*; but, on account of the white spots on the abdomen, we keep it separate, pending further information.

15. **Culex (Mochlostyrax) floridanus** Dyar and Knab.

Mochlostyrax cubensis Dyar and Knab (not *Culex cubensis* Bigot), Journ. N. Y. Ent. Soc., xiv, 223, 225, 1906.

Mochlostyrax floridanus Dyar and Knab, Proc. Biol. Soc. Wash., xix, 171, 1906.

Culex agitator Dyar and Knab (new name), Journ. N. Y. Ent. Soc., xv, 100, 1907.

Culex deceptor Dyar and Knab, Smith. Misc. Colls., quart. iss., lii, 257, 1909.

Culex agitator Howard, Dyar and Knab, l. c., iii, 384, 1915.

Culex floridanus Howard, Dyar and Knab, l. c., iii, 402, 1915.

Culex deceptor Howard, Dyar and Knab, l. c., iii, 408, 1915.

Culex mastigia Howard, Dyar and Knab, l. c., iii, 426, 1915.

Inhabits southern Florida and Cuba. Our material is extremely scanty, consisting of the following: Of *floridanus*, larvæ, no adult; of *agitator*, larvæ, no adult; of *deceptor*, no larvæ, one male and one female adult (the third female type is *peccator*), the male mounted for genitalia and the abdominal markings cannot be distinguished; of *mastigia*, no larvæ, two male and two female adults, both males mounted for genitalia, but the bases of the abdomens remaining show broad white basal

bands. On this basis, we consider the above synonymy, while extremely probable, not absolutely assured.

The larva has a peculiar tapering air-tube with long tufts diminishing outwardly; lateral comb of the eighth segment of 8 spines in a curved row. It lives in permanent water with aquatic vegetation, and has the habit of hanging itself up on leaves, etc., by the hooks of the air-tube or lying on the bottom, seldom coming to the surface. The male genitalia have the basal appendages small and papillose.

16. **Culex (Mochlostyrax) peribleptus**, new species.

Female.—Proboscis black, very slightly swollen at the tip; head with flat black scales, mixed with white ones, especially along the margins of the eyes and on the sides; narrow curved golden ones posteriorly, which run forward in a triangular patch almost to the front margin in the center; many erect forked black scales. Integument of mesonotum blackish, rather sparsely clothed with small narrow curved scales, varying from dark brown to golden brown and light golden, the mesonotum appearing under a hand lens black, with illy defined golden double dorsal lines and short subdorsal ones posteriorly, with a somewhat curved patch in front of the short stripes. Abdomen black above, slightly violaceous, the bristles at the ends of the segments pale; lateral spots white, triangular; venter with the segments white at their bases, broadly black at the apices of the terminal segments. Legs black, the femora white beneath nearly to tips; tips of femora and tibiæ narrowly pale. Wing scales black, those on the forks of the second vein narrowly ovate, the outstanding ones linear.

Male.—The genitalia have the side pieces about three times as long as wide, excavated at the base; lobe divided, the basal portion again forked, one arm short, one long, each bearing a filament with minutely hooked tip; outer division produced, bearing a group of filaments at outer third, a leaf just before the tip and a small filament at tip; clasp narrowed centrally, swollen on outer third, with a terminal groove at the insertion of the small stout terminal spine, the outer margin finely pilose. Harpes narrowly comb-shaped; unci with the second

plate emarginate; basal appendages large, quadrately capitate.

Types, two males and two females, No. 21571, U. S. Nat. Mus.; Parr Shoals, South Carolina, August 1 and 18, 1915, bred from larvæ in a grass pond (T. H. D. Griffiths). No larvæ were sent.

17. **Culex (Mochlostyrax) pose**, new species.

Female.—Head with gray flat scales, shining white in a strong light, white on the margins of the eyes and the sides; narrow curved yellowish scales posteriorly, reaching the front margin at vertex; erect forked scales pale brownish. Integument of mesonotum blackish, rather sparsely clothed with narrow curved scales, varying from brown to light golden, under the lens showing paired blackish spots in front in a uniformly golden surface, the posterior third with four diffused golden lines on a dark ground. Abdomen black scaled, with basal segmental white bands, rather narrow and a little irregular, widening on the sides; the band on the second segment triangularly produced in the middle; venter whitish scaled, the last segments with weak blackish apical bands. Legs black, femora white beneath nearly to tips; tips of femora and tibiæ narrowly pale. Wing scales black, those on the forks of second vein narrowly ovate outwardly, many linear ones on basal part of fork.

Type, female, No. 21572, U. S. Nat. Mus.; Dallas, Texas, November 11, 1905 (W. E. Hinds).

Genus *CLIMACURA* Howard, Dyar and Knab

18. **Climacura melanurus** Coquillett.

Culex (Climacura) melanurus Howard, Dyar and Knab, l. c., iii, 453, 1915.

This species inhabits the eastern United States. It is peculiar in passing the winter in the larval stage in the small water holes in boggy land where it lives. The eggs are laid singly. The species is rare, though widely distributed in swampy regions.

Genus CULICELLA Felt

19. **Culicella dyari** Coquillett.

Culex (Culicella) dyari Howard, Dyar and Knab, l. c., iii, 457, 1915.

It occurs in the northeastern States, westward to the mountains of British Columbia. The larvæ are found in the early spring in the pools left from the melting of the snow. All our records for the adults are in May. It appears there is but a single annual generation and the winter must be passed in the egg state. This species is not a *Culex* on habits any more than by the structure of the male genitalia.

Genus DEINOCERITES Theobald

20. **Deinocerites cancer** Theobald.

Deinocerites cancer Howard, Dyar and Knab, l. c., iii, 201, 1915.

This species has been taken in southern Florida. The larvæ live in the water in the holes of certain species of crabs along the tropical seashore. While this forms not more than a section of *Culex* by the male genitalia, the characters of the larvæ and adults have differentiated to such an extent that it is best classed as a genus.