

**AEDES (OCHLEROTATUS) NUBILUS THEOBALD, 1903 A
SYNONYM OF AEDES (OCHLEROTATUS) SERRATUS
THEOBALD, 1901**

(DIPTERA, CULICIDAE)

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The earlier workers in the classification of the neotropical Culicidae were often handicapped by scanty material. Many descriptions had perforce to be made from one or two specimens only, and if the microscopic preparations of the male terminalia or of the larvae were poor, an incorrect or incomplete description resulted. The advantages of modern optical equipment and adequate illumination, which permit more searching examination and exact interpretation, were not available to them. The earlier crude methods of making microscopic mounts of the male terminalia of mosquitoes have been superseded by improved techniques of staining and dissection. With modern methods and with more abundant material for study, many of the older species have been found to be synonyms.

In the reputedly "difficult" subgenus *Melanoconion* of the genus *Culex*, a study by the writer (1935) of the types in the U. S. National Museum reduced 16 species to synonymy. In the neotropical Sabethini, many synonyms have been found by Lane and Cerqueira (1942).

Even in the comparatively well-known species of the neotropical *Aedes* a number of synonyms exist which could not be uncovered until sufficient material had been accumulated for comparison.

The purpose of this paper is to show that *Aedes nubilus* Theobald, 1903 is a synonym of *Aedes serratus* Theobald, 1901.

To prove this, it must be shown that the separation of the two forms is poorly defined and contradictory in the literature, that the larval characters used to distinguish them are minor and inconstant, that the presence (in *serratus*) or absence (in *nubilus*) of a light longitudinal stripe on the female mesonotum is not a specific character, and that the male terminalia of the two forms are identical.

Aedes serratus was described by Theobald (1901) from males and females from the "Lower Amazon" [Brazil], New Amsterdam [British Guiana], Trinidad [B. W. I.], and also from Rio de Janeiro, Brazil. The female is described in part as follows: "Thorax dark brown, with a broad stripe of creamy-gray scales in the middle, extending from and continuous with the white in the middle of the head and passing back to the

scutellum . . . legs dark brown; . . . ungues equal and unserrated." The male description states: Thorax, &c. as in the ♀." Neither the male terminalia nor the larva is described.

REFERENCES TO EARLY DESCRIPTIONS OF THE LARVA OF *A. SERRATUS*

Dyar & Knab (1906) first described the larva of *serratus* under the name *Aedes meridionalis*, from Puntarenas, Costa Rica. Howard, Dyar & Knab (1917) describe the larva and give a figure. Dyar (1922) gives a key to the larvae of *serratus* and *nubilus*, in which no separation is attempted. Bonne & Bonne-Wepster (1925) describe the larva of *A. serratus*, but do not give a figure (as they do of *nubilus*, No. 57). Shannon (1931) gives a figure (Plate 8) of the comb-scale of *serratus*. Both *serratus* and *nubilus* are mentioned in his key to adults, giving the hitherto accepted difference in the thoracic ornamentation. However, the larva of *nubilus* is not mentioned in the larval key, although that of *serratus* is included. This peculiar omission is taken to mean that it was not realized that the same kind of larva could give rise to two forms of female adult. Dyar (1928) describes the larva of *serratus*; his figure is taken from Howard, Dyar & Knab (1917).

ORIGINAL DESCRIPTION OF THE LARVA OF *A. SERRATUS*

The original description is under the name *meridionalis* Dyar & Knab (1906). It states: "Antennae with the tuft before the middle; head hairs single; lateral hairs single after the first abdominal segment. Air tube 2 X 1. pecten short, reaching over one-half, followed by a large hair tuft; comb of twelve scales in a straight row. Anal segment broadly ringed." The larval skin from which this description was made is in the U. S. National Museum, under the number "Knab 333 b", and is the type of *meridionalis*. The locality is Las Loras, near Puntarenas, Costa Rica.

REFERENCES TO EARLY DESCRIPTIONS OF THE MALE TERMINALIA OF *A. SERRATUS*

The first description of the male terminalia of *serratus* is by Howard, Dyar & Knab (1917). Dyar (1922) gives a key separating *serratus* from *nubilus* by the male terminalia. Bonne & Bonne-Wepster (1925) describe the male terminalia of *serratus*, with a key separating it from *nubilus*. Dyar (1928) redescribes the male terminalia of *serratus* and gives a key separating it from *nubilus*. Figures of the terminalia of both are given.

ORIGINAL DESCRIPTION OF LARVA OF *A. NUBILUS*

The first description of the male terminalia of *serratus* is by Howard, Dyar & Knab (1917). (A more modern nomen-

elature has been indicated in brackets.) The description is: "Side-pieces over twice as long as wide; apical lobe slender, prominent, conical; basal lobe rounded, conical, setose, with a stout spine within. Clasp filament slender, slightly expanded in the middle, with a long terminal articulated spine. Harpes [10th sternites] narrowly elliptical, concave, inner margin thickened, revolute, tip pointed, outcurved. Harpagones [claspettes] with a slender columnar stem and terminal filament, which is linear, pointed at tip, not as long as stem. Unci [mesosome] approximate, revolute, forming a stout basal cylinder. Basal appendages [lobes of 9th tergite] slender, bearing five short spines."

AEDES NUBILUS

Aedes nubilus was described by Theobald (1903) from five females from British Guiana. The description states in part that the "Thorax is deep dusky brown, with narrow-curved bronzy scales. . . . Legs entirely brown. . . ." The male and larva were unknown to Theobald. Grabham (1906) first described the larva of *nubilus* under the name *pertinax*. Dyar (1918) describes the larva under the name *polyagrus*. Dyar (1922) gives a key to the larvae of *serratus* and *nubilus*. Bonne & Bonne-Wepster (1925) describe and figure the larva of *nubilus*, giving a key separating the larvae of *serratus* and *nubilus*. Dyar (1928) redescribes the larva of *nubilus* and gives a key separating it from *serratus*, but does not give a figure.

ORIGINAL DESCRIPTION OF LARVA OF A. NUBILUS

The original description is by M. Grabham (1906) under the name *pertinax*, and in part is as follows: "Head broadly elliptical. . . . Antennae subcylindrical with a slight curve inwards. . . . Tuft below the middle of about eight short hairs not reaching the apex of the shaft. Upper and lower epistomal head hairs single, a small compound hair on the inner side of these. . . . Two large hairs on each side of the first abdominal segment, a single large one on all the others. Comb of about ten scales in a single curved row, each with a strong apical spine and a number of fine setae on each side, spine as long as the body of the scale. Air tube 2 X 1. . . . subconical, slightly swollen above the base. Rows of pecten teeth insertions reaching up half the tube. Teeth evenly spaced, about twelve in number, each with several denticles on the inner side; A pair of large compound hairs at the level of the upper pair of teeth. . . ."

EARLY REFERENCES TO THE MALE TERMINALIA OF A. NUBILUS

The first description of the male terminalia of *nubilus* is by Grabham (1906) under the name *pertinax*. Dyar (1918) de-

scribes the male terminalia under the name *polyagrus*. Dyar (1920) gives a key separating the male terminalia of *polyagrus* from *pertinax*. Dyar (1922) gives a key to the male terminalia of the two species. Bonne & Bonne-Wepster (1925) give a key and descriptions of the two species.

ORIGINAL DESCRIPTION OF THE MALE TERMINALIA OF *A. NUBILUS*

The description by Grabham (1906) is under the name *pertinax* (a more modern terminology is indicated in brackets). It is in part as follows: "♂ . . . terminal clasp segment [clasper] slender, curved, slightly swollen in the middle, apical spine blunt, about one-fifth length of limb; basal clasp segment [side-piece] with a large apical lobe; claspette [basal lobe] a well-developed lobe near base, covered with short spines (no long ones present). Harpes. [claspette] bases villous with fine hairs, at the apex of each a recurved sickle-like portion [filament of claspette]. Harpagones [tenth sternites] deeply infuscated, with a strong recurved spine on each. Unci [mesosome] separated, each terminating in a point. Setaeous lobes [lobes of ninth tergite] pyramidal, with about ten strong curved spines along the internal borders only. . . ."

Keys to the male terminalia of *serratus* and *nubilus*, to be found in the earlier literature, are given below.

Dyar (1920) gives the following key:

"Filament of harpago claspette broadly oval with very short recurved tip *pertinax* Grabham (*nubilus* Theob.)
 Filament of harpago narrowly oval with strong recurved tip
 *polyagrus* Dyar (*nubilus* Theob.)"

(Dyar later (1922) stated that he did not consider this distinction valid.)

Dyar (1922) gives the following key:

"Filament of claspette elliptical, projecting at base and lined 'calla-lily shaped'. Stem of claspette long and slender
 *nubilus* Theobald
 Filament of claspette slender. Stem of claspette longer than the filament. Stem much longer than filament; apical lobe large and prominent *serratus* Theobald."

Bonne & Bonne-Wepster (1925) give the same key, using the exact wording, but in a slightly different arrangement.

Dyar (1928) uses the same wording, but arranges the key in the form of a dichotomy. An abstract follows:

"14b Filament of claspette elliptical, projecting at base and lined . . . 15
 15b Stem of claspette long and slender *nubilus*

14c Filament of claspette slender	16
15b Stem of claspette longer than the filament	17
17a Stem much longer than the filament; apical lobe large and prominent	<i>serratus</i> '

In the body of the text (pages 157 and 159), the claspette filament of *nubilus* is described: "Claspette with narrow stem, the filament large, roundedly expanded at base, lined, tapering to a curved point." The same part in *serratus* is described thus: "Claspette with slender stem and short lined filament." Apparently the shape of the filament of the claspette was relied upon to separate the two forms. The supposed difference will later be shown to be non-existent.

Some early keys to the larvae of the two forms are given below.

Dyar (1922) gives the following key to the larvae:

"Anal segment ringed by the plate.

Pecten of air-tube uniform; lateral comb with scales in a nearly straight row.

Air-tube short and thick.

Lateral comb with about ten scales (9-11).

Hair-tuft at end of pecten or beyond it *serratus* Theob.
nubilus Theob.'"

In the above key, no separation is made.

Bonne & Bonne-Wepster (1925) give the following key to the larvae:

"1b Air-tube with the tuft beyond the pecten.....	5
5a Comb-scales in a single or irregularly single row	6
6 Anal segment ringed by the plate	7
7a Anal processes long	8
8 Air-tube pecten of about ten teeth	<i>serratus</i> Theobald
Air-tube pecten of about eight teeth	<i>nubilus</i> Theobald'"

This separation is not feasible, as the number of pecten-teeth is a variable character.

Dyar (1928) gives a key to the larvae, an abstract of which follows:

"6b Air-tube short, less than three times as long as wide	10
10a Air-tube with the hair-tuft beyond the pecten	13
13a Comb of the eighth segment of few scales.....	14
14b Comb of ten or more scales	<i>serratus</i>
6b Air-tube short, less than three times as long as wide	10
10a Air-tube with the hair-tuft within the pecten	11

11a Lateral comb of the eighth segment of few scales	12
12b Pecten reaching over half the length of the air-tube, the tuft only just within it	<i>nubilus</i> "

This separation rests on the position of the tuft of the air-tube, which is said to be *within* the pecten in *nubilus*, and *beyond* the pecten in *serratus*. Yet in the body of the text (pp. 157 and 159) the tuft is said to be *beyond* the pecten in both *nubilus* and *serratus*. Moreover, Dyar synonymized *polyagrus* with *nubilus*, but in the type slide of the larva of *polyagrus* (No. 21551, U.S.N.M.) the tuft is actually *beyond* the pecten, and not *within* it; in the key above, this would place *polyagrus* with *serratus*, and not with *nubilus*. Therefore, the separation based on the position of the tuft on the air-tube is not consistent.

Thus it is shown that no constant characters have been pointed out by earlier workers whereby the two forms can be distinguished in the larval stage.

The larvae of *serratus* and *nubilus* were known to be closely similar, the only difference stated by various authors being the position of the tuft of the air-tube with reference to the pecten-teeth.

Grabham (1906) says that the tuft is "at the level of the upper outer pair of teeth" in *pertinax* [= *nubilus*].

Howard, Dyar and Knab (1917) say it is "before the outer tooth" in *pertinax* [= *nubilus*].

Dyar (1922) states of *Aedes nubilus pertinax* Grabham that the tuft is "just within the pecten instead of beyond it."

Bonne & Bonne-Wepster (1925) say of *nubilus*: pecten with "a multiple tuft of feathered hairs just beyond the pecten."

Concerning *meridionalis* [= *serratus*] Dyar & Knab (1906) say: "Pecten short . . . followed by a large hair tuft."

Of *serratus*, Howard, Dyar & Knab (1917) say: "a tuft of six or eight hairs just beyond pecten."

Bonne & Bonne-Wepster (1925) also say of *serratus* "a multiple tuft just beyond pecten."

Dyar (1928, pp. 157 and 159) says: "closely followed by a multiple tuft," in describing the larvae of both *serratus* and *nubilus*.

However, it should be noted that this latter description does not agree with the key given by Dyar in the same volume (p. 151). An abstract of this key is given earlier in the present paper, and it is there shown that the separation made is not consistent.

DISCUSSION

Dyar was early aware that his basis for separating *nubilus* from *serratus* was rather indefinite, but in his later work he neglected his earlier conclusions and retained the two forms as distinct species. Thus in 1918 he notes: "Mrs. Bonne-Wepster sends bred specimens [of *nubilus*] from identical larvae, the males with a silvery median mesonotal stripe, the females entirely without this marked ornamentation. The species is therefore, sexually dimorphic." Yet in 1922 he states of *nubilus*: "In the female, the silver line on the mesonotum may be present or absent. Theobald described *nubilus* from a female in which the silvery mark was absent. The differences given by me¹ in the shape of the claspette filament between *pertinax* [= *nubilus*] and *polyagrus* [= *nubilus*] I do not now consider valid. The shape of this structure seems to vary greatly according to the accidents of preparation." Of *A. serratus* he says (1922, p. 163) "Except for the genitalia, this species is very difficult to separate from *Aedes nubilus* Theobald. The silvery mesonotal stripe appears to be always present in the female, and is generally broader than in *nubilus*. It is probable that the two are often confused."

At this time, 1922, Dyar believed that the difference in the male terminalia separating *serratus* from *nubilus* lay in the shape of the filament of the claspette, as he put little stress on the character of the light mesonotal stripe in the female of *serratus*, and its absence in *nubilus*; as late as 1928 he synonymized under *nubilus* two forms, *pertinax* Grabham 1906 and *quasiserratus* Theobald 1907, concerning which the original descriptions state that the female has a light median mesonotal stripe.

The writer examined the seven slide-mounts of the male terminalia of *serratus* and the five slide mounts of *nubilus* in the collection of the U. S. National Museum which were made before Dyar's death in 1929. All the *serratus* mounts with the exception of one, and all the *nubilus* mounts, also with the exception of one, showed the characters of the filament of the claspette to these forms.

But the two exceptional slides should have provided a clue to the identicalness of the two forms. One slide, labeled "A. serratus, Paraiso, Canal Zone, J. Zetek, M 56 z 1086," shows the right claspette filament oriented edge on, so that it appears narrow and slender (*serratus* form) while the other claspette is turned showing the lateral aspect, so that the expanded

¹The differences in the shape of the claspette filament of *pertinax* and *polyagrus* mentioned above are found in Dyar's key (1920, p. 177).

base and striate body with long curved tip is visible (*nubilus* form). (See Fig. 1.)

The other slide is labeled "Aedes polyagrus Dyar, Surinam, Bonne-Wepster K. 1918, 970," and in it the conditions are reversed. The left claspette filament appears narrow and linear, while the right claspette shows very plainly the expanded base and striate body characteristic of the *nubilus* form. (See Fig. 2.)

The writer was fortunate in obtaining material which shows that the light mesonotal stripe in the female adult is an inconstant character. During August 1944 he reared a series of adults from fourth-stage larvae of what were apparently *A. serratus* from temporary rain-pools in a cocoa plantation at Base Line, one of the banana farms of the United Fruit Company inland from Amirante, Panama. All the male adults of the series had a light mesonotal stripe, but the females showed a gradation from an all dark mesonotum to one with a broad light stripe. The larvae were mounted, and showed the characteristic comb-scales and pecten-teeth of *serratus* or *nubilus*. The male terminalia of several specimens were examined, and all showed the claspette filament expanded at the base and striate, tapering to a curved point, as described for *nubilus*.



Fig. 1. Male terminalia labeled "*A. serratus*." The arrow points to the left claspette filament, which is expanded at base and striate; the right filament is apparently linear.

Fig. 2. Male terminalia labeled "*A. polyagrus*" [= *nubilus*]. The arrow points to the right claspette filament, which is expanded at base and striate; the left filament is apparently linear.

SUMMARY

In the introduction it was proposed to show (1) that the earlier literature concerning the two forms contained distinctions which were poorly defined and contradictory, (2) that the larval differences mentioned are minor and inconstant, (3) that the presence or absence of a light longitudinal stripe on the mesonotum of the female is not a specific character, and (4) that the male terminalia of the two forms are identical.

The papers of the authors quoted above demonstrate the first two propositions. The writer's series of females, reared from identical larvae, which produced two forms, with intergrades between them, proves that the coloration of the female mesonotum is variable. The males reared from this series of larvae showed the same form of claspette filament. The fourth point is proved by the two slides of male terminalia in the collection of the U. S. National Museum, labeled respectively *serratus* and *polyagrus*, [= *nubilus*], photomicrographs of which are shown in Figures 1 and 2. These show that the filament of the claspette of both forms is identical in shape, and that therefore the earlier distinction based on this structure is not valid.

It is believed, therefore, that the two forms, *serratus* and *nubilus*, represent only one polymorphic species which must be called *serratus* Theobald 1901, the latter name having priority.

These two forms are widely distributed and very common in the neotropical region, ranging from Mexico to Argentina and including the Bahamas and the Greater Antilles. The larvae breed in temporary pools in the forest. The females are fierce biters, attacking by day and by night in the jungle, and have been suspected of being possible vectors of jungle yellow fever in South America. The reduction to the synonymy of one of these forms will simplify the task of the taxonomist and will lessen the confusion of the field worker in dealing with the multiplicity of species found in the neotropical region.

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A NEW SPECIES OF OPIUS FROM THE PHILIPPINE ISLANDS

(HYMENOPTERA, BRACONIDAE)

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The following description applies to an apparently undescribed species of *Opius* recently reared from fruit fly pupae in the Philippine Islands.

Opius acidoxanthicidus, new species

Male and female. Length of body 4 mm., generally smooth and shining, and finely clothed with pale hairs, the head somewhat punctate, particularly on the face and vertex, the mesothoracic scutum bare and highly polished; ochraceous, legs, mandibles and base of antennae concolorous (tarsi, however, more or less infuscate); antennae distally from second segment, ocellar space, apical margin of mandibles and ovipositor black or blackish.

Head transverse, twice as wide as long, wide between the eyes, which are convex, ocelli in the center of the fronto-vertex, the members arranged in an obtuse triangle with a slight depression on the outer side of the members; distance from lateral ocellus to eye margin about three times diameter of ocellus; antennae considerably longer than the body, 52-segmented, scape and pedicel stout, flagellum filamentous; antennae fairly wide apart at base, space between the antennal socket rings a trifle less than diameter of same, which is twice distance to eye margin; front rather flat and sloping forward to base of antennae, gradually merging with face, which is slightly convex and lies more or less in the vertical plane, clypeus wide (three times length) and straight margined in front, bowed posteriorly, the clypeal fovea at the lateral angles, the genae quite narrow, postgenae wider, mandibles stout, concavo-convex, becoming more or less acute apically and bidentate.

Thorax robust, as wide as the head and deeper than wide, sides of the pronotum deeply sulcate, mesothoracic scutum with short and deep parapsidal furrows near anterior margin, diminishing and gradually disappearing posteriorly, transverse prescutellar sulcus with a pair of large circular median fossae, two smaller ones on either side (male with prescutellar sulcus but without noticeable fossae), scutellum triangular, convex, pro-