THE AMERICAN AEDES OF THE PUNCTOR GROUP

(Diptera, Culicidæ)

PLATE I

By HARRISON G. DYAR

It may be best to substitute the subgeneric name *Ochlerotatus* for the group treated by me as *Heteronycha* (this article follows the one in Ins. Ins. Mens., viii, 106–120, 1920). The two names differ in time of appearance only by page priority, being actually simultaneous. The principal reason for the change is to agree with European authors. Other reasons are: *Ochlerotatus* was clearly defined by Lynch Arribálzaga with a well-known type species (*confirmatus* Arrib. = *scapularis* Rond.), while *Heteronycha* was ill-defined, the type species *dolosa* consisting of males of *Culex bonariensis* Brèthes and females of *Aëdes lynchii* Brèthes. Again *Ochlerotatus* was already used by Coquillett (1906), who referred *Heteronycha* to the synonymy of *Culex* on the erroneous association of the sexes made by Arribálzaga. Finally by the first reviser principle, the type of *Heteronycha* was fixed to the *Culex* element by the action of Theobald in 1901.

The *punctor* group as defined by me (Ins. Ins. Mens., viii, 105, 1920) divides into two series, the *punctor* series proper, in which the spine on the basal lobe of the side piece of the male hypopygium is a normal spine, and the *spencerii* series, in which this spine is modified. The first series is represented in the north European fauna almost species by species; the second series is not represented in Europe at all, as far as present researches show.

The male hypopygium of all but two of the *punctor* series is so similar that it would be advisable to treat them as local subspecies, were it not for the fact that two forms, differing in larvæ and habits, occur in the same faunal region, flying together. The subspecific conception cannot apply to such forms.

Series 1

Species 1

Aëdes (Ochlerotatus) dysanor, new species.

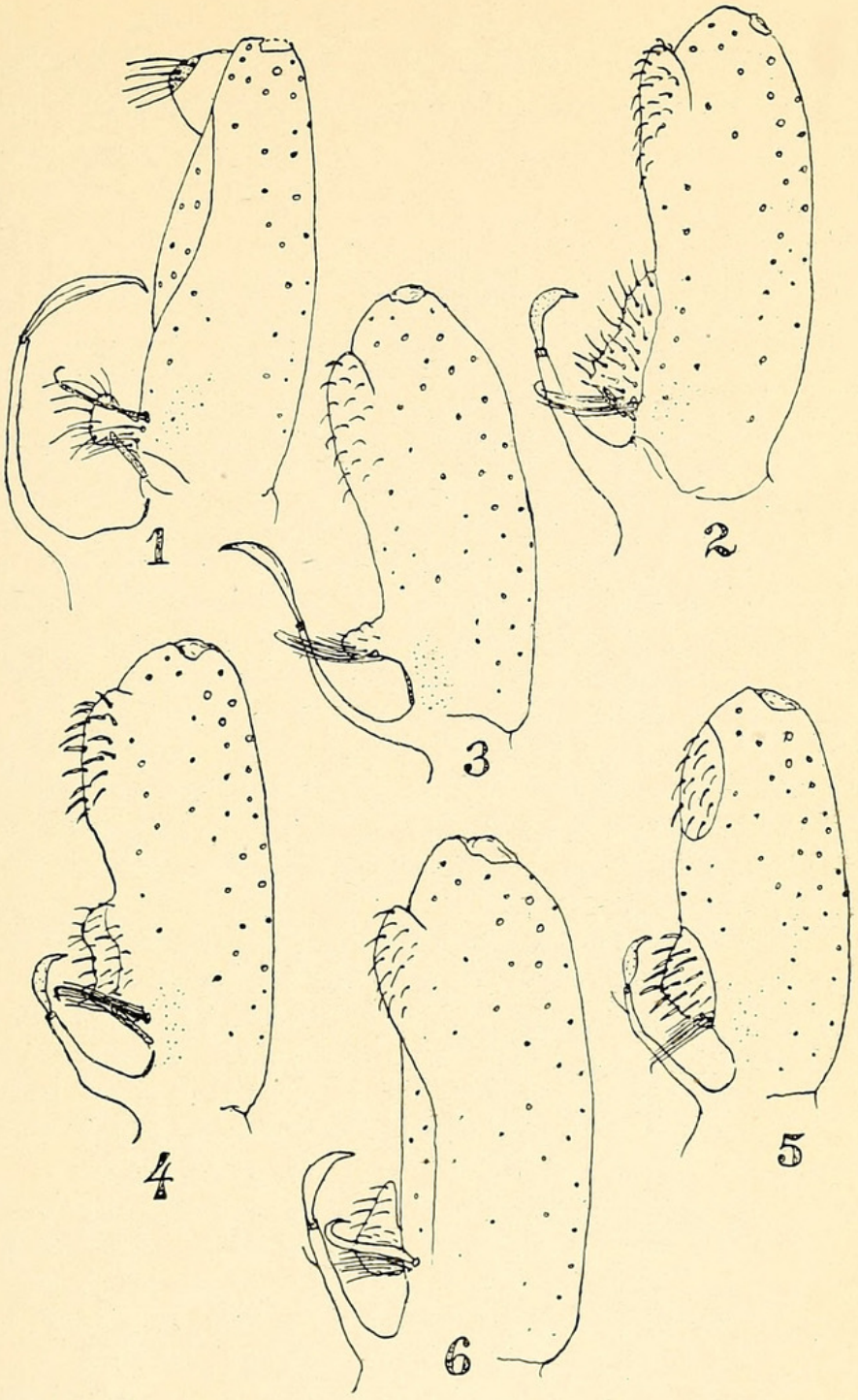
Mesonotum gray at the sides, the dorsal lines brown, generally separate with a tendency toward suffusion, sometimes confluent in a square band; abdominal bands white, narrowed centrally, moderately broad; generally as in *punctor,* apparently smaller. A narrow white line on the outer side of hind tibiæ.

Hypopygium. Apical lobe of side-piece as in *punctor;* basal lobe small, conically elevated, with an oblique basal chitinized rod as in *lazarensis* (Plate I, fig. 1), but the structure is much smaller, a group of long setæ on the basal aspect, of which one is curled at the end, but hardly stouter than the others, although with a larger basal tubercle. Claspette longer and slenderer than in *punctor,* the filament much longer, sickle-shaped, gradually widened in the middle (Plate I, fig. 3).

Type, male, No. 24023, U. S. Nat. Mus.; Plattsburgh, New York, April, 1905 (H. G. Dyar and Miss Edna Hudson); paratypes, males, six, Dublin, New Hampshire, May, 1909 (A. Busck); two, Saxeville, Wisconsin, May 23 and June 1, 1909 (B. K. Miller); one, Fort Ethan Allen, Vermont (through Dr. C. S. Ludlow); one, Fort Strong, Massachusetts, May 5, 1920 (R. I. Schott, through Dr. C. S. Ludlow).

No isolated larvæ are at hand; but the characters must be essentially as in *punctor,* for several specimens were determined by the late Frederick Knab as *auroides* Felt, the determination being made from the larvæ at the time, collected by Mr. August Busck.

This is evidently the American representative of the European *Aëdes concinnus* Stephens (= *sylvae* Theobald, Lang, Handb. Brit. Mosq., 91, 1920, of which *dorsovittatus* Villeneuve is also a synonym according to F. W. Edwards, in litt.). I have before me no slide of *concinnus;* but the European form has the filament of the claspette very broad and short, as kindly



Hypopygium of *Aëdes* of *punctor* group (setæ clasper and basal organs omitted).

1. *Aëdes lazarensis* Felt & Young, White Horse, Yukon Territory, July 2, 1919 (H. G. Dyar).
2. *Aëdes punctor* Kirby, White River, Ontario, June 13, 1918 (H. G. Dyar).
3. *Aëdes dysanor* Dyar, Plattsburgh, New York, April, 1905 (Dyar & Hudson).
4. *Aëdes aboriginis* Dyar, Prince Rupert, British Columbia, May 31, 1919 (H. G. Dyar).
5. *Aëdes fisheri* Dyar, Summit, California, June 18, 1920 (H. G. Dyar).
6. *Aëdes aestivalis* Dyar, Sand Point, Idaho, July 3, 1917 (H. G. Dyar).

pointed out to me by Mr. F. W. Edwards (figured by Brolemann as *Culicada nemorosa salina* in Ann. Soc. Ent. France, 1919, 81, figs. 6-8). It is, therefore, clearly specifically distinct.

SPECIES 2

Aëdes (Ochlerotatus) punctor Kirby.

Culex punctor Kirby, Richardson's Fauna Bor.-Am., iv, 309, 1837.
Culex implacabilis Walker, List Dipt. Brit. Mus., i, 7, 1848.
Culex provocans Walker, List Dipt. Brit. Mus., i, 7, 1848.
Culex punctor Bethune, Can. Ent., xiii, 164, 1881.
Culex punctor Giles, Handb. Gnats or Mosq., 289, 1900.
Culex provocans Giles, Handb. Gnats or Mosq., 327, 1900.
Culex punctor Theobald, Mon. Culic., ii, 75, 86, 1901.
Culex nemorosus Theobald (in part, not Meigen), Mon. Culic., ii, 80, 1901.
Culex nemorosus Giles (in part, not Meigen), Gnats or Mosq., 2 ed., 436, 1902.
Culex punctor Giles, Handb. Gnats or Mosq., 2 ed., 435, 1902.
Culex abserratus Felt & Young, Science, n. s., xx, 312, 1904.
Culex punctor Dyar, Proc. Ent. Soc. Wash., vi, 39, 1904.
Culex nemorosus Felt (not Meigen), Bull. 79, N. Y. Sta. Mus., 332, 1904.
Culex abserratus Felt, Bull. 79, N. Y. Sta. Mus., 329, 1904.
Culicada abserratus Felt, Bull. 79, N. Y. Sta. Mus., 391c, 1904.
Culex punctor Coquillett, Proc. Ent. Soc. Wash., vi, 168, 1904.
Culex punctor Dyar, Journ. N. Y. Ent. Soc., xii, 169, 245, 1904.
Culex punctor Blanchard, Les Moust., 359, 1905.
Theobaldinella nemorosa Blanchard (in part, not Meigen), Les Moust., 391, 1905.
Grabhamia punctor Dyar, Journ. N. Y. Ent. Soc., xiii, 186, 1905.
Culicada auroides Felt, Bull. 97, N. Y. Sta. Mus., 448, 1905.
Culicada abserratus Felt, Bull. 97, N. Y. Sta. Mus., 467, 1905.
Ochlerotatus abserratus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 19, 1906.
Ochlerotatus auroides Coquillett, U. S. Dep. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Ochlerotatus provocans Coquillett, U. S. Dep. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Ochlerotatus punctor Dyar, U. S. Dep. Agr., Bur. Ent., Circ. 72, 4, 1906.
Ochlerotatus auroides Dyar, U. S. Dep. Agr., Bur. Ent., Circ. 72, 5, 1906.
Culicelsa auroides Dyar, Journ. N. Y. Ent. Soc., xiv, 109, 1906.

Aëdes punctor Dyar, Journ. N. Y. Ent. Soc., xiv, 194, 1906.
Aëdes auroides Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 197, 1906.
Culicada abserrata Theobald, Mon. Culic., iv, 364, 1907.
Culicada nemorosa Theobald (in part, not Meigen), Mon. Culic., iv, 370, 1907.
Culicada punctor Theobald, Mon. Culic., iv, 371, 1907.
Culicelsa auroides Theobald, Mon. Culic., iv, 380, 1907.
Culicada abserrata Theobald, Mon. Culic., v, 306, 1910.
Culicada nemorosa Theobald (in part, not Meigen), Mon. Culic., v, 307, 1910.
Culicada punctor Theobald, Mon. Culic., v, 309, 1910.
Culicelsa auroides Theobald, Mon. Culic., v, 322, 1910.
Aëdes abserratus Morse, Ann. Rept. N. J. Sta. Mus., 1909, 719, 1910.
Aëdes abserratus Headlee, Bull. 276, N. J. Agr. Exp. Sta., 101, 1915.
Aëdes abserratus Felt & Stage, Bull. 186, N. Y. Sta. Mus., 68, 1916.
Aëdes centrotus Howard, Dyar & Knab, Mosq. No. & Cent. Am. and W. I., iv, 747, 1917.
Aëdes provocans Howard, Dyar & Knab, Mosq. No. & Cent. Am. and W. I., iv., 748, 1917.
Aëdes auroides Howard, Dyar & Knab, Mosq. No. & Cent. Am. and W. I., iv, 749, 1917.
Aëdes abserratus Howard, Dyar & Knab, Mosq. No. & Cent. Am. and W. I., iv., 752, 1917.
Aëdes punctor Howard, Dyar & Knab, Mosq. No. & Cent. Am. and W. I., iv, 754, 1917.
Aëdes auroides Howard, Parasit., iv, 75, 1918.
Aëdes punctor Dyar, Ins. Ins. Mens., vii, 13, 1919.
Aëdes punctor Dyar, Ins. Ins. Mens., viii, 3, 1920.

The spine on the basal lobe of the side-piece of the male hypopygium is moderately stout only (Pl. I, fig. 2). In the European species, which has been called *nemorosus*[1] (Lang, Hand. Brit. Mosq., 91, 1920) this spine is distinctly stouter. Lang's figure 64 shows the structure well, except that the artist has omitted the long accompanying setæ. I have a specimen from the Royal Museum, Stockholm, Sweden, which agrees.

[1] Mr. Edwards informs me that the types of *nemorosus* Meigen are another species, leaving the present species nameless. Mr. Edwards thinks that *punctor* Kirby will cover both forms; but with this I can scarcely agree, and would suggest the name *meigenanus* for the European one.

Besides this structural difference, the habits of the European species as described by Lang are quite at variance with those of *punctor* in America. I am therefore of opinion that *punctor* and *nemorosus* Auct. are distinct species.

Typical genitalic mounts are before me from Mount Tom, Massachusetts, May 6, 1903 (F. Knab); Plattsburgh, New York, April, 1905 (H. G. Dyar); Dublin, New Hampshire, May, 1909 (A. Busck); Saxeville, Wisconsin, May 23, 1909 (B. K. Miller); White River, Ontario, April, 1918 (H. G. Dyar); Prince Albert and Beaver Creek, Saskatchewan, June, 1918 (A. E. Cameron); Agassiz, British Columbia, April 24, 1919 (E. Hearle); Prince George, British Columbia, May 14, 1919 (H. G. Dyar); Kwinitsa, British Columbia, May–June, 1919 (H. G. Dyar); White Horse, Yukon Territory, July 2, 1919 (H. G. Dyar).

SPECIES 3

Aëdes (Ochlerotatus) aboriginis Dyar.

Aëdes aboriginis Dyar, Ins. Ins. Mens., v, 99, 1917.
Aëdes aboriginis Dyar, Ins. Ins. Mens., vi, 78, 1918.
Aëdes aboriginis Dyar, Ins. Ins. Mens., viii, 25, 1920.

The spine on the basal lobe of the male hypopygium is still more slender than in *punctor;* the basal lobe itself is smaller and more distant from the apical lobe (Pl. I, fig. 4). The differences are, however, slight, and taken alone might be doubtful; but the larva differs in having the anal segment not ringed, the plate being divided on the ventral line. This is a large species, like *punctor,* inhabiting the moist northwest Pacific coast from Washington to Alaska. The larvæ frequent open, often dirty pools, frequently occurring in ditches and other artificial water.

SPECIES 4

Aëdes (Ochlerotatus) hexodontus Dyar.

Aëdes hexodontus Dyar, Ins. Ins. Mens., iv, 83, 1916.
Aëdes hexodontus Dyar, Ins. Ins. Mens., v, 13, 1917.
Aëdes hexadontus Howard, Dyar & Knab, Mosq. No. & Cent. Am. & W. I., iv, 1041, 1917.
Aëdes hexodontus Dyar, Ins. Ins. Mens., vi, 78, 1918.

Aëdes hexodontus Dyar, Ins. Ins. Mens., viii, 23, 1920.
Aëdes hexodontus Dyar, Ins. Ins. Mens., viii, 168, 1920.

The spine on the basal lobe of the male hypopygium is distinctly stout, the structure being practically inseparable from that of the European form. The present species, however, is confined to the mountains of California and Oregon, breeding in open shallow pools in spring. The winter is passed in the egg state. The coloration of the adults is variable, tending to brown or yellow suffused forms, rarely distinctly marked with two brown lines. This differs from the European *nemorosus* Auct., which is of the *punctor* type, the mesonotum yellow with broad central dark band.

SPECIES 5

Aëdes (Ochlerotatus) leuconotips Dyar.

Aëdes leuconotips Dyar, Ins. Ins. Mens., viii, 24, 1920.

The spine of the basal lobe of the side-piece of the male hypopygium is very stout, and there is no marked differentiation from *hexodontus*. The coloration of the adult is as in *aboriginis*, but the species is not as large. The larvæ breed early in muskeg-pools in the moist coastal strip from British Columbia to Alaska. The larvæ agree structurally with both *hexodontus* and *punctor;* but the breeding pools are of a very different character, and the species appears to be distinct.

SPECIES 6

Aëdes (Ochlerotatus) cyclocerculus Dyar.

Aëdes cyclocerculus Dyar, Ins. Ins. Mens., viii, 23, 1920.

In male genitalia and structure of larva indistinguishable from *leuconotips*. The larvæ inhabit muskeg-pools in the same region; but the species is smaller, the coloration of the adults different, and the larvæ darker and more gregarious. This is the commonest species in virgin forest on the coast of British Columbia and Alaska. The mesonotum is generally marked with dark side-stripes, the middle stripe more or less obsolete, which gives a unique appearance. Nevertheless, *cyclocerculus* and *leuconotips* may be varieties of one species. Further experience with these forms is desirable.

SPECIES 7

Aëdes (Ochlerotatus) fisheri Dyar.

Aëdes fisheri Dyar, Ins. Ins. Mens., v, 19, 1917.
Aëdes fisheri Dyar, Ins. Ins. Mens., viii, 23, 1920.
Aëdes fisheri Dyar, Ins. Ins. Mens., viii, 169, 1920.

The basal lobe of the side-piece of the male hypopygium (Pl. I, fig. 5) has the setæ coarse, the spine slender and confused in a group of similar setæ. The larva has the anal segment not ringed by the plate as in *aboriginis,* but the air-tube has detached teeth, a character unknown elsewhere in the *punctor* group. The species has so far been found only in the high Sierras of California, at the 7,000 foot level. The male is peculiar in having the mesonotum hairy as in the arctic species, although this character is not shared by the female. The palpi in the male, also, are distinctly shortened from the usual condition.

SERIES 2

In this series, the spine of the basal lobe of the side piece of the male hypopygium is very much thickened, but of a thin transparent consistency (Pl. I, fig. 6). The basal lobe itself is expanded, its outer margin free from the side-piece. There does not seem to be any specific modification of this structure in the following forms. Two of the species, *spencerii* and *idahoensis,* are separable by the peculiarly colored wing-scales, alternate veins being black and white scaled. These inhabit prairie country inland. The others have the scales not so contrasted in color. These are all flood species, breeding in pools filled by the high water of rivers or lakes.

SPECIES 8

Aëdes (Ochlerotatus) spencerii Theobald.

Culex spencerii Theobald, Mon. Culic., ii, 99, 1901.
Culex spencerii Giles, Handb. Gnats or Mosq., 2 ed., 431, 1902.
Grabhamia spencerii Theobald, Mon. Culic., iii, 250, 1903.
Grabhamia spencerii Ludlow, Journ. N. Y. Ent. Soc., xi, 143, 1903.
Culex spenceri Dyar, Proc. Ent. Soc. Wash., vi, 41, 1904.
Grabhamia spencerii Theobald, Gen. Ins., Dipt., fasc. 26, 23, 1905.
Culex spenceri Blanchard, Les Moust., 277, 1905.

Grabhamia spenceri Blanchard, Les. Moust., 397, 1905.
Ochlerotatus spenceri Coquillett, U. S. Dep. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Grabhamia spenceri Theobald, Mon. Culic., iv, 285, 1907.
Aëdes spenceri Dyar, Proc. U. S. Nat. Mus., xxxii, 125, 1907.
Aëdes spenceri Knab, Journ. N. Y. Ent. Soc., xv, 216, 1907.
Aëdes spenceri Knab, Smith. Misc. Colls., quart. iss., 1, 541, 1908.
Grabhamia spencerii Theobald, Mon. Culic., v, 290, 1910.
Aëdes spencerii Howard, Dyar & Knab, Mosq. No. & Cent. Am. & W. I., iv, 723, 1917.
Aëdes spenceri Cameron, Agr. Gaz. Can., v, 557, 1918.
Aëdes spenceri Cameron, Jn. Am. Med. Vet. Ass., liii, 633, 1918.
Aëdes spencerii Dyar, Ins. Ins. Mens., vii, 37, 1919.

This species inhabits the open prairies in Canada, and is easily recognizable by the bicolored wing-scales and the pale dorsal stripe of the abdomen.

SPECIES 9

Aëdes (Ochlerotatus) idahoënsis Theobald.

Grabhamia spencerii idahoensis Theobald, Mon. Culic., iii, 250, 1903.
Ochlerotatus spenceri Coquillett (in part), U. S. Dep. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Aëdes idahoensis Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 57, 1908.
Aëdes spenceri Cooley (not Theobald), Bull. 109, Mont. Agr. Exp. Sta., 153, 1916.
Aëdes spenceri Cooley (not Theobald), Bull. 112, Mont. Agr. Exp. Sta., 73, 1916.
Aëdes idahoensis Dyar, Ins. Ins. Mens., v, 120, 187, 1917.
Aëdes idahoensis Howard, Dyar & Knab, Mosq. No. & Cent. Am. & W. I., iv, 727, 1917.
Aëdes idahoensis Dyar, Ins. Ins. Mens., vi, 78, 1918.
Aëdes idahoensis Cockerell, Journ. Econ. Ent., xi, 199, 1918.

This species inhabits the limited prairies along river valleys in Colorado and Montana, Idaho, Nevada and eastern Washington, probably extending into southeastern British Columbia. The larvæ breed in early spring pools in arid land, and also to a less extent in later pools caused by irrigation or exceptional rains.

This is closely allied to *spencerii,* but inhabits a separate

region. The wing-scales are bicolored, but the abdominal pale stripe is only exceptionally present. There are larval differences between *idahoënsis* and *spencerii.*

SPECIES 10

Aëdes (Ochlerotatus) hirsuteron Theobald.

Culex hirsuteron Theobald, Mon. Culic., ii, 98, 1901.
Culex hirsuteros Giles, Handb. Gn. or Mosq., 2 ed., 451, 1902.
Culex reptans Smith (not Linnaeus), Bull. 171, N. J. Agr. Exp. Sta., 38, 1904.
Culex pretans Grossbeck, Ent. News, xv, 332, 1904.
Culex pretans Smith & Grossbeck, Psyche, xii, 17, 1905.
Culex pretans Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 291, 1905.
Culex pretans Britton & Viereck, Rept. Conn. Agr. Exp. Sta. 1904, 271, 1905.
Culex hirsuteron Theobald, Gen. Ins., Dipt., fasc. 26, 27, 1905.
Culex hirsuteron Blanchard, Les Moust., 350, 1905.
Culex pretans Blanchard, Les Moust., 630, 1905.
Aëdes pretans Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 201, 1906.
Ochlerotatus pretans Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 18, 1906.
Ochlerotatus hirsuteron Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Ochlerotatus pretans Dyar, U. S. Dept. Agr., Bur. Ent., Circ. 72, 6, 1906.
Culicada pretans Theobald, Mon. Culic., iv, 353, 1907.
Culex (Ochlerotatus) pretans Viereck, 1st. Ann. Rept. Comm. Health Pa., 470, 1908.
Aëdes pretans Thibault, Proc. Ent. Soc. Wash., xii, 18, 1910.
Culicada pretans Theobald, Mon. Culic., v, 305, 1910.
Culex hirsuteron Theobald, Mon. Culic., v, 358, 1910.
Aëdes pretans Morse, Ann. Rept. N. J. Sta. Mus., 1909, 719, 1910.
Aëdes pretans Headlee, Bull. 276, N. J. Agr. Exp. Sta., 195, 1915.
Aëdes hirsuteron Howard, Dyar & Knab, Mosq. No. & Cent. Am. & W. I., iv, 743, 1917.
Aëdes hirsuteron Dyar, Ins. Ins. Mens., vii, 34, 1919.

The mesonotum is broadly dark brown in the middle, the usual two brown stripes being united into a band. This form inhabits the Atlantic region from southern Canada to Texas. The form is local and erratic as to apperance, breeding in low

pools filled by overflow from high water of rivers. There is usually a single spring generation in the north (adults, April, at Washington, D. C.; June, at Ottawa, Ontario, and Fort Snelling, Minnesota), but in the south the emergence seems to depend upon casual floods, which may not recur for a period of years. Specimens before me from Wister, Indian Territory, were taken in July, and Mr. E. W. Jackson of the Essex County Mosquito Extermination Board in New Jersey told me of an experience of his where a flood occurred in the valley of a river. He watched successive broods of *hirsuteron* appearing in higher and higher pools as the water was backed up farther from week to week, until finally pools were reached which had not been water-filled for twelve years preceding, yet *hirsuteron* larvæ appeared in them. Mr. Jackson asked me how long the eggs could live on the ground, a question more easy to ask than to answer.

SPECIES 11.

Aëdes (Ochlerotatus) aestivalis Dyar (Pl. I, fig. 6).

Culex reptans Dyar (not Linnaeus), Proc. Ent. Soc. Wash., vi, 38, 1904.

Culex aestivalis Dyar, Journ. N. Y. Ent. Soc., xii, 245, 1904.

Grabhamia aestivalis Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.

Grabhamia aestivalis Dyar, Journ. N. Y. Ent. Soc., xiii, 54, 1905.

Aëdes aestivalis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 201, 1906.

Ochlerotatus aestivalis Coquillett, U. S. Dep. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.

Ochlerotatus aestivalis Dyar, U. S. Dep. Agr., Bur. Ent., Circ. 72, 6, 1906.

Aëdes aestivalis Cameron, Agr. Gaz. Can., v, 557, 1918.

Aëdes aestivalis Cameron, Journ. Am. Med. Vet. Ass., liii, 633, 1918.

Aëdes aestivalis Dyar, Ins. Ins. Mens., viii, 18, 1920.

Slight larval differences have been observed between this form and *hirsuteron*, but the matter is insufficiently investigated. The form seems to be addicted to the vicinity of lakes rather than rivers, and probably breeds in pools filled by high water in spring. Some of the lakes in the mountains of the west rise

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