



A Description of the Larva and Pupa of *Culiseta* (Culicella) Minnesotae Barr (Diptera, Culicidae)

Author(s): Roger D. Price

Source: *Journal of the Kansas Entomological Society*, Vol. 31, No. 1 (Jan., 1958), pp. 47-53

Published by: Kansas (Central States) Entomological Society

Stable URL: <http://www.jstor.org/stable/25082264>

Accessed: 02-02-2017 14:07 UTC

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://about.jstor.org/terms>



Kansas (Central States) Entomological Society is collaborating with JSTOR to digitize, preserve and extend access to *Journal of the Kansas Entomological Society*

A DESCRIPTION OF THE LARVA AND PUPA OF *CULISETA (CULICELLA) MINNESOTAE* BARR (DIPTERA, CULICIDAE)¹

ROGER D. PRICE

Department of Entomology and Economic Zoology
University of Minnesota, St. Paul, Minnesota

This paper presents a description of the previously undescribed larval and pupal forms of *Culiseta (Culicella) minnesotae* Barr. The erection of this species by Barr (1957) was based only on male and female specimens taken in Minnesota, the immature stages being unknown to him at that time. During the summer of 1956 and the spring of 1957, the present writer took a number of *Culicella* larvae and, upon rearing a portion of them to the adult stage, it was determined that they represented *C. minnesotae* instead of the closely related *Culiseta (Culicella) morsitans* (Theobald), the only other member of the subgenus *Culicella* occurring in North America. Barr (1957) had been unable to assign his new species with certainty to a subgenus, but the finding of these larvae confirms his belief that it belongs to the *Culicella* subgenus. In view of the fact that *C. minnesotae* and *C. morsitans*, as a result of this close relationship, have undoubtedly both fallen into the *C. morsitans* category in references in the past literature, it is of interest to make a detailed description of the immature forms of *C. minnesotae* to determine morphological differences between these stages of the two species.

The following descriptions are based on twelve sets of associated larval and pupal skins, three fourth-instar larvae, one fourth-instar larval skin, and three third-instar larvae, all of these specimens being collected in Ramsey Co., Minn., from July 19 to August 14, 1956. During the spring of 1957, two other breeding spots of *C. minnesotae* were located and examination of the critical characters was made to supplement the data for the above specimens. Twenty fourth-instar larvae collected at Itasca State Park, Clearwater Co., Minn., from May 31 to June 7, 1957, and eight fourth-instar larvae from Cedar Creek Forest, Isanti Co., Minn., June 3, 1957, were utilized for this purpose.

The *C. morsitans* material originally used for comparative purposes consisted of six pairs of associated larval and pupal skins (one from Dryden, Tompkins Co., New York, April 4, 1948, and five from Cayuta Lake, Schuyler Co., New York, May 8-22, 1948) furnished by Dr. Richard F. Darsie, Jr., Department of Entomology, University of Delaware Agricultural Experiment Station, and four larval skins, two pupae, and two pupal skins (Cedar Creek Forest, Isanti Co., Minn., May 11-17, 1956) furnished by Miss Myrtle E. Rueger, School of Public Health, University of Minnesota. The author would like to express his gratitude to these individuals for making this material available to him. From May 7-24, 1957, this worker was fortunate in being able to collect large numbers of *C.*

¹ Paper No. 3799 Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minnesota.

morsitans larvae at Itasca State Park and fifty of these fourth-instar larvae were examined to confirm the differences previously noted.

The systems of numbering the larval and pupal setae follow those proposed by Belkin (1950, 1952, 1953). In the following descriptions, the usual number of setal branches is given and, if the limits of variation of branching differ from this, these limits are given in parentheses.

LARVA

FOURTH INSTAR (Pl. I). Length 7-8 mm. *Head*: Wider than long (Fig. 1, Pl. I). Postclypeal 4 usually double or triple (1-4); upper frontal 5 multiple, usually 7- or 8-branched (6-11), barbed, the longest branches extending beyond apical margin of head; lower frontal 6 always double or triple, barbed, very long, twice length of longest upper frontals; preantennal 7 multiple, 9- to 12-branched (8-14), barbed. Sutural 8 double or triple, rarely 4-branched, medium length; transsutural 9 usually triple (2-4), medium; orbital 10 usually single or double (1-4), medium. *Antenna*: As long as head, curved, strongly spiculated on basal two-thirds; antennal tuft 1 multiple, barbed, inserted at constriction near outer third of shaft and extending beyond tip of antenna; inner and outer subapical setae 2-3 long, single, inserted together equidistant between antennal tuft and tip of antenna; terminal seta 4 long; hyaline process 5 very short; segmented finger process 6 about third length of 4. *Prothorax*: Accessory dorsal 0 tufted, relatively short; hairs 1-2 single, 3-4 double, 5-6 single, all very long, surpassing the head in length (Fig. 2, Pl. I). Hair 7 multiple, 3- to 5-branched, barbed, half as long as 1-6; dorsolateral 8 usually triple (2-3), barbed, of same length as 7. Pleural group with 10 and 12 very long, single, 9 half as long, single, and 11 short, distally 3- to 5-branched. Median ventral 14 double, medium. *Mesothorax*: Dorsals 1 usually single (1-2), medium; 2 short, distally 2- to 4-branched; 3 long, single; 4 fairly long, distally 2- to 3-branched; and 5-7 very long, single. Dorsolateral 8 long, multiple (4-8). Pleural group with 9 a long multiple tuft (4-7), 10 and 12 very long, single, and 11 minute, single. Ventrolateral 13 and median ventral 14 relatively short and tufted. *Metathorax*: Dorsals 1 short, single; 2 medium, single or distally 2- to 3-branched; 3 medium, 4- to 5-branched (3-9); 4 short, distally 2- to 3-branched; 5 short, single or double; 6 long, single; and 7 long, multiple (5-10). Dorsolateral 8 short, multiple (5-9). Pleural group with 9 long, multiple (4-8); 10 very long, single; 11 short, single or distally bifid; and 12 long, distally 2- to 4-branched. Median ventral 13 stellate, 4- to 8-branched. *Abdomen*: Lateral abdominal hairs 6-7 both well-developed, barbed, and multiple on segments I-II; 6 single, long, on segments III-VI and 7 reduced to a small multiple tuft. Comb of segment VIII consisting of many scales (50-100) in a patch (Fig. 3, Pl. I); individual scale expanded outwardly and fringed both laterally and apically with subequal spinules (Fig. 5, Pl. I). Siphon six to seven times as long as basal width, tapering slightly; pecten of few teeth (7-13) on basal fourth, with several distal teeth detached. Individual tooth pointed, slender, with several subequal teeth along basal two-thirds of one side (Fig. 4, Pl. I). Siphonal tuft 3- to 7-branched, inserted within pecten near base of siphon. Anal segment much

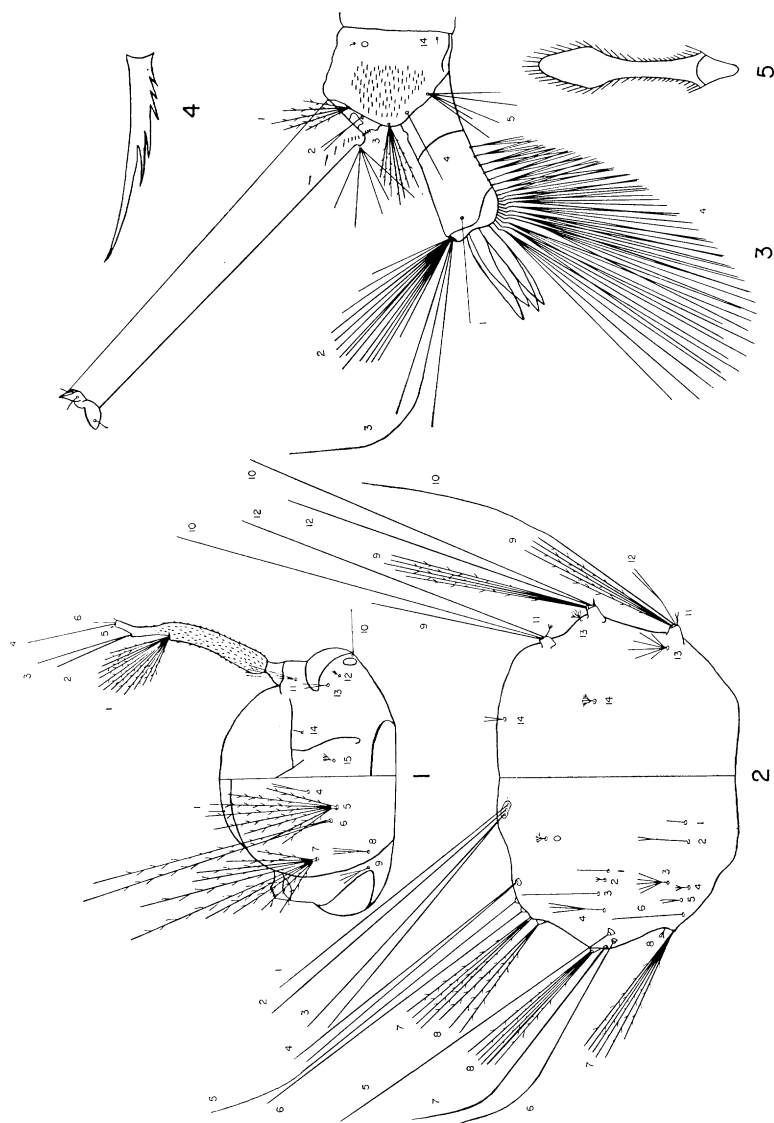


PLATE I

Culiseta (Culicella) minnesotae Barr, fourth-instar larva. Fig. 1. Head, dorsal (left) and ventral (right) views. Fig. 2. Thorax, dorsal (left) and ventral (right) views. Fig. 3. Terminal segments. Fig. 4. Pecten tooth. Fig. 5. Comb scale.

longer than wide, completely ringed by saddle; lateral hair 1 usually single, rarely double, slightly longer than the saddle. Upper caudal tuft 2 of dorsal brush multiple (10-16), relatively long; lower caudal tuft 3 of dorsal brush 3-branched (2-4), consisting of one very long hair and two subequal shorter hairs. Ventral brush 4 well-developed with 16-19 tufts, of which five to seven are precratal. Gills about the same length as saddle, slender, and pointed.

. **THIRD INSTAR.** Essentially as in the fourth instar, except for reduced branching of certain hairs. Upper frontal 5 multiple, 3- to 5-branched; lower frontal 6 double; preantennal 7 6- to 8-branched. Prothoracic hair 7 only 2- to 3-branched; hair 8 always single. Anal saddle extending only about a third of the way down segment; lateral hair 1 inserted slightly below lower margin in indentation. Both upper and lower caudal tufts of dorsal brush reduced in branching.

The larva of *C. minnesotae* can be separated from the larva of *C. morsitans* by utilizing in combination the branching of head hairs 4, 5, and 7, and the number of tufts in the ventral brush of abdominal segment IX. Postclypeal 4 of *C. minnesotae* is generally double or triple, rarely single or quadruple. The upper frontal 5 is usually 7- or 8-branched, less often 6-, 9-, 10-, or 11-branched; never were both upper frontals on one specimen only 6-branched. Preantennal 7 is typically 9- to 12-branched, although the 8-, 13-, and 14-branched states were observed; however, both preantennals on the same specimen were never as few as 8-branched. The number of tufts of the ventral brush are usually 17-18, rarely 16 or 19. As compared to these hairs, those of *C. morsitans* are as follows: Postclypeal 4 is single or double, very rarely triple, usually described in the literature as minute and single; the upper frontal 5 is typically 4- or 5-branched, although also attaining the 3-, 6-, or rarely the 7-branched state. Ross (1947) and Carpenter and LaCasse (1955) substantiate this as the typical branching of the upper head hair. Dyar (1928) also confirms the 4-branched nature of the upper frontal and implies that the American *C. morsitans* larva agrees fully with the European larva. Abundant work on this species by several European workers, Natvig (1948) being the most recent, has shown the upper frontal to be single to 4-branched, apparently rarely, if ever, exceeding the 4-branched state. Preantennal 7 is usually 6- to 8-branched although an occasional 5- or 9-branched hair was noted. The tufts of the ventral brush of *C. morsitans* are typically 20 in number, rarely less than this and occasionally 21 or 22. Illustrations from Dyar (1928), Ross (1947), and Carpenter and LaCasse (1955) also show 20 tufts in this brush. The above comparisons may be summarized as follows:

Hair	Species	N	Range	\bar{X}	σ
Postclypeal 4	morsitans	121	1- 3	1.3	0.49
	minnesotae	84	1- 4	2.3	0.60
Upper frontal 5	morsitans	112	3- 7	4.8	0.69
	minnesotae	76	6-11	7.9	1.23
Preantennal 7	morsitans	93	5- 9	7.1	1.02
	minnesotae	73	8-14	10.6	1.39
Ventral brush 4	morsitans	61	19-22	20.4	0.81
	minnesotae	44	16-19	17.7	0.71

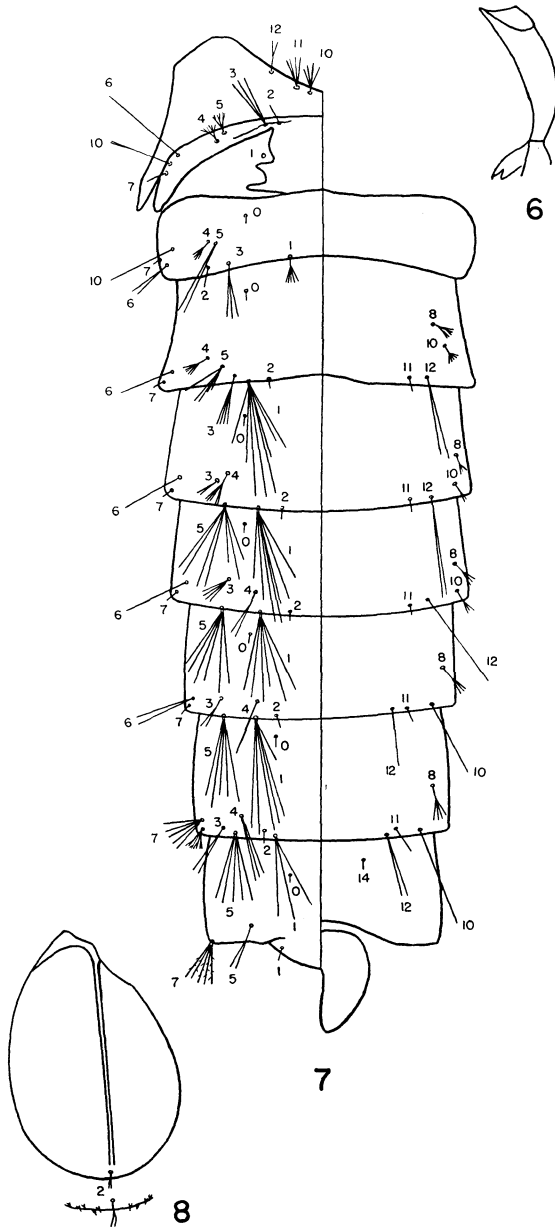


PLATE II

Culiseta (Culicella) minnesotae Barr, pupa. Fig. 6. Respiratory trumpet. Fig. 7. Metathorax and abdominal segments, dorsal (left) and ventral (right) views. Fig. 8. Paddle.

It is quite interesting to note at this point that the chaetotaxy of *C. minnesotae* as described in this paper agrees in virtually every detail with that of *Culiseta (Culicella) nipponica* LaCasse and Yamaguti, 1950. Unfortunately these workers made only a single collection of these larvae on the island of Hokkaido, Japan, and based this new species only on this stage. Were the adult and pupal stages known, an enlightening comparison could be made with the corresponding stages of *C. minnesotae*.

PUPA

Cephalothorax: Setae 1-2 usually double (1-3), 3-4 triple (2-4), 5 double (1-3), 7-9 double (1-3), all of these setae being relatively long. Seta 6 medium, usually single (1-2). Metathoracic setae medium, 10-11 generally 4- to 5-branched (3-6) and 12 2- to 3-branched (1-4). Respiratory trumpet gradually widening apically (Fig. 6, Pl. II). *Abdomen* (Fig. 7, Pl. II): Hair 0 absent on I; single, medioanterior, minute on II-VIII. Hair 1 a well-developed float-hair on I; medium, 5- to 7-branched on II (5-11); long, 5- to 7-branched on III-VI (3-9); long, usually triple on VII (2-4); absent on VIII. Hair 3 long, 3- to 5-branched on I-III (2-6); medium, double or triple on IV (1-4); 5- to 6-branched on V (3-8); generally double on VI-VII (1-3); absent on VIII. Hair 4 increasing from relatively short to fairly long posteriorly, 8- to 11-branched on I (6-14), 4- to 6-branched on II-IV (3-8), single or double on V-VI (1-3), triple on VII (3-4), absent on VIII. Hair 5 fairly short, 5- to 7-branched on I (3-10); long, usually double on II (1-3); medium, 4- to 5-branched on III (4-6); long, 4- to 6-branched on IV-VII (3-7); medium, double on VIII (1-2). Hair 6 single, long on I; medium, usually double on II (1-4); long, single on III-V (1-2), double on VI (1-3), relatively short and 5- to 8-branched on VII (3-9), absent on VIII. Hair 7 short, single on I (1-2); minute, single on II-VI; medium, 4- to 5-branched on VII (3-6); 4- to 6-branched, barbed on VIII. Hair 8 absent on I-II; medium, usually 2- to 4-branched on III-VII (1-5); absent on VIII. Hair 10 long, double or triple on I (2-4); long, single on II; medium, triple on III (1-5); medium, double on IV (1-3); medium, 4-branched on V (3-7); long, usually single on VI-VII (1-2); absent on VIII. Hair 11 absent on I-II; short, single on III-VII; absent on VIII. Hair 12 absent on I-II; long, generally double on III-IV (1-4); long, usually single on V-VI (1-2); long, single or double on VII; absent on VIII. Hair 14 minute, single, medioanterior, present only on VIII. Seta 1 on IX minute, single. Paddle ovoid, apical fourth of border with small marginal and submarginal denticles (Fig. 8, Pl. II); midrib not reaching apex; terminal seta 2 short, single or double.

The only detailed pupal description of *C. morsitans* known to the writer is that of Darsie (1951). Here, perhaps even more so than with the larva, distinct differences are present in the branching of certain setae. *C. morsitans* has single cephalothoracic setae 1 and 2, whereas *C. minnesotae* shows these setae more typically double, rarely single or triple. A much more distinctive difference, however, exists in the branching of seta 7 on abdominal segments VII-VIII. Darsie found this seta always to be single on both segments of *C. morsitans* and he utilized this character among others to differentiate this species from *Culiseta (Culiseta) inornata* (Williston).

The pupae of the *C. morsitans* from Minnesota occasionally show seta 7 double on segment VII, but it is invariably relatively long and single on VIII. Contrasted to this, seta 7 of *C. minnesotae* is 3- to 6-branched on VII and 4- to 6-branched and barbed on VIII.

LITERATURE CITED

- Barr, A. R. 1957. A new species of *Culiseta* (Diptera: Culicidae) from North America. *Proc. Ent. Soc. Washington*, 59:163-167.
- Belkin, J. N. 1950. A revised nomenclature for the chaetotaxy of the mosquito larva. *Amer. Midland Nat.* 44:678-698.
- . 1952. The homology of the chaetotaxy of immature mosquitoes and a revised nomenclature for the chaetotaxy of the pupa (Diptera, Culicidae). *Proc. Ent. Soc. Washington*, 54:115-130.
- . 1953. Corrected interpretations of some elements of the abdominal chaetotaxy of the mosquito larva and pupa. *Proc. Ent. Soc. Washington*, 55:318-324.
- Carpenter, S. J. and LaCasse, W. J. 1955. Mosquitoes of North America (North of Mexico). Univ. of Calif. Press, Berkeley and Los Angeles. vi+360 pp.
- Darsie, R. F., Jr. 1951. Pupae of the culicine mosquitoes of the Northeastern United States (Diptera, Culicidae, Culicini). Cornell Univ. Agric. Exper. Sta. Mem. 304. 67 pp.
- Dyar, H. G. 1928. The mosquitoes of the Americas. Carnegie Inst. of Washington, Wash., D.C. Publ. No. 387. 616 pp.
- LaCasse, W. J. and Yamaguti, S. 1950. Mosquito fauna of Japan and Korea. Office of the Surg., HQ. 8th Army APO 343. viii+213 pp.
- Natvig, L. R. 1948. Contributions to the knowledge of the Danish and Fennoscandian mosquitoes. Culicini. Norsk Entomol. Tidsskrift, Suppl. 1. Oslo. xxii+567 pp.
- Ross, H. H. 1947. The mosquitoes of Illinois. Bull. Illinois Nat. Hist. Surv., 24:1-96.

AUGOCHLORODES, A NEW GENUS OF HALIC-TINAE FROM BRASIL (Hymenoptera, Apoidea)¹

J. S. MOURE, C.M.F.

Department of Entomology, University of Kansas, Lawrence, and
Seção de Zoologia, Universidade de Paraná, Curitiba, Brasil

The form described below is named at this time in order that the name may be used in a paper on the biology of these bees by Drs. Charles D. Michener and Carlos Alberto Campos Seabra. The principal distinguishing characters of the genus are given in italics.

Augochlorodes new genus

Type species: *Augochlorodes turrifaciens* new species

FEMALE. *Head as broad as long* (110:110); eye longer than superior interorbital distance and this greater than inferior interorbital distance (88:60:50). Clypeus twice as broad as long (50:25), *epistomal suture almost straight lateral to subantennal suture*, clypeocellar distance about three times clypeoantennal distance. Frontal carina evident, well formed in lower two-thirds. Interocellar distance about equal to ocellocular (35:40; ocellar diameter 30). Genal areas almost as wide as eyes; *no preoccipital carina*.

¹ Contribution No. 980 from the Department of Entomology, University of Kansas.