

Literature Cited

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*CULICOIDES OF NEW ENGLAND (DIPTERA: HELEIDAE)*EDWARD I. COHER, WILLIS W. WIRTH¹ AND HERBERT KNUTSON²

The *Culicoides* have been the subject of an excellent study recently published by Foote and Pratt (1954). However, the present authors have additional material, much of which was collected during a two-year survey for the Communicable Disease Center, U. S. Public Health Service. This material is of interest particularly from the standpoint of increasing knowledge of the distribution of the group throughout New England. In addition, other material has been incorporated and verified, particularly that of the C. W. Johnson collection at Boston University which was not examined by Foote and Pratt nor included in their report. Previous records of all species, with complete data if the specimens have been examined, are also given. Notes on the biology of some of the species are included.

Most of the identifications have been made by or verified by the second author. Acknowledgements are due Frank R. Lisciotto and John C. Kuschke for their part in the collection of data. An asterisk indicates a new record for the state. Initials given in the collection records refer to: (EIC)—E. I. Coher, collector; (CWJ)—C. W. Johnson, collector; (HK)—H. Knutson, collector; (JCK)—J. C. Kuschke,

collector; (FRL)—F. R. Lisciotto, collector; (MFS)—Maine Forest Service collection; (F & P)—in Foote and Pratt, 1954, see references; (OAJ)—in Johannsen, 1952, see references.

Culicoides biguttatus (Coquillet). ***Maine:** Ashland, VII-29-51(MFS); Den- nistown, VII-21(JCK), VII-22, VII-25-51 (MFS); Greenville, VIII-1-51(MFS); Moosehorn, VII-3, VII-4, VII-6-51(MFS); Oxbow, VII-29-51(MFS); Square Lake, VII-8, VII-26-51(MFS); Vasselboro, VII- 15-52(JCK). Extreme dates: VII-3 to VIII-1. **Vermont:** Laurel Lake, (F & P); Middlebury, VII-12(CWJ). **Massachu- setts:** Amherst, (F & P); VI-19, VII-3, VIII-2, VIII-8 to 10, IX-10-51(EIC), light trap; Merrimacport, VI-11 to 16, VI-24, VI-25, VI-29, VI-30-54(EIC), hundreds in light trap except for final date; Sunderland, VII-12-51(EIC), light trap; Westhampton, VI-28-51(EIC), biting at 8:30 p.m.; Wil- mington, (F & P). Extreme dates: VI-11 to IX-10. **Connecticut:** East Haddam, (OAJ); New Haven, VI-6-04(B.H. Walden); South Norwalk, V-30-43(M.E. Smith).

Culicoides canithorax Hoffman. **Maine:** Narrows, Mt. Desert, VIII-13-30(CWJ); South Harpswell, (F & P). **Massachu- setts:** Cataumet, (F & P); Cranberry Bog, East Sandwich, VII-9-39(R.L. Arm- strong); Mystic, East Sandwich, VI-22-39 (R.L. Armstrong); Essex Co.,(CWJ); Groton, (F & P); Hyannisport, VII-4-04; Woods Hole, VII-23-03(CWJ). ***Rhode Island:** Peacedale, VI-28-52(HK), biting.

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Culicoides crepuscularis Malloch. ***Maine:** Augusta, VIII-23-51(JCK); Moosehorn, VII-4-51(MFS); Oxbow, VIII-3-51(MFS). ***Vermont:** Laurel Lake, (F & P). ***Massachusetts:** Amherst, VII-6, VII-22, VII-27 to 29, VIII-8 to 10-51 (EIC), light trap; Boston, VII-9-20(CWJ); Martha's Vineyard, VIII-3-30(F.M. Jones); Merrimacport, VI-30-54(EIC), light trap; North Shore, VII(B.I. Gerry); Sunderland, VII-12, VIII-23-51(EIC), light trap. Extreme dates: VI-30 to VIII-23.

Culicoides furens (Poey). ***Massachusetts:** Cataumet, (F & P); Martha's Vineyard, VIII-3-30(F.M. Jones). ***Rhode Island:** Peacedale, VI-28-52(HK), biting.

Culicoides guttipennis (Coquillet). ***Vermont:** Laurel Lake, (F & P). ***Massachusetts:** Boxford, V-3-53(T.H.G. Aitken), reared from tree-hole; Scituate (Greenbush)—V-25-54(EIC), larvae taken in a tree-hole, pupated V-27 and subsequently, first adults emerged V-29 and V-30, all males. Larvae burrow head first in bottom organic material, work around, emerge partially, head first, and undulate like *Tubifex*. Pupae swim normally but also crawl along leaf and bottom surfaces, posterior first, in a hitching type of crawling; remain ordinarily quiescent at surface of water or on bottom, occasionally undulating on bottom; when disturbed sink directly to bottom without any apparent movement. Teneral adults darken in about one hour. Larvae found associated with *Aedes triseriatus* larvae and larvae of a dasylloid type. ***Connecticut:** East Haddam, (OAJ).

Culicoides haematopotus Malloch. ***Maine:** Moosehorn, VII-4-51(MFS).

Culicoides hollensis (Melander & Brues). ***Massachusetts:** Woods Hole, (F & P); Foote and Pratt express some doubt as to the status of this species.

Culicoides melleus (Coquillet). ***Massachusetts:** Cataumet, VII-4 to 12-37(M. Foster); Fall River, (F & P). ***Rhode Island:** Kingston, VIII-7, VIII-30-52(HK), hundred in light trap; Peacedale, VI-28-52(HK), biting.

Culicoides obsoletus (Meigen). ***Maine:**

Ashland, VII-19, VII-28-49(MFS), light trap; Aziscoos Lake, VII-8-10(C.A. Frost); Dennistown, VII-17 to 23, VII-28, VII-29-51(MFS), light trap, extremely abundant on VII-19; Dennysville, VII-14-51(MFS), light trap; Moosehead Lake, (CWJ); Great Pond, Mt. Desert, VII-16-18(CWJ); Southwest Harbor, Mt. Desert, VI-20(CWJ); Oquossoc, VII-7, VII-8, VII-15 to 17, VII-19, VII-22, VII-24, VII-27-51(MFS), light trap; Grand Lake Stream, Oxbow, VI-13-52(T.W. Kerr); Rangeley Lake, (CWJ); Square Lake, VII-7, VII-9, VII-10, VII-12-51(MFS), light trap; Greenville, Kellyland, Moosehorn, no data. Extreme dates: VI-13 to VII-29. ***New Hampshire:** Old Spec Mt., Hwy. 26, Bear River, VI-4-52(HK); Bethlehem, VI-5-47 (J.B. Kindler); Bretton Woods, VI-24-13(CWJ); Dixville Notch, VI-25(FRL), VII-10-52(EIC), found only along stream in woods and not in woods on VI-25; Dolly Copp Camp, White Mtns., VI-25-52(EIC-FRL), abundant, biting along Culhane Brook; 1st Connecticut Lake, VI-9, VI-11, VII-9-52(EIC), biting, abundant on VI-11; Franconia, (F & P); Glen House, VI-15-16(CWJ); Jaffrey, VI-4-20(CWJ); Pike, (HK); 3rd Connecticut Lake, VI-24(EIC-FRL), VII-9, VIII-13-52(EIC), biting, abundant on VI-24; Warren, V-30-52(HK); West Milan, first two weeks in July, (HK), abundant at base of mountains. Extreme dates: V-30 to VIII-13. ***Vermont:** Downer St. For., VI-16(EIC-FRL), VI-25, VI-30, VII-21-52(EIC), extremely abundant, biting along shaded stream VI-16 to VI-25; Groton St. Pk., VII-1-52(EIC); Laurel Lake, (F & P); Maidstone St. Pk., VI-26-52(EIC), abundant; Moscow, VI-15, VI-17, VII-1-52(EIC), abundant biting along stream; Mt. Holly, VI-13-52(EIC); North Troy, VI-12-52(EIC); Pittsfield-Sherbourne, VI-26-52(EIC); South Troy, VI-12-52(EIC); Starksboro, VI-4-52(EIC); Warren, VII-17-52(EIC). Extreme dates: VI-1 to VII-21. ***Massachusetts:** Amherst, VIII-16, IX-4, X-12-51(EIC), light trap; Arlington, V-27-20(CWJ); Berkshire "area," (CWJ); Brookline, X-12(CWJ); Cape Cod "area," (CWJ); Chester, V-26-12(CWJ); Goshen,

VII-13-51(EIC), abundant, many complaints in vicinity; Merrimacport, VI-11 to 16, VI-25, VI-29, VI-30-54(EIC), light trap; Montague, VI-18-51(EIC), biting; North Adams, VIII-20 to 21-51(J. Gelheiser and EIC), light trap; North Shore, late June, July, early August(B.I. Gerry); Sherborn, X-30-26(C.A. Frost), biting; Sturbridge, (F & P); Westhampton, VI-28-51(EIC), biting at 8:30 p.m. Extreme dates: VI-11 to 16, to X-30.

Culicoides piliferus Root & Hoffman.

***Maine:** Three Mile Pond, VII-17-52 (JCK). **Vermont:** Laurel Lake, (F & P). ***Massachusetts:** Amherst, VII-6, VII-14, VII-27 to 29-51(EIC), light trap; Merrimacport, VI-11 to 16-54(EIC), light trap.

Culicoides spinosus Root & Hoffman.

***Massachusetts:** Merrimacport, VI-25, VI-30-54(EIC), light trap.

Culicoides stellifer (Coquillet). **Massachusetts:** Amherst, VIII-30 to 31-54 (EIC), light trap; Merrimacport, VI-30-54 (EIC), light trap. **Connecticut:** East Haddam, (OAJ).

Culicoides travisi Vargas. ***Massachusetts:** Merrimacport, VI-11 to 16, VI-25-54(EIC), light trap.

Culicoides variipennis (Coquillet). **New Hampshire:** Franconia, (CWJ), this specimen has not been found for examination by the authors. **Massachusetts:** Cascade, North Adams, (CWJ), a specimen so labelled has been found to be *venustus*. It seems probable that the New Hampshire specimen is *venustus* since that species and *variipennis* are quite dissimilar and it is doubtful that Johnson would miss such differences. This species then, cannot be considered to be confirmed in New England. However, a specimen from Quebec is in the collection of the Museum of Comparative Zoology (Harvard University) and undoubtedly the species must occur in New England.

Culicoides venustus Hoffman. **Vermont:** Laurel Lake, (F & P). ***Massachusetts:** Merrimacport, VI-30-54(EIC), light trap; Cascade, North Adams, VI-14-06(CWJ), erroneously reported as *vari-*

pennis in Johnson's list (1925). **Connecticut:** East Haddam, (OAJ).

Culicoides villosipennis Root & Hoffman. ***Maine:** Sebago Lake St. Pk., (JCK). ***Massachusetts:** Amherst, VII-25-51(EIC), light trap; V-28-43(M.E. Smith), ex pupa, the larvae were taken in water in a tree-hole of a white oak; Martha's Vineyard, VIII-20-31(CWJ).

Culicoides n. spp. **Maine:** Moosehorn, VII-5-51, light trap, 1 large plain-winged female. **Massachusetts:** Amherst, VII-19, VII-22-51(EIC), light trap, females only, a plain-winged species.

SUMMARY. Seventeen species of *Culicoides* are now reported from New England (*variipennis* is not included in these figures). The status of one species, *hollensis*, is in doubt. Sixteen of the species, including two new species known only from female specimens, were taken during this study. Not including the new species, 15 new state records are reported, 7 for Massachusetts, 5 for Maine, and 3 for Rhode Island. Massachusetts now has 15 species reported (including one new species), Maine 8 (including one new species), Vermont 6, Connecticut 4, Rhode Island 3 and New Hampshire has only a single species recorded. It is evident that much light trap collecting should be done in all states except Massachusetts in order to bring their lists up to significant levels. *Culicoides obsoletus* is apparently the most abundant and serious pest of the entire group, although along the coastal areas, the brackish water species are the cause for much complaint.

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