

SIMULIUM (PHOSTERODOROS) PENOBSCOTENSIS, A NEW SPECIES OF BLACK FLY (DIPTERA: SIMULIIDAE) FROM MAINE, U.S.A.¹

By Edward L. Snoddy² and Leah S. Bauer³

Abstract: A new species of black fly, *Simulium penobscotensis*, is described from tributaries of the Penobscot River, Maine, U.S.A. This species is a major late-season biting pest of man. Adults are similar to other members of the subgenus *Phosterodoros*, but the larvae and pupae are quite distinct. The pupal cocoon is unique because it has a definite collar with no windows on the anterior margin, as do other members of this subgenus.

Members of the subgenus *Phosterodoros*, like most other species of Simuliidae, display a high degree of morphological similarity. Most of the work on that subgenus, beginning with that of Snow et al. (1958), has been confined to the southeastern United States. Stone & Snoddy (1969) and Snoddy (1971, 1976) further advanced the taxonomy and ecology of this group.

Three species, *Simulium (P.) nyssa* Stone & Snoddy [collected in Maine by one of the authors (L.B.) during the 1976 black fly season], *S. (P.) fibrinflatum* Twinn and *S. (P.) jenningsi* Malloch, have been reported from the northeastern United States and eastern Canada (Davies et al. 1962, Stone 1964, Stone & Jamnback 1955, Wood et al. 1963). Work on controlling recent outbreaks of black flies biting in late summer and fall in Maine led to the discovery of a new species of *Simulium* described below. *Simulium (P.) penobscotensis*, n. sp. is indistinguishable from *S. nyssa* and *S. jenningsi* in the adult stage but has distinct larval and pupal characters. Electrophoretic analysis of protein variations in biting individuals of these 3 species has shown *S. penobscotensis* to be a major pest (May et al. 1977).

Mature larvae and pupae of the new species have been collected in Kenduskeag, Pushaw, and Sebois streams, and Stillwater, Pleasant, East Branch Pleasant, and Piscataquis Rivers, all tributaries of the Penobscot River. This species was collected

from trailing vegetation in these streams and in medium to large rivers from July to November. It frequently was found associated with *S. fibrinflatum*, *S. tuberosum* Lundstroem and *S. nyssa*.

Simulium (Phosterodoros) penobscotensis Snoddy & Bauer, n. sp. FIG. 1-6

♂. Wing length 1.8-2.0 mm. Clypeus with gray pollinosity. Antenna with scape and pedicel uniformly brown in color, flagellum blackish brown with pale gray pubescence. Anterior 2/3 of scutum with a velvet black configuration on a silvery white background, as is commonly found in other members of this subgenus. Dorsum of abdomen velvety matte black with the usual silvery pollinose patches. Terminalia as shown in FIG. 2.

♀. Wing length 1.9-2.1 mm. Frons shiny blackish brown, diverging above, narrowest point less than height of eye. Vertex and postocular areas with dark brown hairs. Clypeus about equal in length and width, subshiny with pale gray pollinosity. Antenna with scape and pedicel light brown. Palpus light brown. Sensory vesicle ovate. Wing veins pale brown, hairs and spinules brownish black. Subcosta bare. Halter pale whitish yellow with stem darkening toward base. Scutum shiny, sparsely covered with pale yellow recumbent hairs and a thin gray pollinosity anterolaterally, forming indistinct spots which produce an iridescent silvery green reflection. Scutellum brownish black. Postnotum dark. Pleuron dark with thin gray pollinosity. Pleural tuft coppery brown. Terminalia as shown in FIG. 1.

PUPA. Length 2.5-2.8 mm. Respiratory organs about 1.4 mm long, consisting of 8 filaments arranged in 4 petiolate pairs (FIG. 4). Respiratory organ with 2 main trunks branching into 2 dorsal and 2 ventral pairs. Dorsal pair short, petiolate, arising from a short trunk. Ventral pairs long, petiolate, arising from a long trunk of about equal length as petioles. Dorsum of thorax smooth with short, simple trichomes. Cocoon tightly woven, with raised band along anterior margin forming distinct collar, as shown in FIG. 6. No frontal apertures on cocoon as observed in other members of the subgenus.

LARVA. Mature specimens 4.8-5.0 mm. long. Head capsule pale yellow, with dark brown spots, pattern as in FIG. 3. Cephalic apotome yellowish white. Submentum as shown in FIG. 5. Postgenal cleft broadly ovate. Antennae pale with no distinct bands. Anal crosspiece well sclerotized. Subesophageal ganglion pale grayish. Cephalic fan with 48-54 rays. Anal hooks 14-18 in a row, in 76-80 rows. Pupal respiratory histoblasts with 8 coiled filaments.

Holotype ♂, reared from pupa, MAINE, Piscataquis River, 9.6 km W of Howland center on Rt. 16, Howland, Penobscot County, 28.IX.1976. Holotype deposited in National Museum of Natural History, Washington, D.C. Paratypes: 2 ♂♂, Maine, Sebois Stream, Howland, Penobscot County, 4.8 km W of Howland center on Rt. 16, 5.VIII.1976; 2 ♀♀, Maine, East Branch Pleasant River, Brownville, Piscataquis County, 4.8 km N of Brownville

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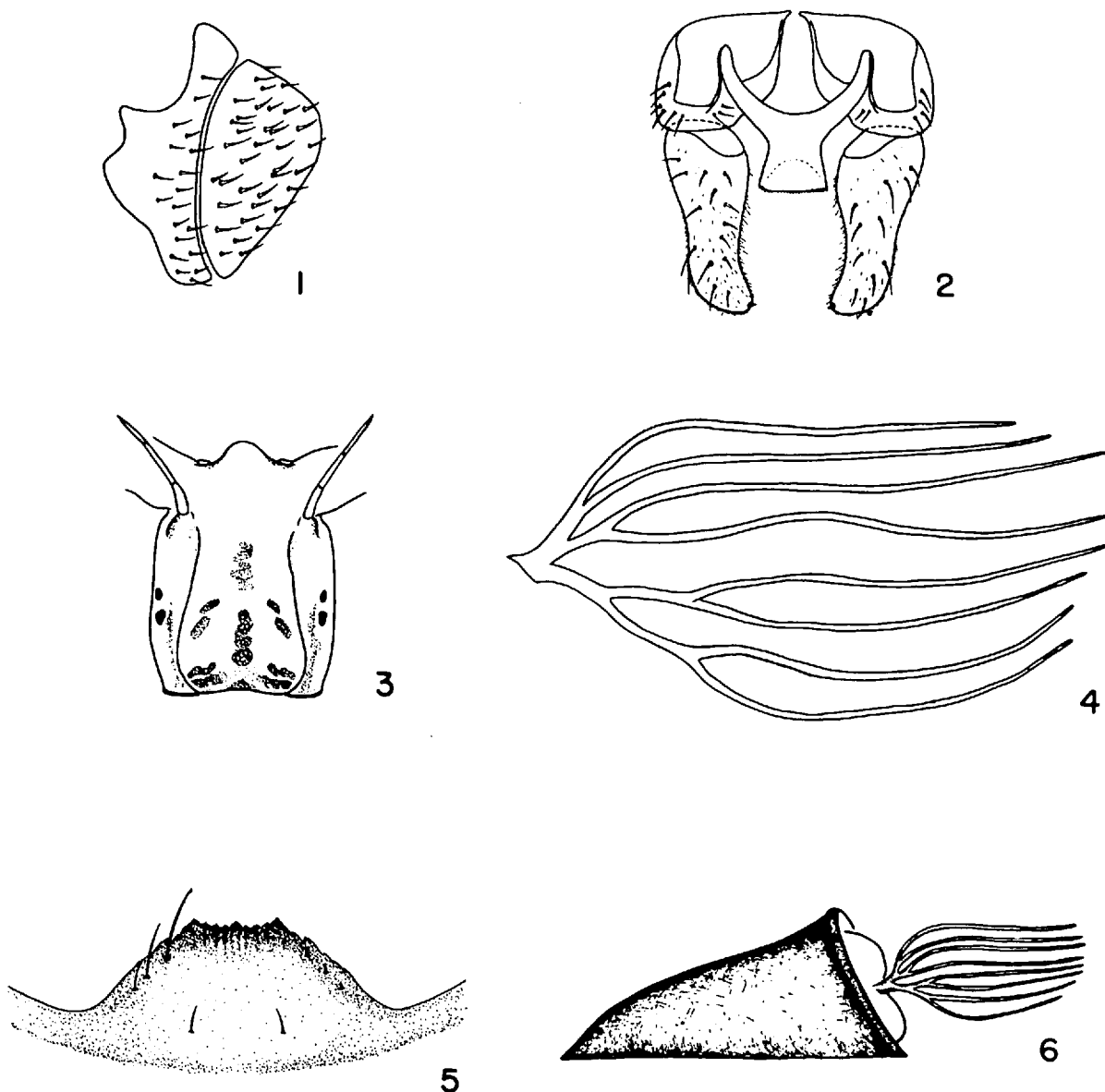


FIG. 1-6. *Simulium penobscotensis*, n. sp. 1, ♀ terminalia (lateral view); 2, ♂ terminalia; 3, larval head capsule (dorsal view); 4, respiratory organ of pupa; 5, hypostominal teeth (ventral view); 6, cocoon of pupa (lateral view).

Junction on Rt. 11, 30.IX.1976. 3 larvae, Maine, Pleasant River, Milo, Piscataquis County. 2 pupae, Maine, 1.6 km NE of Milo on Rt. 16 then 1.6 km NW on dirt road, 5.VIII.1976. Paratypes deposited in University of Georgia Museum at Athens, and the University of Maine Museum at Orono.

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GROWTH OF SOME TOGAVIRUSES IN *AEDES ALBOPICTUS* (DIPTERA: CULICIDAE) CELL CULTURES¹

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Abstract: A newly established mosquito cell line from *Aedes albopictus* ovarian tissue was evaluated for susceptibility and growth of some togaviruses. Sixteen viruses were tested, and the cells supported the growth of almost all alpha- and flaviviruses with exception of louping ill, a tick-borne virus, and dengue type 3 viruses.

Continuous cell lines of ovarian tissues from *Aedes albopictus* have been established in the laboratory, and this report briefly describes the morphology of this cell line and its susceptibility to infection with some togaviruses in comparison with *Culex quinquefasciatus* and *Cx. tritaeniorhynchus* cell lines previously established in this laboratory.

MATERIALS AND METHODS

Establishment and characterization of the cell lines. General techniques used have been reported elsewhere (Hsu et al. 1970, 1972). Three different culture media were used for cell cultures from *Ae. albopictus*, *Cx. quinquefasciatus*, and *Cx. tritaeniorhynchus*: Mitsushashi and Maramorosch (M-M) medium (Mitsushashi & Maramorosch 1964), complete 721 medium, and modified 721 medium, respectively. Cells were routinely subcultured every 3 or 4 days

in flasks and the cells released from the glass surface by a rubber policeman and pipetting.

To date, cells of *Ae. albopictus*, *Cx. quinquefasciatus*, and *Cx. tritaeniorhynchus* have been subcultured, respectively, for 177, 790, and 575 passages.

Virus stocks. All viruses used in the study were from stock collections maintained at NAMRU-2, Taipei for a number of years but with unknown passage histories. They had been maintained by brain passages in Swiss albino mice. Virus dilutions for infecting the cell cultures were made in phosphate-buffered saline containing 0.5% bovine albumin (PBS/BA).

Alphaviruses. Western equine (WEE), WEE-cal; Eastern equine (EEE), EEE-muss; Sindbis (SIN), Ar-339 and Semliki forest (SF) were received from the U. S. Naval Medical Research Institute, Bethesda, Maryland on 21 and 24 February, 21 March and 7 June 1961, respectively. Sagiya (SAG), 406th, Tokyo was received from 406th Medical General Laboratory, U. S. Army, Tokyo, Japan on 11 September 1961 and chikungunya (CHIK), CHIK-TH-35 was received from Dr W. McD. Hammon, Professor, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pennsylvania. The viruses were all received by Dr H. S. Hurlbut.

Flaviviruses. Japanese B encephalitis (JBE), Nakayama; St. Louis encephalitis (SLE), SLE-H; Murray Valley encephalitis (MVE); West Nile (WN), M-6372; dengue type 1 (DEN-1), Hawaiian; dengue type 2 (DEN-2), New Guinea; dengue type 3 (DEN-3), H-87; and dengue type 4 (DEN-4), H-241 were all received from the U. S. Naval Medical Research Institute, Bethesda, Maryland on 20 March, 1 April, 12 June, 19 May, and 15 and 19

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