

RECONNAISSANCE OF MOSQUITOES, PUNKIES, AND BLACKFLIES IN SOUTHEAST ALASKA

W. C. FROHNE AND D. A. SLEEPER

Arctic Health Research Center, Public Health Service, Anchorage, Alaska *

GENERAL

Three rapid survey trips were made in Southeast Alaska during May, June, and July, 1949, to ascertain the principal insect problems of the larger towns. Very little entomological information, apart from conflicting popular claims, was then available to Alaskan health or military authorities to indicate the prevalence and species of mosquitoes, blackflies, and punkies. It was believed that even a superficial survey of key areas would be useful and of interest.

Physically, Southeast Alaska is a maritime region of countless mountainous islands and peninsulas with highly dissected shore lines. Excessive precipitation maintains numerous glaciers, some vast, and gloomy coniferous forests interspersed with a patchwork of extensive upland bogs and lakes from which drain torrential streams.

Foot surveys were made along the shore roads at Ketchikan, Wrangell, Petersburg, and Juneau, usually as far as 6 miles out of town. The more extensive highway system from Juneau was covered by car. Supplementary collecting was done on five climbs up to 3,000 feet at Ketchikan (Deer Mountain), and about a thousand feet up into the forest of Douglas Island near Juneau (Ski Path).

Only simple collection equipment for mosquitoes, including dipper for larvae and chloroform killing tube for adults, was used. For blackflies, a small net proved useful since many Alaskan species, although attracted to the proximity of man, are reluctant to alight or bite. The trouser legs were turned up for the collection of punkies on the lower limbs. Time,

weather, and cover were recorded for adult collections, and water temperature, pH, color, and turbidity for larval habitats. Vegetation associated with mosquito breeding was collected and identification of the dried plants was furnished by Dr. C. L. Porter of the University of Wyoming. Dr. Alan Stone and Dr. Willis Wirth of the U. S. National Museum kindly identified the insects.

In Southeast Alaska mosquitoes constitute a much less serious problem than they do in Central or Arctic Alaska. None of the towns surveyed has a local mosquito problem of great practical importance. Dwellings and even hotels are seldom screened and it was usually difficult to collect adult specimens within the towns. However, it was extraordinary to find that very large larval populations of *Aedes aboriginis* and *punctor* occurred in May on the extensive upland bog encircling Petersburg. Similar heavy breeding obtained on a bog which reaches from near the tip of Wrangell Island south into Wrangell. Biting adult *Aedes* were collected on these bogs a month later in small numbers, but not in the adjacent streets where mosquitoes were declared by residents to be no problem.

In two summer resort localities on flats near the mouths of glacial rivers large populations, mostly *Aedes communis*, gave serious trouble. One area, Taku Lodge, on the fjord of the same name near Juneau, was surveyed on May 11, when concentrated populations of first and second stage *Aedes* larvae (upwards of 50 per dip) were noted on about a square mile of coastal marsh. They were breeding in the melting snow pools, some open, some in alder thickets. The area was not revisited, but the Alaska Department of Health reported high landing rates beginning the

* This work was done as a part of the Alaska Insect Project supervised by B. V. Travis of the U. S. Bureau of Entomology and Plant Quarantine.

first week of June. Their control program instigated during June and July, using a compressor mounted on a jeep to disperse DDT aerosol, was reported to have given considerable relief at the lodge itself. The other situation, the Boy Scout Camp about 18 miles from Juneau on the Eagle River flats, proved to have a much larger breeding area. Here a serious pest problem was evidenced by landing rates (trouser-front counts) of 15 to 50 dark-legged *Aedes* in mid-afternoon on June 17. The larvae had bred in innumerable pools and potholes on the open flats overgrown with several species of *Carex* but free of *Myrica gale* or *Betula nana* bushes characteristic of such coastal flats in Central Alaska. There were at least two cases here in 1949 of campers requiring hospitalization from reactions due to mosquito bites. Control operations were undertaken in 1950.

The survey data do not permit a clear-cut evaluation of the importance of punkies in Southeast Alaska. *Culicoides obsoletus* bit viciously at all survey towns, but high densities were encountered only at Ketchikan in August. It is entirely possible, however, that punkies do occasionally occur in great numbers at Juneau and Wrangell as claimed by local residents, and it is likely that other inhabited areas with serious *Culicoides* problems do exist in Southeast Alaska.

Blackflies of several species were prevalent in the environs and within two of the towns, Ketchikan and Petersburg, in July and August. However, the tendency of all blackflies to stop short of attacking man, which has been observed in Central Alaska also was marked here. Thus, when very numerous, the flies circled in clouds around the head with only an occasional one landing on the forehead, nose or ears, and then usually taking off again almost immediately. This constant landing near the eyes and crawling into sensitive organs is extremely annoying.

The results of blackfly bites were observed on two occasions at Ketchikan. On the first (in July), two bites close together on a temple were received unknowingly in

the rain. Large swellings appeared in less than 2 hours, and persisted unchanged for 24 hours and were still about half the maximum size after 48 hours. They were uncomfortable but did not itch. *Prosimulium hirtipes* was believed to have caused the bites. In the second instance (in August) when Ketchikan had high counts of *Simulium venustum* (white socks) on the wing, six were allowed to settle on an exposed shin. They bit almost simultaneously in 10 minutes, filled with blood, left a drop at the site, and flew off heavily. The bites were encircled with ink. Swellings appeared within half an hour which disappeared almost completely in less than 24 hours. Three bites, which were deliberately scratched, exuded lymph for about a week when picked at. There was nothing painful or noteworthy about these bites. They did not itch as do mosquito bites. Thus, in the main, little evidence to warrant control of blackflies was found.

LARVAL HABITATS

Several typical larval habitats appear to have produced most of the blackflies or mosquitoes encountered in Southeast Alaska. The characteristic upland bogs have been mentioned as important mosquito producers, while blackflies develop in the drainage creeks from the bogs. Roadside borrow pools represent a well-marked type of habitat which furnished almost all the collections of *Culiseta* larvae. No permanent ponds with such floating aquatics as *Lemna*, *Potamogeton*, and *Nymphaea*, in which the sole species of *Anopheles* and *Culex* breed in Central Alaska, were studied.

Upland Bogs.—The deep sphagnum bogs, generally on slopes, are extensive and widespread in the region. From the air they may be seen at various elevations, usually strewn with potholes of all sizes and shapes and generally virtually free of trees other than the bushy little lodgepole pine. The bogs where collections were made were along the ski path on Douglas Island (near Juneau), near Connell Lake (Ketchikan), north of Wrangell, and at Petersburg. They have a characteristic

association of larger plants, usually including: *Pinus contorta* Loud., *Ledum groenlandicum* Oeder, *Kalmia polifolia* Wangenh., *Dodecatheon* sp., *Drosera rotundifolia* L., *D. anglica* Huds., *Gentiana douglasiana* Bong., *Juniperus communis* L. var. *montana* Ait., *Platanthera dilatata* (Pursh) Lindl., *Nephrophyllidium cristagalli* (Menz.) Gilg., *Menyanthes trifoliata* L., *Oxycoccus microcarpus* Turcz., and *Pinguicula vulgaris* L.

The pothole water of the bogs was much diluted with melted snow in May when *Aedes* larvae were present. This pale (straw-colored) water, with a pH of about 5.0, became darker (tea-colored) and more acid in June. Reactions of 4.0-4.5 were usual in July. However, no mosquito larvae were collected from the bogs in July.

Bog Streams.—The streams draining these upland bogs are very numerous. The water in several observed in late July at Petersburg was tea-colored, with pH readings of 4.2 to 4.5. In the bogs, the streams are intermittent through the peat. In the forest zone where they flow under dense canopies of western hemlock and Sitka spruce, they tumble through roots and rocks as small torrents of foaming white water. Effluent sections near the sea, though still fast, run over sand and gravel. Even here the streams are still easily identified as bog streams by their tea-colored, acid water. These bog streams were important breeders of blackflies other than *Simulium venustum*.

Roadside Borrow Pools.—Under this term are included pools in the highway ditches or in muddy flats, mostly free of vegetation and usually in clay or shale basins. Some have growths of *Carex* spp. and many contain a good deal of detritus. The water is clear or turbid, rarely stained a pale straw-colored, reaction less acid than pH 5.2 and may be neutral or slightly alkaline. The water temperatures followed average air temperatures (50°-60°F.). During prolonged rainy weather these pools usually develop inlets and outlets and become turbid. In this condition they rather belie a usual rule of thumb

that Alaskan mosquitoes are absent in flowing waters, for such roadside pools are a habitat of predilection of *Culiseta* (chiefly *impatiens*) larvae.

Torrents.—Cascades other than bog streams are frequent and variable about Juneau, Ketchikan and Wrangell. Almost all are cold. The average temperature of about twenty torrents in mid-June was only 49° F. Most are fed in part by melting snow in the mountains, and apparently warmed by contact with the air in numerous "bridal-veil" falls. At Juneau several of these torrents were still bordered by snow drifts near sea level in June and had temperatures in the low forties. At Wrangell 45° was the average temperature of this stream-type the middle of June. Blackfly larvae were collected in most of them with considerable difficulty, but the collections were small and the larvae also generally small. There were exceptions, of course. For example, the large torrent emptying near the Juneau dump, sections of which are so steep that the water might be described as heavy spray, surprisingly supported large simuliid larvae on sticks. In general, though no thorough surveys for larvae were made in torrents, the small numbers of larvae found and low adult counts suggest relatively low blackfly production.

Larger Streams.—The rivers of the region, being fed by glaciers, are turbid with glacial milk and were not studied. Several clear streams with flows of 15-50 c.f.s., which drained lakes or flowed in valleys rather than through gorges, were surveyed. Such watercourses are fast, though much slower than torrents, being mostly rapids or riffles interrupted only by occasional turbulent pools. They were generally warm (above 50° F. in June). In Ward Creek near Ketchikan and Nugget Creek near Juneau, *Simulium venustum* was found, usually along with other species of blackflies.

NOTES ON SPECIES

Mosquitoes:

* *Aedes aboriginis* Dyar—Juneau, Ketchikan, Wrangell, Petersburg. Larvae

were collected in May, June, and July in roadside borrow pits devoid of vegetation. The species was associated at Wrangell with *Aedes pullatus* and *punctor*; at Petersburg with *Culiseta impatiens*.

A. communis, Deg.—Juneau. Only from Juneau where larvae were associated with *A. punctor* in *Carex* pools.

A. excrucians (Walk.)—Wrangell. A single adult female was collected biting at Rainbow Creek near Wrangell, July 30.

A. impiger (Walk.)—Juneau. Seventeen larvae from a roadside pool near Juneau, May 11.

A. pionips Dyar—Juneau. Fifty-four larvae dipped near Lemon Creek, Juneau, May 11.

* *A. pullatus* (Coq.)—Wrangell, Juneau. Seventeen larvae collected at Wrangell in bare, open gravel borrow pits, May 14, associated with *A. aboriginis*. Nine females taken biting at Mendenhall Glacier, Juneau, July 25.

* *A. punctor* (Kirby)—Juneau, Ketchikan, Wrangell, Petersburg. The larvae of this species predominated in collections from upland bogs. At Wrangell and Petersburg there were very large populations. Inasmuch as the bogs include vastly more area than all other mosquito larval habitats of the region, it is likely that *A. punctor* is the most important pest mosquito.

Culiseta alaskaensis (Ludl.)—Haines. This conspicuous species, which is very common and widespread in Central Alaska, was collected only at Haines as biting adults.

* *Culiseta impatiens* (Walk.)—Juneau, Ketchikan, Wrangell, Petersburg, Haines. The larvae were common from May to August in roadside borrow pools and ditches. Females which emerge in July and August evidently do not bite until the following spring. They were readily collected biting as late as mid-June. A *Culiseta* egg raft presumably of this

species was collected at Wrangell June 21. Either the females are extremely long-lived or there is a second brood.

Culiseta incidens (Thoms.)—Ketchikan. Dr. Stone stated regarding this identification of 21 larvae from Ketchikan, June 26: "It is possible that these are *alaskaensis* larvae, but I doubt it." No *C. alaskaensis* were seen south of Haines.

Culiseta ? *macrackenae* D. & K.—Wrangell. Of a puzzling collection of 14 larvae from a Wrangell roadside ditch, Dr. Stone says: "If correctly determined a considerable extension of its range. I can find no disagreement with larvae from California."

Punkies:

* *Culicoides obsoletus* (Mg.)—Juneau, Ketchikan, Wrangell. Biting females were collected in the study areas about each town, except Haines, from June to August. This species is the principal punkie pest of Southeast Alaska. It was apparently most abundant at Ketchikan in August when as many as 15 were observed biting an exposed shin. It seems likely since the species occurs along the coast that the larvae breed in tidal flats. The higher adult counts were uniformly made a mile or more inland in wooded areas, however.

Culicoides unicolor (Coq.)—Haines, Petersburg, Ketchikan. This species, which was common at Haines along the tidal flats, bit fiercely in the late evening on June 14. A single specimen was collected at Connell Lake near Ketchikan on June 19.

Culicoides ? *tristriatulus* Hoffman—Ketchikan. The identification is tentative. Dr. Wirth has not seen the specimens which were collected at Ketchikan, September 4. He named similar punkies from Valdez *tristriatulus*, however.

Blackflies:

* *Cnephia mutata* (Mall.)—Juneau, Ketchikan, Wrangell, Petersburg, Haines. The adults were collected in all four study areas in June and July and at Haines in June. Next to *Simulium venustum*, it appears to be the most common and widespread blackfly of the region. Though mostly observed at sea level, it was also taken at 3,000 feet on Deer Mountain, Ketchikan, biting, though not aggressively, in the rain. The larvae were not identified.

Prosimulium fulvum (Coq.)—Juneau. Adults of this large, well-marked species were taken only in the Juneau area in June, July, and August. They showed but little inclination to bite.

* *Prosimulium hirtipes* (Fries)—Juneau, Ketchikan, Wrangell, Petersburg. Adults of this common species were taken around each town studied (except Haines) from June to August.

Prosimulium onychodactylum D. & S.—Ketchikan, Juneau. Larvae were collected from Nugget Creek, Mendenhall Glacier, near Juneau and from Ketchikan Creek, Ketchikan,

in mid-May. No adults were encountered.

Simulium arcticum Mall.—Juneau. A single adult occurred in a collection of *Prosimulium hirtipes* and *P. fulvum* from a Douglas Island upland bog (near Juneau) July 23.

Simulium costatum Fries—Petersburg. Isolated larvae and pupae were collected from a bog stream at Sandy Beach, Petersburg, May 15. No adults were discovered.

Simulium decorum Walk.—Juneau. A single adult was captured at Nugget Creek, Mendenhall Glacier, near Juneau, July 25.

* *Simulium venustum* Say — Juneau, Ketchikan, Petersburg. This species, commonly called "white socks," is undoubtedly the chief blackfly pest of Southeast Alaska, although it was not collected at Wrangell and Haines and not many were seen at Petersburg. Wherever larger clear streams, especially those connecting lakes, are found, it was abundant. Ketchikan is such an area; adults were abundant there from mid-June to September from sea level to 3,000 feet. They were annoying until after dark in August and have perhaps less reluctance about biting man than other Alaskan species of blackflies.

* Widespread and common species presumably of practical importance.

SEASONAL INCIDENCE OF MOSQUITOES IN THE UPPER COOK INLET, ALASKA

W. C. FROHNE¹

Little or nothing is known of the densities and seasonal incidence of mosquitoes in most parts of Alaska. There is a real need for quantitative data to supplement

the available lists of species. With the present day rapid development of adulticiding control programs, emphasis should be placed more than ever on the vicious, far-ranging, long-lived adults.

Recent mosquito control trials in the vast permafrost areas of the Arctic Slope (Jachowski & Schultz, 1948) and of the

¹ Arctic Health Research Center, Public Health Service, Federal Security Agency, Anchorage, Alaska.