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Author(s): J. Richard Gorham
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DAVID S. MAY, Department of Biological Sciences, University of Denver, Denver, Colorado 80210. *Submitted 13 June 1974; accepted 14 October 1974.*

Orchid Pollination by Aedes Mosquitoes in Alaska[1]

ABSTRACT: Pollination of orchids (*Platanthera obtusata*) by mosquitoes was first reported in 1913. Since that time the phenomenon has been reported from Michigan, Wisconsin, Alaska, Manitoba and the Northwest Territories. The Alaskan record was based on observations of male *Aedes communis*. It was found during recent investigations in central and northern Alaska that female *Ae. communis* and five other kinds of mosquitoes, all females, also carry pollinia: *Ae. hexodontus* (new record), *Ae. intrudens* (new record), *Ae. nigripes* (new state record), *Ae. punctor* (new state record) and an undescribed population called *Ae.* sp. A (new record).

Pollination of orchids by mosquitoes was first reported by Dexter in 1913. A mosquito acquires the pollinium when it probes for nectar. The pollinia are arranged in such a way that the sticky base adheres to the eye of the mosquito

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(Stoutamire, 1968; Thien, 1969). This is a mutualistic association in which the mosquito assists in cross-pollination of the orchid while obtaining the energy resources required for flight.

Mosquitoes bearing pollinia have often been seen in an area extending from the N-central states, especially Michigan (Dexter, 1913; Stoutamire, 1968) and Wisconsin (Thien, 1969), northward to Churchill, Manitoba (Hocking *et al.*, 1950; Hocking, 1953), and in the taiga around Great Bear Lake (Porsild, 1928, reported by Twinn *et al.*, 1948), Lake Athabasca and Great Slave Lake (Raup, 1930). The 15 species of *Aedes* known to carry pollinia in nature are listed in Table 1.

The field observations on which this report is based were made at Sagwon (69°22′N, 148°54′W) during the summers of 1970 and 1972, and at Eielson Air Force Base (64°40′N, 147°6′W) during the summers of 1970-1972.

The occurrence of orchid-pollinating mosquitoes in Alaska was first reported by Frohne (1955) who saw, in Mt. McKinley Park, males of *Aedes communis* bearing pollinia (this is the only reported instance of male mosquitoes carrying pollinia). More recently, pollinia-bearing *Ae. communis* have been observed at Eielson AFB and at Sagwon. Pollinia-carrying *Ae. intrudens* were taken at Eielson AFB, the first reported natural occurrence of the phenomenon in this species (Stoutamire, 1968, clearly demonstrated that caged *Ae. intrudens* readily acquire pollinia).

Wild flowers were abundant at Sagwon, both in numbers and species. A

TABLE 1.—Species and distribution of insects bearing pollinia of *Platanthera obtusata*

Insects	Geographic distribution								
	Eielson AFB	Mt. McKinley Park	Sagwon	Churchill	Great Bear Lake	Great Slave Lake	Lake Athabasca	Michigan	Wisconsin
Aedes mosquitoes									
campestris	..	..	..	x	..	..	..	..	..
c. canadensis	..	..	..	..	..	..	..	..	x
cinereus	..	..	..	x	..	..	..	..	..
communis s. l.	x	x	x	x	..	..	..	..	x
excrucians	..	..	..	x	..	..	..	..	..
flavescens	..	..	..	x	..	..	..	..	..
hexodontus	..	..	x	..	..	..	..	..	..
impiger	..	..	..	x	..	..	..	..	..
intrudens	x	..	..	..	..	..	..	..	..
punctor	..	..	x	x	..	..	..	..	..
nigripes	..	..	x	x	..	..	..	..	..
riparius	..	..	..	x	..	..	..	..	..
spencerii	..	..	..	x	..	..	..	..	..
vexans	..	..	..	..	..	..	..	x	..
sp. A	..	..	x	..	..	..	..	..	..
species	..	..	..	..	x	x	x	x	x
Moths									
Eudonia lugubralis	..	..	x	..	..	..	..	..	..
Xanthorhoe munitata	..	..	..	..	..	..	..	x	..

cursory collection of flowering plants yielded 68 species (Gorham, 1972). Mosquitoes often alighted on flowers and probed for nectar. Many specimens bore pollen grains as evidence of these visits.

Of the eight kinds of mosquitoes present at Sagwon, namely, *Ae. cataphylla, Ae. impiger, Ae. pullatus, Ae. communis, Ae. hexodontus, Ae. nigripes, Ae. punctor* and an undescribed population here called *Aedes* sp. A, pollinia have been seen on the last four mentioned. I did not find the specific source of the pollinia, but it was probably the bog orchid, *Platanthera* (=*Habenaria*) *obtusata.* This orchid is presently known from only one arctic tundra locality, Umiat (Hultén, 1968), but it is probably as widely and generally distributed in Alaskan arctic tundra as it is in the taiga of Alaska.

Most mosquitoes bore only one pollinium, but I have seen specimens of *Ae. nigripes* and *Ae. hexodontus* with two pollinia, one on each eye. One specimen of *Ae. communis* carried a double-headed pollinium.

Aedes sp. A was the most abundant mosquito at Sagwon (47.5% of a total of 5727 specimens), but very few specimens (0.2%) bore pollinia. *Ae. hexodontus,* a species not previously associated with orchid pollination, was also common (38.2% of the total), but only 0.14% carried pollinia. *Ae. communis* and *Ae. nigripes* were much less abundant (comprising 3.1% and 3.4%, respectively, in population samples) in the general population but had much higher rates of pollinia-bearing: *Ae. communis,* 2.8%; *Ae. nigripes,* 3.1%. *Ae. punctor,* reported here for the first time as a pollinium-bearer in Alaska, was scarce at Sagwon and was not included in these calculations.

Mosquitoes are doubtless the major pollinators of the bog orchid, but I chanced to find at Sagwon one specimen of a pyralid moth, *Eudonia lugubralis* (identification by Eugene Monroe), carrying a pollinium. Stoutamire (1968) has reported that a geometrid moth, *Xanthorhoe munitata,* sometimes carries pollinia in Michigan.

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J. RICHARD GORHAM,[2] Arctic Health Research Center, Fairbanks, Alaska 99701.
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[2] Present address: Food and Drug Administration, Washington, D.C. 20204.