

ESTABLISHMENT OF *WYEOMYIA MITCHELLII* ON THE ISLAND OF OAHU, HAWAII

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The mosquito fauna of the Hawaiian Islands consists entirely of accidental or deliberate introductions (Joyce 1961). This report notes the establishment of *Wyeomyia mitchellii* (Theobald) on the island of Oahu, apparently the only instance in which a *Wyeomyia* species has become established outside the New World.

This species was discovered by the author on 4 July 1981 along Makiki Valley Trail, a site near Honolulu which is described in part by Bonnet and Worcester (1946). While collecting female *Aedes albopictus* (Skuse), significant numbers of a sabethine were also attracted to the human bait. Forty-four *Wyeomyia* females were captured, and sufficient progeny were obtained from them to establish a laboratory colony and to provide additional material for identification. A tentative identification as *Wy. mitchellii* was confirmed by Ronald A. Ward, Walter Reed Army Institute of Research. Voucher specimens have been deposited in the Smithsonian Institution, Washington, D.C. and the Bernice P. Bishop Museum, Honolulu, Hawaii.

Larvae of *Wy. mitchellii* were subsequently found in leaf axils of aroids, including an upland taro referred to locally as "ape" (*Alocasia* sp.). Immatures of *Wy. mitchellii* and *Ae. albopictus* were often found together in these plants. Staff of the Vector Control Branch, Hawaii State Department of Health have also collected larvae in ornamental bromeliads (Patrick Y. Nakagawa, personal communica-

tion). Careful survey of other potential leaf axil habitats will be necessary to reveal the full range of plant associations on Oahu. *Wyeomyia mitchellii* was previously known only from Jamaica, Hispaniola, Cuba, southern Florida and the Atlantic slope of Mexico (Knight and Stone 1977), where leaf axils of bromeliads and aroids are the most common larval habitats (Belkin et al. 1970). Although the Hawaiian collections represent a major extension in distribution of *Wy. mitchellii*, it is important to note that Oahu is at approximately the same latitude as the Caribbean islands to which this species is native.

Larvae of *Wy. mitchellii* have been collected in Makiki Valley and several adjacent valleys, but the extent of the species' distribution on Oahu is still under study. *Wyeomia mitchellii* becomes the sixth member of Oahu's mosquito fauna, the first introduction recognized since the discovery of *Aedes vexans* (Meigen) in 1962 (Table 1). Although the route of introduction is unknown, illegal importation of bromeliads from Florida seems to be the most probable source. The time of introduction is also uncertain, but the occurrence of *Wy. mitchellii* in separate valleys and its abundance in these areas suggests that the introduction was not recent.

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Table 1. The mosquito fauna of Oahu, Hawaii.

| Species* | Date of introduction to Hawaii | Reference |
|--|--------------------------------|-------------------------|
| <i>Aedes albopictus</i> (Skuse) | 1890's | Joyce 1961 |
| <i>Aedes vexans</i> (Meigen) | 1962 | Joyce and Nakagawa 1963 |
| <i>Culex quinquefasciatus</i> (Say) | 1826 | Joyce 1961 |
| <i>Toxorhynchites amboinensis</i> (Doleschall) | 1953 | Steffan 1968 |
| <i>Toxorhynchites brevipalpis</i> Theobald | 1950 | Steffan 1968 |
| <i>Wyeomyia mitchellii</i> (Theobald) | ? | This paper |

* *Aedes aegypti* (Linn.) formerly occurred on Oahu, but it has been eradicated (Nakagawa and Hirst 1959).

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CULICOIDES SPP.¹ ATTRACTED TO PASTURED CALVES IN NEW YORK STATE: EVIDENCE OF A HEMATOPHAGOUS GUILD?²

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In eastern North America, 10 and possibly 11 species of biting midges, *Culicoides* spp., have been reported to seek or take blood from large mammals other than man (Humphreys and Turner 1973, Schmidtmann et al. 1980). We report here information concerning biting midges attracted to Holstein calves at 5 widely separated dairy farms in greater New York state, and advance the possibility that the cohort of common species observed represents an ecological guild.

Calves used to attract host-seeking *Culicoides* were tethered individually to pasture fence-

lines during calm evenings on 26 dates in June, July and August 1978 and 1979. Host-seeking specimens landing on the hair coat of an animal were captured by using a battery-powered vacuum aspirator to take a series of 30-sec samples, one each from the legs, back, belly and head (including the inside and outside of the ears). The sample series were started 30 min before nautical sunset, at sunset and thereafter at 30 or 60 min intervals until 2 hr after sunset. Thus, a total of 536 samples, 134 from each anatomical region, were taken. Because of differences in animal size and tractability, personnel making catches, and climatic conditions, the numbers of specimens captured from each farm and each region of host anatomy were not compared by statistical methods.

The numbers of female *Culicoides* captured are listed by farm, species, and region of host anatomy in Table 1. Five of the 6 species observed were captured at all 5 farms; "eastern" *C. variipennis* (Coquillett) was captured at 4 farms. These 6 species do not reflect taxonomic groupings below the generic level, but each possesses the pattern of antennal pit-sensillae common to other biting midges that blood feed from large mammals (Jamnback 1965). Except for *C. obsoletus* (Meigen), *C. biguttatus* (Coquillett), and *C. stellifer* (Coquillett) that were captured from legs, which possibly were air-borne and destined for the underside of the abdomen, the observed host-attack patterns agreed closely with the activity of biting midges attracted to pastured livestock in southcentral New York in 1976 (Schmidtmann et al. 1980).

The uniformity of species captured at each farm is notable in several respects. First, those biting midges that blood feed from pastured cattle are clearly identified apart from the ca. 25 other species present in inland areas of New York state (Jamnback 1965). Second, it can be inferred that pastured cattle on other farms in New York, and perhaps throughout the Northeast region, are exposed to similar blood-feeding attack. Third, the common presence of 5 to 6 species at each location appears to represent an ecological "guild," that is, "a group of species that exploit the same class of environmental resources in a similar manner" (Root 1967). The presence of other dipteran species-groups (guilds?) that blood feed from a common class of vertebrates has been discussed by Downes (1971). Since the ecologic and economic importance of hematophagous Diptera is closely associated with blood-feeding

¹ (Diptera: Ceratopogonidae).

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