SEASONAL SIZE VARIABILITY IN *CULICOIDES VARIIPENNIS* (DIPTERA: CERATOPOGONIDAE) IN SOUTHERN CALIFORNIA

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Adult body size is an important consideration in assessing vector potential in blood-feeding Diptera. Nasci (1986), for example, demonstrated a significant positive relationship between body size and parity in *Aedes vexans* (Meigen) and *Culex salinarius* Coquillett, and the trend was evident also for *Ae. antlanticus* (Dyar and Knab) and *Psorophora columbiae* (Dyar and Knab). Within the Ceratopogonidae, adult female body size has been positively correlated with fecundity in field-collected *Culicoides furens* (Poey) (Linley et al. 1970), *C. melleus* (Coquillett) (Linley and Hinds 1976) and *C. insignis* Lutz (Kramer et al. 1985). Generally, the size of adult *Culicoides* is inversely related to habitat temperatures (Linley et al. 1970, Linley and Hinds 1976, Akey et al. 1978, Mullens and Rutz 1983, Kramer et al. 1985).

Laboratory studies have shown that larger adult females of *C. variipennis* (Coquillett) are more fecund and survive better than smaller individuals (Akey et al. 1978). Wirth and Jones (1957) noted that *C. variipennis* from cool regions of the U.S. were larger than those from warm regions and also observed that specimens from the same area were larger during cooler periods of the year. I am aware of only 2 field studies that examined seasonal size variability in detail in *C. variipennis*. Zimmerman[1] and Linhares[2] both indicated that larger females of this species were found in cooler periods of the adult flight season in southwestern Virginia and northern California, respectively. Linhares additionally demonstrated that larger *C. variipennis* were more fecund. The purpose of the present study was to document seasonal changes in adult size of *C. variipennis* in southern California.

Adults of *C. variipennis* were collected at 1-3 week intervals throughout the year (October 1982 to September 1983) using small CO_2-baited suction traps. The study area was near a large dairy wastewater lagoon in the Chino Basin near Riverside, CA; details are provided in Mullens (1985). Females were sorted from each collection, and a single wing of each was measured from the basal arculus to the tip using a dissecting microscope equipped with an ocular micrometer. Only collections in which wings of 25 females were measured are reported here, with the exception of October 27 (12 females) and December 2 (17 females).

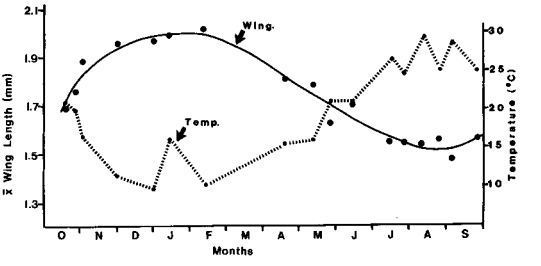

Fig. 1. Seasonal trend (October 1982-September 1983) in average wing lengths of female *Culicoides variipennis* collected near a dairy wastewater pond in Riverside County, CA. Temperatures (air) are mean values for a 10 day period immediately preceding each collection.

The seasonal trend in wing length was very distinctive (Fig. 1). The largest females (wing length 2.02 mm) were collected on February 9, while the smallest (wing length 1.48 mm) were collected on September 7. Pooling all collections, average yearly *C. variipennis* wing length was 1.73 mm. The seasonal trend in adult size (as indicated by wing length) clearly was inversely related to air temperature. Figure 1 indicates average air temperatures for the 10 day period immediately preceding each collection, as recorded at the University of California at Riverside. Temperatures of the larval habitat (mud) do not necessarily correspond exactly to air temperatures. Adult *C. variipennis* size (y) was influenced ($P < 0.001$) by air temperatures (x), however, as described by the regression equation, $y = 2.24 - 0.026 \times$ ($r^2 = 88.7\%$), for this data set. This pronounced negative regression of adult size on temperature is similar to relationships observed in field studies of *C. furens* (Linley et al. 1970), *C. melleus* (Linley and Hinds 1976) and *C. insignis* (Kramer et al. 1985). The actual sizes of the field-collected *C. variipennis*

[1] Zimmerman, R. H. 1981. Seasonal abundance and host preference of *Culicoides* in Virginia: with emphasis of the ecology of *Culicoides variipennis* (Diptera: Ceratopogonidae). Ph.D. dissertation, Virginia Polytechnic Institute and State University, Blacksburg. 188 pp.

[2] Linhares, A. X. 1984. The biology of *Culicoides variipennis* (Coquillett) (Diptera: Ceratopogonidae) in northern California. Ph.D. dissertation, University of California, Berkeley. 153 pp.

in this study, relative to approximate mean temperatures, are fairly similar to those observed by Mullens and Rutz (1983) for laboratory-reared individuals of this species in New York. For example, female *C. variipennis* reared at 20°C had an average wing length of 1.79 mm (Mullens and Rutz 1983), while field-collected *C. variipennis* from mid-June and late October (ca. 20°C air temperature) in the present study had average wing lengths of 1.71 and 1.69 mm, respectively. As discussed by Linley and Hinds (1976), larger adult size during cooler months likely reflects a prolonged period of larval development. This may serve to defer adult emergence during cool periods and improve the survival and reproductive capabilities of those adults that do emerge at this time.

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