Life Cycle and Laboratory Diet for Atrichopogon jacobsoni (de Meijere) (Diptera: Ceratopogonidae)

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Atrichopogon jacobsoni (de Meijere) was first recorded in the state of Hawaii by Joyce (1959). It has since become one of the most common ceratopogonids encountered within the state. Hardy (1964) inferred that the species breeds in fresh water habitats. Most ceratopogonids are aquatic or semi-aquatic, but *A. jacobsoni* appears to deviate from the established norm for it appears to breed in rotting plant material.

Dead larvae and larval skins of a ceratopogonid believed to be this species were found under the bark of a rotting limb of the endemic hibiscus, *Hibiscus arnottianus*, collected by W. Gagné from Mokuleia trail at 2000' on the island of Oahu, February 23, 1970.

MATERIAL AND METHODS

The original gravid females used in this study came from a xeric area above Dillingham Air Force Base, Oahu, in November of 1968. The species has been subsequently reared from females found in the Auwahai district of Maui, and Bird Park, Volcanoes National Park, on the island of Hawaii. The gravid females used in each replicate were aspirated directly from mating swarms into 8 dram (9.5 cm × 2.3 cm) culture vials. The swarms are usually found beside or above a small green shrub in an open forest situation.

The culture medium which was prepared according to Steffan (1966) consisted of the following materials: Bacteriological Agar—2.0 gm.; Corn meal Agar—4.2 gm.; Distilled water—200 ml. This medium was distributed among 25 vials which were then auto-claved and slanted. Pulverized straw was sprinkled on the agar surface before the gravid females were aspirated into the prepared culture vials. The straw absorbed excess free water from the agar surface and introduced fungal spores. The resulting mycelial growth nourished the larvae of *A. jacobsoni*. Several gravid females were placed in each culture vial.

After larvae had been in the vials for approximately 3 days, the available mycelial growth had been consumed. Then a mixture of Brewer's yeast and pulverized straw was sprinkled on the agar surface. Within a few hours the yeast absorbed moisture and became palatable to the ceratopogonid larvae. For the remainder of the larval period, Brewer's yeast was provided each day as needed for larval nutritional requirements.

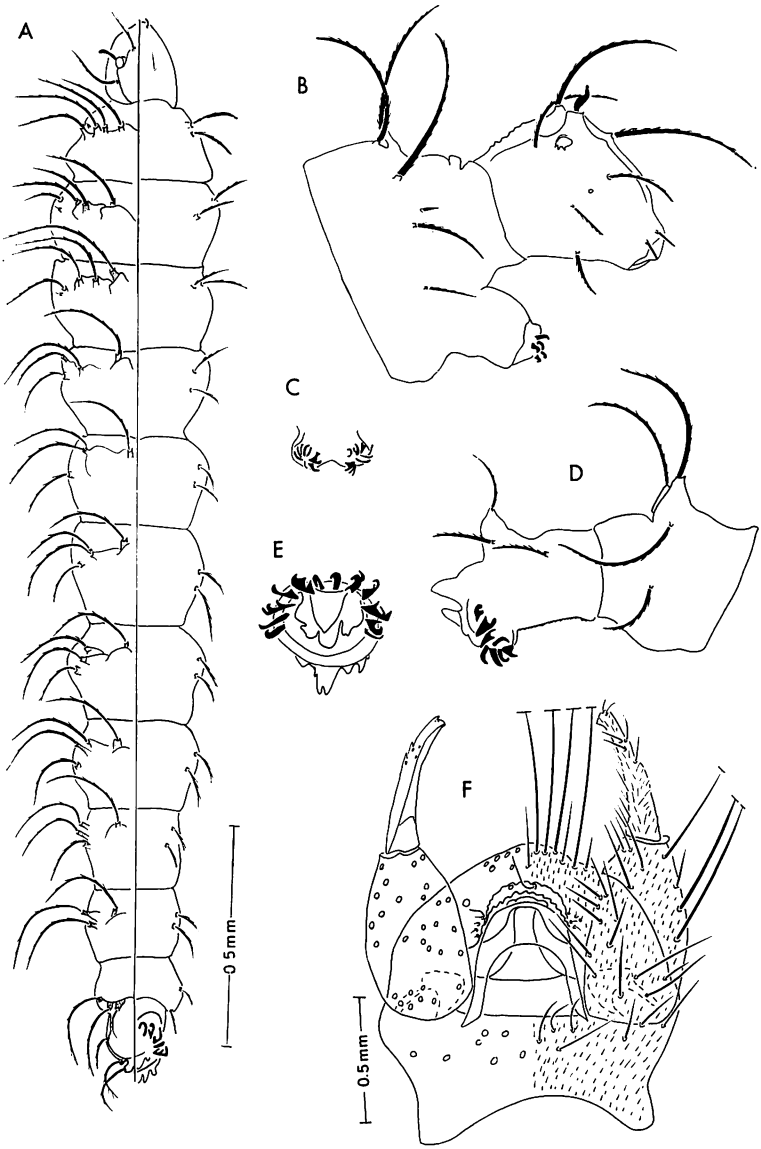

FIG. 1. *Atrichopogon jacobsoni*. a) Final instar larval chaetotaxy. b) Lateral view of head and prothorax. c) Ventral view front proleg. d) Lateral view last two abdominal segments. e) Ventral view posterior proleg. f) Adult male terminalia.

At no time did the larvae bore into the agar slant as do sciarids. The observations were made on material reared at 20°C with no light provided in the rearing chamber.

Notes on Life History

Egg stage: The eggs of *A. jacobsoni* are ovoid, grayish-white and approximately 0.4 mm in length. They were preferentially laid on the moist agar surface. In the laboratory the eggs were usually laid in clusters. Incubation required 5 to 6 days.

First instar: The first instar larvae were approximately 0.8 mm long upon hatching. The head capsules were approximately 0.12 mm wide. The head was provided with a pair of sharp dorsal spines and several pairs of lesser setae. Each body segment had 6–8 dorsal spines in a single row extending to the plural area on each side. The spines leave the body in an anterior direction, then recurve and eventually project posteriorly over the abdomen. The spines are about as long as the body segments upon which they are located. This stadium required approximately 2 days.

The first instar larva feeds gregariously with 10–15 larvae feeding in an area 1 cm across while the remainder of the culture vial remains apparently unexplored. Gregarious feeding was not observed in the subsequent instars.

Second instar: The second instar differed from the first only in the fact that it was larger and had more secondary setation. The head capsules had a width of 0.15 mm. The body was about 2.2 mm long at the beginning of the stadium and 2.6 mm at the end of the stadium. The stadium required 3 days for completion.

Third instar: The third instar larvae was 3.6 mm long at the beginning of the stadium and the head capsule was 0.21 mm wide. In larvae of this stage, the fat body becomes a prominent translucent organ. This stage required 4–5 days.

Fourth instar: This is the terminal larval instar. During this stadium the larval body becomes filled with fat bodies which are opaque. The body was 4.6 mm long and the head capsule was 0.28 mm wide upon entering the stadium. The final body length was 5.3 to 5.6 mm. This stadium required 6 days.

Pupal stage: The final instar larvae of *A. jacobsoni* pupated on the surface of the agar culture medium within the loose straw layer. Pupal development required 4 to 5 days.

Adult: The adults of *A. jacobsoni* were kept alive from 7 to 10 days in the laboratory by feeding them diluted clover honey, but without the honey, they died within 3 days. Several different procedures were tried in an effort to get the reared adults to mate in the laboratory. A *Panax* sp. shrub was placed in a green organdy covered cage (2 ft. × 2 ft. × 4

ft.) with 30 to 40 adults including both sexes, but no swarming or mating resulted. The cage was exposed to bright sunlight, shade, and sunset conditions respectively while it contained the shrub, with negative results. Square, round, and triangular white and black silhouettes and a pan of water were substituted for the shrub without success.

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