

SCIENTIFIC NOTES

BLOOD MEAL SIZE OF *Leptoconops kerteszi*
(Diptera:Ceratopogonidae)

J. D. FOULK

Department of Entomology, University of
California, Riverside, California

Adult *L. kerteszi* gnats rest throughout the night immediately beneath the surface of dry sand. Males and both engorged and unengorged females may be easily collected unharmed from this microhabitat early in the morning before they become active and take wing. Many engorged females were taken at a site along the Santa Ana River Valley west of Riverside in September and October, 1966 for serological analysis of blood meals. An approximation of the weight and volume of the meal was also made, and these results are presented in this note.

Thirty-two engorged gnats were collected in the field into gelatin capsules and were quick-frozen in a thermos containing dry ice (CO₂) to minimize the fluid loss which accompanies digestion. There was but slight difference in the degree of distension of the gnats' abdomens, but color differences were marked since color of a blood meal changes from bright red to dark blue or black as digestion progresses. Twenty of the 32 gnats were selected for weighing. These all contained a bright red blood meal probably taken on the previous day. An estimate of blood meal weight was made by subtracting the mean weight of 40 unengorged females, randomly selected from more than 300 swept from an attacking swarm about the author's head, from the mean weight of the 20 engorged females. A Bosch Mondial® microbalance accurate to .1 mg. was used for weighing. Calculation made in this way gave .21 mg. as the mean weight of the blood meal.

Jack rabbits and brush rabbits frequently are hosts for *L. kerteszi*. Approximately 75 of the field-collected, unengorged females were contained in small cloth-floored feeding chambers (Sjogren and Foulk 1967) and attached to the pinna of a laboratory rabbit's ear. They were allowed to feed uninterruptedly to repletion and then removed from the chambers and frozen. The mean weight of 25 of these replete gnats was .23 mg. or only slightly more than the blood meal weight of the engorged specimens collected in the field. The weight of the replete gnats was approximately 2.5 times that of the unengorged ones.

Since the whole blood of rabbits has a specific

gravity of 1.050 (Spector, 1956), the blood meal volume may be calculated.

IF SG_b = specific gravity of whole rabbit blood (at 25° C.) = 1.050, SG_w = specific gravity of water (4° C.) = 1.0, V_b = volume of blood meal = Unknown, and V_w = volume of water, arbitrarily = 1.0 c.c., THEN:

$$\frac{SG_b (1.050) \cdot SG_w (1.0)}{V_w (1.0 \text{ c.c.}) \cdot V_b (\text{Unknown})}$$

OR $V_b = .9524$ c.c. = volume of blood meal equal to mass of 1.0 c.c. water.

Now, if 1.0 gms. blood = .9524 c.c. blood, then .0001 gms. blood = .00009524 c.c. blood, and, finally, .21 mg. blood = $(2.1 \times 10^{-4}) (9.524 \times 10^{-6}) = 2.00 \times 10^{-8}$ c.c. blood ingested in a replete blood meal.

References Cited

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- SPECTOR, W. S. (Ed.) 1956. Handbook of Biological Data. W. B. Saunders. Phila. p. 51.

PREDATION OF *Culicoides cavaticus* WIRTH AND JONES LARVAE ON *Aedes sierrensis* (LUDLOW)¹

T. B. CLARK, AND T. FUKUDA

University of California—State Department of Public Health Mosquito Project, Fresno.

Tree hole water containing ceratopogonid larvae, and fourth instar larvae and pupae of *Aedes sierrensis* (Ludlow) was taken from an oak tree near the Kings River in Fresno County, California. When this collection was transferred to a rearing pan in the laboratory, several ceratopogonid larvae were seen to attack and kill mosquitoes. The ceratopogonids from this collection were reared and sent to Dr. Willis W. Wirth of the Insect Identification and Parasite Introduction Research Branch of the U. S. Department of Agriculture who identified them as *Culicoides cavaticus* Wirth and Jones.

Several *C. cavaticus* larvae were observed with the aid of a stereomicroscope as they attacked mosquito larvae, Fig. 1. In each case, the attacking

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FIG. 1.—*C. cavaticus* attacking *A. sierrensis*. (I) Initial injury. (C) *C. cavaticus*.

larva first wrapped itself around its prey, thus gaining the necessary leverage for the application of pressure to the mosquito cuticle by the mouth parts of the *Culicoides* larva. After each successful penetration, the head and anterior segments of the *Culicoides* larva could be seen probing beneath the cuticle of its host where it appeared to feed on living tissues. One mosquito was seen under attack by three *C. cavaticus* larvae at once, which suggests the possibility that injured mosquitoes may be especially attractive to *C. cavaticus* larvae.

In this collection the ceratopogonids were more numerous than the mosquitoes, and the tree hole water in which they were found was clear and free from organic debris. The behavior of the *C. cavaticus* larvae in this situation may have been due to crowding and/or starvation since, after

alfalfa pellets were added to the tree hole water, no further predation was observed.

Two other reports of ceratopogonid larvae preying on mosquito larvae have been noted. H. F. Carter reported *A. aegypti* (L.) being attacked by *Forcipomyia* larvae and J. A. Hair and E. C. Turner, Jr. reported the feeding of *Culicoides guttipennis* (Coq.) on the live larvae of *Orthopodomyia signifera* (Coq.) and *A. triseriatus* (Say).

References Cited

- CARTER, H. F. 1919. New West African Ceratopogoninae. *Ann. Trop. Med. Parasit.*, 12, 289-302.
- HAIR, J. A., and TURNER, E. C., JR. 1966. Laboratory colonization and mass production procedures for *Culicoides guttipennis*. *Mosq. News* 26(3):429-433.