

A Premating Period in Certain Species of the Genus *Opius* (Hymenoptera: Braconidae)

By KENNETH S. HAGEN

DEPARTMENT OF BIOLOGICAL CONTROL, UNIVERSITY OF CALIFORNIA

The majority of species belonging to the genus *Opius* that parasitize various tephritid species in the Hawaiian Islands will mate immediately after emergence. However, in two *Opius* species a distinct period of time must elapse after emergence before the males will copulate. This period is designated by the author as the premating period.

It is well known that the males of all the species discussed herein begin emerging before the females. This differential in emergence may at times be two days in length. However, with the exception of the two species having the premating period, when the newly emerged males are exposed to females of a different brood they will copulate immediately.

The species *Opius humilis* Silvestri, *O. fullawayi* (Silvestri), and *O. tryoni* Cameron, parasites of *Ceratitis capitata* (Wiedemann), mate immediately after emergence (Back and Pemberton, 1918; Pemberton and Willard, 1918). The melon fly parasite, *O. fletcheri* Silvestri, shows the same behavior (Willard, 1920). Another parasite of *Dacus cucurbitae* Coquillett, *O. watersi* Fullaway, and the parasites of *D. dorsalis* Hendel, *O. longicaudatus* (Ashmead) and *O. formosanus* Fullaway, were observed to copulate just after emergence.

The two species in which the males apparently require a prolonged period after emergence before they will copulate are *O. oophilus* Fullaway and *O. vandenboschi* Fullaway. These species are parasites of the oriental fruit fly, *D. dorsalis*, and differ from the above-mentioned species by ovipositing in the host eggs (van den Bosch, *et al.*, 1951) or in the first instar larvae (Bess, *et al.*, 1950), respectively, rather than in the large larvae.

A study of the adult male internal reproductive systems of these two species revealed different degrees of spermatozoan migration through the genital ducts dependent upon age. In newly emerged males the only free, active spermatozoa were confined to the testes near the bases of the vasa deferentia. After five or six days at a mean temperature of about 80°F., dissections showed the spermatozoa to have reached the vesicula seminalis. It is not until the spermatozoa have reached this point that the males show any observable sexual behavior.

If both sexes of either *O. oophilus* or *O. vandenboschi* are allowed to remain together for five or six days after emergence they still may not copulate. However, if the sexes are kept separate for five or six days and then mixed, a mating behavior occurs immediately. The absence of mating in the former case where the males were sexually mature is ap-

parently associated with a lack of an attractant gradient between sexes. An obliteration of gradients between sexes is perhaps the result of air saturation of sexual odors. This hypothesis is supported by the fact that when carbon dioxide or even fresh air is blown through the cage, a mating reaction occurs (flipping of wings, Whiting, 1932) and mating is stimulated soon after the cessation of the flow of the CO₂ or air. It was found that the males of all the *Opius* species studied have internal glands which originate in the pygidium. A faint oblique line near the lateral, posterior angles of the pygidium can be seen externally. These glands apparently differ interspecifically. An odor evidently from these "scent glands" is perceptible to humans.

LITERATURE CITED

Back, E. A. and C. E. Pemberton.

1918. The Mediterranean fruit fly in Hawaii. U. S. Dept. Agr. Bull. No. 536 (Prof. Paper). 118 pp.

Bess, H. A., R. van den Bosch, and F. Haramoto.

1950. Progress and status of two recently introduced parasites of the oriental fruit fly, *Dacus dorsalis* Hendel, in Hawaii. Proc. Haw. Ent. Soc. 14 (1):29-33.

Pemberton, C. E. and H. F. Willard.

1918. A contribution to the biology of fruit fly parasites in Hawaii. Jour. Agr. Res. 15 (18):419-465.

van den Bosch, R. and F. H. Haramoto.

1951. *Opius oophilus* Fullaway, an egg-larval parasite of the oriental fruit fly discovered in Hawaii. Proc. Haw. Ent. Soc. 14 (2):251-255.

Whiting, P. W.

1932. Reproductive reactions of sex mosaics of a parasitic wasp, *Habrobracon juglandis*. Jour. Comp. Psych. 14:345-363.

Willard, H. F.

1920. *Opius fletcheri* as a parasite of the melon fly in Hawaii. Jour. Agr. Res. 20 (6):423-438.