CONTACT STIMULANTS FROM Heliothis virescens THAT INFLUENCE THE BEHAVIOR OF FEMALES OF THE TACHINID, Eucelatoria bryani¹,²

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(Received December 4, 1981; revised January 25, 1982)

Abstract—Factors acting at contact or close range affected the behavior associated with host seeking of females, but not of males, of the tachinid, Eucelatoria bryani Sabrosky. Females were arrested by components of larvae of Heliothis virescens (F.) and by a dichloromethane extract of okra leaves. A hexane extract of H. virescens frass and a chloroform–methanol extract of H. virescens larvae were both active. In addition to chemicals, shape and size were involved because females were arrested by small inert objects the size of H. virescens larvae and frass.

Key Words—Kairomone, contact chemicals, arrestant, host seeking, Eucelatoria bryani, Diptera, Tachinidae, Heliothis, Lepidoptera, Noctuidae, parasitoid.

INTRODUCTION

Tachinids are important parasites of many important insect pests, and a better understanding of the role of chemicals in the location and acceptance of their hosts is essential for the optimal utilization of these parasites in pest-management programs. Chemicals clearly affect tachinid host-selection behavior. Sucrose, fructose, a protein, and several unidentified chemicals stimulate oviposition when certain species of tachinids contact hosts, host frass, or host habitat damaged by host feeding (Burks and Nettles, 1978; Hassel, 1968; Nettles and Burks, 1975; Roth et al., 1978). Unidentified volatile

¹In cooperation with the Louisiana Agricultural Experiment Station and the Texas Agricultural Experiment Station.
²Mention of a proprietary product does not constitute an endorsement by the USDA.
chemicals emitted by the food plant of the insect host (Monteith, 1955; Nettles, 1979, 1980) and by the host (Mitchell and Mau, 1971; Monteith, 1955, 1958) are also attractive to certain species of tachinids.

Contact chemicals stimulate oviposition by the tachinid *Eucelatoria bryani* Sabrosky (Burks and Nettles, 1979), and a volatile chemical(s) is involved in host habitat seeking (Nettles, 1979, 1980). *E. bryani* females are attracted to the odor of the host's food plants, okra and cotton (Nettles, 1979, 1980), and to hosts *[Heliothis virescens* (F.)] fed okra leaves (Nettles, 1980), but they are not attracted to odor of hosts fed an artificial diet (Nettles, 1980). The volatile attractant probably is much more important for host habitat finding than for final host location because the plant odor is stronger than the plant-derived host odor (Nettles, 1980) and the mass of the plant is much greater than that of the host larva. Thus, another chemical(s) may be involved in host location and, in support of this hypothesis, I have frequently observed that the behavior of *E. bryani* adults is affected when flies come in contact with feces, vomit, and hemolymph from *Heliothis* larvae. Although the role of contact chemicals as stimulants of host-seeking behavior is well established for several hymenopteran parasites (Vinson, 1977), there has been no research with tachinids on the role of contact chemicals other than as ovipositional stimulants. This paper reports the effects of components of *H. virescens* larvae on the behavior of the tachinid, *E. bryani*.

**METHODS AND MATERIALS**

*Insect Rearing.* *E. bryani* and *H. virescens* were reared as described previously (Nettles, 1980). The *H. virescens* larvae were fed either a Nutrisoy® diet (Raulston and Lingren, 1972) or a lima bean–wheat germ diet (Shorey and Hale, 1965; Burton, 1969). The parent stocks and the flies being held before they were used in the bioassays were given water at 0800 and at 1600 hr each day by saturating a 9 × 9-cm square of Cellucotton® on the top of the cage.

*Tests with* *H. virescens inside a Box.* This test was performed on insects used to rear the *E. bryani* parent stock. Two hundred last-stage *H. virescens* larvae were placed inside a white plastic box (11 × 24 × 30 cm, Transco Plastics Corp., Cleveland, Ohio) containing five layers of hardware cloth, which served as spacers (1.2 cm between layers), and a layer of absorbent paper toweling on the bottom of the box. This box was placed inside a cage where the larvae were exposed to adult parasites. After 2 hr of such exposure, the box was covered and removed from the cage. The numbers of each sex of the flies inside the box and inside the cage (outside the box) were determined.

*Bioassay Using Paired Papers.* Flies (5–15 days old) were separated according to sex using nitrogen anesthesia and placed in cages so that each