

A Method for Sexing Living Pupal and Adult Yellow Mealworms¹

A. K. BHATTACHARYA, J. J. AMEEL,
AND G. P. WALDBAUER

Department of Entomology, University of Illinois,
Urbana 61801

While conducting nutritional studies with the yellow mealworm, *Tenebrio molitor* L., we found it necessary to determine the sex of living pupae and adults. Attempts to sex adults by withdrawing the genitalia from the abdomen with forceps usually resulted in the injury or death of the beetles. When a search of the literature proved of no help we examined specimens in hope of finding externally visible sexual characteristics. We found differences by which the sex of both living pupae and adults can be rapidly and reliably determined under a dissecting microscope. We have been using the characters described here to sex adults and pupae since 1967.

Adult males and females can be distinguished by means of structural differences in the 4th and 5th visible abdominal sternites (Fig. 1). The caudal margin of the 5th abdominal sternite of the male is comparatively blunt, and comparatively wide bands of intersegmental membrane are visible between the 3rd and 4th and between the 4th and 5th abdominal sternites. The caudal margin of the 5th abdominal sternite of the female is somewhat more pointed, and only narrow bands of intersegmental membrane are visible between the last 3 visible abdominal sternites. Some experience is needed to sex adults rapidly and with confidence.

The sex of pupae can be determined by noting the form of the developing genital structures; these are situated just behind the 7th visible abdominal sternite which is the sternite of the 8th abdominal segment (Fig. 1). In the male a small swelling which protrudes from beneath the 7th abdominal sternite bears a pair of short and blunt papillae which are closely approximated on the mesal line. In the female the homologous swelling

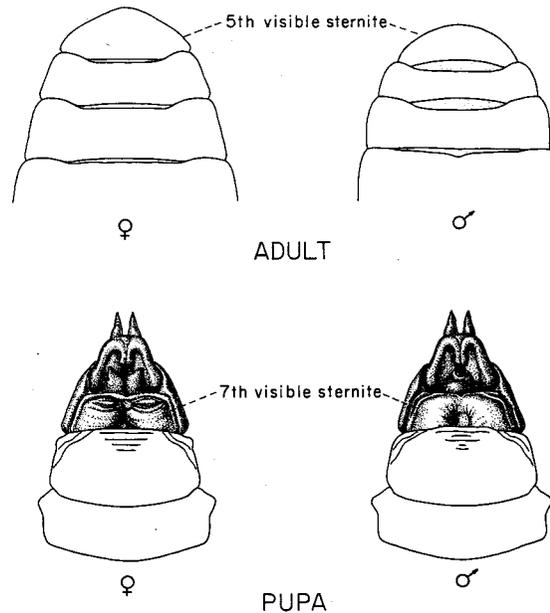


FIG. 1.—Ventral aspects of the ends of the abdomens of adult and pupal male and female *T. molitor*.

is somewhat larger and bears a pair of widely diverging papillae which are situated at its latero-caudal angles.

A comparison with the determination of sex by dissection of the adult genitalia showed that the characters described here are completely reliable. For this purpose we collected 200 pupae from our laboratory culture and separated males and females by means of the external characters. The 2 groups of pupae were allowed to develop to the adult stage, and their sex was again determined by means of externally visible characters. The genitalia of each animal were then dissected and examined. In each case this method confirmed the determination of sex which had been made by means of external pupal and adult characters.

We owe thanks to Mrs. Alice Prickett for making the drawings.

¹This research was supported by Cooperative Agreement no. 12-14-100-9031(51) between the University of Illinois and the Market Quality Research Division, Agricultural Research Service, USDA. Received for publication May 21, 1970.