Genetics of Esterases in *Drosophila.*
IV. Slow-Migrating S-Esterase in *Drosophila* of the *virilis* Group

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A slow-migrating $\beta$-esterase (S-esterase) is described which has been detected in *Drosophila montana*, *Drosophila imeretensis*, and some stocks of *Drosophila virilis* when mixtures of $\alpha$- and $\beta$-naphthyl acetate are used as substrates in histochemical reactions after electrophoresis. Sexual dimorphism for S-esterase has been demonstrated. This esterase is contained in male genitalia only, predominantly in the ejaculatory bulb (waxy plug). It appears 3-4 days after emergence of flies. In hybrids between $S^+$ and $S^0$ species, the activity of the slow esterase is either decreased or inhibited. An autonomous synthesis of the S-esterase in the ejaculatory bulb was established by transplantation of imaginal genital discs into larvae of different *Drosophila* stocks. Based on analysis of physicochemical and immunochromel properties, S-esterase is suggested to be an independent fraction of esterase, possibly dimeric, which does not cross-react with $\beta$-esterase antiserum.

KEY WORDS: esterases; *Drosophila imeretensis*; electrophoresis; interspecific hybrids; gene activation.

INTRODUCTION

As reported previously (Korochkin *et al.*, 1974), the introduction of segments of the fifth chromosome of *Drosophila texana* into the fifth chromosome of *D. virilis* makes detectable an unusual, slow-migrating fraction of $\beta$-esterase. Subsequently, this esterase fraction was designated as S-esterase. The sug-

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gestation has been advanced that S-esterase is a variant of esterase-2 connected with a specific, presumably membrane protein.

Subsequently, it has been found that this esterase is normally present in some *Drosophila* of the *virilis* group, namely *D. imeretensis* and *D. montana* (Korochkin and Belyaeva, 1973). This finding put new problems into focus such as the genetic control and nature of S-esterase, its organ distribution, and the regularities of its phenotypic expression in ontogenesis.

In this communication, we describe the results of our attempts to solve these problems.

**MATERIALS AND METHODS**

The following stocks and strains of *Drosophila* of the *virilis* group were investigated:

1. *D. virilis*. Outbred stocks 140 (varnished), 103 (Rounded), E₁ (puffed, ebony, broken, break, detached), 147 (broken, break, detached). Stocks 1 and 2 with segments of *D. texana* fifth chromosome introduced into the fifth chromosomes. Stock 101, wild, Japanese population. Stock 160, marked with all autosomal recessive mutations: broken (*b*), second chromosome, absence of posterior crossvein; gapped (*gp*), third chromosome, interrupted first longitudinal vein; cardinal (*cd*), fourth chromosome, white ocelli; peach (*pe*), fifth chromosome, peach-colored eyes; glossy (*gl*), sixth chromosome, rough eyes. Inbred stocks derived from a wild Batumi population: 9-8L, 9-261, 9-264, 9-27.


To determine the organ distribution of esterases in each species, the thorax, head, abdomen, hemolymphs, intestine, Malpighian tubules, and fat body were investigated. Examinations were made of the reproductive system of males: the testes, paragonia (the paired accessory glands), ejaculatory duct, and ejaculatory bulb. The female reproductive system was examined as a single entity.

Developmental changes in S-esterase were analyzed in third instar larvae, prepupae, and adult flies as well as in organs of adult flies immediately after emergence and on days 1, 2, 3, 4, 5, 8, 10, and 15 after emergence.

To assess the independence of S-esterase synthesis in male genitalia,