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CHROMOSOME NUMBER AND MORPHOLOGY OF *DROSOPHILA SILVESTRIS* BASDEN — WITH A DESCRIPTIVE NOTE ON THE INTERNAL GENITALIA OF THE ADULTS

By

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With 3 figures in the text

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The external characters of *Drosophila silvestris*, a member of the *obscura* group, was described by BASDEN (1954). The object of the present paper is to record the chromosome number and structure of *D. silvestris*, and to give a brief description of the internal genitalia of the adult, as well as the egg and puparium.

Material and Methods

The material used for this investigation came from Lugton, Midlothian, Scotland, (STOCK 351). Squash preparations of more than one hundred larval brains were made, and from the large ganglion cells the metaphase chromosome configuration and morphology were studied. Larval brains were dissected in 45% aceto-carmine, allowed to remain in the stain-fixative for 5 to 10 min, then transferred to an albumenised slide for squashing. The method of squashing was as follows. The material was covered with a strip of thin cellophane. On top of the cellophane were placed two sheets of filter paper, and immediately, a large diameter specimen tube was rapidly rolled over the whole to make a one-celled layer preparation. The proper pressure required to make an evenly spread film was obtained by trial. Directly after squashing, the prepared slide is transferred to a jar of water, where the cellophane strip falls off, in about 30 sec. The slide was then transferred to 70% alcohol. Examination of the aceto-carmine preparation can be done at this stage, or, if required, the squash can be permanently stained by the FEULGEN technique. All the preparations used in this study were stained by FEULGEN.

Results

Examination of the squash preparations showed that the chromosome number of the diploid cell is 12, ($n = 6$), five pairs of autosomes and heteromorphic X and Y. The morphology of the autosomes is:—2 pairs of rods; 2 pairs of V's; 1 pair of dots. In the female XX are two V-shaped elements, while the male has a V-shaped X and a J-shaped Y, (Fig. 1). Structural details of the individual elements were studied, and a numerical index was assigned to each chromosome.

Chromosome-X is in the form of a V. It is the shortest of the three V-shaped chromosomes. In some of the cells, one arm appeared to be a little longer than the other, while in others, the difference in length of each arm was not obvious. The centromere was not clearly seen.

Chromosome-Y is in the form of a J. Its whole length is a little longer than that of the two arms of X: The position of the centromere has not been determined. In some cells the bottom of the J appeared bent only at a slight angle. This part of the Y chromosome was always darkly stained (FEULGEN technique):

The same applied to the distal end of one arm of X, the longer arm when a difference in length between the arms was noticed.

Chromosome-2 is in the form of a V. It is slightly larger than the X-chromosome with one arm longer than the other. No secondary constriction has been seen in either of the arms of this chromosome.

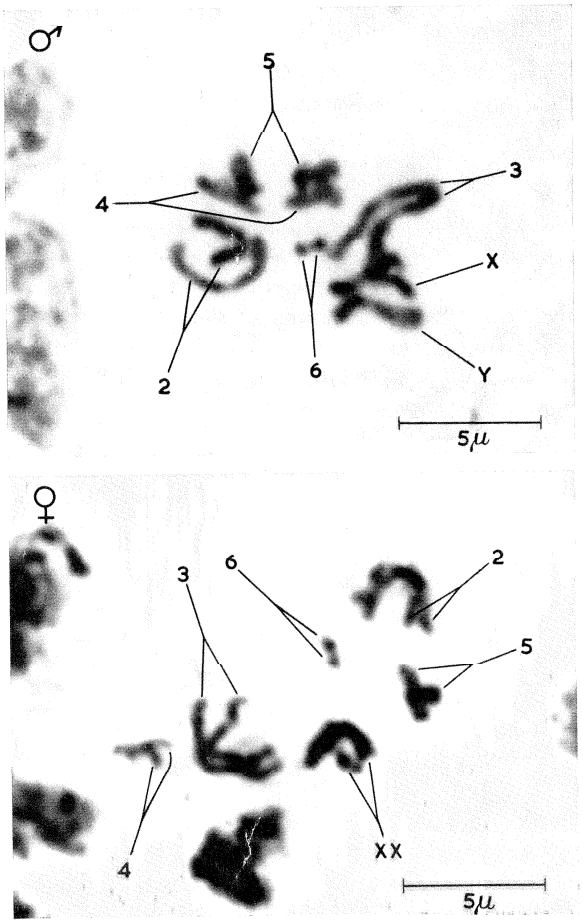

Fig. 1. Metaphase Chromosome Configuration of *D. silvestris*. Photo micrographs of large ganglion cells of ♂ and ♀ larval brain

Chromosome-3 is in the form of a V. It is the largest chromosome. The shorter arm is about equal in length to the smaller arm of chromosome-2. In the longer arm, which is fully one and a quarter times the shorter, there is a secondary constriction about one third from the distal end, so that in consequence the longer arm often appears bent.

Chromosome-4 is in the form of a rod. It is about the length of the long arm of *chromosome-2*.

Chromosome-5 is in the form of a rod. It is shorter and broader than chromosome-4, and almost always appears densely stained.

Chromosome-6 is in the form of a dot. It is clearly visible in all wellspread metaphase mitotic cells. Occasionally the dot appears slightly elongated.

Fig. 2 shows in semidiagrammatic form male and female metaphase mitotic figures selected from many drawings made from squash preparations.

Amongst other species in the *obscura* group, the most similar in metaphase chromosome configuration to *D. silvestris* is *Drosophila obscuroides* POMINI [(BUZZATI-TRAVERSO, 1942). The main difference is in the shape of the Y element, which is rod-shaped in *D. obscuroides*, whereas in *D. silvestris* it is in the form of a J.

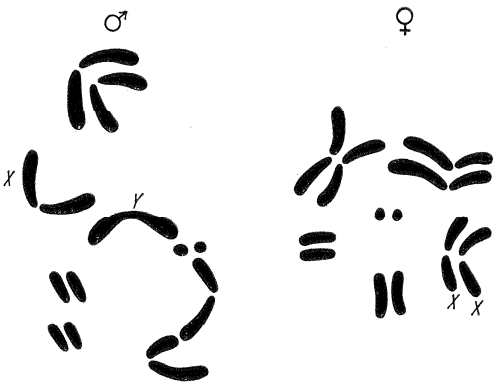

Fig. 2. Semi-diagrammatic representation of mitotic chromosomes of *D. silvestris*

Internal genitalia, egg, and puparium

Ventral Receptacle (*VR.*) (Fig. 3a). Small S-shaped tube lying against ventral surface of the uterus. Proximal two fifths of the tube is wide, the remaining distal three fifths gradually tapering.

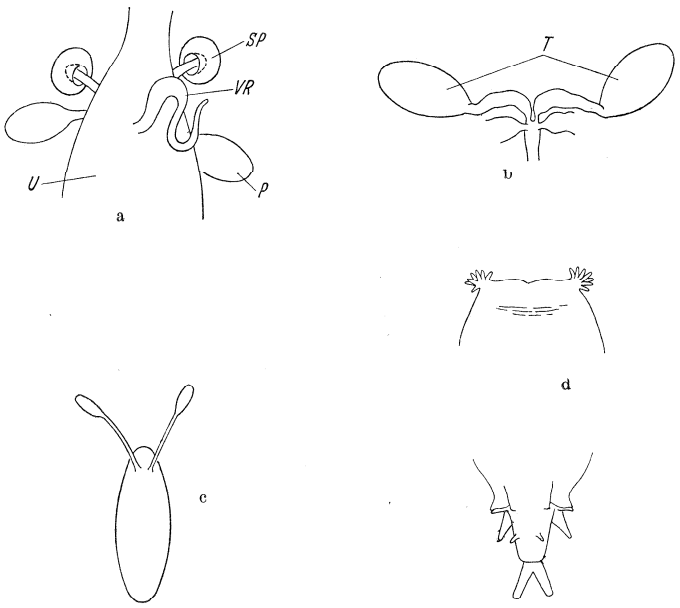

Fig. 3a—d. *D. silvestris* — a and b, internal genitalia of the adult. (*U* uterus, *SP* spermathecae, *VR* ventral receptacle, *P* parovaria, *T* testes). c. Egg d. Anterior and posterior ends of the puparium

Spermathecae (*SP.*) (Fig. 3a). Small spherical bodies, dark brown in colour and chitinized.

Parovaria (*P.*) (Fig. 3a). Oval-shaped bodies, posterior to and extending slightly beyond the spermathecae.

Testes (*T.*) (Fig. 3b). Bright, opaque, orange-coloured, sac-like in appearance, without coiling.

Other characters

Eggs (Fig. 3c). Two filaments, attached about one fifth length of egg from apex, thin, distal ends spatulate. Length of filament about three quarters length of egg.

Puparia (Fig. 3d). Pale brownish yellow. Each of the two anterior spiracles has seven branches without definite stalk. Diagram shows ventral view of the anterior and posterior ends of the puparium.

Summary

The metaphase chromosome set of *Drosophila silvestris* BASDEN, a species of the *obscura* group, is described. From preparations of larval brains it was found that the diploid cell contains twelve chromosomes — five pairs of autosomes (2 V's, 2 rods, 1 dot) and heteromorphic X and Y (V- and J-shaped respectively).

Some internal characters of the adult have also been described.

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Literature Cited

BASDEN, E. B.: The distribution and biology of *Drosophilidae* (Diptera) in Scotland, including a new species of „*Drosophila*". Trans. Roy. Soc. Edinburgh **62**, 603—654 (1954). — BUZZATI-TRAVERSO, A.: Genetica di popolazioni in *Drosophila*. II. I cromosomi di 5 specie del "gruppo obscura" e la incrociabilita' di varie razze geografiche. Sci. Genet. (Torino) **2**, 224—241 (1042).

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