Oshima, C. and T.K. Watanabe. National Institute of Genetics, Misima, Japan. Sterility genes in natural summer and autumn populations of D. melanogaster.

Frequencies of sterile male and female flies among several hundred flies collected simultaneously from the summer and autumn populations of 1970 in Katsunuma locality were found to be 4.3, 4.8 per cent and 3.4, 7.8 per cent respectively. Among 342 second chromosomes extracted from each male fly in the summer and autumn populations, 69 chromosomes were found to be sterility chromosomes. The results are shown in Table 1.

Table 1. Frequency of sterility chromosomes and frequencies of male, female and both sexual sterility chromosomes

Collection time: 1970 (July, October)

Class of viability	Semilethal	Subvital	Normal	Total
No. of tested chromosomes	46	41	255	342
No. of sterility chromosomes	13	12	44	69
Frequency (%)	(28.3)	(29.3)	(17.3)	(20.2)
No. of male sterility chromosomes (%)		32	(46.4)	
No. of female sterility chromosomes (%)		27	(39.1)	
No. of both sexual sterility chromosomes (%)		10	(14.5)	

The frequency of sterility chromosomes was higher than 12.6% in 1968.

By half diallel crosses between sterility lines, which have been maintained by the Cy-sterility balanced system, the frequency of allelism was determined in the summer and autumn populations as Table 2 shows.

Table 2. Results of allelism between sterility genes

Collection time	July 31		October 12	
Sex	♀	♂	♀	♂
No. of sterility chromosomes	11	19	24	23
No. of crosses	55	171	276	253
No. of allelic crosses	10	1	14	26
Frequency of allelism (%)	(18.2)	(0.6)	(5.1)	(10.3)
Frequency of finding	No. of sterility genes			
1	6	17	14	10
2	-	1	1	-
3	-	-	1	2**
5	1	-	1*	-
7	-	-	-	1

**, * persistent gene

Table 3. Persistent and allelic sterility genes during two years in Katsunuma locality

Collection date	Oct. 2, 1968	July 31, 1970	Oct. 12, 1970
Female sterility gene	FS 801 A - F (6 chromosomes)	FS 102 (1 chromosome)	FS 201 A - E * (5 chromosomes)
Male sterility gene	MS 801 A - M (13 chromosomes)	MS 113 (1 chromosome)	MS 202 A ** MS 202 B·FS 206 MS 202 C·FS 217 (3 chromosomes)
		MS 114	MSS 203 A
		MS 103	MSS 203 B
		MS 102	MSS 203 C

:allelic relationship

**, * persistent gene

The sterility strains, which were extracted from a natural population in Katsunuma locality in 1968 and have been maintained in our laboratory, were crossed diallelly with new sterility strains extracted from the summer population of 1970. On the other hand, diallel crosses between the sterility strains of the summer and autumn populations were performed.

One male sterility gene (MS 801) and one female sterility gene (FS 801) have persisted for two years. The male sterility genes (MS 202, B, C) in the autumn population of 1970 were linked with different female sterility genes (FS 206, FS 217). Three different male sterility genes in the summer population of 1970 were found to be combined in double sterility chromosomes (MSS 203 A - C). On the other hand, a female sterility gene (FS 102) has increased in the autumn population. The results are shown in Table 3.

The breeding pattern of D. melanogaster in Katsunuma locality has been scarcely known, but the places of hibernation and the dispersion of flies were probably localized in the district.

Ehrie, M.G. and R.C. King. Northwestern University, Evanston, Illinois. The anatomy of the larval ring gland of Drosophila melanogaster and its associated organs.

During histological processing Drosophila larvae are generally punctured to insure penetration of the fixative. The drop in hydrostatic pressure caused by puncturing often alters the three dimensional interrelations of adjacent organs. In 1966 F.G. Gottlieb published the details of a procedure that avoids puncturing (J.Roy.Mic.Soc. 85: 369-373). We have adapted this technique for plastic embedments. Larvae were relaxed, fixed, and dehydrated following Gottlieb's directions. The Dioxane used as the dehydrating solvent was replaced by propylene oxide, and the larvae were then infiltrated with the following resin mixture: Araldite 502 monomer, 8 ml; dodecenyl succinic anhydride hardener, 8.5 ml; and DMP-30 accelerator, 0.32 ml. The monomer and hardener must be mixed thoroughly before the accelerator is added. All components were obtained from Polysciences, Inc., Paul Valley Industrial Park, Warrington, Pa. 18976. Larvae were infiltrated with resin using the following schedule: 12 hours each in (1) 3 parts propylene oxide (P): 1 part resin mixture (R), (2) 1 P:1 R, (3) 1 P:3 R, and (4) 100% R. The specimens were transferred to embedding capsules containing fresh resin and were left to polymerize at 60°C, for 24 hours.

The female sectioned was in the terminal portion of the third instar (92 hrs. after hatching). One micron sections were cut with glass knives mounted in a Leitz Fernandez-Moran microtome. The serial transverse sections were stained with Azure B. Outline drawings of the sectioned brain, ring gland, aorta, and oesophagus were made on sheets of cardboard using a Wild M20 microscope equipped with a drawing tube. The tracings were cut out and glued together to form a three dimensional model of these organs at 350X.

The accompanying photomicrographs and drawings illustrate the results. The following labeling system is used: 1. fat body cell; 2. prothoracic gland cell; 3. tracheal cell; 4. aorta; 5. oesophagus; 6. antennal imaginal disc; 7. brain hemisphere; 8. corpus allatum cell; 9. corpus cardiacum; 10. afferent nerve to corpus cardiacum; 11. salivary gland cell; 12. ventral ganglion; 13. efferent nerve from corpus cardiacum. (See next page.)

The ring gland lies above the brain, straddling the aorta (Figs. D and E). Fig. A shows a section through the anterior portion of the ring which contains prothoracic gland cells clustered in paired longitudinal strips along the dorsal surface of the aorta. Two tracheae enter the prothoracic gland to the left and right where its ventral lateral surfaces rest upon the paired antennal discs (Figs. A and B). The anterior tips of the brain hemispheres and the corpus allatum are included in the section shown in Fig. B. The ventral ganglion and the corpus cardiacum are included in section shown in Fig. C. An afferent nerve to the corpus cardiacum is sectioned where it leaves the right brain hemisphere. It is joined by a nerve from the left hemisphere (Fig. E). A left and right nerve leave the corpus cardiacum and pass through the arms of prothoracic gland to the corpus allatum.

The positions of the brain (B), corpus allatum (CA), and corpus cardiacum (CC) are contrasted for the larva and adult in diagrams F and G. During metamorphosis the prothoracic gland (pg) degenerates and the corpus allatum and corpus cardiacum move posteriorly and ventrally relative to the brain.

(M.G. Ehrie held an Undergraduate Research Participation Award from the N.S.F. during the summers of 1968 and 1969.)