Ander, Georges Pleiotropic effect of lozenge clawless. The lozenge-clawless (lz^{cl}) mutant which affects the size, color, and structure of the eye, and implicates reduction of claws in both sexes and in females the loss of parovaria and spermathecae, also effects a considerable reduction of the third antennal segment. Histologically a certain type of thin-walled blunt hairs (possibly sensilla basiconica) were found mostly lacking. More accurate investigations involving differences between the alleles lz^{cl}, lz^{s}, lz^{34k}, lz^{46f24} and lz^{g} and their compounds are in course.

Anders, Georges Pleiotropic pattern of the lozenge-mutant in D. pseudoobscura. Investigations on pseudoobscura lozenge showed the pleiotropic pattern to be very similar to that of melanogaster. The eyes, claws, and antennae are affected by reduction. In females the spermathecae and parovaria are lacking. Owing to this great similarity in the pattern of gene action a homology of these genes can be postulated.

Asahina, Kazuo Studies on the Taxis of D. melanogaster. It seems highly probable that the behavior of D. melanogaster is controlled by the phenomena of four fundamental taxises: phototaxis, chromotaxis, negative geotaxis, and negative aggrotaxis. In this investigation the relation between these taxises and behavior was studied. The experiment on chemotaxis, one of the important factors responsible for the matter, has not yet been performed. The results obtained in experiments in which temperature was 25°C are as follows.

1. Phototaxis (investigated by light within the limits of 1,000 Lux): Males and females show similar positive responses. Response of taxis becomes stronger in accordance with intensity of stimulus of the light, and it reaches a constant level after 30 minutes of irradiation. The animals also show strong responses under green color, the complementary color of red, and white illumination, whereas a weak response is observed under yellow color, the complement of blue. But under orange illumination they show a negative response.

2. Chromotaxis: In general, the taxis appears strongly by the light of long wave and weak by short wave. It appears also strong by green and weak by yellow. This taxis is similar in males and females, and also shows constant reaction after 30 minutes of irradiation.

3. Negative Geotaxis: The flies begin to fly up lively by the illumination of every color when they are changed an angle from horizon. This reaction becomes maximum during the first 5 minutes and decreases afterwards. The animals show the strongest responses under green light at 45° and under red at 90°, but do not show any difference under the other colors.

4. Negative Aggrotaxis: It is observed in test tube that the individuals migrate from dense part to that of scattered under the illumination of every color. This phenomenon is increased under light of red, green, and orange, while it is comparatively weak under blue and yellow light. These responses appear considerably quick and both males and females show the same reaction. These experiments show that the similar inclination exists between the cooperative effects of green and red and those of yellow and blue. The behavior of the flies, therefore, does not always consist with the approximation of the wave length and this phenomenon is worthy of note.

The present author is now investigating the interrelation of intensity of these taxises, and that between the taxis and ovulation or sex ratio.

Basden, E. B. Drosophila in Scotland. During 1950-51 a survey of the Drosophila fauna of Scotland produced the total of 18 species listed below. Those marked with an asterisk are new to the British list, while some of the others are recorded for the first time from Scotland.

1. D. subobscura Collin. Common and widespread. An out-of-doors species that only exceptionally enters buildings. It is most plentiful in and near woodlands, though it is the only species that can be expected in wide open spaces remote from trees. (moorlands, etc.)
2. D. obscuroides Pom. Widespread but not as frequent as (1). Does not enter buildings, and keeps to wooded areas.
3. D. tristis Fall. Has a widely scattered distribution but is only infrequently met with. My most northerly record is Lat. 57°53'.
4. D. ambigua Pom. Found as yet at only 4 or 5 places up to Lat. 57° 36'.
*5. D. sp. nr obscuroides (new species) Has long bristles on each ovipositor plate. Quite common in 1951 at apple baits. Not yet caught north of Lat. 57° 56'. This is a purely woodland species. Adults soon die in the laboratory unless fed with honey water. Many attempts to maintain stocks have failed, though ones and twos can be reared on Drosophila medium and fermenting fruits.
*6. D. guyenoti Burla. Fair numbers are attracted to apple baits, but it is not a common species and has not been trapped north of Lat. 57°.
7. D. funebris Fabr. This is the commonest species inside buildings, though it is also plentiful outdoors, but so far has not been met with north of Lat. 57° 36'.
8. D. busckii Coq. As yet found occasionally in the eastern part of Scotland up to Lat. 56° 44'.
9. D. melanogaster Meig. This will almost certainly be found in many more built-up areas but so far has not been found by me above Lat. 56° 34'.
*10. D. simulans Sturt. This has been found on two occasions, in 1950 at Liberton, near Edinburgh, and in 1951 at Inverkeithing, across the Firth of Forth from Edinburgh.
11. D. phalerate Meig. This is the commonest toadstool species but occurs frequently at apple baits. It will probably be found wherever the larger fungi occur, but the most northerly record at the moment is Lat. 57° 36'. This and the next two species (12, 13) breed but reluctantly on Drosophila medium.
12. D. transversa Fall. This can be bred from various ground fungi in large numbers but is very rarely attracted to fruit baits, even outside the fungus season (July-October). It has not yet been found north of Lat. 56° 26'.
13. D. pallida Ztt. (= unistriata Strobl, teste Duda 1935) The eggs of this species can often be found embedded in the flesh of fungi. The adults will go to apple bait during the winter months. I have not yet found it beyond Lat. 56° 18'.
14. D. immigrans Sturt. This occurs commonly in a fruit store in Edinburgh and will doubtless occur in similar places elsewhere in Scotland.
15. D. sp. (repleta group, near bifurca P&W) This has been collected in a house in Brechin, Angus.
16. D. fenestrarum Fall. This has been caught a few times around Edinburgh.
17. D. (Parascaptomyza) disticha Duda. A few specimens have been found in windows and amongst garden herbage in the southern part of Scotland. It will breed copiously in Drosophila medium.
18. D. sp. One specimen at apple bait at Coldbackie, in the extreme north.

Bird, Myrtle J. Chemical mutagenesis. Compounds shown in the table have been tested for mutagenic action in D. melanogaster. All were dissolved in 0.4% saline and injected into the abdomen of 1-2-day-old males. The determining factor for the selection of the concentration administered is the solubility of the compound. In all cases fully saturated solutions were used. In some experiments different concentrations were also tested for purposes of comparison. After treatment the males were tested for sex-linked recessive lethals by the Muller-5 technique.

Compound	Concentration used	No. chromosomes tested	No. lethals	% lethals
1:3-dimethanesulphonoxy-propane	0.2	976	30	3.1
	1.1	956	99	10.4
	2.2	624	60	9.6
1:4-dimethanesulphonoxy-butane	0.04	407	2	0.5
1:4-dimethanesulphonoxy-but-2-yne	0.1	547	30	5.5
	<0.1*	1082	47	4.3
cis-1:4-dimethanesulphonoxy-but-2-ene	0.06	1365	3	0.2
	0.2	507	4	0.8
	0.25	475	5	1.1
trans-1:4-dimethanesulphonoxy-but-2-ene	0.06	1374	17	1.2
n-butylmethane-sulphonate	0.2	707	6	0.8
Controls (combined data)	-	2449	3	0.1

* A little of compound out of solution at time of injection.

Detailed cytogenetic analysis of lethals induced by the various chemical mutagens investigated is being undertaken by Dr. Onsy G. Fahmy and will be published elsewhere.

Brunetto, Anna, and Frumento, Luigia. Salivary chromosomes of D. ambigua. The salivary chromosomes of D. ambigua (obscura group) show in wild populations several heterozygous inversions. As a preliminary for physiological and population genetics researches, we have studied the salivary chromosomes of laboratory stocks, giving a map of the homozygous and heterozygous condition. The map will be published shortly in Scientia Genetica. The chromosome complement of ambigua (A. Buzzati, 1942) is formed of two big and two small mediocentric and one point chromosomes. According to that, 8 major elements can be found in the salivary cells. The chromocenter is large and well differentiated. When broken by pressure, the limbs of the individual chromosomes tend to keep together, joined by the centromere. The sex chromosome, which in the mitotic nuclei is one of the larger V-shaped ones, does not show in the salivaries very long arms, but they are connected by most of the chromocenter.

In our map, we have adopted a nomenclature system based on letters. Dr. Prevosti (1950, Genetica Hiberica) uses numbers in his study of the salivary chromosomes of the European species of the obscura group. The correspondence of the chromosomes in the two systems is as follows:

Chrom.	Br.Fr. map elements		Prevosti map elements	
A	a	a'	4'	4
B	b	b'	1	1'
C	c	c'	2	2'
D	d'	d	3	3'

In our material (wild strain from Terminillo, kept in captivity for two years) we found several heterozygous inversions:

Elements	Inversions	Incidence (80 larvae obser.)
b	2 median (tandem)	40
b'	1 median; 1 subterm.	48;40
c	1 submedian (the two chromatids can be asynaptic until the proximal end)	40
c'	none observed	
sex chr. (d		
(d'	none observed	
a	none observed	
a'	none observed	

The inverted homozygous order has been observed only for element c.

We have had the opportunity of studying a series of permanent preparations of salivary chromosomes of larvae of the first generation which that stock had in captivity (July-August, 1949); we find all and only the inversions which are still present in the stock. However, a few small heterozygous deficiencies have been lost. The deficiencies which have been seen in the material of the first captive generation have the following distribution: element c, one subterminal deficiency; element b', one subterminal deficiency; element a, one subproximal deficiency.

Burdette, Walter J. Incidence of tumors in different strains of Drosophila.

It is customary to classify inbred strains of mice used in cancer research according to their degree of susceptibility to spontaneous and induced tumors. Tumors appear with characteristic incidence in Drosophila strains as well. Although the number of tumors appearing is known to be influenced by culture conditions (temperature, nutrition, etc.), the incidence remains within certain limits for each stock under ordinary culture conditions. The percentage of tumorous individuals has been determined in a number of stocks for 7 to 15 generations, and some of this information is presented in the table below, with the thought that it may be useful for other investigators to have the comparative incidence of a number of tumors under the usual conditions in one laboratory. The lowered incidence of tumors in three strains after they had been made isogenic will be noted. It is apparent that a wide spectrum of tumor penetrance is available for study in Drosophila.

Incidence of Tumors in Drosophila

Stock	Months counted	Times counted	Total no. counted	Total tumorous	Per cent tumorous Total	Males	Females
bw st tu	4	7	4426	24	.54	.26	.84
tu^{36a} (isogenic)	8	13	7473	222	2.97	3.21	2.73
tu^{36a}	5	9	3394	182	5.36	5.10	5.66
ed Su^{2}-dx	4	7	4022	385	9.57	11.59	7.52
f^{257-19} B/In AM	4	7	2449	416	16.99	15.53	17.87
tu^{wps}	8	13	8077	1423	17.62	12.10	23.18
w^{bf} f^{5}	4	7	2827	715	25.29	30.20	19.85
lz^{3} f	8	13	1016	2428	23.88	28.53	18.59
tu^{50d}	8	15	7144	1901	26.61	29.60	23.31
bw tu	8	14	8614	2434	28.26	26.72	29.92
se e^{11} tu^{49h}	8	13	8799	3275	37.22	38.11	36.41
tu^{h} (isogenic)	8	13	5464	2421	44.31	42.09	46.86
tu^{g} (isogenic)	8	12	4626	2156	46.61	49.19	43.81
tu^{48j}	8	14	5865	2833	48.30	53.66	43.67
tu^{h}	8	13	12236	6616	54.07	50.98	57.69
vg mt^{A} bw y B^{263-43} (homozyg.)	8	14	10069	5944	59.03	56.49	61.09
tu^{g}	4	7	3120	2274	72.88	69.92	75.77
vg bw tu	8	14	11967	9113	76.15	87.30	65.34
	8	14	10555	10540	99.86	99.77	99.94

Burla, Hans Drosophilids of the Ivory Coast (French West Africa)

During three months, from July to October 1951, I collected Drosophilids at five different places close to Abidjan, Ivory Coast. Two of the places lie in small spots of rain forest along the coast, the third in a secondary forest of the same region, the fourth in a cultivated area with plantations of banana and coffee, and the fifth in a very big mesophile virgin forest one hundred km. away from the coast. A total of 98 species has been recorded. Only 32 of them occurred on the fruit bait generally used for collecting Drosophila. Thirty species were recorded near the stumps of cut palm trees (Raphia species), 23 species around cut Mahogany trees, 32 species on fungi, 25 on wild fruits, and 5 on flowers. The following genera, subgenera, and groups are represented: Chymomyza (9 species) , Leucophenga (9) , Zaprionus (9) , Hirtodrosophila (3) , Mycodrosophila (11) , genus Drosophila (44) , Pholadonis (21) , Sophophora (12) , melanogaster group (5) , subgenus Drosophila (11). The remaining species could not be classified yet. Of the 65 Drosophilid species of the Ethiopian region mentioned by Duda (1939-40), only 22 could be found again, including a few doubtful determinations. About 70 species seem to be new. The characters of many of the species are aberrant and thus lead to revised definitions of the systematical group to which they belong.

Buzzati-Traverso, A. A. Interspecific crossings in the affinis subgroup.

Extensive tests have been made to check whether the American species belonging to the affinis subgenus (affinis, algonquin, athabasca, azteca, narragansett) could be crossed with the only known European representative of this subgroup, D. helvetica. No hybrids bave been obtained.

Buzzati-Traverso, A. A. Interspecific crossings in the obscura subgroup.

D. ambigua females, when crossed with D. miranda, pseudoobscura, or persimilis males produce a small number of hybrid

Larvae. Salivary-gland chromosomes can be studied in the mature larvae. No pairing occurs between the chromosome elements of the two species involved; 13 long and 2 short chromosomes can be seen originating from a common chromocenter. Larvae pupate, but no adults have been obtained.

Buzzati-Traverso, A. A. Interspecific crossings in the Pholadoris subgenus.

Crossings between D. victoria and D. lebanonensis gave both ways perfectly fertile hybrids. Reciprocal crossings between either one of the aforesaid species and D. nitens gave sterile adult females. Salivaries have not been studied yet.

Buzzati-Traverso, A. A. Natural selection under increased mutation pressure in D. melanogaster populations.

Using the same isogenic strain, four populations in numerical equilibrium were established. While the control population did not receive any treatment, the other three were subjected to 500, 1000, 2000 r units every fifteen days; only adult males were irradiated. From time to time the fertility of females, the egg hatachability, and the total productivity of adult individuals were tested. The experiments showed that an increase in the mutation rate brings about a more rapid rate of adaptation to the environment. The 2000-r populations became much more prolific that the control series over a period of thirty generations. The experiments were repeated with different isogenic strains, and confirmed.

Carson, H. L. Interfertile sympatric sibling species within D. bocainensis Pavan and da Cunha 1947.

A study has been made on flies collected by Dr. A. R. Cordeiro at a single locality in Rio Grande do Sul, Brazil, all of which were apparently morphologically D. bocainensis. According to salivary-gland-chromosome examinations of their offspring, the 51 wild females studies fall into two clear non-interbreeding groups on the basis of the chromosome arrangements that they transmit. Twenty-nine individuals fall into group A, to be designated D. parabocainensis n. sp.; these gave offspring homozygous for gene arrangement, except for an infrequent short inversion in 2L. Twenty-two individuals fall into group B, for which the name D. bocainensis will be retained. The latter is highly heterozygous for gene arrangements in chromosome 2 and especially chromosome 3. The X chromosome, although homozygous for gene arrangement, could be observed to differ considerably in arrangement from that in group A. Reciprocal crosses between these two in the laboratory, using strains from either within or between localities, produce luxuriant F_1's, in which the hybrid individuals are heterozygous for from 14 to 24 inversions, depending on the strain of bocainensis used. There is consistently an 8-inversion difference between the X chromosomes of the two. Except for obvious mechanical difficulties due to rearrangements, pairing in the hybrid salivary-gland cells is complete, and so far no "small differences" in banding pattern have been detected. The F_1 hybrids of the sympatric or allopatric cross parabocainensis female x bocainensis male produce a vigorous F_2 and are fertile in all backcrosses; F_1 males from the cross bocainensis female x parabocainensis male, although they inseminate their sister and backcross females with motile sperm, appear to be largly sterile. F_2's in this direction, however, have been obtained in 4 out of 16 such crosses, but only in mass culture. Three of these four are from sympatric crosses. A third species of the group, to be designated D. bocainoides n. sp. has been found in collections from the state of Sao Paulo. The male of this species is strongly differentiated morphogically from those of the two sibling species, and no species hybrids have been obtained with it. Chromosomal differences also appear to be relatively greater, and the evidence thus indi-

cates that D. bocainoides is quite separate from the other two. Study of natural chromosomal variability, hybridization, and geographical distribution of these three entities is continuing.

Cooper, K. W. The Chapter on Spermatogenesis in Biology of Drosophila. Although the introductory remarks to Biology of Drosophila by Dr. Demerec (p. vi) suggest that Professor Alfred Huettner's material on the spermatogenesis of Drosophila was placed at my disposal for drawing up the chapter on "Normal Spermatogenesis" (and have been so taken by at least one reviewer), in all fairness to both Dr. Huettner and myself let it be said that this was not the case. Regrettably, I have never seen either Dr. Huettner's notes or preparations, nor did I know of their availability until I had read Dr. Demerec's prefactory note in the published volume. The chapter on spermatogenesis was prepared on very short notice, which did not allow extensive original investigation on my part. The slide material used consisted of a large collection of very beautiful slides prepared by Professor Curt Stern, and generously loaned to me, some 40 slides made by myself for elucidation of the first meiotic prophase, and supplementary preparations of living spermatocytes; these formed the basis for such original observations as appear in the review.

da Cunha, A. Brito, Brncić, D. J., and Salzano, F. M. Comparative study of chromosomal polymorphism in populations of tropical Drosophila. Groups of closely related species were chosen foe this study: D. grizeolineata and D. guaramunú; D. cardinoides and D. polymorpha; D. bandeirantorum. The results so far obtained are:

Species	No. ind. studied	No. different inversions	Mean no. of inv. heterozygous per individual in different populations.
D. grizeolineata	446	5	0,01 - 0,53
D. guaramunú	312	16	1,41 - 2,85
D. cardinoides	80	1	0,01
D. polymorpha	155	6	1,44
D. bandeirantorum	328	2	0,32 - 0,56

The ecological data we have indicate that D. guaramunú is ecologically more versatile than D. grizeolineata, and the D. polymorpha is more versatile than D. cardinoides. D. bandeirantorum seems to be very specialized and common only a short time during the year. The cytological data suggests that the amount of chromosomal polymorphism is proportional to the degree of ecological versatility of the species and to the complexity of the environment where the population lives.

Dale, Ernest E. Differential mortality. An attached-X stock of Drosophila (D. melanogaster.) with red-eyed females and white-eyed males gave differential mortality of the two sexes when exposed to culture medium containing colchicine. Data are given on survival of colchicine-exposed flies and controls, the experiments being run simultaneously and covering an eight-day period.

Colchicine exposed	No. surviving	Per Cent
♀ 700	29	4.1
♂ 700	525	75.0
Controls		
♀ 449	355	79.1
♂ 451	371	82.3

Dresden, D. and Oppenoorth, F. J. Selecting strains resistant to gamma-HCCh (hexachlorocyclohexane).

Starting slection experiments with two strains of D. melanogaster, Berliner Inzucht and a wild strain, an attempt was made to obtain resistance against gamma-HCCH (contact method in adults). The LD50's were 1 and 2 microgram respectively. During 6 selections the LD50's increased gradually to 6 micrograms in both strains. This value did not change during the next 10 selections. By means of a new injection method we will try to find out to what extent the increased LD50 is due to internal or external factors.

Edmondson, M. Interchange of eye and antennal tissue during development.

A Drosophila male was found which had one normal antenna while the other consisted of two joints that were fairly normal except that they lacked arista and were covered with eye facets of the normal red color. In the anterior edge of the eye on the same side of the head there was a nick, embedded in which and slightly protruding was the bulb of an antenna. It seems clear that there had been an exchange of eye and antennal tissue, each into the place of the other, during imaginal development.

Epling, Carl, and Mitchell Donald F. A previously unrecorded gene arragement of D. pseudoobscura in southern California.

The "Pikes Peak" gene arrangement of the third chromosome of D. pseudoobscura is common in the Rocky Mountains, Texas, New Mexico, and Arizona. It has been found in low concentration in central California. It has been unknown in southern California until the present year, although the populations at Keen Camp and Pinon Flat have been sampled repeatedly each year since 1939 by Dobzhansky and, more recently by ourselves. An approximate total of 14,000 chromosomes has been determined. This year one Pikes Peak chromosome was found in a late-season sample of six females from Pinon Flat. It was also found repeatedly at three other stations in the San Jacinto Mountains not previoucly sampled. One of these is about six miles from Keen Camp, the others are about four miles from Pinon Flats. Large samples made at these stations throughout the season 1951 indicate that Pikes Peak had a frequency in each population of about 1%. The combinations of Pikes Peak with other gene arrangements present are easily distinguished in salivary-gland smears; thus it is improbable that it has been overlooked in the past even though it is infrequent. The meaning of its appearance, especially at Pinon Flat, is obscure.

Faber, J. and Sobels, F. H. A new imaginal ring in the mid part of the hindgut.

A histological analysis of pupae of the mutant lethal nonevaginated (lne, 1-0.1±) revealed the existance of a hitherto unknown imaginal ring in the hindgut, which is responsible for differentiation of part of the rectal region. In lne pupae a delay occurs in the replacement of the posterior part of the larval hindgut by cells from the genital discs. Because of this delayed development it was possible to observe an imaginal structure situated in the mid region of the hindgut developing also independently of the anterior part of the hindgut, which is formed by the imaginal ring caudal to the entrance of the malpighian tubes. These imaginal cells probably give rise to that part of the posterior intestine which represents the rectal ampulla. The same imaginal structure could be observed in normal pupae. Transplantation experiments are under way to check these observations.

Fujii, S. and Kawabe, M. On the development of some "bristle genes" in the pupal stage of D. virilis. The formation of the bristles in wild flies begins about 48 hours after puparium formation. A study on singed^{14} showed that the formation of bristles is delayed several hours (60 hours after paparium formation), but the time of bristle pigmentation is much the same as that in wild flies (about 100 hours after puparium formation). No difference was found between singed^{16} and wild-type in the formation and pigmentation of bristles.

Gowen, John W., and Statler, Janice Irradiation effects on viability of D. melanogaster. Day-old male and female imagoes were exposed to X-rays in 0, 20, 100, 500, 2500, 5000, and 10,000 r doses. Repeated pair matings, representing the 49 combinations, were made. Twenty-six different criteria described the physiological effects. Well-being of irradiated females was measured by total eggs laid, per cent of life devoted to egg laying, and days females lived. Eggs laid decreased linearly with dose until, at 10,000 r, less than fifty eggs or four per cent of control were metabolized and laid. Per cent of life given over to oviposition likewise decreased linearly from 75 to 34 per cent over the range of irraditions. Life spans for the irradiated females were irregularly decreased with higher doses. Duration of life for the males was increased by irradiation of 2500 r or more. Per cent of life during which the males were fertile decreased linearly with increasing dosage. Rate of decrease was similar to that for females. Quality of the progeny, as measured by hatchability of the eggs, decreased linearly with increasing irradiation, defective eggs being eight times as great at 10,000 r as with untreated females. Defective eggs, when sperm were irradiated, decreased linearly with dosage of X-rays. The decrease was comparable to that observed for the females. Effects were quantitatively similar for irradiation of eggs and sperm in these data. This observation is contrary to that ordinarily considered true when the measure of X-ray effects is sex-linked lethal mutations in eggs or sperm.

Imaizumi, T. and Kimoto, Y. Cytoplasmic constituents of eggs in early developing stages, and their staining properties. In developing egg cytoplasm we can recognize yolk granules of larger size and minute granules which disperse through hyaloplasm. These minute granules are 0.5 micron in diameter and globular in shape, and never transform in any stage or medium. Because of their insolubility in acetic acid, they cannot be confused with mitochondria, and are distinguished from ultramicroscopic microsomes by their greater size. They stain with pyronin, toluidine blue, or Sudan III, but not with methyl green or the Feulgen technique. After treatment with ribonuclease or with a cold bath of 10% $HClO_4$, basophilia of the granules mostly diminishes. Contrary to these, the hyaloplasm is acidophile in neutral medium, so it may be surmised that most of the RNA of the cytoplasm is concentrated in these granules.

The staining properties of nuclei and other cytoplasmic constituents are shifted from basophila to acidophile or vise versa according to pH of the medium when stained with buffered double bath of toluidine blue and fuchsin S. The pH values of the shifting zone for each constituent are as follows:

Species	Stages	Nuclei (interkinesis)	Cytoplasm Hyaloplasm	Cytoplasm Minute granules	Yolk granules
virilis	preblasteme		4.4	2.4-3.0	5.4-6.0
	blasteme	4.0-5.4	3.4-4.4	2.4-3.0	5.4-6.0
	early blastodermal	3.4-5.0 (achromatic part)		2.4-3.0	5.4-6.0
melanogaster normal	preblasteme		4.4	3.0-4.0	5.0-5.4
	early blastodermal	4.0-5.0 (achromatic part)		3.0-3.4	5.0-5.4
melanogaster lethal (without X chromosome)	preblasteme		4.4	3.0-4.0	5.0-5.4

The details will be reported in another paper.

Ives, P. T. and Evans, Alice T. A probable simultaneous double mutation in the Cy sp^2 chromosome.

In DIS-19, page 46, it was reported that a Cy bw sp^2 was recovered from a stock of net b cn bw/Cy sp^2. In DIS-22, page 71, a curious allele, or series of alleles, of the bw of this chromosome was reported, an given the symbol bw^{47j}. In 1949 another allele was found which was bw-like when homozygous, but allelic only to Cy bw sp^2 and not to net b cn bw. On 51f5 we observed that orange (or) of Mossige, DIS-24:61, is also present in Cy bw sp^2 and that the 1949 bw-like mutant was an allele of Mossige's or and exactly like it in phenotype. At least one of the bw^{47j}-type alleles has proven to be an allele of Cy bw sp^2 or but not of net b cn bw, Mossige's orange, or the 1949 allele. Mossige's or is not present in other Cy chromosome of our stock list, including Cy al^2 lt^2 L^4 sp^2, Cy pr, Cy sp^2, Cy L^2 sp^2, Cy al Bl lt^2 cn^2 L^4 sp^2. Although of very similar phenotype, the mutant gene pd is not present in the Cy bw sp^2 or chromsome but cn^2 is. When In(2R)Cy crosses over from Cy cn^2 bw sp^2 or to its homologue and becomes homozygous the result i a bright yellowish-to-orange eye color, darkening with age, and sp^2 wings. The simplest interpretation seems to be that in 45a a double and simultaneous nonle mutation occurred at the bw and or loci of the standard Cy sp^2 chromosome. Whi technically it should be written as Cy cn^2 bw^{45a} sp^2 or^{45a}, it should be satisfactory and much easier to designate it only as Cy bw sp^2 or. The relation of the various bw^{47j}-type mutants of the local population to bw^{45a} and or^{45a} has not been investigated.

Janzer, Wolfgang Studies on cave animal characteristics.

In connection with studies on the evoluti of cave animal characteristics, D. melanogaster has been tested. Cultures raised the dark for 10 generations showed no significant difference as to their photic responses when compared with those raised in the light. Further, stocks with dark body and eye color (se, e^{11}) could be shown to exhibit significantly higher photophilous behavior than those with light body and eye color (w, y Hw). Of 8 different mutants tested (S/Cy, B, w, e^{11}, se, y Hw, ar/ey^D, Berlin-normal), the mutant Bar (B) showed least photophily.

Judd, Burke and Lefevre, G. X-ray-induced dominant mutation in D. melanogaster. The frequency of all kinds of visible dominant mutations was determined after irradiation of Canton-S + males and females. In addition the change in incidence of detected mutations after irradiation was followed by subculturing the experimental bottles at weekly intervals for a minimum of four weeks. Doses of 2500 r and 5000 r were applied in the male irradiations; 3000 r in the female. Dominant mutations are sufficiently numerous to provide quantitative data; over 2% dominants were found as a maximum. However, the number of detected mutants declines rapidly two or three weeks after exposure. In these experiments no leveling off of the mutation rate was observed in the late subcultures, but the incidence of detected mutation was invariably lowest in the last subculture. Moreover, after four weeks the same mutant incidence was observed in both the 2500-r and 5000-r experiments, even though it was much higher in the latter at the beginning. The mutation rate in the 3000-r female series was somewhat, but insignificantly, lower than that in the 2500-r male series. Even in the female irradiations a decline in the incidence of detected mutations was noted after 11 days. Apparently, germinal selection is operative in eliminating induced mutations from the germ line. It cannot be decided if this is the sole cause for the decline, or whether, in addition, an intrinsically lower dominant mutation rate exists in the gonial as compared with the mature germ cells. All the mutants tested were homozygous lethal.

Kikkawa, H. Effects of 3.4-dihydroxykynurenine on pigment formation. The biochemical step from 3-hydroxykynurenine to brown pigment is quite unknown. But judging from Raper's works for the melanine formation, 3.4- or 3.6-dihydroxykynurenine seems to be a next product of 3-hydroxykynurenine. The 3.4-dihydroxykynurenine has been synthesized by Drs. T. Sakan and S. Seno of Osaka City University. Tests of this substance to v bw and cn bw mutants of Drosophila, however, were negative.

Koske, Thea A new species hybrid in the obscura group. For some time I tried to cross European species of the obscura group, but only with negative results. Later I also included some American species. Some time ago I learned by letter from Professor Buzzati-Traverso that he had succeeded only in crossing D. ambigua females with pseudoobscura and persimilis males of certain origin. (A report has been made recently by him at the Intern. Congress of Entomology at Amsterdam) Shortly afterwards I obtained a hybrid by crossing pseudoobscura females (Oaxaca) with ambigua males. The ambigua strain was of Swiss origin and highly inbred. The salivary chromosomes of the hybrid show a most complicated pattern. There are some inversions, overlapping inversions, and smaller rearrangements. Some parts lack in pairing. Nevertheless, extended sections of certain elements are exactly paired. An analysis will be carried out. Also the interaction of mutant alleles in the hybrid will be tested.

Lewis, E. B. Additions and corrections to the cytology of rearrangements. The following salivary-gland-chromosome locations of break points in certain rearrangements supplement descriptions found in the work of Bridges and Brehme.

ADDITIONS:

Rearrangements	Break Points
T(1;3) v	10 / 93B
T(1;3)05	4F / 88A-C / 92/62B-C (new order in 3 is : tip of 3L to 62 B-C / 88A-C through centromere of 3 to 62B-C / 92 to 3R tip; section 88A-C to 92 is inserted into X-- in 4F according to Griffen's analysis).
T(2;3) A	29 B-C / 83B
T(2;3) B	33 / 81F
T(2;3) 101	42-43 / 83 E-F
T(2;3) 108	The single euchromatic break is in 52D-F and is superimposed on In(2R)Cy.
T(2;3) 109	22F-23AB / 80 / 55F-26A (a cyclical exchange of tips as reported by Bridges and Brehme, but contrary to earlier report the inversion in 3R is evidently In(3R)P.).
T(3;4) c	86B-C (just to right or left of 86C1-2) / 101F
In(3LR) sep (Muller)	65E/85E

CORRECTIONS:

T92;3)Xa	The break in 3R which is superimposed on In(3R)P is not in 89D but lies near the end of 89E (to the right of bx and its pseudoalleles).

Lindsley, D. L. An X chromosome specifically deficient for the nucleolus organizing region.

In experiments in which newly derived X chromosomes, involving changes in the heterochromatic region, are recovered, it is desirable to test every product for the presence or absence of each known heterochromatic marker separately. Therefore, a chromosome lacking the nucleolus organizing region, but retaining the bb locus and block A has been made. The proximal break in In(1)sc^{L8} is immediately to the right of the nucleolus organizing region, while the proximal break of In(1)w^{m4} is immediately to the left of it (Kaufmann, 1944). A single exchange between these two inversions results in one product which is duplicated for the region from immediately to the right of sc to immediately to the left of w and is deficient for the nucleolus organizing region. This product is viable in heterozygous but not homozygous females. It lives as a male in the presence of Y or Y" but is sterile; XO males or males carrying Y^{1c} do not survive. Such viability data agree with observations that the nucleolus organizing region of the Y chromosome is carried on Y short. The sterility of nucleolusless/Y is puzzling, since males carrying larger deficiencies, also including the nucleolus organizing region, such as In(1)sc^{4} sc^{8} are fertile; also males carrying duplications for all of the region duplicated in the nucleolusless chromosome and more are fertile (T(1;4) w^{m5L}).

Lüning, K. G. X-ray-induced mutations in different stages of spermatogenesis.

Wild-type, M5, and y w sn males were irradiated (2900 r) at the ages of 0-1 or 6-7 days. The males were mated to virgin y w sn females immediately or after some days. Every day or every third day the males were transferred to new females. Eggs were collected and the number of hatched eggs eas counted; total, 150,000 eggs. In the first five days the rate of dominant lethals was nearly constant. Then there was a more-or-less sharp increase in the rate of dominant lethals. This high frequency remained till the 11th day; then there was a sharp decrease, which continued to the 20th day after treatment, when there was only a slight effect of treatment compared to the controls. The increase in the rate of dominant lethals appeared at the same time, whether the males

ADDITIONS:

Rearrangements	Break Points
T(1;3) v	10 / 93B
T(1;3)05	4F / 88A-C / 92/62B-C (new order in 3 is : tip of 3L to 62 B-C / 88A-C through centromere of 3 to 62B-C / 92 to 3R tip; section 88A-C to 92 is inserted into X-- in 4F according to Griffen's analysis).
T(2;3) A	29 B-C / 83B
T(2;3) B	33 / 81F
T(2;3) 101	42-43 / 83 E-F
T(2;3) 108	The single euchromatic break is in 52D-F and is superimposed on In(2R)Cy.
T(2;3) 109	22F-23AB / 80 / 55F-26A (a cyclical exchange of tips as reported by Bridges and Brehme, but contrary to earlier report the inversion in 3R is evidently In(3R)P.).
T(3;4) c	86B-C (just to right or left of 86C1-2) / 101F
In(3LR) sep (Muller)	65E/85E

CORRECTIONS:

T92;3)Xa	The break in 3R which is superimposed on In(3R)P is not in 89D but lies near the end of 89E (to the right of bx and its pseudoalleles).

Lindsley, D. L. An X chromosome specifically deficient for the nucleolus organizing region.

In experiments in which newly derived X chromosomes, involving changes in the heterochromatic region, are recovered, it is desirable to test every product for the presence or absence of each known heterochromatic marker separately. Therefore, a chromosome lacking the nucleolus organizing region, but retaining the bb locus and block A has been made. The proximal break in In(1)sc^{L8} is immediately to the right of the nucleolus organizing region, while the proximal break of In(1)w^{m4} is immediately to the left of it (Kaufmann, 1944). A single exchange between these two inversions results in one product which is duplicated for the region from immediately to the right of sc to immediately to the left of w and is deficient for the nucleolus organizing region. This product is viable in heterozygous but not homozygous females. It lives as a male in the presence of Y or Y" but is sterile; XO males or males carrying Y^{1c} do not survive. Such viability data agree with observations that the nucleolus organizing region of the Y chromosome is carried on Y short. The sterility of nucleolusless/Y is puzzling, since males carrying larger deficiencies, also including the nucleolus organizing region, such as In(1)sc^{4} sc^{8} are fertile; also males carrying duplications for all of the region duplicated in the nucleolusless chromosome and more are fertile (T(1;4) w^{m5L}).

Lüning, K. G. X-ray-induced mutations in different stages of spermatogenesis.

Wild-type, M5, and y w sn males were irradiated (2900 r) at the ages of 0-1 or 6-7 days. The males were mated to virgin y w sn females immediately or after some days. Every day or every third day the males were transferred to new females. Eggs were collected and the number of hatched eggs eas counted; total, 150,000 eggs. In the first five days the rate of dominant lethals was nearly constant. Then there was a more-or-less sharp increase in the rate of dominant lethals. This high frequency remained till the 11th day; then there was a sharp decrease, which continued to the 20th day after treatment, when there was only a slight effect of treatment compared to the controls. The increase in the rate of dominant lethals appeared at the same time, whether the males

were mated or unmated from irradiation to the 5th or the 7th day after treatment. From this it was concluded that when males were unmated the sperm was reabsorbed and/or spontaneously ejaculated.

To explain the variations in the rate of dominant lethals, it was supposed that the variation fitted with different stages of spermatogenesis that were treated. In the first 5 days, sperm that was mature at treatment was used. In the next 5 days, sperm was used which was maturing (spermatid stage) at treatment. After the 11th day, sperm that was immature at treatment was used.

Later the frequencies of point-mutations (y, w, and sn), gynandromorphs, and hyperploid males were studies in the two periods 1-6 and 7-10 days after treatment. Wild-type males were irradiated (960 r) and mated to virgin y w sn females, two of each sex per vial. At the beginning of the 7th day the males were transferred to another 5 virgin females. The following data were obtained.

Days after treatment	Total females and gyn.	Point-mutations	Gynandro-morphs	Hyperploid males
1-6	59856	8	35	12
7-10	47007	22	32	56

From this it is concluded that spermatids are more sensitive to irradiation than mature spermatozoa.

Mainx, F. Structural variety in wild populations of European species of the obscura group. For some time I and my collaborators have been occupied with this problem. In a short time a paper will appear containing general statements and the salivary chromosome maps of D. subobscura, D. obscuroides, and D. amnigua. A second paper will deal with a qualitative analysis of the inversions in D. subobscura (Austrian, British, and other strains). Further current investigations deal with the selective value of inversions in artifical populations, with quantitative analysis of certain populations, with selection of inversions by inbreeding, and with X-ray-induced inversions in D. subobscura.

Makino, Sajiro, and Kanehisa, Takeharu A preliminary survey of the geographical distribution of Drosophila in Hokkaido. The species of Drosophila so far collected from Hokkaido and their distribution are preliminarily listed below. For description, the island of Hokkaido was divided into four regions-- South, Central, East, and North.

	South	Central	East	North
Amiota sp.		+		
Scaptomyza sp.	+	+		+
Hirtodrosophila sp.		+	+	+
H. cinerea group	+			
melanogaster		+		
auraria	+	+	+	+
suzukii	+	+	+	+
obscura group		+	+	
transversa	+	+	+	+
nigromaculata	+	+	+	+

	South	Central	East	North
virilis	+	+	+	+
testacea	+	+	+	+
funebris	+	+	+	+
histrio		+	+	
immigrans		+	+	
rufa		+	+	
repleta group			+	
melanica group			+	
maculatis group			+	
robusta group	+	+		
sordidula		+	+	+
coracina		+	+	
busckii	+	+	+	
Mycodrosophila sp.			+	
grandis (?)			+	

Makino, Sajiro and Kanehisa Takeharu A monthly survey of Drosophila in the City of Sapporo, Hokkaido.

Monthly collections of Drosophila have been made in three different regions in the City of Sapporo. The species so far observed and their monthly appearance are as follows: (V =May, VI = June, VII = July, VIII = August, and IX = September.

	West					South					North					Total
	V	VI	VII	VIII	IX	V	VI	VII	VIII	IX	V	VI	VII	VIII	IX	
auraria	145	300	426	315	109	-	41	246	437	27	-	16	50	91	18	2221
nigromaculata	115	80	229	196	-	-	-	195	44	-	-	-	12	5	-	866
transversa	-	-	16	19	5	-	-	28	6	21	-	-	-	-	2	97
immigrans	-	-	64	111	51	-	-	16	15	3	-	-	11	3	1	275
funebris	-	-	13	-	5	-	-	26	10	3	-	-	5	-	-	62
busckii	-	-	-	63	-	-	25	24	68	-	-	-	-	-	-	180
testacea	-	20	25	5	4	-	-	59	12	-	-	-	-	-	-	125
histrio	-	-	6	-	-	-	-	-	5	-	-	-	-	-	-	11
coracina	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
melanogaster	-	-	-	34	15	-	-	-	-	2	-	-	-	-	-	51
virilis	-	-	-	9	2	-	-	-	33	2	-	-	-	-	-	46
robusta gr.	-	-	-	51	-	-	-	-	4	3	-	-	-	-	-	58
rufa	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Scaptomyza sp.	-	5	-	-	-	-	-	9	-	-	-	-	-	-	-	14
Total	260	405	780	803	191	-	66	603	635	61	-	16	78	99	21	4008

Makino, Sajiro and Takada Haruo A monthly survey of Drosophila in the vicinity of Otaru City, Hokkaido.

Monthly collections of Drosophila have been made in Otaru City and its vicinity, Shioya, in Hokkaido. The species so far observed and their monthly appearance are listed on the following page: (V = May, VI = June, VII = July, VIII = August, and IX = September)

	Otaru City					Shioya					Total
	V	VI	VII	VIII	IX	V	VI	VII	VIII	IX	
auraria	+	+	+	+	+	+	+	+	+	+	394
nigromaculata	+	+	+	+			+	+	+		177
transversa	+	+	+	+	+		+	+	+	+	
sordidula				+			+	+	+		9
immigrans			+	+	+				+	+	120
funebris				+	+						5
repleta					+					+	8
melanogaster				+	+					+	206
virilis				+	+					+	7
testacea					+					+	4
suzukii					+					+	30
buskii					+					+	11
histrio										+	1
robusta group										+	3
Amiota sp.										+	2
Total	27	53	89	120	197	38	71	88	102	192	977

Makino, Sajiro and Kanehisa, Takeharu Some notes on a heritable tumor found in D. virilis.

Individuals having a tumor-like outgrowth in the head and thorax regions were found in outbreeding stocks of the wild strain of D. virilis collected in Sapporo, Hokkaido. It occurred in 53 specimens out of 1224 individuals under observation. In general, the tumor-like outgrowth was observed to develop especially in individuals showing abnormalities in the wings and others. Results of inbreeding with the tumor-bearing flies are listed below. The frequency of tumor-bearing individuals tends to increase with the generation of inbreeding. (Temperature: 20°-27° C.)

	Indv. with tumor		Tumor indv. with bodily abnor.		Normal indv.		Indv. with bodily abnormalities		% of tumor indv.
	♀	♂	♀	♂	♀	♂	♀	♂	
F_1	37	32	41	26	48	74	27	22	43.8
F_2	40	27	4	10	22	24	7	8	58.0
F_3	37	10	8	9	4	0	0	2	91.0
F_4	202	132	16	22	17	30	3	13	92.0

Meyer, Helen U. Evidence of the unsplit condition of interphase chromosomes.

A Notch mutant had been induced in a pole cell of a male embryo by treatment with ultraviolet (irradiated in the polar cap stage in a nitrogen atmosphere, in which, however, it was kept for only 7 minutes). Breeding analysis showed that in addition to this lethal in the X chromosome, lethals had also been induced in both second chromosomes of the same pole cell. This cell proved to be the only primordial germ cell which was furnishing functional sperm, as evident from the fact that all female-producing sperm derived from this male transmitted the Notch in the X chromosome and all sperm analyzed transmitted one or the other of the two second-chromosome lethals (depending on which homologue of the second chromosome had been received, as shown by markers present).

This case allows the following conclusions to be drawn: (1) Since

Notch is lethal to males, the male which grew upt from the treated embryo could not have received the Notch mutation from its mother; in all probability, then, it was induced by the treatment. This gives strong evidence that, when pole cells are treated, not all cases where the same lethal is found in all gametes receiving a given chromosome have been caused by the pre-existence of the lethal in one of the parental germ cells; they must sometimes be caused by induction of the lethal in one pole cell while the other pole cells are killed off. (2) This particular Notch is seen not to have acted as a cell lethal during the stages of spermatogenesis, even though the X chromosome was present in haploid dose, and all germ cells had Notch in their X chromosome. (3) Though only one functional primordial germ cell was left, about fifty female offspring were obtained, and about the same number of male offspring (of which 43 were analyzed for mutations in their second chromosomes).

Now since all offspring receiving a given treated chromosome showed the given induced mutation (whether Notch or autosomal lethal) it could be concluded--as pointed out by H. J. Muller--that in all probability these mutations must have been present in both chromatids that were derived from the given treated chromosomes of the survivor pole cell. This indicates strongly that none of these chromosomes were split into two daughter chromatids during interphase, since cells of the polar cap are known to be in interphase at the time chosen for treatment. This conclusion could be avoided only be supposing exactly the same mutation to have been simultaneously induced in both chromatids in the case of all three chromosomes--an assumption which seems highly unlikely--or by supposing that one of the two daughter cells of the surviving pole cell failed to give rise to any functional germ cells. The last supposition also appears unlikely. This because, firstly, the pole cells do not undergo division until some 14 hours after the stage at which they are treated. Therefore, a physiological injury would be unlikely to have remained so localized until that time as to kill off one daughter cell completely while allowing the other one to give rise to numerous descendant germ cells. Secondly, the cells are by the time of this first post-polar division located within the definitive gonads, but for some divisions after that still appear to be entirely undifferentiated from one another. Thus it also seems very unlikely that one of the two daughter cells produced by a given pole cell at that stage would, through its later divisions, give rise to a multitude of functional germ cells, while the other daughter cell gave rise exclusively to nongerminal cells. Conceivably, however, one of the two daughter cells might have been killed by an unrestituted break or other dominant lethal genetic changes that had occurred in only one of a pair of sister chromatids.

During our 4 years of work on the induction of mutations by ultraviolet treatment of the polar cap, three other cases had been found (but none in the about equally numerous controls) in which all tested offspring that had received a given second chromosome contained an identical lethal, while at the same time all the other offspring, which received the homologous second chromosome, contained another lethal, identical in all the latter. These cases either resulted from coincidence of pre-existing lethals in both the parental and the maternal second chromosome or were due, like the case of Notch reported above, to one surviving germ cell with lethals induced in both second chromosomes, which also were presumably in an unsplit condition during interphase, in which stage the pole cells are known to be.

Mickey, George, H. Origin of a new R allele in mosaic D. melanogaster.

A new dominant allele of Roughhened, which is lethal in homozygous condition and which produces an extreme eye surface resembling glass or Glued when heterozygous with

Roughened, arose in a single mosaic male among 102 progeny of a female treated with cold shock at an early embryonic stage. The mosaic male produced 788 offspring, only one of which showed the roughened eye. The latter produced 50% offspring, rough in both sexes, indicating its normal viability in a heterozygote. Consequently it appears that possibly a single cell carrying the mutant was incorporated into the mosaic gonad of the original male. This observation is significant in considering mutation rates resulting from treatment of pole cells.

Mickey, George H. and Blount, Jerry Somatic polyploidy in D. melanogaster induced by cold shock.

The effects uponsomatic cells (ganglia) of cold shock applied to embryos at the pole-cell stage and to third-instar larvae of D. melanogaster were investigated. Results were scored from aceto-carmine squash preparations of the third-instar larval brains by comparing the ratio of normal diploid metaphases to the polyploid metaphase figures. Results were as follows:

Stage	Treatment	No. Indiv.	No. Figures	No. Poly.	% Poly.
control	untreated	53	1746	0	0
pole cell	1/2 hr. -5.5° C	22	957	38	3.3
pole cell	2 hr. -3.3° C	19	976	102	9.1
pole cell	1 hr. -6.1° C	16	729	106	12.0
third instar	24 hrs. -6.1° C recover 24 hrs.	9	763	289	29.7

Both temperature and length of treatment influence polyploidization but the temperature appears to be relatively more important. The last experiment gave the highest percentage of tetraploid cells and the most consistent figures. This may be due to the fact that there was less opportunity for the elimination of these tetraploid cells before their detection. Gloor's treatment of D. hydei larvae at higher temperatures (8°-12° C) and for a longer period (10 days) gave a much higher degree of ploidy (Gloor, DIS-24; 82). The length of treatment in our experiments allowed for only a single doubling of chromosomes.

Mickey, George H. and Di Paolo, J. A. Lethals induced in Drosophila by combined action of urethane and H_2O_2.

Adult males of D. melanogaster were injected with M/4 urethane (ethyl carbamate) in Holtfreter's salt solution. From 12 males a total of 641 chromosomes were tested for sex-linked lethals, using the Muller-5 techique. Only 2 lethals were detected (from separate flies). From 23 males injected with the same solution of urethane but also treated for 24 hours with fumes of superoxol (3% H_2O_2) a total of 1203 chromosomes were tested and 17 lethals were detected. Two flies gave three lethals each, three gave 2 lethals each, and the others only 1. Crossover tests proved all the cases of multi-lethals from single males to be distinct (with one possible exception). The rate of lethal production in the experiment using urethane ($0.31 \pm 0.22\%$) was not significantly different from the controls ($0.26 \pm 0.12\%$); but the percentage of lethals induced by the combined treatment ($1.41 \pm 0.34\%$) was significantly greater than in either the controls or the urethane experiment.

Mickey, George H. and Sturtevant, F. M. Jr. Failure of phenol to produce lethals in Drosophila.

Phenol had been administered to Drosophila previously by subjecting adults to vapors, injecting adults, soaking fertilized eggs or excised ovaries, and placing phenol in the food. We employed

three methods hitherto unused for phenol: (1) male third-instar larvae and adults of both sexes were subjected to a constant flow of phenol vapors for 24 hours; (2) different concentrations of phenol (0.20%, 0.25%, and 0.50%) in Holtfreter's saline solution were injected into third-instar male larvae, and 0.50% into female larvae, using a semi-micropipette; and (3) mature sperm were treated with phenol (0.01, 0.1, 1.0 and 2.0%) in Holtfreter's solution by the vaginal-douche method of Herskowitz. Control and experimental series were tested for sex-linked recessive lethals by the Muller-5 method. Rate of lethal production in experiments was in no case significantly different from that in the controls. The reason for the failure of in vivo treatment is postulated to be phenol detoxication in the fly and inability of the phenol to reach the germ plasm during the critical physiological period.

Miller, D. D. Mating behavior in D. athabasca and D. narragansett.

Observations of mating behavior in D. athabasca and D. narragansett are in progress, employing New York and New Jersey strains of athabasca (kindly supplied by Drs. E. Mayr, C. Pittendrigh, and B. Wallace) and a New Jersey strain of narragansett (furnished by Dr. C. Pittendrigh). A number of differences between the mating behaviors of these species have been observed, both with respect to each other and with regard to the similar species D. affinis and D. algonquin (Miller, 1950). D. athabasca males were found to be different from males of the other three species in regularly extending and vibrating one wing rather than both during courtship. A distinctive courtship movement of D. narragansett males was rapid opening and closing of the wings while approaching and circling about the females. The following table presents data on copulation times in the four affinis subgroup species affinis, algonquin, athabasca, and narragansett.

Temp.	affinis	algonquin	athabasca	narragansett
27° C			1'13", 1'26", 1'12", 1'23"	
26			1'25"	
25				10'59", 14'32"
24	58", 1'10", 1'13", 55", 1'1", 1'26"	5'35", 4'50", 7'31"	1'40"	
23	1'24", 1'3", 1'29", 1'24", 1'22"	4'37", 5'42"	1'48", 1'42", 1'27", 1'15", 1'12", 1'23", 1'25"	17'42", 20'52"

A few interspecific mixtures of males and females have been observed. Attempted (but not successful) copulations have been observed in both reciprocal combinations of the species pairs algonquin x athabasca and athabasca x narragansett.

Mittler, S. Variation of the penetrance of tu^{50j} when reared on yeasts that do not require vitamins or amino acids.

A highly inbred stock of D. melanogaster containing tu^{50j} was raised on a minimal medium consisting of glucose, $(NH_4)_2 SO_4$, and several trace elements, inoculated with yeasts that were able to live in absence of vitamins or amino acids. Hence, the flies obtained practically all their nourishment from the yeast and not from the medium. In research work involv-

ing penetrance and expressivity, utmost attention is usually given to temperature, and the nutritional aspect is almost always ignored. The following yeasts were used and are presented in a series decreasing in the ability to aid in the formation of tumors: Hansenula anomala, Pichia membranaefaciens, Candida sorbosa, Nadsonia fulvescens, Debaromyces globosus, Hansenula saturnus, Torulopsis utilis, Rhodotoryla gracilis, R. glutinis, and Geotrichium. Penetrance was less when the above yeasts were compared to Saccharomyces cerevisiae (Baker's yeast) on cornmeal-molasses medium. D. melanogaster can live exclusively on a nonfermenter yeast, Pichia membranefaciens.

Moriwaki, D., Okada, T., Ohba, S., and Kurokawa, H. Drosophila species belonging to the "obscura" group found in Japan.

In the summer of 1951, we were able to collect about 800 flies (females about 160), belonging to the "obscura" group of Drosophila, at several localities in Hokkaido (Akkeshi and five others) and one locality in the northern district of Honshu (Mt. Hakkoda). Although it still remains undecided whether these flies form one species or more, they are believed to belong to the "obscura" rather than to the "affinis" subgroup.

Having compared them with ten species of the "obscura" subgroup, namely pseudoobscura, persimilis, miranda, obscura, subobscura, obscuroides, tristis, bifasciata, alpina, and ambigua, mostly according to descriptions seen in the literature, we found that the several characteristics, such as color of mesonotum, male sex-combs, male genitalia, and karyotype, of this species, if it is one, were mostly similar to the descriptions of D. obscura Fallen.

On the other hand, the "obscura" species of Sweeden described by Fallen (1823) may be identified as "subsbscura" as proposed by Buzzati-Traverso (1949) on the evidence that D. subobscura is numerically prevalent at Esperöd (Sweeden) and has the wider geographical distribution in continental and insular Europe among species of the "obscura" group. The "obscura" species of Moscow described by Frolova & Astaurov (1930) has a karyotype of either "A" (♀: V-shape 4, Dot 1) or "B" (♀: V-shape 3, Rod 2, Dot 1), either of which differs from the karyotype of D. subobscura showing Rod 5 and Dot 1. Then the Swedish obscura, provided that it should be considered as being subobscura, seems to be different from Moscow obscura. Moreover, the karyotype of the present species in Japan coincides with the "A" type, one of the two types of the Moscow obscura.

At any rate, D. obscura is an uncertain species, as pointed out by Buzzati-Traverso in DIS-23 ("What is Drosophila obscura?"), and the identification is very difficult. But it is desirable to decide early to which species the name "obscura" should be given, in order to establish the synonymization.

Mossige, Jeanne Two new jaunty mutations.

This laboratory has had one stock containing j, namely, b j pr cn. On Oct. 18, 1949, one sv^2 male was found in sv^2 stock with curled wings. This proved to be an allele of j. On May 5, 1950, several sc cv v f flies in sc cv v f stock were also found to have curly wings and these too were j. The occurrence of two new spontaneous j mutations in the same laboratory within such a short space of time seems remarkable, as only two alleles have been reported previously. Contamination would seem to be impossible as the stocks where the mutations were found showed no irregularities and if contamination had come from b j pr cn then the other markers should also have been found. Moreover the first mutation has been kept in combination with sv^2, which again should have been found in

sc cv v f if the first had contaminated the second. The two alleles, j^{49j} and j^{50e} (see New Mutants) seem to be identical: both have a slighter manifestation than j, both overlap + at 21° but not at 30°, whereas j does not overlap + at 21°, tested at the same time as the others.

Muller, H. J. Detection of mutations in the second chromosome by use of the "sifter" stock.

Flies one or more of whose second chromosomes are to be tested for the presence of recessive mutant genes are first crossed with a stock (such as Indiana stock g^{98}) containing S^2 and Cy in the same chromosom If the usual inversions in both right and left arms are present with Cy, and preferably also Bl and L^4 as a check on the rare crossing over which these allow, F_1 females as well as F_1 males are available for the testing; otherwise only F_1 males are used. The F_1 flies are crossed individually to flies of the "sifter" stock (Indiana stock j^{42}). In this stock, one second chromosome, containing S and Sp in the left arm and P^- (Pale deficiency) in the right arm, has its right arm connected by a translocation with a third chromosome having the complex of inversions designated as InsCXF, which effectually prevent crossing over with the other third chromosome. The other second chromosome contains Cy, with its left- and right-arm inversions, as well as cn^2, L^4, and sp^2; and the other third chromosome contains the closely linked dominants Dl and H and, very near to them, P^i (the Pale insertion, complementary to P^-) and e. Thus the cross of the F_1 flies by sifter flies is as follows (representing by mu the chromosome in which the presence of mutant genes is to be determined, and allowing the presence of the Cy inversion to be understood).

$$(F_1)\ \frac{mu}{S^2\ Cy\ Bl\ L^4\ sp^2} \times \text{(sifter)}\ \frac{S\ Sp\ T23\ P^-}{Cy\ cn^2\ L^4\ sp^2} \cdot \frac{InsCXF}{Dl\ H\ e\ P^i}$$

If we neglect crossovers, we find that the only F_2 which survive are those having the composition $\frac{mu}{Cy\ cn^2\ L^4\ sp^2}\ \frac{\quad}{Dl\ H\ P^i}$. All zygotes which receive one of the T23 chromosomes from the sifter parent will of course die unless they receive the other one also, thus getting S Sp T23 P^-. InsCXF. But in that case they fail to receive P^i and hense are killed by their P^-. Zygotes which receive the Cy cn^2 L^4 sp^2 and Dl H P^i chromosomes from their sifter parent can live only if they receive mu from the F_1 fly, for otherwis they will be homozygous for Cy. (Very seldom Cy homozygotes live; in the cross shown they would be recognizable by having Bl)

If the sifter parent was a female there will be a not negligible amount of crossing over between the chromosome arms containing the Cy inversions, because of the reduction of crossings over in the third chromosomes occasioned by InsCXF. The crossovers containing P^- will still die, as do the noncrossovers with P^-, but the crossover gametes of type S Sp cn^2 L^4 sp^2; Dl H P^i will be able to live provided they become combined with the mu-containing gametes of the F_1 (those combined with the S Cy Bl L^4 sp^2 gametes are killed by their S^2/S compound condition). These surviving crossovers would be detrimental to the mutation study if the females were allowed to breed, but they are recognizable by reason of being non-Curly. Hense the flies of F_2 must b etherized and the non-curly discarded. Although some of the Curly females may have been inseminated by crossover non-Curly males, this is not a source of error for the recognition of lethal and other mutations in F_3, since even the crossover males carried a noncrossover mu chromosome, distinguishable from its homologue through the presence of S and Sp in the latter.

The procedure therefore is simply to mate together, en masse, the Curly

(non-Bl) F_2 flies of each culture, and then to examine the F_2 to see whether non-Curly non-Lobe flies are present (their absence indicating a lethal), or are reduced in number relative to the Curlys (an indication of a detrimental), or are sterile (because of a recessive sterile), or visibly abnormal. If evidence of the presence of a crossover chromosome is found, as shown by S and Sp, flies of this kind are eliminated and F_3 virgins without these markers are chosen to continue the line. Thus the F_3 provide the basis for readily establishing a stock, not requiring further selection, of any second chromosome mutant found.

The chief advantage of the "sifter" method is, as its name is intended to imply, its almost automatic sifting of the F_2 zygotes, so as to make it unnecessary to obtain virgins from the numerous F_1-F_2 cultures, at the very stage of operations where this requirement has usually constituted the limiting factor on the size of the body of data obtainable. As abundance of data is especial importance in most mutation work, the door is thereby opened to studies which would not hitherto have been feasible. The method is applicable to the study of second chromosomes of virtually any composition, and therefore can be used not only for determinations of the frequency of occurrence of mutations in the laboratory but also for the analysis of the composition, as regards their second chromosomes, of flies taken from populations existing in nature.

The warning must however be given that sifter flies are rather weak and not good breeders, especially in view of the few viable offspring they produce on crossing. Therefore several virgin sifter females should be provided for every F_1 male bred, and vial cultures provided with the usual anti-mold compounds and with sterilized cellucotton and cotton. Under these conditions ample F_2 are usually forthcoming for the mass cultures of the next life cycle, the critical cycle; and the next generation develops much better.

Muller, H. J. Homosexual copulation in the male of Drosophila, and the problem of the fate of sperm of males isolated from females.

In a culture vial containing about 20 wild-type males which had been kept (at room temperature) isolated from females, ever since their hatching about two weeks previously, a male was observed to be in copulation with another male. The copulating male was dorsal to the other, in approximately the normal position for Drosophila copulation by a male, except that its abdomen was inflexed farther forward, with the extruded penis firmly fixed into the deep space of the neck region on the dorsal side of the other fly, between the posterior surface of the latter's head and the anterior surface of its thorax. The male being copulated with went about as if undisturbed. The copulation lasted about five minutes from the time it was first observed, and so it may have lasted for the normal length of time.

The question arises, to what extent is this a usual method whereby Drosophila males kept apart from females but in company with other males lose their sperm. The work of Harris (1929) showed that the sperm of males kept without females from some two weeks after irradiation still had the high mutation frequency characteristic of sperm irradiated when mature, instead of the low frequency characteristic of sperm derived from similarly irradiated males after they had been kept with females for about two weeks. However, later work has shown that after not much longer than two weeks following irradiation the males that have been kept without females do show a drop in mutation frequency. If, as seems likely, this drop is not entirely due to the admixture of newly formed sperm with the old sperm, the old sperm must after a time become unavialable. There are several conceivable ways in which this could

occur: (1) the old sperm when kept in a male might after a time degererate, possibly becoming resorbed; (2) the sperm might gradually leak out: as in some vertebrates, they might be lost (3) by ejaculations occurring in the absence of copulation, or (4) in the course of copulations other than heterosexual ones. We now see that possibility (4) does occur sometimes in Drosophila as in vertebrates, in the form of homosexual copulation, but there is as yet no evidence as to how common it is, aside from the negative fact that it has not hitherto been reported.

Muller, H. J. Localization of Y:bw$^+$ insertion and cr-u sterile (crs).

The portion of the right arm of the third chromosome inserted into the long arm of the Y in the Y:bw$^+$ chromosome found by Dempster is very similar in length and position to the Pale insertion (P^i) and can be substituted for it for saving the life of an individual having the Pale deficiency (P$^-$) in one second chromosome. However, it does not extend quite so far to the right as does P^i, so that a Minute bristle effect is produced, by a Minute locus lying between the right breaks of these two insertions. Also between these breaks is the locus of the recessive male-sterility gene, "crs" (called "cru-sterile"), originally associated with "cr-u". The symbol "cr-u" represents Bridges' "cream-underscored", a dilutor of eosin, which he had localized in the left arm of chromosome 2 and which he had thought to be itself responsible by a pleiotropic action for the male-sterility effect. Thus males homozygous for crs are rendered fertile if they contain P^i in one of their third chromosomes, but not if they have Y:bw$^+$ (and no P^i).

Muller, H. J., and associates Ultraviolet induction of mutants at loci at which spontaneous mutants are known.

The question has been raised (by Dr. J. Schultz in a personal communication) whethe any mutations which arose after ultraviolet treatment have been found (or made very probable) to be allelic with know spontaneous mutants. The following is a list of such cases known to our group.

X Chromosome

achaete: 1 case by McQuate in 1949, in sc.Y^1 chromosome, not associated with mutations to y or lethal.
fused: 1 case by Edmondson, 1951
Notch: 1 case by Altenburg about 1930; 1 case by Muller about 1941; 1 case by Meyer, 1947; 1 case by Meyers and Byers, 1951.
vermilion: 1 case by Edmondson, 1951.

Chromosome 2

apterous: 1 case by Meyer and Byers, 1949.
black: 2 cases by Meyer, 1950, 1951.
dachsous: 1 case by Meyer, 1951
giant larvae: 1 case by Meyer, 1950.
light (lethal): 2 cases by Meyer, 1950, 1951.
Lobe: 1 case by Edmondson and Meyer, 1949.
straw: 2 cases by Meyer, both in 1951.
lethals: various cases of allelism of uv-induced with spontaneous lethal.

Probable allele where the locus has not been tested:

X Chromosome

narrow abdomen: 1 case by Edmondson, 1951

Chromosome 2

Dent: 3 cases, 1 dominant and 1 recessive by Meyer, and 1 dominant by

Edmondson, in 1950 and 1951. These were all shown to be in the left arm of chromosome 2.

Known alleles which were probably induced, but may be spontaneous:

Chromosome 2

dumpyTh: 1 case by Meyer, 1951.
dumpy-oblique: 1 case by Meyer and Byers, 1951.

Chromosome 3

claret: 1 case by Meyer, 1950, sterile in homozygous female.
glasslike: 1 case by Meyer, 1949. This is an allele of a spontaneous mutation like glass in the third chromosome, found in this laboratory, but not tested for allelism with glass itself, to which both may be allelic.

Nakamura, K., Immaizumi, T., and Kitazume, Y. Amino acids in D. melanogaster. Surveys were made by two-dimensional paper chromatography of the free amino acids found in alcoholic extracts of larvae, pupae, and adults, respectively. In each stage 17 kinds of amino acids were found; leucine, phenylalanine, valine, proline, tyrosine, arginine, histidine, alanine, lysine, threonine, glycine, serine, asparagine, glucosamine, glutamic acid, aspartic acid, and cystine, besides two unknown ones. Of these, leucine and cystine were present in greater quantities in larvae than in pupae and in adults; smaller amounts of phenylalanine were found in adults than in larvae and in pupae. Hydrolysates of normal, lethal (YY), and unfertilized eggs were tested by two dimensional paper chromatography. Leucine, phenylalanine, valine, proline, tyrosine, alanine, arginine, histidine, lysine, threonine, glycine, serine, aspartic acid, and two kinds of unknown elements were found in each of them. A third unidentified one (cystine?) was found in lethal and unfertilized eggs, but was lacking in normal eggs.

Nolte, D. J. Secondary genic products. A long-term investigation has been undertaken on the eye-pigmentary system of Drosophila, with particular reference to the eye-color mutants of D. melanogaster, the main techniques being a histological study of eye structure and a spectophotometrical assessment of the pigments. Part of the work has been published, several papers are in the press, and further work is in progress. The mutants include 30 of the main eye-color genes, 24 multiple alleles of ten of the foregoing genes, and 4 position effects; 3 wild-type strains are being used for comparison, one being a South African strain.

Four regions of pigment concentration have been located in the compound eye: the primary, secondary, basal, and post-retinal; great variation occurs in the various mutants with regard to the arrangement of the cells, their size, the size of the pigment granules, and the type of pigment contained. The content of brown pigment varies independently of the content of red pigment in the series of mutants already tested, and the color of the eye is not directly proportional to the amounts of the two pigments, but often dependent on the ratio between these amounts. In two series of multiple alleles already tested, one shows a simple quantitative proportional ratio between the two pigments, but the other shows more of a qualitative ratio or relationship, in that the two pigments do not follow the same series of increases in quantity. Although in general the two pigments of any specific strain seem to vary independently in quantity from culture to culture, there appears to be some connection between them at one or another stage of their synthesis; there appears to be, in some mutants, a competition for an assumed common substrate, and thus it was found that pr has more brown pigment than the wild-

type, while cd has more red pigment.

As the work progresses it is becoming more and more evident that many of these eye-color genes are such only by nature of some secondary reaction--for example, the provision of a by-product of their primary action, this by-product being utilized in the synthesis of one or the other, or both, of the pigments. While some genes, as for example w, v, cn, bw, might be assumed to be primary eye-color genes, others, as for example rb, cm, g, car, do not appear to be connected with a series of basic stages in pigmentation. In compounds between these genes no epistasis appears, but instead a sub-additive type of interaction, and sometimes even a super-additive interaction as in the case of the compound rb g car, which produces more red pigment than the compound rb car.

Novitski, E. Autonomy of sterility of transformed females. Using the unstable ring In(1)X^{c2}, w^{VC}, which has been shown by Griffen and Lindsley to give rise to a high frequency of gynandromorphs, it was possible, from transformed females of the constitution In(1)X^{c2} w^{VC}/In(1)dl-49, y Hw m^2 g^4 f5/Y; tra/ tra, to select mosaics in which the ring had been eliminated in early cleavage, giving rise to part normal-male and part transformed-female tissue. Of 24 such mosaics, 16 were sterile and the remaining 8 produced, among their 1595 female offspring, no progeny carrying the ring-X which would have been indicative of the normal proliferation of 2X+Y spermatogonia in the mosaics.

Novitski, E. The compound X chromosomes. There are four ways in which two single X chromosomes may be arranged to give simple compounds since (1) the order of loci may be mirror-image or tandem, and (2) the centromere may be median or terminal. Since each type is unique in its pairing configuration and gives different kinds of information about crossing over, the writer wishes to suggest that each type be given a simple designation. Although the type that is generally called attached-X had, in the earlier days, been referred to at times as double-X, and the double-X of Muller has, more recently, been described as an attached-X, it is felt that a simple consistent scheme is provided by referring to those compounds with median centromeres as attached-X's and those with terminal centromeres as double-X's. In the ordinary attached-X, as well as in Muller's double-X, the arrangement of the two chromosomes is in mirror-image fashion. Consequently, the distinction between the mirror-image tandem arrangements may be adequately provided by referring to the latter as tandem double-X's, as the case may be, and by using no further designation for the mirror-image types.

Two new types have been recently derived; these are (1) the double-X and (2) the tandem double-X.

(1) The double X. Pairs by simply folding back on itself (like the attached-X). Unfortunately, from the standpoint of further genetic analysis, the double-X discovered by Muller and now commonly used instead of the attached-X for stock keeping carries In49 in the heterozygous state. Two new cases have been discovered in the progeny of sc^8 f v cv/y w females where, apparently, a crossover occurred between the distal heterochromatic region of sc^8 and the base of the normal chromosome. The double-X is designated structurally as Normal X + sc^8 and genetically as y w + f (?) v cv sc^8. Homozygosis for the heterozygous mutants may be achieved by double crossing over (singles produce bridges in this type of compound X), and both cv and v appear with a low frequency. Cases of homozygosis for forked have not been

found. There is some doubt, therefore, that this double-X carries that gene. Examination of ganglia show that the chromosome is very long at anaphase (and therefore is of the double type); at metaphase, the chromosome appears V-shaped, but a tip of the V rather than the apex is directed toward the center of the plate.

(2) The tandem double-X. Pairs by forming a spiral and, by crossing over, manufactures single rod chromosomes. This compound was derived by inducing a crossover between the short arm of the Y at the tip of the X·Y chromosome and the base of sc^4. Structurally, the chromosome may be written as sc^4 + EN· YLsc8; the raised dot indicates the position of the centromere. The sc^4 chromosome used carried y car m w^a; the X·Y chromosome may be represented as car^+ m^+ y·y^+. Crossover studies indicate that a striking excess of single chromosomes is recovered; it is presumed that crossing over is occurring with normal frequency but that nonrandom disjunction favors the inclusion of the single X in the egg nucleus. The long arm of the Y, present at the base, has been replaced by the duplication B^S. Such a chromosome should, with some low frequency, yield instances where crossing over has occurred between this duplicating fragment at the base, and the homologous region at the end of the sc^4 chromosome. This chromosome would be a double ring, of interest because the recovery of single rings from it by crossing over would have to depend on certain three-dimensional properties of this type of chromosome.

Novitski, E. Useful derivatives of the X·Y chromosome. Among a large number of rearrangements involving the X·Y chromosome found while looking for a special type of inversion, two may be of particular interest in experiments where the inverted sequence of the X·Y chromosome is troublesome because it gives either too much or too little, crossing oveer when heterozygous with a normal sequence. One of these, labeled X·Y In X·Y 26, has one break in the heterochromatin, the other in section 10A. No crossovers have been found when this chromosome is with sc^8 or a normal chromosome. Another, X·Y In X·Y 24, appeared to be an almost complete reinversion since it crosses over freely with a normal sequence. The crossover class with the left end of a normal chromosome and the base of In X·Y 24 is inviable in the male, however, indicating that some normally proximal genes, located distally in the X·Y chromosome, had not been shifted back into their normal position by the second inversion. To make a chromosome that would be free of this complication, In X·Y 24 was crossed to an attached-X detachment (A2) which carried the long arm of the Y chromosome. A single crossover replaced the deficient base by a normal base. The chromosome thus constituted has been tested by mating to $\underline{y^2\ su^{wa}\ w^a\ bb}/0$ females. F_1 males are fully fertile and viable, although there must still be a small duplication at the distal end. It is carried in stock as: Ins 24L + A2R y/ $\underline{y^2\ su^{wa}\ w^a\ bb}$ and Ins 24L + A2R y v/$\underline{y^2\ su^{wa}\ w^a\ bb}$.

Oftedal, Per Genetics and histogenesis of a new tumor tu(2)49k. A tumor stock developed spontaneously from a stock of ma^{49d} shows black aggregations in about 50%-60% of the flies in stock. The tumor may be located in any part of the fly, but usually in the abdomen. In outcrosses 2% incidence is obtained in F_2. In backcrosses the incidence is up to 10% and may rise to 34% when crossed to the stock from which it arose. The main gene is completely recessive and is located in the second chromosome, probably between c and px. It is not an allele of mt^A of Hartung (Hartung, J. Hered. 41:269). Modifiers have been located in the middle of chromosome 3, rather closely linked to ma, and in chromosome 1. The third-chromosome modifier is present in the Sb and H chromosomes of the Cy/Pm; H/Sb stock in this laboratory.

Histologically the tumors start as melanization of the larger lymphocytes, visible at 34 hours after hatching, and so complete as to sometimes obscure the presence or absence of a nucleus at 75-78 hours of age. At around 65 hours, some of the smaller lymphocytes change into spindle-shaped cells and often aggregate into clumps, showing extra- and intracellular deposits of melania. The pericardial blood-forming organ is always affected. Melanization progresses at least until 96 hours of age. Black aggregations in adults consist of cellular detritus and black masses, presumably melanin. The rectal epithelium of old tumor larvae sometimes shows nuclei reminiscent of early- and late-prophase ganglion nuclei, but of much larger size.

Ohnishi, E. Bilateral asymmetry and correlative expression of wing and hind leg in Bd^{491}.

The phenotype of this Bd is very variable, ranging from wild-type to vg-like appearance, and the grades of expression of the wings of one individual are sometimes independent of each other. Besides the excision of the wing, hind legs are crumpled and this occurs only associated with heavy expression of the wing excision. This is true also with respect to both sides of one asymmetrical individual. This correlation suggests that some cooperation exists between the imaginal discs of the dorsal mesothoracic and the ventral metathoracic, rather than a mosaic nature of this mutant.

Ohnishi, E. Tyrosinase activity during puparium formation in D. melanogaster.

Rapid increase and decrease in tyrosinase activity during puparium formation was observed by the following techniques. Larvae or pupae were ground in a glass mortar and made into a pulp with distilled water. This was centrifuged, and the supernatant fluid (without lipid layer) and precipitated cell debris were measured separately by Warburg's manometer, using catechol as the substrate. Special care was taken to use individuals of exactly the same stage. Values for Q_{O2}, calculated from the oxygen uptake of the first five minutes, are shown in the table.

Stage	Tyrosinase activity (Q_{O2}) Extract	Cell debris	Sum
larva moving on the wall	trace	trace	-
larvae immobile (ca. 1 hr before puparium formation)	8.2	14.9	23.1
prepupa with white puparium	12.2	15.5	27.7
prepupa 1.5 hr after puparium formation	3.7	10.1	13.8
prepupa 3.0 hr after p.f.	1.6	6.4	8.0
prepupa 6.0 hr after p.f.	2.2	4.4	6.6
prepupa 12 hr after p.f.	0.7	1.4	2.1

Q_{O2} = microliter O_2/mg body weight hour

In spite of the very high activity of the white prepupa preparation by the grinding method, an almost inactive preparation was obtained by the following procedure. White prepupae were immersed in 0.75% NaCl solution and dissected by needles under a binocular microscope , with special caution not t injure the tissues, and the puparium was torn into 3-4 pieces, setting free body fluid into the NaCl solution. Remaining tissues and puparium were ground and suspended in water. This diluted body fluid and suspension were both almost inactive. When both were mixed and left to stand for 10 minutes, then separated by centrifuging, some activity appeared. Considering these and other factors, it may be concluded that tyrosinase in vivo is probably in an inactive state, and it is activated by an activator of unknown nature present the tissues. Details will be shown elsewhere.

Oster, Irwin, I. Accentuation of distinctions in larval Malpighian coloration by the feeding of riboflavin.

Kikkawa (DIS-22) reported that riboflavin is the substance which gives the Malpighian tubes their coloration. Following this, a statement, of undetermined origin, has received circulation, that the feeding of riboflavin to larvae results in a deepening of the color of the Malpighian tubes. In order to study this phenomenon, I tried feeding larva with a concentration of 0.3 g riboflavin per liter of food. It was found that the larvae of flies of genotypes giving adults with phenotypically normal eye color were thereby caused to acquire a deep yellow-orange color in their Malpighian tubes. Eight wild-typ stocks derived originally from very diverse sources (including Florida, Japan, and Argentina) were all found to give this deep color, as also were stocks showing the phenotypes of 21 different mutant genes not affecting eye color. Stocks with mutant eye colors gave the following results for the color of the Malpighian tubes (second column) as compared with the colors of larvae not fed extra riboflavin (first column), as previously reported by Brehme and others (see Bridges and Brehme, 1941) or as determined by us.

Eye-Color Phenotypes of Adults	Color of Malpighian Tubes of Larvae	
	Without extra riboflavin feeding	With extra riboflavin feeding
p^p, st, ca, w^a, w^e	colorless	colorless
cm	very pale yellow	very pale yellow
bw, cn, cn bw, st, v	pale yellow	pale yellow
bur, cn, car	pale yellow	deep orange
glass-like (DIS-25), pr, pu, ras^2, se	bright yellow	deep orange

From the above it is evident that the feeding of riboflavin accentuates the difference between the colorless and the bright yellow (= normal) tubes, and also between the colorless and certain of the pale yellows, as well as between the other pale yellows and those ordinarily bright yellow. Hence, this method should be useful for the better discrimination of larvae of different genotypes, whose classification would otherwise be more difficult and uncertain. At the same time, interesting biochemical problems are raised concerning the basis of these differences in the treatment of riboflavin by Malpighian cells of different genotypes, and the relation of this to the processes occurring in the development of eye pigments.

Oster, Irwin I. An analysis of ultraviolet-induced lethals due to gene mutation.

Medvedev (1938), in a developmental analysis of 30 cases of sex-linked lethals that had arisen spontaneously and that showed no apparent changes in their salivary-gland chromosomes, found that 15 exerted their lethal effect during the pupal stage. (It is not stated to what extent the possibility of allelism among these lethals had been ruled out.) In 1939 he reported that of 12 of these same spontaneous sex-linked lethals, which killed in some prepupal stage, 2 caused death during the embryonic period, 9 during the 1st larval instar, and 1 during the 2nd larval instar. Five others among the total of 30 were observed to die at about the time of pupation. He interpreted this apparent grouping as showing three "sensitive periods"--in the embryo, the first instar, and the time of pupation. Poulson (1937 et seq.) found that deficiencies usually cause embryonic death, as might be expected in view of their involving multi-locus losses, since the earliest-acting loss would be the one whose effects were seen. Hadorn (1948) tabulated the stages of death for 38 lethals reported on in previous work of various authors.

Death was found to occur at various stages, and Hadorn interpreted the results as showing a clustering of deaths at four periods: the early embryo, the period just before or after hatching from the egg case, just before or after pupa formation, and just before or after eclosion from the pupa case. He regards "phases of high developmental activity" as especially subject to the action of lethals. However, since many of the lethals were known to be allelic, and many were deficiencies, the collected data which he presented are such as to provide little evidence of what the relative frequency of death at different stages would be for gene mutations.

We had at our disposal a group of sex-linked lethals which had been obtained by ultraviolet irradiation of D. melanogaster spermatozoa in experiments by J. T. McQuate. These had been localized by McQuate in linkage tests and had then been determined by Dr. J. I. Valencia by cytological examination of the appropriate portions of the salivary-gland chromosomes to entail no visible structural changes of the X chromosome(see Valencia and McQuate, Rec. Gen. Soc. Amer., 1951). Thus these cases represent point mutations and are suited for a study of the action of individual genes on the physiologival processes involved in development. The lethals were contained in balanced stocks, with the lethal X chromosome distinguished from its homologue by the markers yellow body (y) and white eye (w). These allow the male larvae with the lethal chromosome to be recognized by their light mouth parts (due to y) and their colorless Malpighian tubes (due to w). Death in embryonic stages was shown by the presence of brwonish eggs and the absence of y w larvae. When death occurred in larval stages, the instar to which viability extended could be determined by the morphology of the spiracles. The moribund larvae were observed and dissected in insect Ringer's solution.

Forty-three of the ultraviolet-induced gene-mutational lethals were subjected to the above type of study. Of these only 4 were found to cause the death of the embryo (in all cases this occurred during the late embryonic stage), 21 caused death during the first larval instar, none during the second larval instar (or at least this was not the limit beyond which they could not pass), 7 during the third larval instar, 8 during the early pupal period, none during the middle pupal period (with the same qualification as above), and 3 during the late pupal period. Of these 43 stocks, 36 showed no morphological abnormalities as determined by gross inspection and dissection of the dead or dying stage, while 7 exhibited some derangement which might be related to the cause of death. The locus in chromosome 1, and the characteristic effects, of these 7 lethals are as follows:

1jl: lethal jawless. 14. Dies during the first larval instar, mouthparts poorly formed and sometimes absent.

1ml: melanoma-like. 1. Dies during the third larval instar; larvae at time of death have internal black and brown melanotic masses (usually one or two, sometimes as many as ten), may represent a malignancy.

1rr: lethal, ring gland rudimentary. 0.3. Dies during the third larval instar, reduction of the ring gland with associated failure to undergo the third molt; otherwise normal, may live 15-30 days.

1te: lethal, tracheae enlarged. 0.3. Dies during the third larval instar; main tracheal tubes greatly enlarged, may lack functional posterior spiracles.

1tl: lethal, tracheae lacking. 59. Dies during the first larval instar; no evidence of main tracheal tubes, although small side branches are present.

1tr: lethal, tracheae ramified. 56. Dies during the first larval instar; main tracheal tubes are thick and have very many side branches.

1ts: lethal, tracheae stretched. 8. Dies during the first larval instar; very large larvae; all the tracheal tubes are very thin, suggesting

that they do not grow at the same rate as the larvae and thus become stretched.

A consideration of our data indicates that there is a clustering of mortality at the end of embryonic life, at the beginning and end of larval life, and at the beginning and end of pupal life. These are all stages where many newly developed parts and processes become functionally active for the first time. The lethal gene may have influenced development earlier, but the effect of this did not become exerted on the survival until the given part or process was called on to participate in some vital physiological function. This is well illustrated in stock lrr. These larvae remain small, and live about 15 days as third-instar larvae but are unable to pupate because of a reduced ring gland. However, the ring-gland deficiency already was determined during the first and second larval instars by a failure of the gland's cells to enlarge. Although the greatest developmental changes of all take place in the embryo, relatively few lethals were found to act there, doubtless because functioning of the new parts is not yet active and they are not so important for life. On the other hand, a great preponderance of lethals express themselves during the first larval instar, when a manifold physiological (nervous, secretory, muscular, circulatory, etc.) processes characteristic of larval life are required. Similarly, during the end of larval and the beginning of pupal life, new and different physiological processes must take place and thus many lethals were found which express themselves then. Furthermore, the fact that no lethals were found which act mainly during the second instar was to be expected, since that period is not characterized by radically new physiological functions but only by slight morphological changes.

In addition to the above cases of gene mutation, one case of ultraviolet-induced deficiency (bands 15A2-3 to 15C4-5, according to J. I. Valencia) and one of translocation were studied similarly. The former proved to be lethal to the embryo, like most other deficiencies, although death occurred at a late embryonic stage. The latter caused death during the first larval instar.

Prevosti, A. The vti and vli characters in a wild population of D. subobscura. Collins.

The frequency of the characters vti (venae transv. incompl.) and vli (venae long. incompl.) has been studied in a population of subobscura of Barcelona, using the method of inbreeding by F_1 pair matings. The experimental cultures were reared at 25° C, a temperature almost at the upper limit for the subsistence of the species, and greater than those employed by Buzzati-Traverso and Gordon, Spurway, and Street in their studies on natural populations of the same species. The results obtained by these authors, and my own results, can be summarized as follows:

	Gordon, Spurway, and Street			Buzzati-Traverso	Prevosti
	Slough	New Forest	Studland	Bellumo	Barcelona
% of wild ♀♀ with vti in their descendants	38.3±7.1	26.2±6.8	25.5±5.7	15.5±3.9	61.5±9.5
with vli	23.4±6.2	11.9±5.0	20.0±5.4	8.3±3.0	34.6±9.3

The greater frequency of these characters in the population of Barcelona may be atttibuted, at least partically, to the higher temperature of the experiment, for other experiments show that their penetrance increases greatly with the temperature. When eggs laid by the same female were reared at 20° C and 27° C, the average increase of penetrance with the higher temperature was from 45.9±2.6 to 87.2±2.4 per cent for vti, and from 28.4±2.2 to 89.5±5.0 per cent

for vli.

vti and vli are controlled by a polymeric genotype, and its relation with temperature and therefore with the rate of development suggests a possible ecological interpretation of these characters. Its presence would be related to an adaptative limitation in the variability of the polymeric genotype controlling the rate of development. Investigations are in course to test this interpretation.

Ratty, Frank J., Jr. Lethal coverage with short duplications. A series of 5 short duplications of the w-spl area inserted into the autosomes h been tested for ability to cover lethals the w-spl area. One of these duplicatio Dp(1,3)N264-58a, was obtained from M. Demerec; the other four were produced by irradiations in this laboratory. Two are from Canton-S + irradiation and two are from w^{m4} irradiations (see New Mutants, Report of G. Lefevre). Thre of the duplications show mottling for w, indicating association with heterochromatin; and two do not. All five, however, are able to cover w-lethal or Notch mutations. Six "plain" w deficiencies have been thoroughly tested against three of the duplications; N264-58 (mottled), Dp(1;3)49a7 (mottled), and Dp(1;f?)50k11 (not mottled). The latter covers all six w deficiencies, giving fertile males. The mottled duplications cover only four of them. Forty-four Notch mutants (some also deficient for w) have been tested with t about two mottled duplications. DpN264-58 covers thirty of them, twenty-two of which give fertile males. The covered fertile males are usually non-Notc in appearance, but transmit the Notch phenotype unchange to their daughters. In a few cases, the covered males are themselves Notch, but these are invariably sterile; however, non-Notch covered males may also be sterile. The oth mottled duplication, Dp49a7, seems to be shorter than N264-58, since it cove fewer mutants, but no other difference is apparent. The remaining two dupli cations have not yet been tested thoroughly, but can cover some w lethals an Notch mutants, giving fertile males. Thus, there is little doubt that short duplications inserted into heterochromatin so that the visible loci, such as w, rst, and spl, all show mottling are fully capable of covering the lethal effects of deficiencies for these same loci. However, the percentage of covered males in many cases is very low. Still, no correlation between coverage and secondary nondisjunction has been noted.

Sattel, Walter Running and hopping abilities of D. melanogaster. Statistical analysis of data from sever authors and from my own experience, as the hopping and running abilities of so D. melanogaster wild and mutant stocks, yielded the following results. (1) There are significant differences with relation to the "age" of the stocks; "old" stocks, like Oregon (cultured sin 1909), show least hopping-distance; "young" stocks (inbred since 1938) show greatest distance. Significant differences as to the running velocity have yet been established. (2) Running and hopping abilities are strongly relate to the constitution of the thoracic muscles. Stocks tested were: (1) Oregon Pavia, Coimbra, Reindorf, Nordhausen, Berlin, "Lamark", Corteolana, and Flordia; (2) wild stocks same as (1), and al dp b, dp, Sp J/C_2 , V-ple, and

Scossiroli, R. Relation between successful interspecific crossings and gene arrangements. In crosses between D. ambigua females an pseudoobscura or persimilis males having different gene arrangements, different numbers of pupae can be recovered from t same number of parental flies per cultur bottle. The Chiricahua gene arrangement seems to be the most successful in such crossings.

Semenza, L., and Barigozzi, C. Chromosomes of Aphiochaeta xantina. The ganglial cells, as well as the spermatogonia, show 10 chromosomes, all telomitic with strong somatic pairing. The spermatogenesis shows a very clear pachytene, with 5 pairs. Doplotene with chiasmata. No chromocenters in the resting nuclei. Salivary chromosomes generally do not show bands.

Singleton, J. R. and Zimmering, S. Interchromosomal interference in D. melanogaster. An experiment was designed to determine the extent of interchromosomal interference in the absence of inversions. Females of the constitution b cn c bw were crossed by ru h th ss males, and the F_1 heterozygous females backcrossed by Cy/b cn c bw; ru h th ss/ru h th ss males (since the homozygous b cn c bw; ru h th ss males were found to be sterile.) The non-Cy offspring were classified according to crossover types. A simple Chi-square test based on some 14,000 flies indicated no obvious interchromosomal interference in this experiment. A more detailed analysis on about twice as many flies is under way.

Sobels, F. H., Kruijt, J. P. and Spronk, N. Lethality due to combined action of the genes Dichaete and eyeless-dominant. After crossing D/+ and ci^D/ey^D flies, we found that the F_1 class D; ey^D showed an almost complete lethality of 95%-100%, whereas the ey^D class showed only a relatively slight decrease to 25%. Reciprocal crosses gave slightly different results, as the offspring of D mothers rendered some break-throughs, which have only rarely been observed with ey^D mothers; These facts might point in the direction of a maternal influence. The lethality obviously only occurs in the pupal stages, as by means of marking with ebony, egg and pupal counts, no specific morality of the D; ey^D or ey^D classes could be observed during the larval period. About 75% of the D;ey^D animals die in an early pupal stage. The late lethal pupae are characterized by highly abnormal heads, with more reduplications of the antennae and more extreme reduction of the eyes as compared to the ey^D class. The bristle pattern is always disturbed. Extreme reduction of eye size is often correlated with reduplication of the antennae. Reduplication of the antennae causes a decreased possibility of emergence, probably by affecting the ptilinum mechanism. Sometimes cause of lethality was most evident by complete reduction of the head, the labium excepted. The same abnormalitites, however, to a less extreme degree, were also observed in the few emerging D; ey^D flies.

At 16° eye size is less reduced, antennal reduplications occur less often, and in consequence the amount of lethality is lowered. Temperature treatment during 60 hours at 16°, and beginning at different periods after hatching, influences eye size and antennal reduplications and gives more or less comparable results to those found by M. Vogt (1947) for Def^{r-L} and ant.

Hence we may conclude that expressivity of eyeless-dominant may be strongly influenced by the dominant gene Dichaete; a similar but weaker effect was obtained by combining ey^D with Moire. Secondly, the developmental processes causing this lethality are dependent on temperature. In addition it may be mentioned that this lethality is much higher in males than in females and that the rest of the genotype also influences the phenomena described here.

Spiess, E. B. Recent collections in New England. The northeastern limits of distribution for Drosophila species in North America have been rather sparsely investigated;

in fact, no large-scale collections have been made farther north than southern Vermont and New Hampshire (Spiess, 1949, Jour. N. Y. Ent. Soc.). A recent collection sent from the Mt. Desert Biological Survey, Bar Harbor, Maine, during the summer of 1950 included the following species: affinis (1), algonquin (4), athabasca (5), melanogaster-simulans (173), melanica paramelanica (5) putrida (3), quinaria (2), quinaria group (?) (1), robusta (2), and busckii (4). Except for athabasca and algonquin, all other species here are first evidence of their northern distribution. Bar Harbor is in the Transition Life Zone, but since this collection was made in mid-summer it is not too surprising to find forms like paramelanica and busckii in the population.

In October of the same year we made a collection in Lexington, Massachusetts, with the following results: algonquin (8), athabasca (25), melanogaster-simulans (1 female), immigrans (5), busckii (3), putrida (1), sigmoides (1), transversa (1), Chymomyza amoena (1). The presence of sigmoides in this collection is unusual, since its center of distribution is approximately Tennessee-Carolina and it has never been taken north of New York City. The collecting site was in birch and oak woods about a quarter of a mile from a settled area. All the other species have been taken at that time of year in the Boston area.

Spiess, E. B., Ketchel, M. and Terrile, B. A. Physiological properties of gene-arrangement carriers in D. persimilis.

Flies from Jacksonville, California, (elev. 800) containing the Whitney and Klamath arrangements of the third chromosome have been tested for egg-laying capacity, longevity, wing-beat frequency, and wing-area dimensions. Various culture conditions and mating procedures were utilized in the latter two cases; but the basic experimental procedure throughout was the mixing of strains at random in a population cage in order to get genetic heterozygosity with gene-arrangement homozygosity. All cultures were kept at 15° C. Heterozygotes for gene arrangements were F_1's of population-cage progeny. Results were as follows: (1) Egg-laying capacity: WT/WT maintains about 13-15 eggs per day for about 100 days; KL/KL starts at 13.5 for ten days, but falls off to 8-9 eggs per day for the next 100 days; WT/KL maintains a high rate of production (17-20) for the first sixty days, thereafter falling off faster than homozygotes. In senescence (100-170 days from pupa) all three types give equal rates, a fact which might be expected since natural selection would have built up genetic combinations for high production in early life. (2) Both homozygotes survive equally well under these experimental conditions, but heterozygotes have a significantly lower mortality rate. All three have long-lived individuals which survive until about 170 days. (3) Wing-beat frequency (using a stroboscopic method perfected by Williams and Chadwick): WT/WT. 11,020 beats per minute; KL/ KL, 9170 beats per minute, WT/KL (from WT mothers), 11,410; WT/KL (from KL mothers), 11,090. All standard errors are less that 100 beats per minute. (4) Wing-area dimensions for these types are WT/WT, 2.60 mm^2; KL/KL, 3.16 mm^2; WT/KL (WT mothers), 3.07 mm^2; and WT/KL (KL mothers), 2.76 mm^2. Standard errors are less than 0.04 mm^2. A "stroke-energy" index proportional to the kinetic energy given to the air by the wing beat (Reed, Williams, and Chadwick, Genetics, 1942) can be applied to determine which type is expending the greatest amount of energy. This index is as follows for these zygotic types: WT/WT, 762; KL/KL, 830; WT/KL (WT mother), 1236; WT/KL (KL mother), 907. By varying the culture conditions and mating procedures in different ways, wing dimensions and wing-beat frequencies may be caused to vary rather considerably; but in all cases so far heterozygotes have had a higher "stroke-energy" than either homozygous type, although in some cases not significantly higher. These are being retested at present.

The heterosis exhibited here is not the result of crossing after inbreeding. Strains of flies are maintained by mass matings, so that genetic heterogeneity is encouraged. The limits of heterosis due to crossing strains should already be accounted for by using the population cage, so that heterosis exhibited is clearly due to heterozygosity of the third chromosome. These tests can be used to analyze the variation involved in a gradient in relative frequencies of gene arrangements up an altitudinal transect in the Sierra Nevada.

Spurway, H. — *D. subobscura* is very well adapted for prolonged experiments. A single pair transferred to a fresh bottle daily will often give 600 to 800 imagines, and will continue breeding for over a month. Research on the possible effect of parental age is under way, and it is hoped to construct a fertility table.

Tattersfield, F., Kerr, R. W., Taylor, J. and Kerridge, J. R. Resistance to the toxic effects of DDT. — Work has been actively prosecuted to ascertain whether resistant strains of *D. melanogaster* (Rothamsted var.) could be obtained by repeated sprayings with DDT suspensions. A resistance of 1.5 to 3 times that of the original parent strain has emerged. The physiological and morphological characters are being studied. The effects, on resistance to DDT and CO_2, of age of individual and of parents, and of certain environmental factors, are being examined. The maximum resistance to DDT has been found, by R. W. Kerr, to occur at an age of the adult fly of about five days, and this is correlated with a higher respiration rate (Rothamsted wild-type). A "hybrid" stock supplied by B. J. Harrison, Bayfordbury, Hertford, England, is now under experiment.

Ulrich, Hans Killing of Drosophila eggs by partial X-raying. — Single sectors 0.1 mm in length, representing one-fifth of the Drosophila egg (average total length, 0.52 mm), were separately X-rayed at different ages of the eggs with a dose of 1000 r (217 r/min, 50 kv, 2 ma). The resulting percentages of non-hatching (i.e., killed) eggs were used as index of radiosensitivity of the several sectors. Eggs irradiated when 15 to 30 minutes old show a definite, high maximum (66.5% corrected) in the second fifth counting from the anterior pole, the middle fifth giving lower (24.2%) and the three other fifths very low percentages (3.5% to 5.4%). This characteristic distribution of radiosensitivity agrees well with the developmental state according to Rabinowitz *et al.*). The egg when 15-30 minutes old contains either the two pronuclei or 2 to 4 cleavage nuclei , lying mainly in the second fifth. The high susceptibility of this sector may be due to the presence of these nuclei; the mean susceptibility of the middle fifth may be due to extending of nuclei to this section, but also to the method used in localizing the irradiation in this fifth. The fifths 1, 4, and 5, containing no nuclei, are not sensitive. This result contributes to the problem of whether nucleus or cytoplasm is responsible for the death of cells after irradiation. In older eggs (1-2, 2-3, up to 5-6 hours) radiosensitivity is distributed throughout the egg, but not equally, the maxumum remaining in the second fifth. But in general the maximum is not so pronounced as in youngest eggs. The middle fifth gives only a little lower, the other fifths definitely lower percentages than the second fifth. The killing rates after partial X-raying of eggs older than 2-3 hours are low throughout. This agrees with the result of total X-raying, demonstrating a rapid decrease of radiosensitivity in older stages of embryological development.

Ulrich, Hans Sensitive periods and egg-regions in production of the modification "abnormal abdomen" by X-raying eggs of D. melanogaster.

When X-raying Drosophila eggs at different stages with different doses, the author did not find the sensitive periods of the modification "abnormal abdomen" (aa) found by Henke and Maas when treating eggs with high temperature. In special experiments with 4- to 5-hour eggs, percentage of killed individuals (eggs, larvae, and pupae) increased with dose more rapidly than did percentage of flies showing aa. With a dose of 800 r, the rate of aa reached its maximum of about 20% (few animals), while 93.5% of individual died. This suggested that higher rates of aa cannot be obtained when eggs are X-rayed totally, because the doses required to produce them are lethal.

If sensitivity to the effect of X-rays in producing aa is distributed in another manner in the egg than sensitivity to lethal effect (see preceding note), it should be possible by means of partial X-raying to apply higher doses (while shielding the region highly lethal-sensitive and exposing the highly aa-sensitive one) with the result of obtaining a lethal rate much lower than 100% and a percentage of aa higher than reached before by total X-raying. Eggs at the ages of 15-30 minutes , 1-2 hours, 2-3 hours, etc., up to 7-8 hours were partially treated with a dose of 1000r. When applied to total eggs of , say, 4-5 hours, this dose kills 99.9% of individuals; and when applied to single fifths of 4-5-hour eggs, it kills 38% to 68%, the percentage depending on the position of the treated fifth. The resulting percentages of aa after partial X-raying (see table) demonstrate a first low maximum at 1-2 hours in the middle fifth of the egg. With increasing age the maximum decreases and migrates towards the posterior pole of the egg, coming up to a new high peak at an age of 4-5 hours in the last two fifths of the egg. With further increasing age the maximum decreases and finally disappears, The method of partial X-raying makes it possible to detect sensitive periods not to be found when eggs are totally irradiated, and, moreover, to find sensitive regions of the modification "abnormal abdomen".

Percentages of Flies with Abnormal Abdomen

Age of eggs when X-rayed	No. of the treated fifth				
	1	2	3	4	5
15-30 min.	0.6	4.2	1.7	1.5	0.8
1-2 hours	2.8	10.8	27.6	14.6	1.3
2-3 "	0.6	0.0	7.1	7.8	2.8
3-4 "	1.0	1.3	3.1	11.3	13.5
4-5 "	0.6	0.8	0.7	38.0	46.5
5-6 "	1.7	0.4	0.0	7.9	7.0
6-7 "	3.5	1.2	0.0	9.6	11.8
7-8 "	0.7	0.7	0.0	2.8	0.7

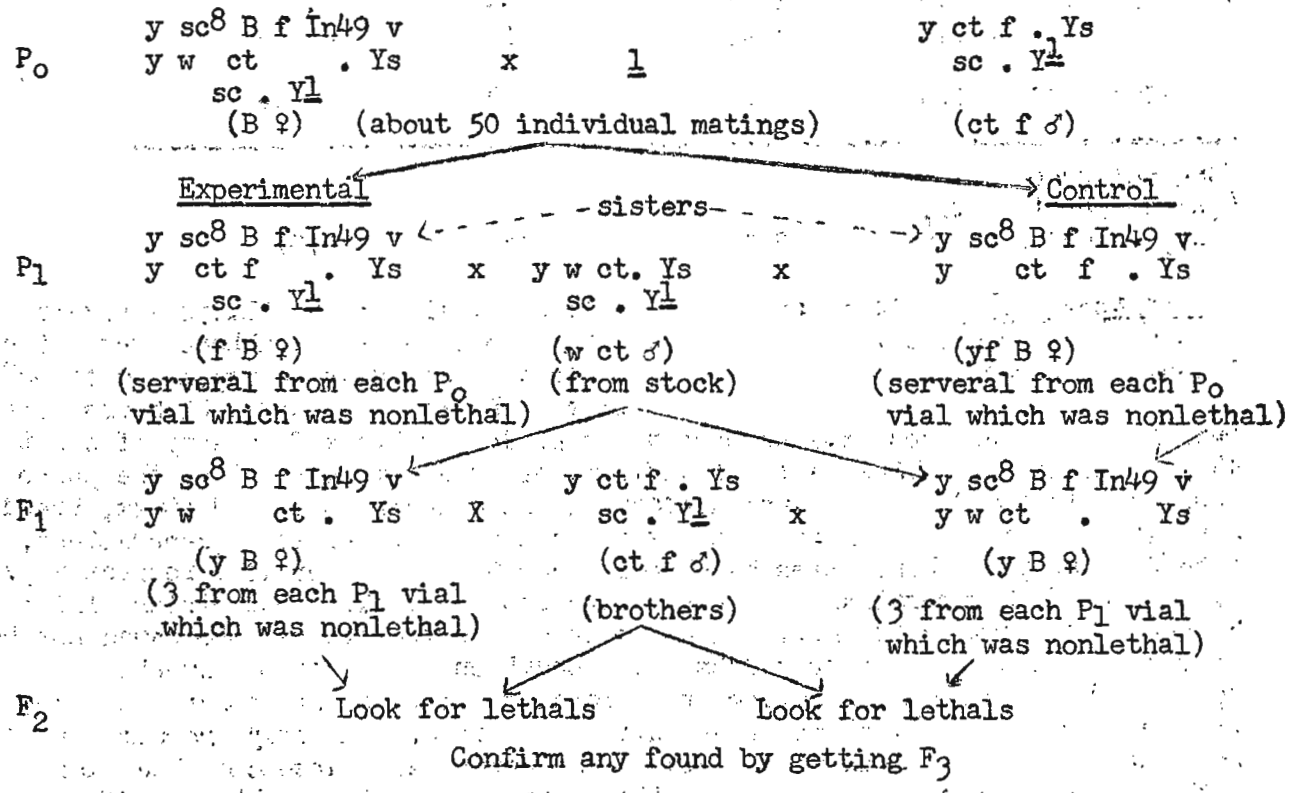
Valencia, J. I., and Valencia, R. M. The ineffectiveness of extra heterochromatin in influencing mutation rate in the female.

In the course of a recent experiment of the X-ray induction of mutations at specific loci in the female (Rec. Gen. Soc. Amer. 18: 105, 1949), it was observed that the spontaneous mutation rate (for both visibles and lethals) was unusually high in the stock used. Since this stock (bl23, "plond", DIS-22) contained an extra Y chromosome (of sc.Y^L type), the question arose whether extra heterochromatin might be influencing mutation rate. The following experiment was carried out to check this hypothesis, following a genetic scheme devised by H. J. Muller.

Spontaneous recessive lethals were looked for in a particular X chromosome (y sc^8 B f In49 v) among the progeny of females having this X and either having (experimental series) or not having (control series) an extra Y chromosome. The control and experimental females of the generation (called P1) which was tested for its spontaneous mutation frequency were sibs of each other and did not differ genetically from each other in any systematic way except by the presence or absence of a sc.Y^l chromosome (recognized by their being non-yellow or yellow). The crosses of flies, called P_o (see the figure), that produced these P1 females were designed in such a way as to make possible the elimination of all pre-existing lethals, to equalize the experimentals and controls by randomization of the autosomes, to make each of the many experimental and control lines isogenic with one another for the two X chromosomes (in the P_1 generation, in which lethals occurred), and to allow identification, in each generation, of all female combinations of X's and Y's, whether formed by disjunction or by nondisjunction. Since disjunctionally produced males from the crosses could have either one or two Y chromosomes, the male parents in each generation (except the last, where this did not matter) were taken from attached-X stocks.

We tested 3864 experimental and 3864 control chromosomes. In the former, 12 lethals (.31%), and in the latter 13 lethals (.33%) were observed. Thus we conclud that, in females at least, extra heterochromatin does not influence the spontaneous lethal mutation rate.

Crossing scheme used in lethal experiment. Phenotypes in parentheses.



<u>von Brandt, H., and Höhne, G.</u> Mutagenic action of some chemicals.

The following compounds have been tested for mutagenic action in D. <u>melanogaster</u>: (a) ethylurethane, dissolved in).96 KCL, (b) tri-(2-chlorethyl)amin, dissolved in citric acid and 0.96% KCL, (c) p-dimethylaminoazobenzene, dissolved in sesame

oil, (d) 2-methyl-1,4-naphthohydroquinone, dissolved in 0.96% KCl, and (e) 4,4-stibendicarboxamidine, dissolved in 0.96% KCl. In all experiments sublethal doses of the chemicals were administered by means of injection of imagines, except that in (c) we also exposed imagines to a sesame oil aerosol. The wild-type males treated (Berlin-wild) were tested for sex-linked recessive lethals by the ClB or Muller-5 method. The mutation rates of the control groups (treated only with KCl, NaCl, citric acid, or sesame oil) varied from 0.2 to 0.5%. The following table shows the results. Apart from the well known mutagenic agents ethylurethane and tri-(2-chlorethyl)amin, there were no significant increases in frequency of lethals after treatment with (c), (d), and (e).

Compound tested	No. chromosomes tested	No. lethals	% lethals
(a) Injection - 0.3%	1394	22	1.58
(b) Injection - 0.10	172	3	1.74
- 0.03	353	19	5.38
- 0.01	1189	38	3.20
(c) Injection - 2.3%	3220	22	0.68
Aerosol - 2.3% 48 hours	2298	4	0.13
(d) Injection - 1.0%	1496	4	0.27
- 0.01%	1245	10	0.80
(e) Injection - 1.0%	662	4	0.60
Control group (injection of NaCl, NCl, or critric acid)	3741	14	0.37

Waddington, C. H. Selection of the genetic basis of an acquired character. Developing flies of a wild-type strain or ginally collected in Edinburgh were giver temperature shock by being placed at 40° for four hours at about 21-23 hours after pupation. A crossveinless phenocopy was produced with a frequency of about 40%. One selected line was started from the crossveinless flies, the pheno copies being bred from in each generation; in a second selected stock, breeding was from those which did not show the phenocopy. After 15 generations, the frequency of phenocopies had become over 90% and under 10%, respectively. In the twelfth generation of the upward-selected stock, crossveinless flies appeared even among the individuals to which the temperature shock had not b given. When these were bred from, the condition was certainly inherited, probably by a gene of imcomplete penetrance whose behavior has not yet been fully worked out. Thus the crossveinless condition, initially produced as a response to an environmental stimulus, has during the course of selection picked up a genetic basis which enables it to appear in the absence of the stimulus.

Wallace, Bruce, and Demerec, Rada A test for translocation mosaics in Drosophila sperm exposed to nitrogen mustard aersol. In a recent article (B. Wallace, Dominan lethals and sex-linked lethals induced b nitrogen mustard. Genetics 36: 364-373, 1951) it was suggested that the genetic test for translocations (y; bw; e) may f

to reveal mosaic males carying translocations in one portion of their sperm and normal chromosome complements in the other. Such males would remain undetected because all expected classes of individuals would be present in the final (F_2) cultures although not in equal proportions. Since tests for translocations are generally made in vials, the distortions in the relative proportions of the various classes would be ascribed to chance. It was conceivable that the low frequency of recoverable translocations after nitrogen mustard treatment could be partically explained on this basis. The hypothesis has been subjected to experimental test, but the results are inconclusive. They may be interesting, however, in other connections.

In two experiments, 465 sperm from 57 treated males (2% aqueous solution of nitrogen mustard; 4-6 hours' exposure) were tested for translocations. Three were found (0.6%; limits of the 95% confidence interval,).2%-1.9%) F_2 males were retested for translocations. If any of the original 465 sperm carried an unstable condition that resulted in mosaicism for a translocation, some of the F_2 males descended from that sperm should carry a translocation undetected in the F_1, while the others should be normal. 4342 F_2 males were tested--an average of 9.3 males for each of the original 462 sperm that gave negative F_1's. No translocations were detected in this generation. The highest frequency of mosaics compatible with these observations is 0.6% (95% confidence).

To explain by mosaicism the low frequency of translocations (relative to X-ray treatments giving similar sex-linked-lethal frequencies) after exposure to nitrogen mustard, one must assume that mosaics are induced with a higher frequency than nonmosaic translocations. Since the 95% confidence interval of the frequency of mosaics detected in the F_1 spans the upper limit of the 95% confidence interval of the frequency of translocations in the F_2, we must conclude that the test has failed and no conclusion can be reached concerning the hypothesis to be tested. The available data, however, may be sufficient to subject other hypotheses to test and for such hypotheses they are perfectly valid.

Wette, Reimut Production of phenocopies by chemical substances.

Rapoport reports induction of phenocopies by 1,4-derivatives of benzene in D. melanogaster. Of several substances being tested in our experiments with dead-yeast cultures, hydrochinone has so far yielded a clear effect: 90% of the F_1 flies showed monostrophic asymmetries of the twisted type in the abdomen.

Yoshida, Y. "Conditioned lethal."

In D. melanogaster, a certain mutation provisionally named "conditioned lethal" was found in the second chromosome of a stock of bw dp, during an experiment using the stocks bw/Cy and bw dp. But it seems that "conditioned lethal" is independent of bw and dp. The homozygous stock of "conditioned lethal" is viable and fertile, but "conditioned lethal/Cy" always gives only "conditioned lethal/Cy", and never homoxygote of the "conditioned lethal".

In the offspring of "conditioned lethal/Cy", females x "conditioned lethal homozygous" males, the homozygote is lethal. In the reciprocal cross, however, the homozygote is semilethal. In the offspring of "conditioned lethal/Cy" females x wild-type males, the heterozygote of "conditioned lethal" is semilethal, but viable in the reciprocal cross. It seems that the homozygote of "conditioned lethal" is generally viable and fertile, but that it is lethal or semilethal with certain genetic factors. The heterozygote of

"conditioned lethal" is semilethal with these factors, which are being analyzed as to whether they are simple or complex, and whether they are chromosomal or cytoplasmic.

TECHNICAL NOTES

Anders, Georges, and Schmitter, Marco A method of mass investigations in Drosophila eggs.

Eggs are collected, dechorionated with sodium hypochlorite, and washed in distilled water, after which they are placed in rows on a glass slide and allowed to adhere by drying. Then they are treated in the following way:

1. Prick each egg gently with a steel needle and let the exuding content dry.
2. Submerge the slide for several minutes in a dish containing ca. 0.5% collodion in a mixture of equal parts of ether and absolute alcohol.
3. Allow to dry for several seconds and put in 70% alcohol for 5 minutes.
4. Let remain for 10 minutes in distilled water.
5. Transfer the slide to 1 N HCl at 60° for 6 minutes.
6. Wash for several minutes in distilled water.
7. Stain in Feulgen dye for 2 to 3 hours.
8. Wash for 1 hour in running tap water.
9. Run up through alcohols to Euparal.

In order to avoid plasmal reaction the slide may be treated before hydrolysis with 96% alcohol in the usual way. Moreover, after dying, the eggs may be washed with SO_2-water to prevent staining of cytoplasm. Both treatments we found to be unnecessary for current work. The method is useful for testing fertilization in young eggs and for determination of the stage at which embryos belonging to a lethal genotype die.

Clancy, C. W. "Seeding" cultures with Fleischmann's New Dry Yeast.

I find a saltcellar (shaker) very convenient for distributing the few granules of this material required to properly inoculate a vial or bottle with live yeast.

Green, M. M. Rapid preparation of cornmeal-agar medium.

We have found that the use of a pressure cooker of the type commonly used in home canning facilitates the preparation of the usual cornmeal-agar medium. A measured amount of water (according to the volume of medium to be prepared) is brought to a boil in the uncovered cooker. The other ingredients--agar, soaked cornmeal, molasses, brewers' yeast, etc.--are added, the cooker is covered, and the material autoclaved for 10 minutes. The resultant medium is ready for pouring. Since the water loss by this procedure is small as compared to the loss during the usual methods of preparing media, the amount of water used is decreased by 10%.

Herskowitz, Irwin H. Grid-smear technique for electron microscopy of salivary-gland chromosomes.

Several techniques have been described for the preparation of Drosophila salivary-gland chromosomes for electron microscopy, employing replicas (casts), stained sections, and stained smears. This note describes a new and very simple technique for such preparations. Full-grown larvae of D. melanogaster are placed in 60 per cent acetic acid, and the salivary glands removed. After 10 minutes in this solution the glands are transferred to a 200-mesh nickel grid previously coated with a water-floated

film of parlodion. Another coated grid is put on top of this, the grids placed between two slides and the glands crushed by thumb pressure. After the squashing, the two grids are separated with a needle and permitted to dry in air for a few minutes. The tissue is then ready for microscopy and remains in excellent condition for months. The grid-smear method is time-saving, permits microscopy of unstained tissues, and eliminates the necessity of subjecting the material to various chemical and physical agents, which might cause distortion in addition to the original fixation.

Herskowitz, Irwin H. and Burdette, Walter J. Preparation of permanent aceto-orcein smears. Permanent aceto-orcein smears of Drosophila salivary-gland chromosomes may be prepared routinely by means of the following technique. Salivary glands are removed from larvae during the third instar after they have been placed in 60% acetic acid. After 10 minutes in this solution the glands are crushed in the usual manner between a slide and a coverslip previously covered lightly with albumen. The coverslip is floated off with the stain, consisting of 2% orcein in 60% acetic acid. Most of the tissue adheres to the coverslip, and contact with the stain is necessary for only a few seconds. The coverslip is then mounted on a clean slide bearing a small drop of light Karo corn syrup. Excess Karo is removed by pressure and the preparation permitted to harden. By covering the margins of the coverslip with Clarite or a similar mounting medium, such preparations are made waterproof.

There are several advantages of this method besides simplicity. The acetic acid induces sharp definition of the bands and, since it is used alone, permits excellent chromosome spreads. The Karo washes away excess stain ans leaves the background of the chromosomes clean. Moreover, with simple modifications, this method permits one to retain ordinary preparations for an extended period. Salivary chromosomes are particularly well seen using a 1.25-mm dark M phase objective.

Mittler, Sidney Medium for rearing yeasts that do not require amino acids or vitamins. In attempt to control the nutrition of D. melanogaster, yeasts were selected that could grow on a vitamin-amino acid-free medium. The following medium was employed:

Agar	15 gm	NaCl	0.5 gm
$C_6H_{12}O_6$	30 gm	$MnSO_4$	0.5 gm
KH_2PO_4	1 gm	$MgSO_4$	0.5 gm
$NaKC_4H_4O_6$	8 gm	$FeSO_4$	0.5 gm
$(NH_4)_2SO_4$	2 gm	H_2O	1000 cc
$CaCl_2$	0.5 gm		

When this medium is inoculated with a yeast that can live in the absence of vitamins or amino acids, practically all the nutrition obtained by the flies is from the yeast. If one uses a yeast like Hansenula anomala NRRL 365 with the above minimal medium at a temperature of 24° C, one has a set of conditions that can be reproduced. With the cornmeal-molasses medium there are probably as many variations possible as there are research workers. In the study of penetrance and expressivity it is of utmost importance to have nutrition as well as temperature under control.

Rosin, S. The position of the wings of killed drosophilae. In flies that have been killed by overetherizing the wings are maintained in a vertical position, so that some bristles cannot be easily seen. In order to study bristle pattern in fixed material,

70%-80% alcohol heated to 70°-80° C is poured over the well-etherized (but not overetherized) flies. By this fixing method we get a more or less normal position of wings.

Stone, P. C. and Zimmering, S. An effective mite control. The Drosophila lab at Missouri had for many years been heavily infested with mites. Complete control has been achieved by use of a new organic mitecide, Aramite-15-W, so that for the past three months no mites whatever can be found. Adult flies were transferred to a fresh food vial together with about 150 mg (the amount that can be held on a penny) of the full-strength Aramite (15% active ingredient), and shaken so that they were well covered with the powder. Cotton plugs were also dusted with Aramite. As a routine, this process was carried out for two generations. Used in this way, Aramite will kill the hypopus as well as other stages of mites, but does not seem to harm the adult drosophilae or affect their fertility. It is important that there be no free water on the walls of the vials, as Aramite will then make a paste with the water, which kills flies. This procedure was carried out in a separate room, the empty lab being, in the meantime, fumigated with a commercial mixture of 3 parts ethylene dichloride to 1 part carbon tetrachloride, about 15 pounds per 1000 cubic feet being used. Aramite 15-W is obtainable from the U. S. Rubber Co., Naugatuck Chemical Division, Naugatuck, Connecticut.

Wallace, Bruce Estimating the size of experimental Drosophila populations. In a study of either the ecology or the genetics of a population, one of the important factors is population size. Determining the number of adults in a Drosophila population by etherization and counting is a laborious task (the number may exceed 10,000), which disrupts, with possible selective effects, the continuity of a population. The result obtained is hardly more than an estimate, because several hundreds of the flies remain uncounted in the cage and moribund flies are includes in the final figure. Any technique that gives a rapid estimate of the number of adults would be a useful one.

An attempt at estimating the number of flies by sampling "fly specks" has been made with some success. The experiment completed dealt with the relation between a known number of adult flies in a population and the number of specks obtained on a sampler exposed to the population for certain periods of time. The cage used was one of Lucite and screen, 18 inches long by 5 1/2 inches wide by 4 1/2 inches high. The sampler was a glazed porcelain cylindrical electrical insulator 3/4 inch long and 5/8 inche in diameter. It was mounted on a glass rod 7 inches long, which was inserted into a rubber stopper. Samples of specks were taken by projecting the sampler through a hole in the small end of the cage and plugging this hole with the stopper on which the sampler was mounted. The sampler, consequently, was suspended equidistant from the top, bottom, and sides of the cage, 7 inches from one end. The number of specks obtained was determined under a low-power binocular microscope merely by counting and simultaneously touching each speck with the point of a pen. Specks, even when overlapping, were easily distinguishable against the white porcelain background.

The results of the experiment can be tabulated as follows:

Day	No. new flies added*	Total flies in cage#	No. specks (4-hour Exposure)**	No. specks (17-hour exposure)##
1	674	674	21	32
2	688	1362	24	53
3	1140	2502	48	185
4	1496	3998	37	142
5	2213	6211	48	270
6	1858	8069	102	407
7	1526	9595	106	386

* Obtained each day from a series of culture bottles.
\# Assuming, erroneously, that no deaths occurred.
** Sampler exposed from 12:30 p.m. to 4:30 p. m.
Sampler exposed from 4:40 p.m. to 9:40 a. m.

The slope and error of the slope of the regression of specks on flies during the four-hour interval was .0095 ± .0005 (error = 5.3% of the slope). For the 17-hour interval the corresponding figures were .0421 ± .0054 (error = 12.8% of the slope). The ratio of the slopes, .0421/ .0095, was 4.43; and the ratio of the lengths of exposure, 17/4, was 4.25.

These data indicate that this is a technique that can be used for determining the relative number of flies in a population at frequent intervals without disturbing the population unduly. Whether it can be used to compare one population with another or to estimate actual numbers of flies under various conditions is not known.

Wilson, L. Deterioration of brewers' yeast as a factor in comparative growth studies on Drosophila.

A supply of dry brewers' yeast kept in a dark bottle under ordinary laboratory conditions eventually failed to support growth in Drosophila. The yeast was purchased in October, 1949, and used for routine sterile growth studies at a concentration of 4% until August, 1950. Suddenly at that time larvae in all experiments died before the first moult. Increasing the concentration of yeast did not prevent the deaths, but a high proportion lived in 0.75% yeast. These results suggested a vitamin deficiency which was not great enough to prevent development of the slow-growing, inadequately fed flies. To test this hypothesis the yeast was supplemented with different brands of B-complex vitamins in a concentration sufficient to supply 200 micrograms of thiamin per 100 milliliters of medium. Perfectly normal growth resulted. No growth occurred if the vitamins were autoclaved in distilled water before being added to the sulture medium. It has been possible to test the rate of deterioration of strains of yeast by periodically checking the rate of growth of the larvae and the time of occlusion of the adults. A strain of yeast purchased in February, 1951, and kept continuously in the refrigerator began to show deterioration in September, 1951. It is obvious that in comparative growth studies where yeast is used in media, great care must be exercised to insure a yeast of constant nutritional value.