

a lethal is indicated by the absence of an entire class of flies, the test is objective. Lethals are among the most commonly induced mutations. While the number of gametes analyzable will vary with the number of persons employed, a staff of 2 or 3 can screen between 5,000 and 10,000 X-chromosomes a month.

The purpose of the experiment with mutagens should determine the experimental precautions employed. Whenever quantitative mutation frequencies are required in order to compare, for example, results from different mutagens or different cell stages etc., then the age of the flies, the breeding periods, the cell sampling procedures as well as other physiological and environmental variables must be rigorously controlled. On the other hand, if only a relative index of mutagenicity is sought, these variables need not be as stringently controlled.

The two generation reciprocal translocation test is one that is in general use in many laboratories. The test is similar to the sex-linked lethal test, requiring single cultures for each  $F_1$  individual tested. Screening of  $F_2$  progeny is more difficult and time consuming than for lethals, but the test is an objective and reliable index of chromosome breakage. Meiotic and post-meiotic male germ cells are most effectively studied. Four to six weeks (if retests are carried out) may be required to complete the translocation test.

Sex chromosome loss experiments are a one-generation test which detect either complete or partial loss of the sex chromosomes, the loss resulting primarily from chromosome breakage. The test is useful because either sex may be treated, the phenotypes of the exceptional classes of offspring are readily discernible from the normal progeny, and large numbers of flies may be rapidly screened with each individual representing a treated gamete. It should be possible to examine a minimum of 5,000 progeny from treated gametes *per day per investigator*. Although many more chromosomes can be tested *per man hour* by this method than by the recessive lethal method, many mutagens may be more effective at inducing lethals and other point mutations than chromosomal loss.

A second one-generation test of great usefulness in detecting chromosome rearrangements induced in either sex is the bithorax method of Lewis (3). A conspicuous enhancement of the bithorax phenotype signals a chromosome rearrangement, translocation or inversion, involving chromosome 3 (one of the two large autosome pairs of *Drosophila*). Each  $F_1$  represents a treated gamete and only the exceptional progeny need be further analysed to verify the transmission and to determine the nature of the change. Probably no more than