

Moree, Ray. Washington State University, Pullman, Washington. Selection for and against heterozygous lethals in some American populations of *D. melanogaster*.

In measuring the heterozygous effects of lethals by the use of estimates of population parameters, one of the estimates employed is the degree of allelism, conventionally calculated as the ratio of the observed number of lethal crosstests to

the total number of crosstests, i.e.,  $I = d/c$ . But since in crosstesting a number ( $k$ ) of lethal-bearing chromosomes, the number of kinds of matings possible ( $c = k(k-1)/2$ ) does not coincide with those occurring in a breeding population ( $k^2$ ), it is suggested that the allelism estimate may be improved by taking  $J = (2d+k)/(2c+k) = (2d+k)/k^2$ ; this follows from the simple relation  $k^2 = 2c+k$ . (In an earlier report this distinction between the symbols  $I$  and  $J$  was not made (Moree 1967)). The elimination rate by homozygosis is then taken as  $JQ^2$  rather than  $IQ^2$ , where  $Q$  is the frequency of lethal-bearing chromosomes. By this means the experimental estimate of the frequency of lethal deaths is brought into mating correspondence with the frequency of lethal deaths in the population sampled, and so is a better estimate of the latter parameter.

The effect of an estimate of allelism on the calculated average fitness of a heterozygote can be determined by the method devised by Crow and Temin (1964). These authors have shown that the average chromosomal effect on the total fitness of a heterozygote carrying one lethal-bearing chromosome is given by  $H+F = (U-IQ^2)/Q = \bar{U}/Q - I\bar{Q}$ , where  $H$  is the effect on fitness,  $F$  is Wright's inbreeding coefficient, considered negligible in the following examples, and  $U$  is the average lethal mutation rate per chromosome per generation, taken as  $U = .005$ ;  $+H$  implies a deleterious effect while  $-H$  implies a heterotic one. To date, all second chromosome data from large natural populations have yielded  $+H$  values of  $H$ ,  $U$  being larger, and in some cases considerably larger, than  $IQ^2$ , a relation first noted by Sturtevant a number of years ago. But when  $J$  is used instead of  $I$ , some of the estimates of  $H$  are negative, as shown below. Thus in some instances lethal and semilethal genes appear to reduce fitness while in others they appear to increase it.

	Q	k	c	d	$IQ^2$	$JQ^2$	$\bar{U}/Q - I\bar{Q}$	$\bar{U}/Q - J\bar{Q}$
Ives: Fla. '40	.670	50	1200	4	.0015	.0106	.0052	-.0084
Ives: Ohio '41	.497	48	1128	7	.0015	.0066	.0070	-.0033
Ives: Mass. '45	.458	37	666	3	.0009	.0066	.0090	-.0035
Band, Ives: Mass. '58	.359	57	1567	10	.0008	.0031	.0116	.0053
Hiraizumi, Crow: Wis.	.288	50	1182	7	.0005	.0022	.0157	.0097
Seto: Ohio '60	.374	54	1418	34	.0034	.0059	.0044	-.0024

These new estimates are by no means intended as final. Further needed adjustments for such variables as synthetic lethals, inbreeding, where relevant, and for the fact that allelism and mutation rates are based on different arrays of lethals (Crow and Temin 1964; Dobzhansky 1964) have yet to be made.

References: Band, H. T. and P. T. Ives, 1963, Canadian J. Genet. and Cytol. 5:351; Crow, J. F. and R. G. Temin, 1964, Amer. Nat. 98:21; Dobzhansky, Th., 1964, Amer. Nat. 98:151; Hiraizumi, Y. and Crow, J. F., 1960, Genetics 45:1071; Ives, P. T., 1945, Genetics 30:167; Ives, P. T., 1954, P.N.A.S., US 40:87; Moree, R., 1967, 56:578; Seto, F., 1961, Amer. Nat. 95:365. (Aided by funds from the State of Washington Initiative Measure No. 171 for the Support of Biological and Medical Research.)

Charlesworth, B. and R. W. Davies. Cambridge University, England. Secondary non-disjunction in FM6 stocks.

We have evidence that our stocks of FM6 contain XXY females in appreciable frequency. For example, 5 out of 17 single-pair matings of FM6 Ubx<sup>130</sup> females with Muller-5 males gave exceptional males,

at an overall rate of 45%. Exceptional males are fertile, and non-disjunctional cultures give regular and exceptional females capable of transmitting the non-disjunction. The frequency of XXY females appears to vary between sub-lines, and may have been much higher when the FM6 stock was originally obtained from Pasadena 2 years ago. (J.R.S. Whittle, personal communication). It would be advisable for other workers to check their stocks, as erroneous results may occur in using this balancer in chromosome substitutions with unmarked stocks.