Van Delden, W. Genetics Institute, University of Groningen, Haren, The Netherlands. Selection for competitive ability.

An experiment was started to study the genetic effects of combining two Drosophila species in a competitive situation. The strains used were a wild type laboratory strain of D. melanogaster and a vermillion D. simulans strain. Flies of both strains were combined for a number of generations. Each generation was started with a fixed number of parents, which were removed seven days after introduction of the simulans flies. The generation interval was 21 days during the first 60 generations, 14 days during the next generations. The experiment was done in bottles at 25°C. At the present time the lines are kept for more than 80 generations. Four selection lines were initiated: a control D. melanogaster line (A-line) continued each generation with 5 pairs of flies per bottle; a control D. simulans line (D-line) with 20 pairs of parents; a competition line (C-line) with 5 pairs of melanogaster and 20 pairs of simulans; and a competition line (B-line) with 5 pairs of melanogaster and 20 pairs of simulans, the simulans flies in this line however were derived each generation from the D-line. The melanogaster flies were added to the bottles 72 hours after introduction of the simulans flies.

To compare the competitive performance of the competition and control lines, melanogaster flies from the A-, B- and C-lines were combined with simulans flies from C- as well as D- lines in the same way as for the maintenance of the regular lines. Such tests performed during the first 10 generations did not show any differences in performance between A-, B- and C-lines. Tests done after generation 65, however, showed considerable differences between lines.

Table 1 gives the results of a test done in generation 77; recorded are the mean numbers of melanogaster flies emerging within 15 days after introduction of the melanogaster parents (each entry is based on 9 bottles). Both B- and C-lines produced more melanogaster than the A-line when combined with simulans from the C- as well as from the D-line. All melanogaster lines show a higher productivity with C-simulans than with D-simulans. The mean number of C-simulans flies (242.3) in competition lines is also higher than the number of D-simulans flies (200.6). In pure cultures the mean number of C-simulans flies is 284.9, compared to 261.3 for the D-simulans flies.

Table 1. Mean number of D. melanogaster flies emerging from combined and pure cultures.

	sim. C-line	sim. D-line	no sim.
mel. A-line	66.9	44.8	286.3
mel. B-line	131.0	82.6	381.1
mel. C-line	106.0	50.3	220.2

These data suggest selection for increased competitive ability in the B- and C-melanogaster lines. The phenomenon of the higher total productivity in the C-simulans competition lines is still under study.

Genetic changes in the melanogaster lines B and C are also suggested by the results of the heritability tests for sternopleural chaetae number in the melanogaster lines done in generations 40 and 50. Table 2 shows an increase in heritability and additive genetic variance for B- and C-lines compared to the base population and the A-line.

Table 2. Heritabilities and additive genetic variances for sternopleural chaetae number.

	generation 0		generation 40		generation 50	
	h^2	V_G	h^2	V_G	h^2	V_G
Base population	0.33	0.81	-	-	0.29	0.77
A-line	-	-	0.32	0.63	0.25	0.52
B-line	-	-	0.50	1.25	0.42	1.62
C-line	-	-	0.43	1.75	0.52	2.34

Further research is done now on the differences in developmental time between the lines (melanogaster from B- and C-lines showing a faster development than the control line).

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