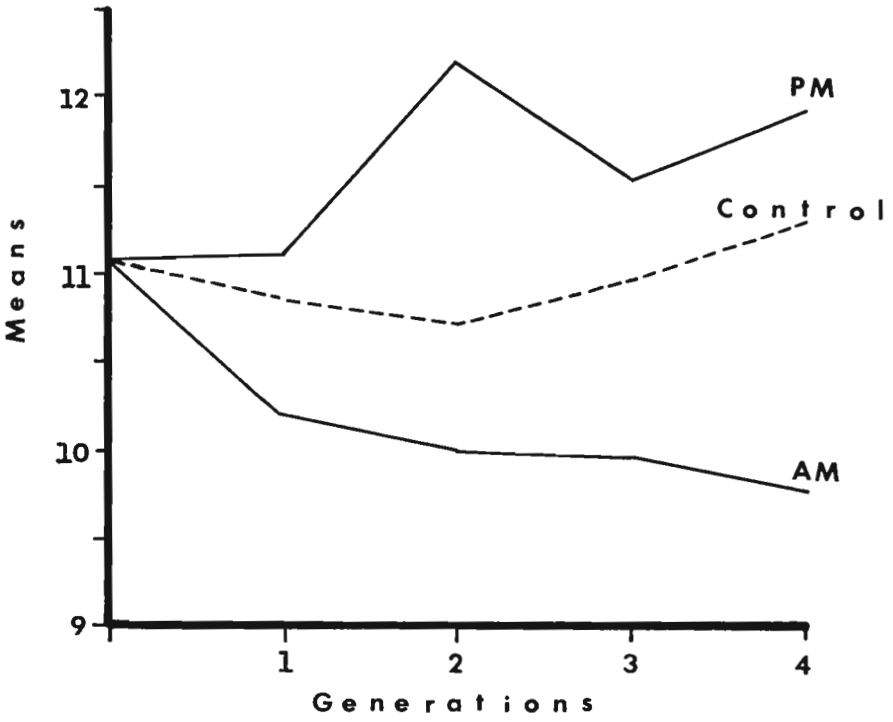
Grant, B.S. and W.L. Harrison. College of William and Mary, Williamsburg, Virginia.

Selection on the eclosion rhythm of D. melanogaster.

In preliminary directional selection experiments performed as the first phase of a disruptive selection program, we have confirmed the results of Pittendrigh (P.N.A.S. 58: 1762) demonstrating that the eclosion profile of Drosophila can be altered via selective breeding.

Our base population was derived from a four-way gene pool cross of the inbred lines Swedish-B, Oregon-R, Samarkand and Canton-S. Within the first generation, small but distinct differences between the eclosion profiles were obvious for the populations selected for early morning and late afternoon emergence from the puparium. The mean eclosion times of the selected lines continued to diverge from each other and the control (unselected) population without overlap (see figure). The response to selection, thus far, has been asymmetric. Both selected populations continued to peak at "dawn" (12:12 LD cycle) but the "PM" population showed an additional peak at "dusk" which appeared to increase each generation with the concomitant diminution of the morning peak. The "AM" population profile appeared quite similar to the unimodal control except for an exaggerated increase in the peak of emergence at "dawn."



Over four generations of selection, the average realized heritabilities for AM and PM are 0.24 and 0.10 respectively. These estimates are somewhat atypical. Since the data are cyclical, the extremes in eclosion time, either very early (just after midnight) or very late (just before midnight) would differ greatly in score on a linear time-of-day scale of one through 24 hours; however, in terms of a diurnal rhythm of eclosion, rather than simply developmental rate, such individuals differ only slightly. In order to avoid the ambiguities of possible overlapping of daily distributions, the tails of the distributions were truncated arbitrarily for a four hour block of time between the two hours immediately preceding and succeeding midnight. Actually, because so very few flies emerge during this interval, the effect of truncation on mean estimates is negligible. (Supported by NSF-GU-3111-M.)

Miller, D.D. University of Nebraska, Lincoln, Nebraska. Evidence of "eastern" D. athabasca XL inversion associations in the XL patterns of other D. affinis subgroup species.

As reported by Miller and Voelker (1969), the salivary gland chromosome patterns of the long arm of the X of "western" and "eastern" D. athabasca appear to be differentiated by a minimum of five inversions: MI, MII, MVI, MVII, and MVIII. Recently XL patterns have been studied in five related species: D. affinis, algonquin, azteca, narragansett, and tolteca. Although it is not yet possible to interpret the XL sequences of these other species in terms of all the material of the athabasca XL strand, one can nevertheless recognize some pattern associations attributable to certain of the inversions (MI, MVII, and MVIII) distinguishing the sequences of "eastern" athabasca from numerical Sequence I of "western" athabasca. These are either actual stretches of pattern like those of "eastern" athabasca inversion break point regions or, at least, cases involving discontinuities coinciding with the "eastern" athabasca inversion break points and

hence interpretable as possibly related to the athabasca Sequence I by way of these inversions. The following table presents these findings. The athabasca inversions are identified by their symbols and by the associations at their break points (section numbers from

D. athabasca inversions		D. affinis Subgroup Species				
		affinis	algonquin	azteca	narragansett	tolteca
M I	3'15	+?	present	present	+?	present
	4'16	+?	+?	+?	?	+?
M VII	27d'34	+?	present	+?	+?	+?
	27p'35	present	present	present	present	present
M VIII	27d'30	+?	-	present	present	?
	34'29	+?	-	present	+?	present

the Sequence I XL map of Miller and Voelker '69). Cases in which the indicated inversion break point region association was found are designated by "present", those in which the same inversion break may have occurred as an intermediate step by a "+?", those in which the inversion association was definitely absent by a "-", and cases in which no decision could be reached by a "?". These findings provide additional evidence of an intermediate phylogenetic position of "eastern" athabasca between "western" athabasca and other D. affinis subgroup species (though not necessarily in a linear phylogeny). Such a position of "eastern" athabasca was also implied by patterns of the C Chromosome (Miller and Sanger, 1968).

1) Miller, D.D. and Sanger, W.A. 1968. Journal of Heredity 59: 322-327. 2) Miller, D.D. and Voelker, R.A. 1969. Journal of Heredity 60 (in press at the time of this report).

Baldwin, D.G. University of Arizona, Tucson, Arizona. The frequency of inversion sequences in D. pseudoobscura in southern Arizona.

D. pseudoobscura females were collected during the months of October through January through two winters (1968-69 and 1969-70) from four locations in southern Arizona. Sycamore Canyon and the Patagonia Dam Road in the Patagonia Mountains are at 4500 ft. in oak woodland. Madera Canyon Road, at the base of the Santa Rita Mountains, is at 3500 ft. in desert scrub. Soldiers Trail, at the base of the Santa Catalina Mountains, is in desert scrub at 2900 ft. The collections were taken from the Patagonia Mountain sites in 1968-69 only and from Soldiers Trail in 1969-70 only, but collections were made during both winters at Madera Canyon Road. The traps consisted of large cans baited with fermenting bananas.

The gene arrangements of both homologues of the third and X-chromosomes were scored for one female larva from each wild female collected. The total number of chromosomes examined

Locality	n	AR	ST	CH	PP	SR
Sycamore Canyon	8	87.5	0	12.5	0	0
Patagonia Dam Rd.	40	77.5	20	2.5	0	10
Madera Canyon Rd.	102	67.6	25.5	5.9	1.0	9.8
Soldiers Trail	28	64.3	28.6	7.1	0	17.8

(n) was 178. The frequency of the sex-ratio (SR) sequence of the X-chromosome is significantly greater at Soldiers Trail than at the other sites. No larvae were found to be homozygous for sex-ratio. Only one female produced unisexual offspring, indicating that only one of the females collected had been inseminated by a male with the sex-ratio inversion.

The decrease in frequency of Arrowhead (AR) and the increase in frequency of Standard (ST) from Sycamore Canyon to Soldiers Trail probably reflects the decrease in elevation (Patton and Heed, DIS 40: 69). The other third chromosome inversion types found in the study were Pikes Peak (PP) and Chiricahua (CH).