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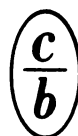
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EXPERIMENT ON THE ARTIFICIAL MIGRATION
OF MOLLUSKS WITH POPULATIONS OF
Bradybaena fruticum MÜLL.

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It was established by several years of observations of two populations of the dimorphic terrestrial mollusk, *Bradybaena fruticum*, that changes in the frequency ratio of two phenotypes ("striated" and "unstriated") are evidence of the seasonal migrations of the animals. These migrations are connected with the individual activity of the animals and do not go beyond the limits of the ratios characteristic for each population. In connection with this, it is very important to determine the effect of environmental conditions on changes in the frequencies of the two morphological types viewed against the genetic structure of the population built up with time. It would be desirable to have direct experiments on the effect of environmental conditions on the phenotypic appearance of the population.

The first experiments on the translocation of fairly large samples of populations to other habitats were the work of N. P. Dubinin and G. G. Tinyakov (1947) carried out on *Drosophila funebris*. Subsequently, A. Lomnicki (1964) set up analogous experiments on the edible snail, *Helix pomatia* L., which remained unfinished. V. E. Beregovoi (1971), carried out similar experiments on the frog hopper, *Philaenus spumarius* L.

In order to transplant animals from a population of *B. fruticum* which had been carefully studied earlier (Khokhutkin, 1971) and which were living in the floodland forest along the left shore of the Kama River in the neighborhood of the town of Sarapul, we took two samples (516 and 507 specimens) containing 91.7 and 78.7% unstriated animals. The mollusks were transferred to a mixed forest with a dry microclimate situated on the higher right bank of the Kama. Collections of the previous two years showed that a sparse population of *B. fruticum* with a statistically equal ratio of the two morphological types ($45.5 \pm 8.67\%$ of the unstriated forms) lived here.

Both samples were transplanted in June of 1972 to two areas of this forest (0.06 ha each) separated by a 30-meter meadow. Control collections were made in July and September, after which the animals were again released to the same areas. The total number of mollusks in the control samples decreased to 114 and 101 specimens in July and to 31 and 8 specimens in September. In addition to this, 78 and 23 shells were found on the first and second plots, respectively, during the September collections.

The following changes in the frequency ratio of the two morphological types of the donor population were found. The differences between the numbers of animals of the unstriated morphological type from the donor population and the recipient population from the two areas were 46.2 and 33.2%, respectively, at the start of the experiment. There were no significant differences in the donor population by areas between the July and September sampling, and the number of animals of the unstriated morphological type comprised 58.7 and 57.6%, respectively.

Assuming that, by analogy with *Cepaea nemoralis* L., the unstriated trait is dominant in *B. fruticum* populations, we have the following original and new concentrations of alleles in the donor population (see Table 1).

As seen from the data presented, the equilibrium distribution of genotypes became established at a new level in the donor population which was statistically indistinguishable from that in the recipient

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TABLE 1. Experiment on Artificial Migration with Populations of *Bradybaena fruticum* Müll.

Indicator	Donor population		Recipient population
	sample 1	sample 2	
Original concentration of alleles:			
$A=p$	0,71	0,54	0,26
$a=q$	0,29	0,46	0,74
Equilibrium distribution of genotypes, %			
$p^2 AA$	50,7	28,9	6,9
$2pq Aa$	41,0	49,8	38,6
$q^2 aa$	8,3	21,3	54,5
New concentrations of alleles:			
$A=p$	0,36	0,35	—
$a=q$	0,64	0,65	—
Equilibrium distribution of genotypes, %			
$p^2 AA$	12,8	12,2	—
$2pq Aa$	45,9	45,4	—
$q^2 aa$	41,3	42,4	—

population. In this manner, the frequency of animals of the unstriated morphological type decreased to the level existing in the aboriginal population which obviously suggests that, under these conditions, selection "works" against the unstriated morphological type.

In the experiment with *Drosophila*, "natural selection was the decisive factor in the evolution of populations with respect to the distribution of inversions within them" (Dubinin and Tinyakov, 1947; Dubinin and Glembotskii, 1967). In the case of froghoppers and mollusks which have a relatively small populational area of distribution, one can expect to see the effect of the population founder principle or, in a more general form, the effect of genetic drift. The results of the experiment with froghopper populations (Beregovoi, 1971) to a certain extent support the latter assumption: morphological types from the donor population appeared in the recipient population. However, the author himself did not regard these data as definitive, since the observation was conducted during the course of only one generation. The data of Yu. I. Novozhenov (1970) show that stabilizing selection plays the principal role in the development of the phenotypic appearance of populations of the field maybeetle, *Melolontha hypocaustani* F.

The data presented by us cannot be regarded as definitive either, because due to the sharp decrease in the population, we will probably not be able to continue our observations of the phenotypic appearance of the donor population or of the changes produced in subsequent generations of the recipient population. The results obtained are evidence of natural selection, but further experiments are required to confirm the action of automatic genetic processes.

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