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THE GENES FREQUENCY DYNAMICS IN A POPULATION OF *DROSOPHILA MELANOGASTER*

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Key words: genes frequency, *Drosophila melanogaster,* population, selection.

Abstract: In an artificial population of *Drosophila melanogaster*, after three generations, under selection action, the frequency of phenotypes have changed drastic

INTRODUCTION

The english Hardy and german Weinberg have studied, independently, the genes frequency in *Drosophila melanogaster* populations and, on this basis, have elaborated the Hardy-Weinberg law. In conformity with this law **the genes frequency in a enough large panmictic population remains constant in generations row.** So, in the absence of selection or mutations a population keeps equilibrium. In the case of a pair gene/alleles (Aa), their frequencies is like $(p+q)^2 = p^2$ AA + 2pq Aa + q^2 aa. Under action of some factors (as selection or mutation) the genes or alleles frequencies, in a population, can be modified and, as a result, may be reached **a new equilibrium**.

THE AIM OF INVESTIGATIONS

In this paper we aimed to evidence the dynamics of genes and alleles (for wings shape) frequencies in a population of *Drosophila melanogaster*, without a selection pressure

MATERIAL AND METHODS

As biological material it was used individuals of wild type Oregon and of mutate Curly Lobe Plum (genotype Cy+L/+Pm+) of *Drosophila melanogaster.* We was interested only of mutations Cy and vg (genotype vg/vg). It was introduced 20 ♀ individuals and 20 ♂ individuals of Oregon and 10 ♀ and 10 ♂ from the Curly Lobe Plum + 10 ♀ and 10 ♂ from vestigial, in the same flask, on fresh media

So, the percentage ratio was 50% individuals from Oregon population, 25% individuals from vestigial and 25% individuals from Curly Lobe Plum. It was analised all individuals in F_1, F_2 and F_3 generations to see if have appeared modifications of initial individuals ratio, as phenotype and genotype.

RESULTS AND DISCUSSIONS

The selection action at the genotypes level has as result genes frequency change. If the frequency of one of alleles , for instance a_1, increases we may assume that it is favoured while a_2 allele is unfavoured, in the spite of the fact that selection act at level on individuals (genotypes). But the selection do not acts as „all or nothing”. A part of the individuals with a_1 allele may be well adapted and an other part may be less adapted. The same is possible for individuals with a2 allele. So individual adaptability do not depend only of one allele. The adaptive value of each individual is a quality of whole genotype, depends of interactions between all his genes.and alleles.

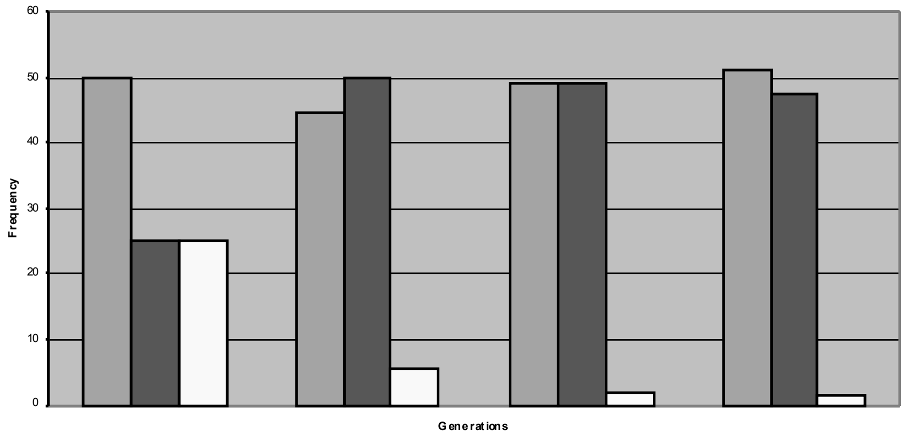
In our investigations the genotypes frequencies were: 0.75% vg^+/vg^+ and 0.25% vg/vg. For these genotypes frequencies there were a_1 and a_2 as genes frequencies. After three generations the genotypes frequencies were modified, the number of vg/vg individuals decreasing from 25% to 1.36%, and the sum number of +/+ and Cy+L/+Pm+ increasing from 75% till 98.62%. We can not affirm thatthese are the genes frequencies because vg may be in heterozygous state in some individuals (with normal phenotype).So we designed the allele a_1 frequency by p and the a_2 frequency by q. In a general case, a population with $p^2a_1a_1$, $2pqa_1a_2$ and $q^2a_2a_2$ genotypes frequencies will produce pa_1 and qa_2 gametes. If the adaptability of a_1 gametes will be equal with 1, then the adaptability of a2 gametes will be 1-s.In this formula s represents intensity of selection against a_2. After selection action the situation will be pa_1 and $q(1-s)a_2$. In population the situation will be p+q(1-s) = p+q-sq = 1-sq. The relative proportion of a_1 and a_2 gametes, after selection action is p/1-sq and q(1-s)/1-sq. It is important to note that the sum of gametes frequencies , after selection action, is not equal with 1 but with 1-sq.

Table 1. The phenotypes dynamic under selection action.

Parents			F_1		F_2		F_3	
Phenotype	No.	%	No.	%	No.	%	No.	%
+	40	50	675	44.57	5061	49.01	1803	51.26
Cu	20	25	750	49.70	5052	48.95	1666	47.36
Vg	20	25	86	5.70	208	2.02	48	1.36

The modification of genes frequency established by selection is designated by Δq, where Δq represents the difference q_1 (the frequency of a_2 after selection) and q_0 (the a_2 frequency before selection)

So, $\Delta q = q_1 - q_0 = [q(1-s)/(1-s)]-q = -sq(1-q)/(1-sq)$ We may observe that Δq has negative value.This means that a_2 fequency decreases after gametes selection.In these conditions, in next generations, the a_2 frequency will reduce more and more and, at the end, it will disappear in population.



Parents F1 F2 F3

Fig. 1. The phenotypes frequencies

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