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Estimate of the longevity in experimental populations established with hybrids of *Drosophila prosaltans* and *D. saltans*.

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Studies of the reproductive isolation of the sibling species of *Drosophila prosaltans* and *D. saltans* show that they cross with each other in the laboratory, depending on the geographical origin of the flies used. Tadei (1974, 1977) working with these two species, established 4 groups of experimental populations, and among these was the group H constituted by populations founded with hybrids F₁ resulting from the crossing between females of *D. prosaltans* with males of *D. saltans*. The populations H₂, H₃ and H₄ (group H) had been kept by the serial transfer technique (Buzzatti-Traverso, 1955; cf., Tadei and Mourão, 1981) in a constant temperature room (25 ± 1.0°C), with censuses carried out every 7 days, counting themselves for sex and adults and young being weighed separately. Since the foundation until the aforementioned date of the publication, 170 full weekly censuses had been carried out. Since then these populations had been kept only with weekly transfers until May 1999, when we restarted the full weekly censuses, totaling 100 censuses in this analysis. With the resumption of the full censuses, it was possible to study the population parameters related to the size (regarding the number of flies and biomass), birth rate and mortality of H₂, H₃ and H₄, estimating directly in the populations the longevity of the flies in conditions of intense competition.

The estimate of the average longevity of the flies was made through Levene's Method (appendix in Dobzhansky and Pavlovsky, 1961). This method was developed for determining the longevity in populations where the processes of birth and death are considered continuous stationary stochastic processes. In this case the gross average longevity (a) is given by the number of surviving individuals divided by the average number of individuals born in an interval of unitary time. If time's interval for the computation of births is very long, the correction of the estimate of the average longevity of the flies becomes necessary. The model of Levene was developed for application in populations with two weekly transfers. The application of this model modified for populations with a weekly census is hereby proposed. By accepting the premises of the model, the expression for obtaining the value a is given by:

$$a = \frac{e^{-\frac{c}{m}}}{1 - e^{-\frac{c}{m}}}$$

By means of the expression above, the value m (corrected average longevity) in terms of a is given by:

$$m = \left[\ln \left(\frac{1+a}{a} \right) \right]^{-1}$$

In this study the values of the gross average longevity (a) and corrected (m) in the unit of time of the censuses (weeks) were estimated as well as the values in days for the corrected average longevity (m^*), minimum and maximum longevity of males, females and total of flies populations H₂, H₃ and H₄. Differences in the longevity of the flies of these populations were verified, the average longevity being larger in H₄ (19.9 days), intermediate in H₂ (15.0 days) and smaller in the population H₃ (12.7 days). H₄ population, in relation to H₃, presents an increase in the average longevity of 38% for males, 33% for females and 36% for the total of flies. The biggest differences in longevity values are observed when the upper values of the distribution are considered; H₄ flies survive up to 66 days, more than twice the time of survival of H₂ and H₃ flies.

The average values obtained for birth and mortality rates are equivalent in each population, indicating a balance of stable size as required by Levene's Model. However, when each of the taxes is separately considered in the comparison among the three populations, the differences are significant. These populations show different adaptive strategies, for, in spite of population H₄ presenting the smallest values for birth and mortality rates, its population size is intermediate in relation to H₂ and H₃, being basically kept because of the flies' largest longevity. Due to the fact that these populations present only small variations in size and in birth and mortality rates along the time, it was possible to use Levene's Model, that proved itself efficient in the estimate of the flies' longevity. Despite Tadei and Bicudo (1981) chromosomal analyses having shown that H₄ population reconstituted the full chromosomal set of *D. saltans* eliminating of *D. prosaltans*, preliminary results now obtained from our molecular analyses with markers of AFLP (Amplified Fragment Length Polymorphism) show that this population still maintains DNA segments of *D. prosaltans*.

References: Buzzati-Traverso, A.A., 1955, *Heredity* 9: 153-186; Dobzhansky, Th., and O. Pavlovsky 1961, *Heredity* 16: 169-179; Tadei, W.P., 1974, Thesis (Master in Genetics), São Paulo: Bioscience Institute, University of São Paulo, Brazil, USP; Tadei, W.P., 1977, Thesis (Doctor in Science/Genetics), São Paulo: Bioscience Institute, University of São Paulo, Brazil, USP; Tadei, W.P., and H.E.M.C. Bicudo 1981, *Brazil. J. Genetics*, 4 (4): 549-570; Tadei, W.J., and C.A. Mourão 1981, *Brazil. J. Genetics*, 4 (2): 149-164.