Najera, C. University of Valencia, Spain. Effect of alcohol and overcrowding on viability of eye colour mutants of *Drosophila melanogaster*.

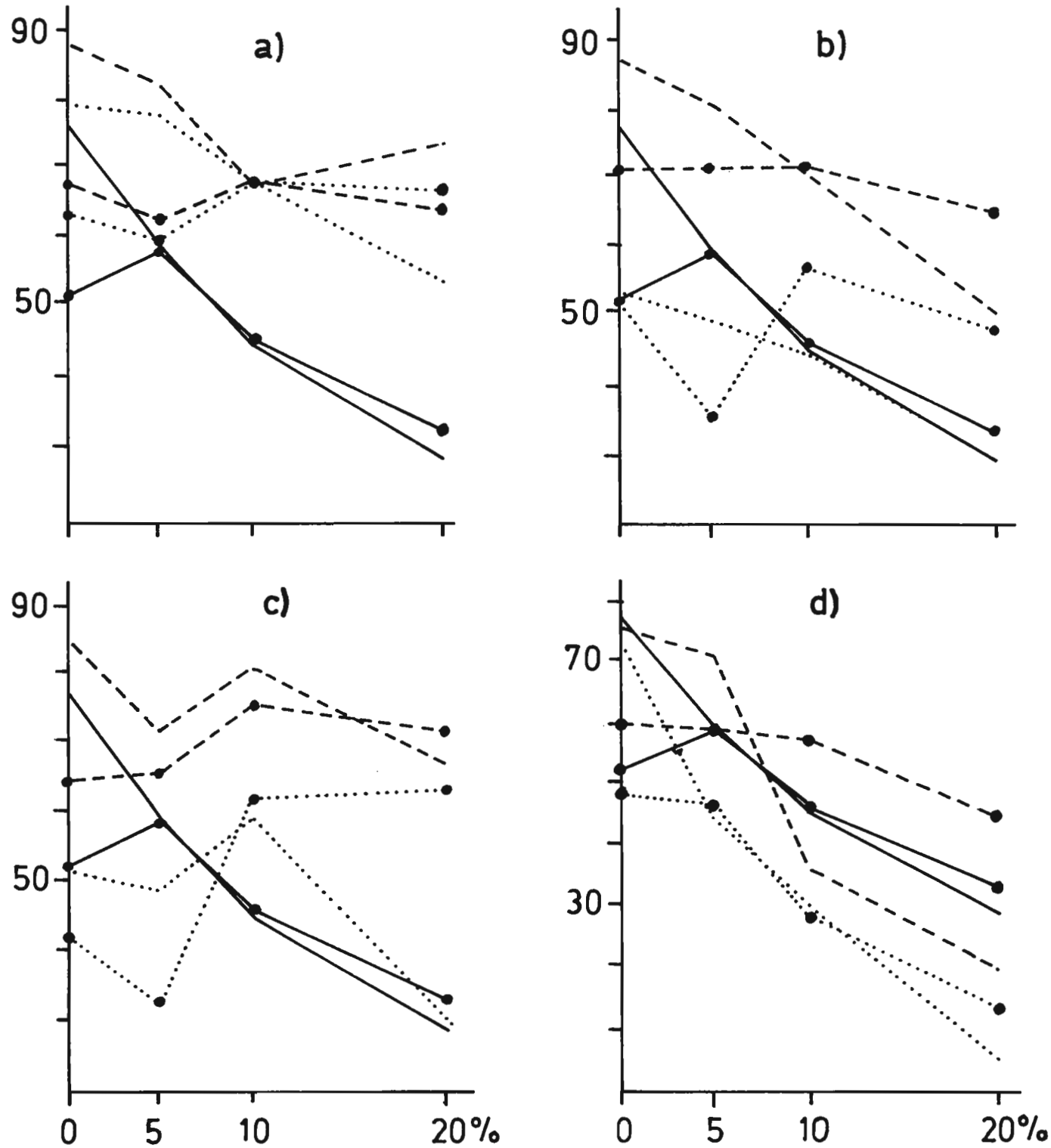

Figure 1. Viability of the wild and mutant strains at different alcohol levels. Wild homozygotes (——), heterozygotes (- - - -), mutant homozygotes (·····). Non-overcrowding (——), overcrowding (—●—).

In a previous work (Najera & Mensua 1982) we analyzed cellar, vineyard and pine wood populations in respect to eye colour mutants. The cellar flies had almost double the number of mutants of the vineyard and pine wood populations.

In order to prove the influence of alcohol on the viability of eye colour mutants obtained in a wine-cellar, a factorial experiment was designed. Five strains were used: 2/58A (sepia), 2/54A (cardinal), 2/74B (cardinal, cinnabar and possibly another colour mutant not yet identified), 1/51.3 (dark colour not yet identified), and a wild strain from the same cellar. Three factors were proved: (a) two levels of competition for food (25 cc or 2 cc of agar-corn medium), (b) four levels of ethanol concentration (0%, 5%, 10% and 20%), (c) three different genotypes (mutant homozygote, wild homozygote and heterozygote for each strain--a total of nine different genotypes).

One hundred eggs were placed in each vial. A total of ten replicae was made for each factor.

The results are presented in graphic form (Fig. 1). The wild strain has better viability in a non-overcrowding situation (25 cc). When alcohol concentration increases there is a decrease of viability, but there is no differences between the two levels of competition for food.

In 2/54A strain (Fig. 1a) there is no difference between homozygotes and heterozygotes. Viability is not affected when the alcohol concentration is increased, as it is in the wild strain.

In 2/58A and 1/51.3 strains (Figs. 1b and 1c) the viability of the heterozygotes is always higher than that of the homozygotes and the viability in an overcrowding situation does not decrease (2/58A) or increase (1/51.3) in regard to a non-overcrowding situation with increased alcohol concentration. Thus, a higher viability is always observed when both overcrowding and high alcohol concentration are present.

A factorial analysis (2x3x4) was made for each mutant (Table 1). Overcrowding does not affect viability except in 2/54A strain. The effect of genotype and alcohol are always significant.

Table 1. Facotrial analysis overcrowding-genotype-alcohol.

Sources of variation	fd	2/58A		1/51.3		2/54A		2/74B	
		F	P	F	P	F	P	F	P
Overcrowding	1	0.099	ns	2.32	ns	17.77	<0.001	0.18	ns
Genotype	2	82.30	<0.001	82.06	<0.001	80.75	<0.001	27.77	<0.001
% alcohol	3	36.77	<0.001	14.89	<0.001	26.71	<0.001	67.66	<0.001
Overcrowd-Genotype	2	2.39	ns	2.26	ns	1.81	ns	1.61	ns
Overcrowd-alcohol	3	13.04	<0.001	16.55	<0.001	10.71	<0.001	10.49	<0.001
Genotype-alcohol	6	5.42	<0.001	13.48	<0.001	8.38	<0.001	4.13	<0.001
Over-Geno-alcohol	6	2.07	0.05	3.84	<0.001	2.23	0.05	1.26	ns
Replicae	216								

Overcrowding-genotype interactions are not significant but alcohol always interacts significantly with overcrowding and genotypes. The alcohol-overcrowding interactions results in better viability in mutant strains than in the wild strain, especially in heterozygous ones. Because the wild strain also comes from a cellar, we conclude that eye colour mutants have a better viability in the special conditions of a cellar. This interaction could in part explain the higher frequency of eye colour mutants in the cellar.

References: Najera, C. & J.L. Mensua 1982, Jornadas de Genetica Luso-Espanolas XVIII:133.