Silva, F.J. and J.L. Ménsua. Universidad de Valencia, Spain. Synergistic effects between eye-color genes of **Drosophila melanogaster.**

Double mutants have been commonly used as a means of studying synergistic effects between genes. The pigmentary pattern of a double eye-color mutant is generally the sum of the effects of each mutant; however, in some cases, a more extreme interaction appears. This might happen when two mutants are defective for the same mechanism. For this reason paired combinations of eye-color mutants were synthesized in order to find out between which mutants this kind of interaction occurs. The pigmentary pattern of the double mutants was studied by separation on thin-layer chromatography and quantification of the fluorescent spots as described by Ferre et al. (1983).

Table 1. Percentages of eye-pigments and related metabolites (Or-R has aribtrarily received the values of 100). NDP (neodrosopterin), DP (drosopterin), IDP (isodrosopterin), ADP (aurodrosopterin), ADHP (6-acetyl-dihydrohomopterin), SP (sepiapterin), H_2BP (dihydrobiopterin), BP (biopterin), PTE (pterin) and IXP (isoxanthopterin). Xanthurenic acid and other metabolites were not detected in any of the double mutants. ND (not detected).

Strain	NDP	DP	IDP	ADP	ADHP	SP	H_2BP	BP	PTE	IXP
g ltd	TRACE	TRACE	ND	ND	ND	ND	ND	ND	ND	ND
rb ltd	TRACE	TRACE	TRACE	ND	ND	ND	ND	ND	ND	ND
ltd rs^2	5±3	3±1	3±1	6±1	TRACE	52±7	37±6	101±13	ND	13±1
ltd ca	TRACE	2±0	2±0	5±1	TRACE	53±15	11±2	75±15	TRACE	1±1
rb p	13±5	5±1	3±0	9±1	48±10	74±5	65±2	248±49	TRACE	24±0
ltd p	8±3	5±0	3±1	7±1	TRACE	56±8	40±5	75±9	ND	22±0
ltd st	21±5	18±4	16±4	24±4	128±12	165±17	41±2	237±31	11±1	32±3
g st	58±30	5±1	3±0	9±0	16±9	116±2	81±34	109±13	ND	44±9
ca	5±0	5±0	7±0	17±0	90±16	113±4	47±8	180±36	11±4	50±6
g	17±2	19±1	19±1	42±3	52±9	206±10	53±3	178±9	24±3	54±2
ltd	43±1	36±3	35±4	63±2	203±8	203±33	95±6	165±31	26±7	33±8
p	18±3	20±4	19±3	43±5	86±18	98±14	72±7	184±28	30±6	59±6
rb	34±2	25±3	36±3	55±3	94±12	162±7	50±5	149±14	37±4	29±2
rs^2	43±15	50±18	44±13	100±10	129±23	144±23	91±6	154±22	52±7	89±7
st	80±2	93±6	88±8	95±2	116±37	98±7	94±4	78±5	60±5	69±1

Quantification of the pteridines of some of the double mutants studied is shown in Table 1 in percentages of wild type. All of them present lower quantities of pteridines than expected (see in Table 1 the pigmentary pattern of the simple mutants) but the more drastic interactions occur between the mutant lightoid (ltd) and the mutants garnet (g), ruby (rb) and rose^2 (rs^2). The double mutants g ltd and rb ltd have an almost completely white eye-color due to the absence of pteridines and brown pigment. This result contrasts with the higher expected quantities of pteridines for these double mutants. Then it seems that the gene ltd is acting synergistically with the genes g, rb and rs^2 to produce the wild type pigmentary pattern. It is likely that these genes are required for the normal transport of eye-pigments precursors since some researchers have found that the mutants ltd and g have defects in the transport of brown pigment precursors (Sullivan & Sullivan 1975; Howells et al. 1977), although they did not test pteridine precursors.

References: Ferre, J., F.J. Silva, M.D. Real & J.L. Mensua 1983, in: Chemistry and Biology of Pteridines (Blair, ed.), de Gruyter Berlin-New York: 669-673; Howells, A.J., K.M. Summers & R.L. Ryall 1977, Biochem. Genet. 15:1040-1059; Sullivan, D.T. & M.C. Sullivan 1975, Biochem. Genet. 13:603-613.