These families were extremely early flowering when compared with other mutant families (i.e. Nos. 1–23). Thus, the extreme early mutants showed maximum genotype × environment inter-action in the present studies. Similar conclusions were also drawn by GHAFOOR ARAIN[3] where extreme early or late-flowering M_2-derived lines of EMS treated material of barley cultivars of diverse yields showed maximum genotype × environment inter-actions in M_4 and M_5 generations and these lines tended to possess specific adaptation pattern with respect to yield.

Zusammenfassung. Die Umweltstabilität von 29 strahleninduzierten Mutanten und 11 Kulturvarietäten wird anhand der Methode von EBERHART und RUSSELL[2] untersucht. Die Mutanten werden auf Grund der Versuchsergebnisse in stabile und angepasste klassiert.

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Adaptedness of the Carriers of Normal and Subvital Second Chromosomes of *Drosophila melanogaster*

Much research has been dedicated to the study of second chromosome genetic load of *Drosophila melanogaster*, for example, the extensive revision made by CRUMPACKER[1]. Nevertheless, there is relatively little information on the parameters, in particular on the adaptation, of the normal and subvital homozygous wild strains in experimental populations, in the specialized literature.

Adaptedness is defined as the ability of a genotype or group of genotypes to transform the available food into living matter, as well as the ability to survive and reproduce in a given environment[2,3]. It is necessary to quantify the 'adaptedness' for measuring the effect of natural selection or to compare different populations[4].

This paper is an attempt to investigate the adaptedness of wild homozygous second chromosomes strains of *D. melanogaster* with normal and subvital viability.

The homozygous 2nd chromosome strains were obtained by means of CyL/Pm technique[5], and their viabilities classified by the usual method[6]. With 10 homozygous strains (M6, M8, M10, M12, M17, M18, M19, M24, M27, and M32) for different wild normal 2nd chromosomes and 2 homozygous strains (M7 and M15) for different

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Table I. Mean numbers and mean biomass of adults and young flies per week, with their standard errors, and the numbers of weekly census (N) utilized to computations, in 15 experimental populations of *Drosophila melanogaster*

Populations	*N*	Adults		Young	
		Number	Biomass (mg)	Number	Biomass (mg)
Heterozygous					
POL1	20	259 ± 12	210 ± 10	405 ± 26	294 ± 20
POL2	20	276 ± 11	217 ± 9	404 ± 28	281 ± 20
POL3	20	251 ± 11	202 ± 9	405 ± 31	297 ± 25
Means	20	262 ± 7	210 ± 5	405 ± 16	291 ± 13
Homozygous					
M 6	20	225 ± 16	188 ± 13	480 ± 41	362 ± 31
M 7	27	169 ± 11	142 ± 9	402 ± 24	306 ± 19
M 8	22	198 ± 16	153 ± 12	546 ± 37	375 ± 26
M10	24	227 ± 18	220 ± 18	514 ± 45	441 ± 36
M12	21	190 ± 12	160 ± 10	363 ± 27	282 ± 21
M15	21	145 ± 19	112 ± 15	530 ± 52	363 ± 34
M17	20	176 ± 17	131 ± 13	377 ± 30	270 ± 24
M18	21	158 ± 11	140 ± 10	482 ± 31	385 ± 21
M19	20	183 ± 22	146 ± 17	365 ± 40	257 ± 26
M24	23	209 ± 13	177 ± 11	377 ± 21	296 ± 15
M27	20	183 ± 11	145 ± 9	405 ± 23	300 ± 16
M32	20	171 ± 14	144 ± 11	360 ± 26	282 ± 20
Means	22	186 ± 4	155 ± 4	433 ± 10	327 ± 7

Table II. Ratio variance values (F) of the comparisons of the 3 heterozygous populations (POL 1, POL 2 and POL 3) and each one of the 12 homozygous populations

Comparisons of the heterozygous populations	df	Adults		Young	
		Number	Biomass	Number	Biomass
M 6	3.76	3.62[a]	1.49	1.37	2.24
M 7	3.83	20.27[b]	16.34[b]	0.00	0.27
M 8	3.78	7.25[b]	8.54[b]	5.37[b]	3.60[a]
M10	3.80	2.22	0.43	2.73[a]	8.32[b]
M12	3.80	10.72[b]	7.84[b]	0.55	0.14
M15	3.77	18.72[b]	20.82[b]	3.08[a]	2.15
M17	3.76	11.38[b]	15.45[b]	0.24	0.30
M18	3.78	27.07[b]	14.96[b]	1.82	5.05[b]
M19	3.76	7.73[b]	7.69[b]	0.39	0.63
M24	3.79	5.92[b]	3.48[a]	0.29	0.13
M27	3.76	12.90[b]	13.65[b]	0.00	0.17
M32	3.76	14.95[b]	12.49[b]	0.64	0.14

df, degrees of freedom between and within; [a] $p < 0.05$; [b] $p < 0.01$.

wild subvital 2nd chromosomes, 12 homozygous and 3 heterozygous (founded with mixture of the 12 chromosomes) experimental populations were established. The populations were started with 600 individuals each and maintained by means of the serial transfer technique[7], with a weekly census, for 30 weeks. From these populations, some information was obtained about adaptedness. The results are summarized in Table I.

A superiority of the heterozygous populations was observed by comparing the mean numbers of adults ($t = 9{,}505$; 13 df; $p < 0.01$), and the mean biomass of adults ($t = 8{,}605$; 13 df; $p < 0.01$) of the homo- and heterozygous populations. However, no difference was observed between mean numbers of young ($t = 1{,}508$; 13 df; $p > 0.05$). Notwithstanding, the homozygous populations exhibit mean biomass of young individuals ($t = 2{,}497$; 13 df; $p < 0.05$) superior to that of the heterozygous populations.

For the 3 heterozygous control populations in relation to the mean numbers and mean biomass of adults and young portions of populations, the hypothesis of heterogeneity is rejected by means of analysis of variance ($F_{2.57} = 1.29$; $p > 0.05$ for adults mean numbers; $F_{2.57} = 0.73$; $p > 0.05$ for adults mean biomass; $F_{2.57} = 0.00$; for young mean numbers; $F_{2.57} = 0.15$; $p > 0.05$; for young mean biomass).

The comparison between the 3 heterozygous populations and each of the 12 homozygous populations (see Table II) showed that the great proportion of no rejection of the heterogeneity hypothesis occurs in the adult portion of populations. This fact leads to the conclusion that the principal difference between homozygous and heterozygous individuals in relation to the adaptedness lies in the adult fraction of the populations.

The mean number of the adult flies (192 ± 7) of the normal viability chromosomes populations is superior to the mean number of adult flies (157 ± 12) of the subvital viability chromosomes ($t = 2{,}502$; 10 df; $p < 0.05$); of the rest, the components of adaptedness of subvital and normal chromosomes populations are statistically equal.

The superiority of heterozygous individuals in biomass was reported for *Drosophila pseudoobscura*[8], as well as the superior competitive fitness (relative adaptedness) of homozygous individuals with respect to the heterozygous individuals in *Drosophila willistoni*[3]. The incompatibility of the events which show superiority of homozygous over heterozygous individuals in relation to the hypothesis of the superiority of the heterozygous was also discussed in the literature[9].

In conclusion, the results showed differences in adaptedness between homozygous and heterozygous individuals, and between the normal and subvital homozygous. They also offer biological support to the WALLACE and MADDEN technique[6], which allows us to distinguish the subvital and normal chromosomes among the quasi-normal.

Resumen. Se estudió el «adaptedness» de estirpes de *Drosophila melanogaster* homócigos y heterócigos para el II cromosoma. Fueran observadas diferencias significativas cuanto al «adaptedness» de las estirpes homócigos, principalmente en la etapa adulta de las poblaciones. Fué tambien posible constatar que las estirpes homócigos normales difieren de las subvitales cuanto al tamaño de las poblaciones.

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