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Screening of Ovral and Lyndiol for genetic effects in D. melanogaster.

Sanjeeva Rao et al. (1971) reported a significant increase of mutations in D. melanogaster by feeding Sodium Saccharin. Tranquilizers containing Thioridazine Hydrochloride and Chlordiazepoxide Hydrochloride have also increased the mutation frequency in D. melanogaster by feeding technique (Sanjeeva Rao et al. 1973; Pratap 1970). In view of the positive results obtained in Drosophila with tranquilizers and artificial sweeteners, experiments were undertaken to assess the genetic damage induced if any by oral contraceptives commonly used. The present study reports the work carried out with two oral contraceptives namely Ovral and Lyndiol.

Oregon-K strain flies were allowed to feed on a normal medium containing two tablets of Ovral dissolved in 100 cc of food medium. In another experiment, flies were allowed to feed on a medium containing two and three tablets of Lyndiol for every 100 cc of the medium. After 72 hours the flies were removed and the eggs laid were allowed to hatch. The emerging males were tested for genetic effects if any. The genetic damage induced was studied by scoring for sex-linked recessive lethals and translocations. A brood pattern of three days each of six broods was employed to screen the differential response of various stages of spermatogenesis. Each treated male was mated to three females of y sc^{S1} In49 sc^{8};bw;st stock. After three days of mating, the females were transferred to fresh vials while the male was transferred to a fresh vial along with three more females. The F_1 females were mated individually to y sc^{S1} In49 sc^{8} males, while the F_1 males were mated individually with bw;st stock to score for sex-linked recessive lethals and translocations respectively in the F_2 generation. The results are presented in Tables 1 and 2.

Table 1. Showing the percentage frequencies of sex-linked recessive lethals induced by Ovral and Lyndiol in Drosophila melanogaster.

Treatment	Brood A			Brood B			Brood C					
	N	L	%	N	L	%	N	L	%	N	L	%
Control	1336	3	0.22	1716	8	0.46	1894	3	0.24			
Ovral	975	1	0.102	1035	7	0.676	824	2	0.243			
Lyndiol (2 tab.)	597	-	-	479	-	-	693	-	-			
Lyndiol (3 tab.)	526	1	0.190	707	-	-	658	-	-			
	Brood D			Brood E			Brood F			Total		
	1599	7	0.43	1015	4	0.39	1073	3	0.27	8633	28	0.324
	620	5	0.806	539	1	0.186	293	-	-	3578	16	0.447
	920	4	0.435	456	-	-	153	-	-	3298	4	0.121
	452	-	-	300	-	-	182	-	-	2825	1	0.035

N = Total number of X chromosomes scored L = Number of sex-linked recessive lethals induced

Table 2. Showing the percentage frequencies of translocations induced by Ovral and Lyndiol in D. melanogaster

Treatment	Brood A			Brood B			Brood C					
	N	T	%	N	T	%	N	T	%	N	T	%
Control	758	nil	nil	748	nil	nil	834	nil	nil			
Ovral	946	nil	nil	895	nil	nil	606	nil	nil			
Lyndoil (2 tab.)	616	2	0.325	420	nil	nil	646	nil	nil			
Lyndiol (3 tab.)	721	nil	nil	176	nil	nil	525	nil	nil			
	Brood D			Brood E			Brood F			Total		
	769	nil	nil	660	nil	nil	683	nil	nil	4452	nil	nil
	447	nil	nil	383	nil	nil	143	nil	nil	3420	nil	nil
	280	nil	nil	795	nil	nil	266	nil	nil	3023	2	.066
	269	nil	nil	698	nil	nil	427	nil	nil	2816	nil	nil

N = Total number of sons scored T = Number of translocations induced

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Singh, B.N. Banaras Hindu University, Varanasi, India. Heterosis owing to basal inversion in D. ananassae.

Several inversions in the natural populations of Drosophila ananassae, a cosmopolitan and domestic species, have been reported from various parts of the world. Most of the inversions have a very restricted distribution while the three paracentric inversions originally described by Kaufmann (1936) from Alabama, U.S.A. and termed by him as subterminal (IIL), terminal (IIIL) and basal (IIIR) seem to be coextensive with the species (see the geographic distribution of inversions arranged by Shirai and Moriwaki, 1952; Singh, 1970). These three widely distributed and frequently reported inversions have been called 'cosmopolitan' by Futch (1966).

It has been found in many species of Drosophila that heterotic buffering is associated with chromosomal polymorphism. In D. ananassae heterosis has been found to be associated with subterminal and terminal inversions when heterozygous (Moriwaki et al, 1956; Moriwaki and Tobari, 1963; Tobari, 1964; Singh, 1972, 1973; Singh and Ray-Chaudhuri, 1972). The literature, however, lacks information regarding basal inversion. In the present investigation, a wild laboratory stock of D. ananassae containing this inversion in IIIR and the standard gene sequence in the other chromosomes, has been utilized. This stock was raised from a female captured in Lowari, Chakia forest area, Varanasi, in November 1968. In order to determine the frequencies of different genotypes (karyotypes), the larvae were squashed with the usual acetocarmine method.

All the three karyotypes for the basal inversion were distinguished. Their frequencies are shown below:

	Standard Homozygote	Heterozygote	Inversion Homozygote
Observed	54	119	38
Expected	61.53	104.82	44.65

$\chi^2 = 3.82$
$P > 0.05$

In a random sample of 211 larvae, 119 (56.4%) are heterozygous for the inversion. Thus the frequency of heterozygotes is more than 50 per cent. This suggests that the inversion heterozygote is adaptively superior to the corresponding homozygotes. The expected values of the three genotypes have been calculated on the basis of Hardy-Weinberg frequencies. The χ^2 test shows that the differences are statistically insignificant ($P > 0.05$).

Thus it can be suggested that heterotic buffering is associated with basal inversion as is the case with subterminal and terminal inversions. Now it is known that all the three inversions in D. ananassae which are coextensive with the species, exhibit heterosis in heterozygous condition. So it is proposed that this may be one of the factors which enabled these inversions to spread almost throughout the distribution range of the species.

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The results showed the inability of the two oral contraceptives to induce any mutations in Drosophila melanogaster.

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