The scutum-scutellum separation occurs quite late in larval development (Garcia-Bellido 1975) and indeed, of 43 scutellar clones, 15 included only one bristle, 14 included both bristles and another 14 extended into the scutum.

There is no distinct pattern of spot distribution within the head and thorax (besides contingency); spots partially overlap in all possible directions, thus confirming the absence of cellular determination within the disc until late in development (Sturtevant 1929). However, a nonrandom rate of cell division at the late larval development is indicated by the distribution of single bristle spots: Of the 131 single bristle spots, 37 affected the anterior and posterior verticals on the head, 11 the posterior humerals, 13 the anterior notopleurals and 15 the posterior dorso-centrals. The same bristles were also frequently involved in larger spots (though they were not the most frequently involved ones in these spots). The remaining 17 bristles were affected 55 times in single bristle spots. This would indicate a higher rate of cell division at the posterior zones of all three imaginal discs as well as at the antero-lateral zone of the mesothorax at late larval development.

In summary, the loss of a small free chromosome fragment, carrying genes of interest, could become a useful tool in developmental genetics of Drosophila. The random loss of such a fragment throughout development may prove useful for the study of the kinetics of determination and of cell multiplication.

Work supported by NIH grants GM 18678 to E. Novitski and GM 24182 to J.H. Postlethwait.

References: Garcia-Bellido, A. 1975, Ciba Found. Symp. 29:161-182; Novitski, E. and J. Puro 1978, DIS 53:205; Sturtevant, A.H. 1929, Z. wiss. Zool. 135:323-356.

Fogleman, J. and W. Heed. University of Arizona, Tucson, Arizona. A comparison of the yeast flora in the larval substrates of D. nigrospiracula and D. mettleri.

Two cactiphilic Drosophila of the Sonoran Desert, nigrospiracula and mettleri, exhibit a larval niche separation (Heed 1977). D. nigrospiracula breeds mainly in the necrotic tissue of cardon (Pachycereus pringlei) on the Baja peninsula and saguaro (Carnegiea gigantea) on mainland Mexico. D. mettleri breeds in the soil saturated with the fermenting juices of these cacti. The niche separation certainly acts to eliminate interspecific larval competition. The mechanism through which the niche separation is maintained has yet to be fully elucidated, but laboratory experiments have shown that nigrospiracula larvae are more adapted to relatively "fresh" cactus substrates (Mangan 1978). Previous studies (Heed et al. 1976; Starmer et al. 1976) have analyzed the yeast flora associated with cactiphilic Drosophila and their host plants. They reported little overall difference between saguaro and soaked soils with one yeast, Pichia membranaefaciens, being predominant in both. They speculated that competition for this yeast could be one of the factors that led to the spatial isolation of the larvae. Since then, it has been shown that their isolates designated P. membranaefasciens were really several new species of yeast distinct from

Table 1. Comparison of Larval Substrates

Parameter	Cactus Rots	Soaked Soils	Significant Difference?
Log Average Concentration*			
Pichia opuntiae (var. thermotolerans)	7.860	7.920	no
Pichia cactophila	7.282	7.669	no
Pichia heedii	7.099	7.528	no
Pichia amethionina (var. pachycereana)	6.797	6.744	no
Candida sonorensis	3.163	7.406	P<0.1
Cryptococcus cereanus	2.219	6.053	--
Candida ingens	4.902	5.423	--
Candida species "K"	--	6.125	--
Pichia species "M"	--	5.247	--
Avg. Freq. of Isolation	0.65	0.60	no
Log Avg. Concentration (All Yeasts)	7.198	7.341	no
Shannon-Weaver Diversity Index (H´)	0.433	0.630	--
(previous estimate)	(0.590)	(0.568)	--
Evenness (J´)	0.512	0.660	--
Avg. Number of Yeast Species Per Sample ± SE	4.57±0.48	5.43±0.57	no
(previous measurement)	(1.88±0.33)	(2.00±0.38)	no
Average % (Wt./Wt.) Moisture ± SE	82.3±1.3	13.5±1.0	P<<0.001

*Average of seven samples collected over a 10-month period.

P. membranaefaciens (Starmer et al. 1980). In addition, new techniques have been developed which provide for the quantification of the yeast flora through the use of selective media (Starmer et al. 1980). This report is a reinvestigation of the larval substrates in the light of this new information.

Seven samples of each substrate, saguaro rots and soaked soils, were collected over a 10-month period starting in January 1979. The results are shown in Table 1. Yeast concentrations are expressed as the log of the average number of cells per milliliter of available water. That is, an adjustment was made to compensate for the differences between substrates in percent moisture content. Statistical comparisons between substrates represent t-tests of arc sin $\sqrt{\text{relative percent}}$ transformed data.

The bottom four species in Table 1 were not used in the comparison of substrates since they represent less than 1% of the total yeasts and were infrequently encountered. The concentration of only one, C. sonorensis, of the remaining five species was significantly different between substrates. The high concentration of this species in soils, however, is due to one collection in which it occurred with abnormally high frequency. There are noticeable increases in the diversity index for soils and in the average number of yeasts per sample for both substrates over previous reports of these parameters. These increases are most likely due to the split of P. membranaefaciens into the four new species: P. opuntiae, P. cactophila, P. heedii, and P. amethionina. It is evident from the data that no major differences exist between the substrates with respect to yeast species. Seasonal variation in yeast flora may, however, have masked significant differences between substrates. Seasonal variation in yeast flora has been shown to exist in Opuntia rots of the Australian desert (H. J. Phaff, pers. communication).

The techniques employed in this study provide a more accurate characterization of the yeast flora than previously possible. This is especially true with respect to yeasts that occur in low concentrations. The conclusions remain essentially unchanged: there are several predominant yeasts which could be considered common resources and the basis of competition if the larvae of the two species were to live together and feed exploitatively. The only physical parameter measured for which major and consistent differences exist between substrates is percent moisture content (Table 1). It is possible that females of the two Drosophila species use this as a cue for oviposition site separation.

This work was supported by an NIH postdoctoral fellowship (GM06807) awarded to J.F.

References: Heed, W.B., W.T. Starmer, M. Miranda, M.W. Miller and H.J. Phaff 1976, Ecology 57:151-160; Heed, W.B. 1977, Proc. Entomol. Soc. Wash. 79:649-654; Mangan, R. 1978, Ph.D. Dissertation, Univ. of Arizona; Starmer, W.T., W.B. Heed, M. Miranda, M.W. Miller and H.J. Phaff 1976, Microbial Ecology 3:11-30; Starmer, W.T., H.J. Phaff, W.B. Heed, M. Miranda and M.W. Miller 1980, Am. Nat. (submitted).

Fujikawa, K. Hiroshima University, Hiroshima, Japan. Pilot experiments involving visible mutations induced in immature Drosophila oocytes by γ-rays at low dose rate.

In an attempt to obtain more information on factors which alter the incidence of genetic radiation damages induced in meiotic germ cells corresponding to prophase I, the dose-rate effect of γ-rays on the frequency of visible mutations induced in immature Drosophila oocytes was investigated in the experiments described herein.

Females of D. melanogaster carrying X-chromosomes marked with sc^{S1} B InS sc^{8} were collected within 4 h of eclosion and then irradiated with 3000 rad of ^{60}Co γ-rays either at 3000 rad/min or at 30 rad/min. The irradiated females were aged for 24 h and mass mated with y w m f/B^{s} Y sc^{8}; dp males (40 females to 120 males per culture bottle). Six successive daily brood changes were made. All the F_1 progeny were examined for dumpy mutations, and the recovered mutants were classified according to their phenotypes (olv, ov, ol, lv, o, v and cm; see Carlson and Oster 1962). The yellow and Minute exceptions were scored in the F_1 female count. Although these three kinds of exceptions are detectable as either whole-body or mosaically expressed changes, the mosaic-individuals for any of them were seldom recovered in the present experiments. Therefore, data pertaining to mosaic-types are not discussed in this report.

The results obtained are summarized in Table 1. Since the number of any kind of exceptions isolated in each brood was not large, the mutation frequencies in this table are given as average of those obtained in six broods. As shown in Table 1, the frequencies of yellow and Minute