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γ-irradiation-induced mutations at specific loci in post-meiotic germ cells of D. melanogaster.

Virgin males 3-4 days old from a mass-bred wild-type stock, "D-32", were γ-rayed (4000r) and mated immediately to females bearing certain markers in the sex ($Ins(1)sc^{S1}$,dl-49,y sc^{S1}/w^a) and the second (b cn vg) chromosomes. The first mating lasted for two days after irradiation in order to collect all (mature and immature) sperm (first brood). The second mating was carried out during the following three days in order to collect spermatids (second brood). Males were placed individually with harems of five virgin females on each mating day. All F_1 females were examined for the presence of visible mutants at the y, w, b, cn and vg loci and F_1 males only at the b, cn, vg loci. Altogether, 1520 males were irradiated and 67,030 F_1 females and males were examined among which 131 mutants were found.

All visibly mutant females and males were classified as sterile or fertile. If fertile, the mutants were further classified as viable or lethal. True nature of the latter was studied. Point mutations have been separated from chromosome rearrangements according to the viability and fertility of the mutants which were kept in stocks. This classification will be checked by cytological and genetical analysis now in progress.

For the first brood the overall mutation frequencies (including cases of inviable or sterile and lethal mutants) of the y, w, b, cn and vg loci were 0.27; 1.93; 0.20; 0.99 and 2.64 x 10^{-7}/r, respectively. For the second brood corresponding frequencies were 0.58; 1.44; 0.14; 1.03; 2.22 x 10^{-7}/r. Point mutation frequencies in the first brood for those loci were 0.18; 0.27; 0.04; 0.29 and 0.29 x 10^{-7}/r respectively and 0.14; 0.59 and 0.59 x 10^{-7}/r for loci b, cn and vg in the second brood. Average point mutation frequencies for all post-meiotic stages germ cells in studied loci were 0.14; 0.21; 0.07; 0.37 and 0.37 x 10^{-7}/r, respectively.

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The action of methylurea on forked (f) bristles and other bristle mutants.

It was discovered several years ago in our laboratory that methylurea not only increases the number of facets in the Bar (B) eye but also modified forked (f) bristles, changing them to wild-type like bristles. More recent investigation has shown that spineless bristle mutant (ss) likewise is modified by methylurea.

A 0.35% by weight of methylurea added to Pearl's formula constituted the experimental media. Forked Bar (f B) stock raised on this media produced large eyes (approximately 450 facets in males, control 110±3.2 facets) and wild-type bristles. The action of methylurea on forked and Bar appear to be independent of one another, i.e., forked is modified independently of Bar, see table 1. The major bristles affected include the scutellars, postalars, dorso-centrals and the major head bristles. The spineless (ss) bristles increase to double their normal length, but never approach the length of the wild-type bristles. Other bristle mutants tested, forked f^{36a}, singed (sn^3), Stubble (Sb), Prickly (Pr) and Minute-n (M(1)n) show no effect. Also combination of these mutant genes were studied. Forked-spineless (f, ss) and forked-Minute-n (f, M(1)n) were modified to wild-type like bristles, approximately double the normal mutant length.

Other ureids were tested; 2% urea, 0.25% allylurea, 0.5% acetylurea, 0.25% biuret, 0.25% ethylurea, 2% birurea. Ethylurea, acetylurea, and urea showed similar effect as methylurea but to a lesser degree.

Table 1

Effect of 0.35% methylurea on combination of forked bristle and Bar eye ♂♂ at 25° C.

	f B	f $+^B$	$+^f$ B	f^{36a}B	$f^{36a}+$
Effect on bristle	+	+	-	-	-
Effect on eye	+	-	+	+	-