Green, M.M. & *G.L.G. Miklos. University of California, Davis and *Australian National University, Canberra. The generation of deleted X chromosomes using the male recombination (MR) system.

"Male Recombination" (MR) second chromosomes produce distinct genetically measurable effects, which include not only the induction at high frequency of mutations at specific loci, but also the generation of chromosomal rearrangements. The factor(s) located on an MR chromosome can have a number of mechanisms of action upon the genome. One appears to be the redeployment of nomadic elements within the genomic landscape, another could involve exchange events betweeen sedentary, more conventional DNA sequences which lead to the excision of variable amounts of DNA under the influence of existing transposon families.

In a cross of the type [MR/+; +/Y♂ x C(1)DX ywf/$Y_{♀♀}$] the majority of the internal genic sequences of the paternal X chromosome can be deleted, with the genesis of a mini X chromosome. These deletions are detected as y^+ females of the constitution y^+ mini X/ C(1)DX, $ywf_{♀♀}$. 25 such minis were detected amongst 107, 310 progeny, and each carried variable amounts of the euchromatic sequences from both the tip as well as from the base of the X chromosome. Partial genetic analyses of 11 minis revealed the extent of the X base and the X tip which these deleted X's still carried (Table 1).

Table 1. Genetic content of mini X chromosomes.

Genes	y	su(s)	su(w^a)	...	Bx	car	mal	su(f)	No/Class
CLASS I	+	+	+		-	-	+	+	3
II	+	+	-		-	-	+	+	1
III	+	-	-		-	-	+	+	1
IV	+	+	+		-	-	-	+	5
V	+	+	+		+	+	+	+	1
BAND LOCATION	1B1.		1E1.			19D2.		20D/F. (het/eu junction)	

Thus far, two of the minis of class 4 have been subjected to a more refined X base breakpoint analysis (Table 2). We have been able to delineate the proximal breakpoint of these minis because the base of the X has been near saturated in the mutagenic analyses of Schalet, Lefevre and others. Thus we have at our disposal contiguous complementation groups spanning nearly two divisions, a situation which occurs nowhere else in the entire genome. It can be seen that minis y^+-2 and y^+-77h both break between lethal complementation groups B96 and B214, which demarcate bands 19F1 from 19F2. An independently derived X-ray induced translocation from John Merriam, [T(X;Y)y^+ B^S, B101] also has its breakpoint between B96 and B214, as do a number of the deficiencies described by Schalet and Lefevre (1976).

Table 2. Viability of mini X's with lethals at the base of the X chromosome. The lethals and their cytological locations are as shown (+ = viable, - = lethal).

Lethals:	EC242	B96	B214	A7
Mini y^+-2	-	-	+	+
Mini y^+-77H	-	-	+	+
Band:	19E3	19F1	19F2	20A1.2

It appears that the 19F1/19F2 interval warrants closer scrutiny to determine if it is a hot spot upon which MR activity is brought to bear. It is not without relevance that division 19 has been found to be a hot spot by Berg et al. (1980) and Engels & Preston (1981). The results of Bingham et al. (1982) indicate that the P element, which belongs to a P strain specific nomadic family, transposes to new sites, and that these sites can correspond at the cytological limits to those prone to breakage.

The mechanism of action of MR induced deletions, however, is unknown. It remains to be determined whether (a) such minis carry a P factor at the site of breakage or whether they are P free; and (b) whether the presence of MR simply provides an enzymological basis for insertion/excision events occurring in the genome.

Finally, the use of a near saturated genomic region such as divisions 19 and 20 allows breakpoint mapping to a degree not approachable by in situ hybridisation. The existence of a cloned probe near to the 19F1/19F2 region (Miklos unpub.) means that it should now be possible to determine the molecular characteristics of the genomic landscape for which a P element has such obvious affinity.

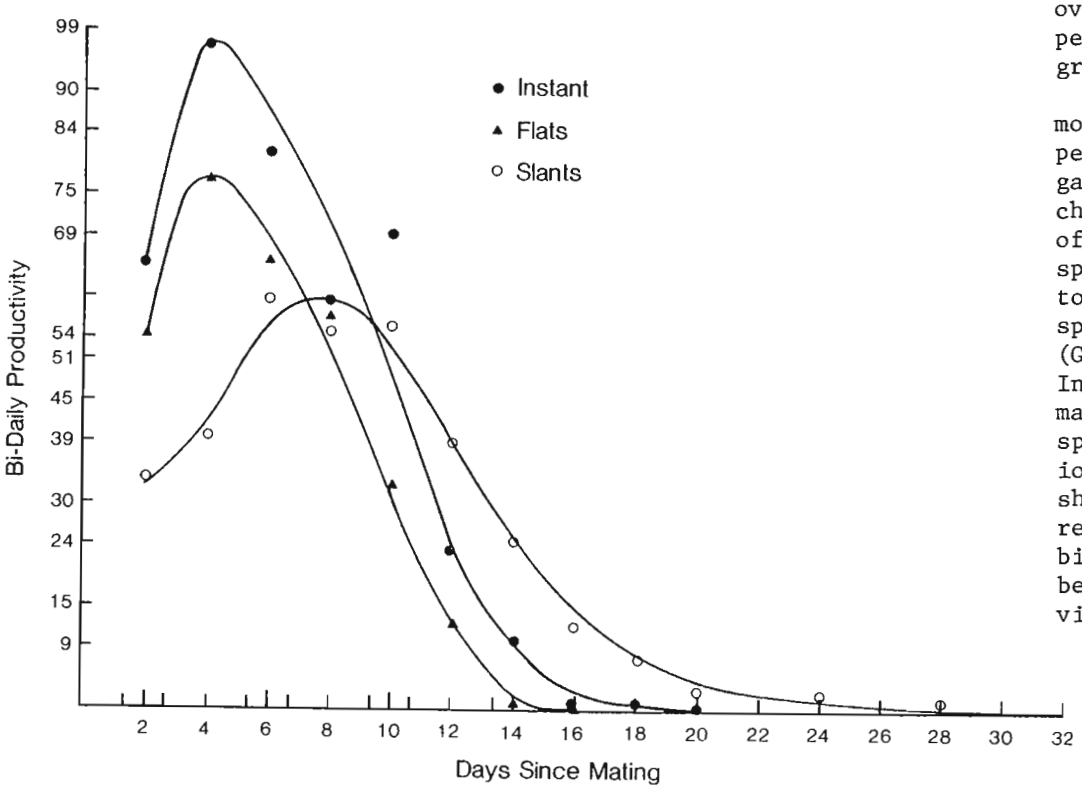
References: Berg, Engels & Kreber 1980, Science 210:427-429; Bingham, Kidwell & Rubin 1982, Cell 29:995-1004; Engels & Preston 1981, Cell 26:421-428; Schalet & Lefevre 1976, Genetics and Biology of Drosophila 1b: Ch.21:847-902.

Gromko, M.H. & M. Jensen. Bowling Green State University, Ohio. The effects of culture medium on productivity.

Many experiments on sperm competition make use of successive broods of individual females. Curves of "progeny produced" vs. "time since mating" found in such experiments have a characteristic shape (Pyle & Gromko 1978; Gilbert et al. 1981). Daily productivity rises rapidly to a peak at about 3 to 8 days from mating; thereafter productivities decline, gradually approaching zero. Here we note that some of the characteristics of productivity curves can be manipulated by changing the culture medium. The results of sperm competition studies are expected to vary as a consequence of variation in the shape of the productivity curve.

Virgin female and male D. melanogaster were collected from a wild type strain previously described (Pyle & Gromko 1978). Three to five day old flies were pair-mated in 8 dram food vials, with males removed within 30 min of the completion of copulation. There were three experimental groups with 24 mated females per group. Group A females were kept on cornmeal-molasses-agar food poured on a slant. Group B females were kept on cornmeal-molasses-agar poured flat. Group C females were kept on instant food (Carolina Biological Supply, Formula 4-24®) poured flat. All three groups had a few grains of live yeast and a small square of Kim wipes added to the food. Females in all groups were transferred to new vials every other day for 20 days and then every 4 days for 16 more days. All progeny were counted and recorded.

Analysis of variance reveals significant difference among the groups in total progeny produced ($p<.005$). Duncan's multiple range test shows that total productivity on instant food (406.46±S.E.23.53) is significantly higher than productivity on slants (340.53±21.60) and flats (301.96±20.51), which are not significantly different from each other. Furthermore, differences in the shape of the productivity curves are apparent (Fig. 1). Group B (cornmeal food poured flat) and C (instant) show the same shape: peak productivity was at a high level and was reached at the second transfer. Productivity dropped off rapidly from that point, declining to zero by the eighth transfer. In contrast, peak productivity in group A (slants) was at a lower level but maintained that level for several transfers. Progeny were produced over a much longer period of time in group A.



At least one model of sperm competition in D. melanogaster predicts that changes in patterns of productivity and sperm use will lead to differences in sperm competition (Gromko in prep.). In particular, females which store sperm for longer periods (as in group A) should be slower to remate and might exhibit higher P_2 values because of decreased viability of stored