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The displacement of first-mating by second-mating sperm in the storage organs of the female.

The sperm storage organs of *D. melanogaster* females are non-elastic and non-contractible, providing room for only one-fifth of the volume of sperm initially deposited in the uterus by the male. Lefevre and Jonsson (1962) showed that one mating normally fills these organs to capacity, leaving no space for the storage of sperm

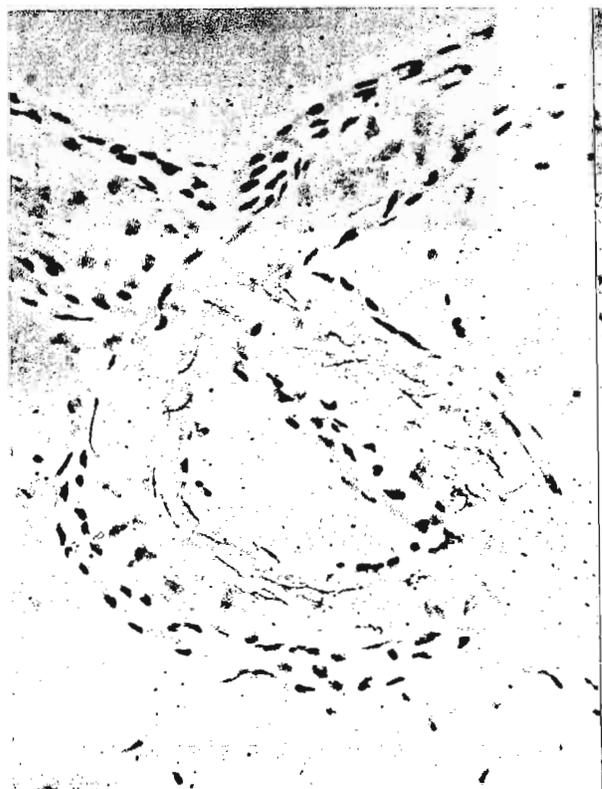
from a second mating. Although the fecundity of twice-mated females did not significantly exceed that of once-mated females, the majority of their progeny derived from sperm of the second mating.

By means of females mated first to one-day old untreated Canton-S males and secondly to Canton males whose sperm had been labeled with tritiated deoxycytidine we were able to observe directly the displacement of the unlabeled by the labeled sperm in the spermathecae and ventral receptacles of the females. The sperm were labeled by placing 16-hour old larvae upon food containing a total activity of 200  $\mu$ c from the presence of tritiated deoxycytidine. The sperm utilized by these males for their first matings contained about 90% labeled sperm bundles.

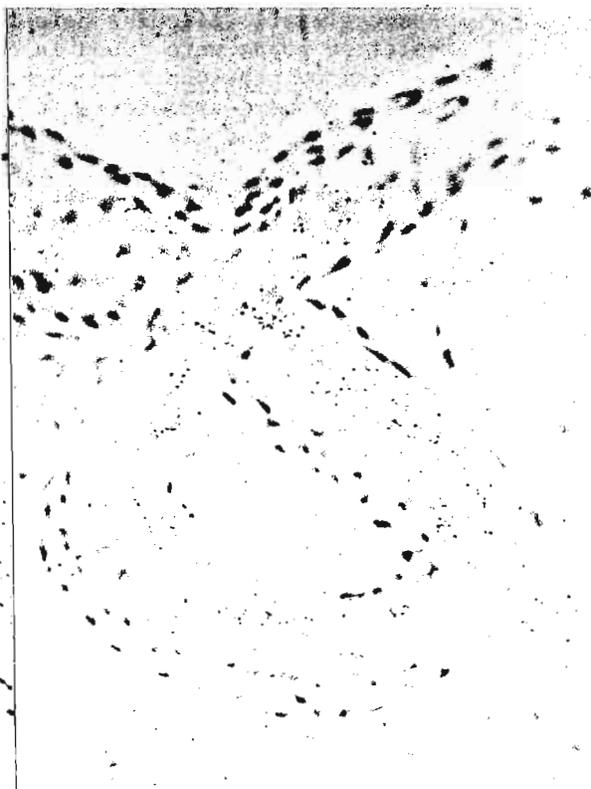
Virgin females, 24-hours old, were mated with 24-hours old non-labeled virgin males, the time of mating was observed and immediately thereafter, without etherization, the female was removed to another vial and presented with a virgin labeled male. The interval between the first and second mating was noted. After observing the second mating the females were taken and squash preparations were prepared of the spermathecae and ventral receptacles. Radioautographs were prepared from these squashes from which the presence of labeled and non-labeled sperm could be noted.

Precise timing of first and second matings was obtained in three cases of a total of 30 females with which the study was started. In all those cases more than half of the sperm of the spermathecae and ventral receptacles appeared to be from the second mating. The shortest interval between the second mating and fixation of the female reproductive tract was 20 minutes. It, therefore, may be concluded that within 20 minutes sperm from the second mating can replace first-mating sperm in both these storage organs.

The accompanying figure shows the ventral receptacle of the female killed 20 minutes after the second mating.



**a**



**b**

Legend:

Ventral receptacle from female insemated first with unlabeled and secondly with labeled sperm (a, tissue level; b, level of photographic film).