

SHORT REPORTS

Artificially Induced Crossing Over in the Male of *Drosophila ananassae*

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During the past few years, occurrences of crossing over in the male *Drosophila* have been established by a number of investigators. FRIESEN¹⁾, PATTERSON and SUCHE²⁾, SHULL and WHITTINGHILL³⁾, and PLOUGH⁴⁾ have reported cases of *Drosophila melanogaster*, in every one of which the crossing over was induced either by X-rays or by heat, excepting one of cases in PATTERSON and SUCHE's experiments in which it occurred under ordinary culture. In *Drosophila virilis*, KIKKAWA⁵⁾ substantiated the male crossing over in the normal state; while in the series that they treated, FUJII⁶⁾ and MORIWAKI⁷⁾ obtained some additional cases. I obtained the same result also in *Drosophila ananassae*, an account of which is given in this paper.

I desire to express my cordial thanks to Professor Y. IMAI for his guidance in the course of my investigations.

Three genes located in the second chromosome — cardinal (*cd*, recessive, eye-colour), spineless (*ss*, recessive, short bristles), and Plexate (*Pt*, dominant, extra veins) — were selected for this experiment. Their tentative loci were previously examined by counting 2425 flies, with the result, 0.0 *cd*, 28.3 *Pt*, and 29.0 *ss*. The heterozygous males of constitution $\frac{cd\ ss}{Pt}$ were crossed with double recessive females (*cd ss*). In one of the treated series, males in the young pupal stage were exposed to the high temperature of 32°–36°C for about 40 hours; in the other, to pupae of the same age were applied X-rays of 50 KV, 4 ma, 25 cm for 25 minutes. The result is shown in the table.

As to the table, 20 flies carrying *cd Pt* and 15 *ss*-flies may be regarded as having resulted from male crossing over induced by X-rays. These flies were almost fertile, the respective progenies having turned out in the ex-

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- 1) Science, 78:513-514, 1933. Biol. Zentr., 54:65-75, 1934. 2) Genetics, 19:223-236, 1934.
3) Science, 80:103-104, 1934. 4) DIS (Drosophila Information Service), 3:50, 1935. 5) Proc. Imp. Acad. Tokyo, 9:535-536, 1933. Cytologia, 6:190-194, 1935. 6) Unpublished; V. KIKKAWA, 1935. 7) Proc. Imp. Acad. Tokyo, 11:242-243, 1935.

Experiment	Total	0 (0.0)		1 (28.3)			2 (0.7)		1,2			
		<i>cd ss</i>	<i>Pt</i>	<i>cd</i>	<i>Pt</i>	<i>ss</i>	<i>cd</i>	<i>Pt ss</i>	<i>cd</i>	<i>Pt</i>	<i>ss</i>	+
Control	3560 { Females	899	851	0	0		0	0	0			(15)
	Males	951	832	0	0		0	0	0			(12)
Heat	1782 { Females	460	440	0	0		0	0	0			0
	Males	460	422	0	0		0	0	0			0
X-rays	8325 { Females	2125	2126	8	10		0	0	0			(20)
	Males	1988	2011	12	5		0	0	0			(20)

pected ratio. The fact that no exceptions appeared in the second region at a relatively short distance, also suggests the crossover origin of the variants. Besides these, we obtained rather a large number of phenotypically normal flies not only in the X-ray series, but also in the control. They, however, could not be regarded as double crossovers, seeing that the frequency of their appearance was too high. It is more reasonable to suppose that there was a reversion of *Pt* to + as the result of gene mutation. Full results will be published in due course, the matter being still under experiment. The frequency of exceptional crossing over can therefore be said to be about 0.42 per cent in the X-ray series, 35 exceptionals appearing in 8325, while in the untreated series no crossover appeared in 3560 offspring. In the heat series also, from 1782 nothing appeared, probably because of the small number involved.

That crossing over never occurs in male *Drosophila* has long been believed, but recently, in the male of *D. melanogaster* and *D. virilis*, it was artificially caused rarely by X-rays and by means of heat, and even in the untreated culture, though still more rarely. This fact, according to the aforesaid experiments, can therefore be applied to *Drosophila ananassae*.