Pulvermacher, C. and W. Köhler. Institut für Genetik der Freien Universität Berlin, Germany. Frequency of successful matings.

In order to find out the intervals between copulations of female D. mel., the following mating scheme was used: For each cross, a male and a female were paired for a certain period of time. The whole experiment was divided into three main systems, in which the females were allowed to pair for one, two and three days successively. Each female was then transferred into a new vial and allowed to pair with the respective male as described in the scheme. This was repeated five times for every system. The flies used in this experiment were separated at eclosion and stored for 3-4 days to attain the maximum reproductive stage. The F_1 phenotype of females indicates which males had successfully copulated.

	p generation ♀	x	♂	F_1 phenotype ♀♀
1)	w/w	x	+/Y	+
2)	w/w	x	w/Y	w
3)	w/w	x	B/Y	B
4)	w/w	x	Sb/Me	Sb or Me
5)	w/w	x	Ly/D	Ly or D

(The arrows indicate the transfer of the same female.)

The tables show that at least 15% of the females copulated again after 24-48 h, 37% after 48-72 h and 50% after 72-96h. Moreover, with the increasing time intervals, there is a rise of multiple fecundations.

The simultaneous appearance of the different phenotypes indicates that the sequence of the copulations had no influence upon the sequence of fertilization of the eggs.

In contrast to Manning (1), in our mating scheme (one to one crosses) rapid remating is quite common and obviously not necessarily due to rape. According to Nonidez (see Miller, in Demerec (2)) sperm stored in the seminal receptacle are probably used first, those from the spermathacae later. In case one successful copulation is sufficient to fill up at least the seminal receptacle, our results show that this sequence may be doubted. But if the seminal receptacle is not filled at one copulation or if the reserved sperm is reduced by a certain percentage, then the multiple fertilizations can lead to surmise such that the sperm disperse at random among the seminal receptacle and the spermathecae.

Table 1. (see next page).

Table 2. Total of successful multiple copulations

	cross no.	N	1x	2x	3x	4x	5x
	1	66	100.0	x	x	x	x
	2	73	84.9	15.1	x	x	x
I	3	38	92.1	7.9	0.0	x	x
	4+	13	100.0	0.0	0.0	0.0	x
	5	40	75.0	22.5	2.5	0.0	0.0
	1	78	100.0	x	x	x	x
	2	51	62.7	37.2	x	x	x
II	3	70	47.0	49.9	2.8	x	x
	4	69	69.4	24.9	5.7	0.0	x
	5	57	22.8	54.3	15.8	5.2	1.8
	1	55	100.0	x	x	x	x
	2	42	50.0	50.0	x	x	x
III	3	45	26.6	55.5	17.8	x	x
	4	40	45.0	37.5	10.0	7.5	x
	5	37	37.8	40.5	21.6	0.0	0.0

N number of fertile cultures
I, II, III mating systems with one, two and three day intervals
+ N too small

References: (1) Manning, A. 1962 Nature 194:252-253; (2) Demerec, M. (ed.) 1950 The Biology of Drosophila (Wiley, New York).

Table 1. Frequency of successful matings

			F_1 ♀♀ from cross					F_1 ♀♀ from crosses									
	cross nr.	N	1	2	3	4	5	1&2	1&3	1&4	1&5	2&3	2&4	2&5	3&4	3&5	4&5
	1	66	100.0	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	2	73	84.9	0.0	x	x	x	15.1	x	x	x	x	x	x	x	x	x
I	3	38	81.6	2.6	7.9	x	x	5.3	2.6	x	x	0.0	x	x	x	x	x
	4	13	69.7	0.0	23.0	7.8	x	0.0	0.0	0.0	x	0.0	0.0	x	0.0	x	x
	5	40	30.0	2.5	15.0	5.0	22.5	0.0	10.0	0.0	10.0	0.0	0.0	0.0	0.0	2.5	0.0
	1	78	100.0	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	2	51	23.5	39.2	x	x	x	37.2	x	x	x	x	x	x	x	x	x
II	3	70	1.4	37.1	8.5	x	x	20.0	15.7	x	x	14.2	x	x	x	x	x
	4	69	0.0	24.6	31.8	13.0	x	2.9	2.9	0.0	x	2.9	10.1	x	5.7	x	x
	5	57	0.0	8.8	0.0	10.5	3.5	1.8	0.0	0.0	0.0	8.8	15.8	17.5	3.5	3.5	3.5
	1	55	100.0	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	2	42	40.5	9.5	x	x	x	50.0	x	x	x	x	x	x	x	x	x
III	3	45	2.2	2.2	22.2	x	x	4.4	26.7	x	x	24.4	x	x	x	x	x
	4	40	0.0	0.0	42.5	2.5	x	0.0	5.0	0.0	x	27.5	0.0	x	5.0	x	x
	5	37	0.0	0.0	24.3	10.8	2.7	0.0	2.7	0.0	2.7	8.1	0.0	0.0	0.0	18.9	8.1

N number of fertile cultures
I, II, III mating systems with one, two and three day intervals