Table 3 (contin.): [Kidwell]

Strain	Location	% GD sterility A		% GD sterility A*		P-M designation	% SF sterility A		% SF sterility A*		I-R designation
Akita	Japan	0	(26)	0	(17)	Q	59	(112)	7	(103)	I
Best's	Australia	5	(20)	58	(26)	M	64	(452)	4	(391)	I
Bridgewater	Australia	0	(26)	0	(26)	Q	62	(127)	5	(62)	I
Ettiwada	Australia	0	(26)	3	(16)	Q	52	(279)	2	(232)	I
Fairfield	Australia	0	(26)	77	(26)	M	61	(110)	4	(81)	I
Katsunuma 80	Japan	0	(26)	4	(26)	Q	25	(80)	5	(56)	I
Lake Boga	Australia	2	(52)	13	(45)	M	67	(255)	1	(112)	I
Mildura	Australia	0	(26)	0	(25)	Q	71	(113)	0	(8)	I
Mourguong	Australia	0	(26)	4	(25)	Q	66	(443)	12	(372)	I
Sarina	Australia	0	(26)	0	(26)	Q	57	(127)	5	(20)	I
Shimane	Japan	0	(21)	0	(20)	Q	73	(138)	1	(109)	I
Tottori	Japan	0	(26)	0	(24)	Q	60	(424)	1	(146)	I
Niigata	Japan	8	(52)	22	(46)	M	96	(274)	12	(196)	I
Ishikawa 2	Japan	5	(42)	4	(48)	Q	22	(195)	7	(398)	I
Aomori	Japan	35	(20)	0	(21)	P	58	(224)	2	(128)	I

* Figures in parentheses are the number of F_1 females tested.
† Figures in parentheses are the number of eggs observed for hatchability.

Koene, P. & R. Bijlsma. University of Groningen, The Netherlands. Differences in mating success between G6pd and Pgd genotypes of Drosophila melanogaster.

Since some time it has become clear that the adult component of selection, besides viability selection, may be an important component of the total selection in D. melanogaster (Prout 1971a, b; Bundgaard & Christiansen 1972). Especially factors concerning the mating process may be of significance for the maintenance of polymorphisms in nature. Differences in mating preference and mating success have been demonstrated for a number of genetic factors in Drosophila (for a review see Petit & Ehrman 1974). Here we want to report differences in mating success in a female-choice experiment with respect to the allozyme variation at the loci G6pd (glucose-6-phosphate dehydrogenase) and Pgd (6-phosphogluconate dehydrogenase). Both loci are located on the X-chromosome in D. melanogaster and both are found to be polymorphic in natural populations with, electrophoretically, a fast (F) and a slow (S) allele. There are thus four possible homozygous (males are hemizygous) genotypes: FF, FS, SF and SS. These genotypes are denoted by two letters: the first stands for G6pd and the second for Pgd. The flies used for the experiment were isolated from the Bogota population as described by Bijlsma (1980) and maintained as mixed populations at 25°C on standard food.

The test was started by bringing together in a vial, without etherization, 1 virgin female and 4 males: one of each hemizygous genotype. During 30 minutes after entry the flies were observed. When a mating occurred the genotype of the male was determined and the time

Table 1. Number of matings between different genotypes for G6pd and Pgd together with the number of females that did not mate within 30 minutes.

Female Genotype	Male genotype FF	FS	SF	SS	total	not mated
FF	20	24	24	11	79	41
FS	16	18	30	11	75	45
SF	20	35	24	19	98	22
SS	33	22	29	28	112	8
Total	89	99	107	69		

Table 2. The mean mating latency time (MLT) of different female and male genotypes together with the number of matings observed.*

Females Geno-type	MLT in min.	No. of matings	Males Geno-type	MLT in min.	No. of matings
SS	8.99	112	SS	10.49	69
SF	11.38	98	FF	10.72	89
FF	12.17	79	FS	12.02	99
FS	14.35	75	SF	12.08	107

*data arranged according to increasing MLT.

interval between entry and mating, (mating latency time, MLT), was noted. A total of 120 females of each homozygous genotype were tested this way. In order to be able to distinguish between the male genotypes the males were marked with fluorescent microdust (Crumpacker 1974) in different colors, two days prior to the test. A pilot experiment showed no significant differences in mating success between males stained with the different colours.

Table 1 shows the total number of matings observed. First of all a contingency χ^2 for all matings turned out to be not significant ($\chi^2_9 = 15.78$; $0.10 < P < 0.05$). Therefore female and male totals can be treated separately. The females show significant differences between the different genotypes in the number of matings performed within 30 minutes: the contingency χ^2 for mated versus not mated is highly significant ($\chi^2_3 = 40.47$; $P < 10^{-8}$). SS females are highly receptive and over 90% of the females mated during the observation time, while only 63% of the FS females mated. This difference in receptivity is also reflected by a negative correlation between the number of matings and the mean MLT (Table 2). The more reluctant the female the higher the MLT and the lower the number of matings within a limited time period.

Males show a significant departure from random mating ($\chi^2_3 = 8.88$; $P < 0.05$). The SS males are less successful having the lowest number of matings while the SF genotype is the most successful. The differences in number of matings is positively correlated with the MLT. This indicates that the SS males only successfully mate with the most receptive females, which mate fast, while the SF males are more persistent and also have a high number of matings with the more reluctant females. As a consequence the MLT is increased in the latter case. Evaluation of these data in the light of the model about mating success envolved by Kence & Bryant (1978) leads to the conclusion that the SS genotype has a significantly lower sexual vigor (females are less reluctant and males less successful) than the other genotypes. This indicates that differences in mating success between the different genotypes for G6pd and Pgd may influence the allele frequencies at these loci and may contribute to the maintenance of the polymorphism at these loci in nature. It is, however, still possible that the differences in mating success are due to closely linked genes and not to the enzyme loci themselves.

References: Bijlsma, R. 1980 Biochem.Genet. 18:699-715; Bundgaard, J. & F.B. Christiansen 1972, Genetics 71:439-460; Kence, A & E.H. Bryant 1978, Amer.Natur. 112:1047-1062; Petit, C. & L. Ehrman 1969, Evol. Biol. 3:177-233; Prout, T. 1971a, Genetics 68:127-149; Prout, T. 1971b, Genetics 68:151-167.

Korochkin, L.I. Institute of Developmental Biology, Moscow, USSR. The hypothesis about the role of heterochromatin in the evolution of Drosophila of the virilis group.

1. It is known, that the species of Drosophila of the virilis group are differed by heterochromatin and satellite DNA amount (Cohen & Bowman 1979).

2. Phylads of Drosophila of the virilis group are characterized by the specific pattern of proteins and isozymes and specific regularities of the formation of biochemical phenotype during development (Korochkin 1982).

3. It is supposed, that these differences in the satellite DNA pattern depends upon the affinity of genome to the retroviruse-like jumping genes. These genes can determine the redistribution of heterochromatic material, which changes the pattern of molecular and morphogenetic processes during development.

4. The affinity of genome to specific jumping genes can be changed by a single mutation, which corresponds to R. Goldschmidt's "great mutation" determining the origin of a new species.

The fly, developed from the egg carrying such mutation, can be an ancestor of a new species, which originates as a saltation but not as a result of accumulation of many small mutations.

References: Cohen, E. & S. Bowman 1979, Chromsoma(Berl.) 73:327-355; Korochkin, L. 1982, Sov.J. of Devel.Biol. 10:90-94.