receptivity than KL. Indeed MD rose rapidly to over 95% in 4 generations. Females were allowed 4-5 days for maturation and egg-laying at that temperature (time determined for fast maturation at 15° by Yu & Spiess 1978). Populations initiated at that temperature originally with strain hybrid flies had been so infertile as to be abandoned but this population had normal fertility until it was discarded after 5 generations. Thus flies bred in these conditions but at 25° did adjust to those conditions better than original strain hybrids were capable of doing.

Acknowledgements: The assistance of Lyn Guinsatao and Charles Wilke and support from NSF Grants DEB-7903259 and DEB-8113615 are gratefully acknowledged.

Reference: Yu,H.F. & E.B.Spiess 1978, Genetics 90:783-800.

Spiess,E.B. University of Illinois, Chicago, Illinois. Female receptivity and emergence of WT and ST karyotypes from the James Reserve population of D.persimilis.

New strains of D.persimilis were kindly sent to this laboratory in 1978 by Drs. John A. & Betty C. Moore (University of California, Riverside). These had been derived as 68 isofemale lines from a natural population at an elevation of 5400 ft near Mt. San Jacinto (James Reserve). They were uniquely characterized for this species by an unexpectedly high frequency of Standard (ST) arrangement of the third chromosome, nearly 80% in this population (Moore et al. 1979), with the Whitney arrangement (WT) second in frequency, and MD and KL third and fourth, respectively, but rare in this population. In contrast with the McDonald Ranch population, there have been no recorded seasonal cycles in relative frequencies of these arrangements at James Reserve (Moore et al. 1979).

Ten strains each of ST and WT were chosen to be made homokaryotypic and the amy variant identified. ST persimilis has the amy-1.00 variant generally, though in this population the amy-0.84 (slow allele typical of ST D.pseudoobscura) is found equally commonly. For contrast the WT arrangement is marked with amy-1.09. To analyze female receptivity association with chromosomal arrangements, we wished to simulate the karyotypes and genotypes of the wild population by testing female receptivity of the following combinations: (1) strain homokaryotype ST and WT females, (2) outcrossing the 10 strains of each arrangement simply by pairing strains ($ST_1$ x $ST_2$ ...$ST_9$ x $ST_{10}$) and the same for WT arrangement strains, followed by testing progeny ($F_1$) females, (3) outcrossing $F_1$ ST x $F_1$ WT to obtain heterokaryotypes, and (4) inbreeding the heterokaryotypes ($ST_{1-2}/WT_{3-4}$) to obtain and test females in 5 sets of segregating progenies (expected ratio of 1/4 ST: 1/2 WT/ST: 1/4 WT, identified by the amy variants). This design differs from that used by YU & Spiess (1978) in that control of the genetic background by marking the remaining principal autosomes was not done, but theoretically the genetic background by being uncontrolled would be sufficiently randomized to allow us to observe any control of female receptivity by the third chromosome arrangements (ST and WT), particularly in the segregating progeny of (4) above. All cultures were made both at 25° and 15° for consideration of temperature effects on female receptivity.

Table 1. Average percent females receptive from the James Reserve Population.

| | 25° | | | 15° | | |
|---|---|---|---|---|---|---|
| | WT/WT | WT/ST | ST/ST | WT/WT | WT/ST | ST/ST |
| Intrastrain | 58.8 | ----- | 74.6 | 72.1 | ----- | 82.8 |
| $F_1$ (strain hybrids) | 59.9 | ----- | 67.0 | 67.4 | ----- | 69.5 |
| Heterokar. from $F_1$ WT x $F_1$ ST | ---- | 54.7 | ---- | ---- | 67.0 | ---- |
| Segregating $F_2$ | 59.3 | 56.9 | 66.9 | 57.7 | 59.4 | 67.3 |
| Segregating $F_2$ Emergence (Mating and Nonmating Females Pooled) Relative to Expected 1:2:1 Ratio (N=480 emerged at each temperature). | 0.90 | 1.03 | 1.03 | 1.025 | 1.07 | 0.84 |

Flies cultured at 25° were tested for female receptivity when aged for 2 days posteclosion, while those cultured at 15° were tested when 4 days old (ages determined by Yu & Spiess for "switch on" of receptivity). Each test comprised 20 virgin females with 20 double-cross-hybrid KL males known to court intensely. For each strain or cross type, 5 repeats were run. Overall average female receptivity (% mating) for 3 karyotypes before and after crossing between strains and in $F_2$ progenies is given in Table 1 together with relative emergence

numbers. (Each data entry has N=500 females approximately.) While there was some heterogeneity between strains and their outcross progenies, these data inform us of any third chromosome effects persisting through various genetic background changes. We may note that ST/ST females are more receptive than the karyotypes containing WT at both temperatures by about the same amount (8-10%). In comparing temperatures, females are generally more receptive when cultured at cool than at warm temperature, in contrast with the population from McDonald Ranch. Thus there is no temperature sensitivity differentially affecting female receptivity of these karyotypes. Among the $F_2$, however, pooling both mated and unmated females together, as given at the bottom of Table 1, indicate frequencies of emergence, differential temperature effects for what amounts to preadult viability: WT/WT karyotype is apparently at a 10% disadvantage at warm temperature, while the ST/ST has a 20% disadvantage at cool, with heterokaryotype (WT/ST) relatively unaffected throughout. However at 25° it was just two of the 5 sets of segregating progenies that showed a significant deficiency of WT/WT, while at 15° two different sets of progenies displayed a significant deficiency of ST/ST.

Thus chromosomal polymorphs in this population contrast with those in the Napa Valley (McDonald Ranch) in these respects at least: (1) James Reserve population has no apparent seasonal cycle of karyotypes, and female receptivity is not temperature sensitive differentially by chromosomal arrangement. (2) The commonest arrangement in this population (ST) contributes to fast receptivity among females of some strains irrespective of temperatures. (3) Preadult viability is temperature sensitive in some strains, favoring ST at warm and WT at cool.

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References: Moore, J.A., C.E.Taylor & B.C.Moore 1979, Evolution 33:156-171; Yu, H.F. & E.B.Spiess 1978, Genetics 90:783-800.

Spiess, E.B. University of Illinois, Chicago, Illinois. Low female receptivity factor(s) on chromosome 3KL of D.persimilis.

Strains of D.persimilis collected at McDonald Ranch, California, in 1975 and characterized for speed of female receptivity ("switch-on:) by Yu & Spiess (1978) were surveyed for α-amylase variants. Of 3 KL kinlines with amy-1.09, two (lines McD-4 and McD-11) were lowest in receptivity of 19 kinlines tested, while the third was equal to the remaining 16 kinlines (with amy-1.00). We had concluded that KL/KL and KL/MD females matured faster on the average than MD/MD females when cultured at 25°. Thus it became of interest to determine whether the low receptivity in the two amy-1.09 lines was due to a factor (or factors) linked to the KL arrangement (chromosome 3) or to an independent factor(s) on a honhomologous chromosome. Since one KL line (McD-17) with amy-1.09 had the high receptivity characteristic of the remaining KL lines, there was no need to postulate association of the amy-1.09 variant with low receptivity behavior.

Crosses were made in the following manner designed to test for association between low receptivity and the KL arrangement chromosome using amy-variants as markers. Each KL line was outcrossed to a line (McD-33, KL, amy-1.00) that has highly receptive females. $G_1$ progeny males (McD-4/33 or McD-11/33) were backcrossed to the parent line females:

Table 1. Association contingencies for backcross progeny females.

| | A | | | B | | | C | | | D | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Amy-1.09 | 1.09/1.00 | Sum | Amy-1.09 | 1.09/1.00 | Sum | Amy-1.09 | 1.09/1.00 | Sum | Amy-1.09 | 1.09/1.00 | Sum |
| M | 12 | 38 | 50 | 32 | 41 | 73 | 14 | 24 | 38 | 19 | 14 | 33 |
| NM | 30 | 20 | 50 | 23 | 19 | 42 | 30 | 21 | 51 | 9 | 11 | 20 |
| | | | 100 | | | 115 | | | 89 | | | 53 |
| | $\chi^2$ = 13.3, P < 0.01 | | | $\chi^2$ = 1.3, n.s. | | | $\chi^2$ = 4.21, P = 0.04 | | | $\chi^2$ = 0.8, n.s. | | |