It was hypothesized that the selective effect of the H factor in dorsal prothoracal disk cells at 25°C might be due to some distinctive features of that disk. One of them could be the time of its growth. According to Madhaven and Schneiderman, the mitotic activity of eye-antennal and dorsal mesothoracal disc cells is expressed early, as the beginning of the first larval instar, whereas the dorsal prothoracal disk cells start dividing at the beginning of the third larval instar. Presumably the activity of the H factor starts at this time. If the explanation is correct, one should expect a high rate of mosaicism for all the anlages whose mitotic activity starts later than 48 hours after hatching. A study of the rate of mosaicism in the tergite area confirmed our supposition. The development of histoblasts starts at the pupal stage, and the rate of mosaic spots in the tergite area was ten times higher in $H^+$ females than in $H^-$ females. It is not possible to explain the results at 16°C as well. At this temperature the growth rate is sharply slowed down but the H factor does not seem to change the duration of its own latent period. Therefore its activity begins at an earlier stage in the development of eye-antennal and dorsal mesothoracal disks, leading to a much higher rate of mosaicism in their derivatives.

References: Khovanova, E.M. 1977, Genetics XIII:1966-1975; Madhaven, M.M. & H.A. Schneiderman 1977, Wilhelm Roux's Archiveb. 183:269-305.

Sokolowski, M.B. York University, Downsview, Ontario, Canada. Gregarious oviposition behavior in Drosophila melanogaster.

The outcome of oviposition site preferences (OSP) is a particular pattern of egg distribution which is dependent on a variety of factors affecting the complex behavior patterns of the ovipositing female. Examples of parameters which have been shown to influence oviposition site choice are temperature (Fogleman 1979), ethanol (Richmond & Gerking 1979), oviposition substrate texture (Takamura & Fuyama 1980), presence of preadult forms on the oviposition substrate (Del Solar & Palomino 1966 & Del Solar 1968) density of females (Rockwell & Grossfield 1978) and presence of adult males (Mainardi 1968, 1969; Ayala & Ayala 1969).

Gregarious oviposition is an OSP pattern which results in the eggs being distributed unevenly over the oviposition substrate. Gregarious egg-laying behavior in Drosophila pseudoobscura was reported by Del Solar & Palomino (1966). Selection for and against gregariousness in the choice of oviposition sites in D.pseudoobscura was successful indicating a genetic component to this behavior in this species (Del Solar 1968).

I have been interested in whether adults from stocks of Drosophila melanogaster known to have genetic differences in a preadult behavior (larval foraging behavior) also demonstrate differences in gregarious OSP. Before OSP for sites occupied with larvae as compared to unoccupied sites could be tested, it was necessary to determine whether gregarious OSP in Drosophila melanogaster exists. The present report documents the results of this preliminary study. The oviposition preference apparatus used was modified from the one used by Del Solar & Palomino (1966). Eight plugs (2.5 cm in diameter and .75 cm in height) of Brewer's yeast-agar medium, were placed in a petri dish (13.5 cm in diameter and 2.0 cm in height) and positioned as in Fig. 1. The plugs were darkened with charcoal (4 gm of powdered charcoal/1,000 ml of medium) so that the oviposited eggs were visible. Each plug was surrounded by a plastic ring 1.5 cm in height and 3.1 cm wide, with walls .4 cm thick. The rings utilized to ensure that the larvae remained on the plugs in which they were originally placed. The plugs were numbered and lettered 1 through 8 and either A or B, as indicated in Fig. 1.

The 4 stocks used in this study were designated $W_2W_3$, $E_2E_3$, $E_2W_3$ and $W_2E_3$. A breeding scheme that utilizes the presence of crossover suppressors to permit substitutions of intact second or third chromosome pairs from one stock into another is described in Sokolowski (1980). The reconstructed stocks were $W_2E_3$ and $E_2W_3$. The latter stock would have the same second chromosome pair as $E_2E_3$, but differ in having the same third pair of chromosomes as $W_2W_3$.

Thirty 5 day old flies (15 females and 15 males) from one of the four stocks ($W_2W_3$, $E_2E_3$, $W_2E_3$ and $E_2W_3$) were placed into the centre of the oviposition preference apparatus. Adults were left to oviposit for 24 hours (starting between 1300 and 1500 hours) under conditions of constant illumination, 23±1°C and approximately 60% relative humidity. After the oviposition period, the flies were removed and the number of eggs laid on each of the plugs was counted.

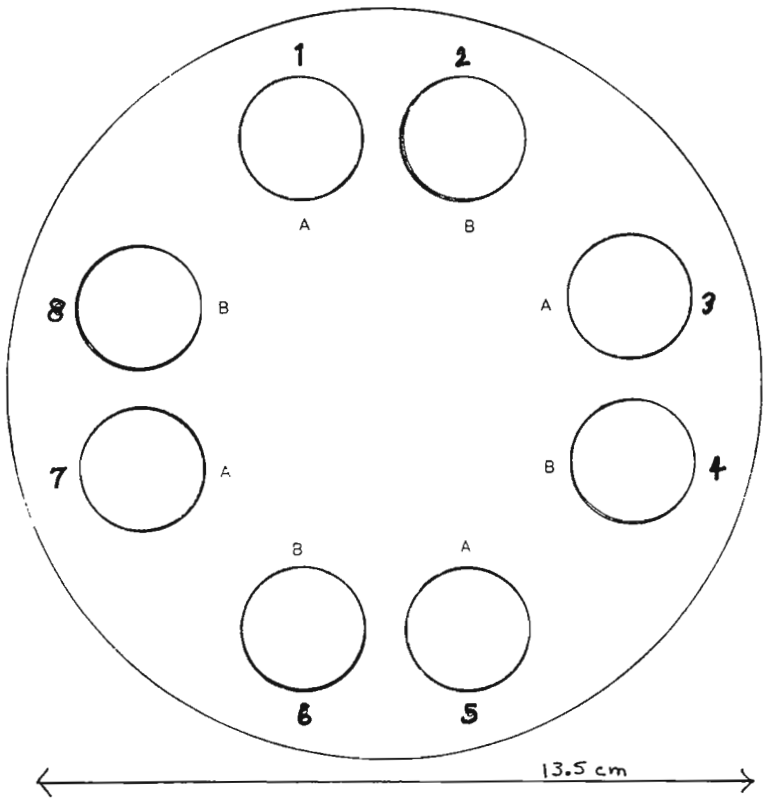


Figure 1. OSP apparatus modelled after Del Solar & Palomino (1966). Oviposition plugs were numbered 1 through 8 and A or B. Each plug was surrounded by a ring whose measurements are indicated in the text.

Table 1. Gregarious Oviposition Behavior in Drosophila melanogaster.

| Stocks | Replicate | A 1 | B 2 | A 3 | B 4 | A 5 | B 6 | A 7 | B 8 | $X^2_7$ | P |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $W_2W_3$ | 1 | 58 | 29 | 9 | 14 | 14 | 23 | 36 | 11 | 78.4 | .001 |
| | 2 | 137 | 28 | 24 | 17 | 14 | 29 | 9 | 21 | 350.1 | .001 |
| $X^2_{35}$=778.8 | 3 | 54 | 34 | 36 | 86 | 65 | 45 | 52 | 36 | 43.2 | .001 |
| | 4 | 38 | 65 | 52 | 15 | 30 | 155 | 55 | 30 | 253.3 | .001 |
| p < .001 | 5 | 7 | 3 | 9 | 5 | 22 | 23 | 26 | 4 | 53.8 | .001 |
| $E_2E_3$ | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 29 | 162.4 | .001 |
| | 2 | 29 | 41 | 6 | 51 | 2 | 6 | 68 | 10 | 545.5 | .001 |
| $X^2_{35}$=1150.2 | 3 | 62 | 45 | 25 | 37 | 20 | 4 | 102 | 39 | 149.3 | .001 |
| | 4 | 82 | 40 | 30 | 27 | 35 | 11 | 120 | 8 | 231.2 | .001 |
| p < .001 | 5 | 23 | 32 | 2 | 10 | 7 | 3 | 15 | 28 | 61.8 | .001 |
| W E | 1 | 0 | 2 | 29 | 37 | 52 | 9 | 1 | 16 | 126.0 | .001 |
| | 2 | 10 | 8 | 9 | 52 | 11 | 2 | 22 | 13 | 107.0 | .001 |
| $X^2_{28}$=304.1 | 3 | 18 | 3 | 1 | 0 | 0 | 6 | 0 | 0 | 63.1 | .001 |
| p < .001 | 4 | 7 | 4 | 6 | 3 | 5 | 14 | 3 | 1 | 8.1 | n.s. |
| $E_2W_3$ | 1 | 25 | 0 | 0 | 2 | 20 | 0 | 50 | 100 | 670.2 | .001 |
| | 2 | 9 | 7 | 20 | 10 | 68 | 24 | 72 | 13 | 156.0 | .001 |
| $X^2_{28}$=8948.7 | 3 | 19 | 20 | 2 | 18 | 16 | 3 | 7 | 1 | 40.9 | .001 |
| | 4 | 2 | 12 | 0 | 10 | 12 | 6 | 13 | 41 | 81.6 | .001 |
| p < .001 | | | | | | | | | | | |

Casual observation of the ovipositing females revealed that the eggs found on a single plug were oviposited by more than one female. This observation supported the findings of Del Solar & Palomino (1966). In Table 1 the number of eggs laid on each of the 8 plugs is presented individually for each replicate. A chi squared test was performed for each OSP test. In all cases, for all stocks (except for one replicate of $W_2E_3$), females showed significantly gregarious egg-laying patterns. The null hypothesis, whereby each of the 8 plugs had an equal probability of having eggs oviposited on it (that is a 1:1:1:1:1:1:1:1 ratio), was rejected at the p <.001 level.

When the replicate chi squares are combined with each stock, there was a one in one-thousand chance that the eggs were oviposited evenly. All stocks of Drosophila melanogaster tested showed OSP's that resulted in aggregation of their eggs.

References: Ayala,F.J. & M.Ayala 1969, DIS 44:240. Del Solar, E. 1968, Genetics 58:275-282; Del Solar, E. & H.Palomino 1966, Am. Nat. 100:127-133; Fogelman, J.C. 1979, Behav.Genet. 9: 407-412; Mainardi,M. 1968, Boll.Zool. 35:135-136; Mainardi,M. 1969, Boll.Zool. 36:101-103; Richmond,C.R. & J.L.Gerking 1979, Behav. Genet. 9:233-241; Rockwell, R.F. & J.Grossfield 1978, Am.Midl.Nat. 99:361-368; Sokolowski,M.B. 1980, Behav.Genet. 10:291-302;

Takamura,T. & Y.Fuyama 1980, Behav.Genet. 10:105-120; Weisbrot, R.D. 1966, Genetics 53:427-435.

Sondergaard, L. University of Copenhagen, Denmark. Mating capacity of e/e and e/+ males under non-competitive conditions.

It is well-known that the mutant ebony (e) has several pleiotropic behavioural effects. Some of these have been thought to be the reason why the e gene, in contrast to most other mutant genes, stabilizes at a certain level in population cage experiments. One factor which is rarely considered is what one might call the "Don-Juan" factor, i.e., the number of females a male can mate within a given period. A male with a very efficient courtship could be at a selective disadvantage if he needs too long a recovery period after copulation compared to a male with a less effective courtship, but with a very short recovery period. To test the mating capacity, single unexperienced ♂♂ (12-24 hrs of age) were confined for 24 hrs with 12 one-week-old ♀♀ in light or complete darkness. e/e, e/+ and +/+ ♂♂ were mated with e/e; e/+ and +/+ ♀♀also to test the effect of the female genotype on male performance. Results are shown in Table 1. The overall tendency is that e/+ and +/+ ♂♂ perform better in light, whereas e/e ♂♂ perform equally well in light and darkness when mated to e/+ and e/e ♀♀. In the light the order of the D.J. factor is e/+ > e/e > +/+, indicating overdominance for this trait.

Table 1. D.J. factor ± s.d. (see text) for males confined for 24 hrs with 12 of the indicated genotype; experiments were performed in 24 hrs light and 24 hrs of darkness. In each experiment 75-100 were tested individually.

| | darkness | light |
|---|---|---|
| +/+ ♀ x e/+ ♂ | 3.3±1.5 | 4.8±2.0 |
| e/e ♀ x e/+ ♂ | 3.6±1.7 | 5.9±2.0 |
| e/+ ♀ x e/+ ♂ | 3.4±1.9 | 5.7±2.4 |
| +/+ ♀ x e/e ♂ | 2.9±1.3 | 3.7±1.9 |
| e/e ♀ x e/e ♂ | 4.3±2.1 | 4.5±2.0 |
| e/+ ♀ x e/e ♂ | 4.3±1.9 | 4.4±2.1 |
| +/+ ♀ x +/+ ♂ | 1.8±1.1 | 2.4±1.6 |
| e/e ♀ x +/+ ♂ | 2.5±1.3 | 3.1±1.5 |
| e/+ ♀ x +/+ ♂ | 1.7±1.5 | 3.2±1.5 |

These observations are explainable by the fact that e/e flies are blind and that e/+ and e/e have a more efficient courtship behaviour (Kyriacou et al. 1978). However, this does not explain the observed differences between different females when tested to the same male genotype: in the light the scores are lower with +/+ ♀♀. In darkness the results are more complex: no differences were observed between ♀♀ mated to e/+ ♂♂; e/e ♂♂ show lower scores with +/+ ♀♀; +/+ ♂♂ have a higher mating frequency with e/e ♀♀. These differences could be explained by differences in female heat. A more possible explanation is a difference in the activity levels of both males and females. That is, increasing spontaneous activity in the order +/+; e/+; e/e. In the light +/+ ♀♀ do not move around as much and therefore rarely meet a male; in the darkness they move around even less. However, with e/+ males this is compensated for by the higher activity of these males also in the dark. In the experiment with +/+ ♂♂ sluggishness is only compensated for by the high activity of the e/e ♀♀ in darkness. In the dark the high activity of e/e ♂♂ compensates for differences between e/e ♀♀ and e/+ ♀♀ activity.

Reference: Kyriacou,C.P., B.Burnet & K.J.Connolly 1978, Anim.Behav. 26:1195.

Spiess, E.B. University of Illinois, Chicago, Illinois. Discrete generation populations of D.persimilis selected for female receptivity and frequencies of KL-MD karyotypes.

Population box experiments were designed in 1979 with selection for early maturation of females (D.persimilis) in order to substantiate the relative frequency changes expected of KL and MD arrangements that had been characterized for female "switch-on" of receptivity by Yu & Spiess (1978). Three strains of KL (4,11,17) with amylase variant amy-1.09 and 3 strains of MD (7,16,35) with amy-1.00 derived from a McDonald Ranch, CA, population were intercrossed within homokaryotypes and introduced into plastic refrigeration boxes ("Bennett cages") with 8 holes for as many food vials to provide oviposition area for 200 initial pairs of flies. Females were virgins of 1-2 days past eclosion while males were as old or slightly older. Initial frequencies were approximately 90%: 10% of either arrangement and four populations were monitored by electrophoresing a sample of