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Adult density and mating activity in Drosophila gaucha and Drosophila pavani.

Drosophila pavani and Drosophila gaucha are two sibling species of the mesophragmatica group, whose geographic distribution is mostly allopatric, although they have been found to co-exist in one part of their range (San Luis, Argentine). In nature no hybrids have been found, and in the laboratory the F_1 hybrids are totally sterile. (Koref-Santibañez, 1964).

Their courtship is very similar both qualitatively and quantitatively (Koref-Santibañez and del Solar, 1961), but there exists a certain ethological isolation, revealed by homogamic courtship preferences shortly after males are confronted with females of both species.

Many factors may influence mating propensity, among them variables acting at pre-adult and adult stages as well as interactions among mating adults (Spiess, 1970). The study of these factors may be of aid in analyzing the causes of sexual isolation between sympatric sibling species.

The present communication summarizes the results of a series of experiments performed in order to analyze the density of mating adults in different volumes in relation to mating activity.

5, 10, 20 or 40 pairs of each of the following combinations: ♂ D. pavani x ♀ D. pavani; ♂ D. gaucha x ♀ D. gaucha; ♂ D. pavani x ♀ D. gaucha; ♂ D. gaucha x ♀ D. pavani were placed in vials of the following volumes: 40 cc, 80 cc, 120 cc and 160 cc, giving 64 different combinations. The flies were left for 6 hours under permanent illumination in a constant temperature room at 16°C. The females were then dissected and examined under a microscope in order to detect the presence of sperm within the spermathecae.

Table 1 summarizes the percentage of females inseminated at each of the four volumes. It shows that the activity of males or the receptivity of females are not significantly modified

Table 1. Percentage of D. pavani (p) and D. gaucha (g) females inseminated by D. pavani (p) or D. gaucha (g) males in different volumes (N = 400 pairs in each combination).

	♂ p		♂ g	
Volume	% ♀ p	% ♀ g	% ♀ g	% ♀ p
40 cc	67.50	80	86.00	32.75
80 cc	76.00	69.75	83.25	37.75
120 cc	61.25	75.25	83.75	30.25
160 cc	70.00	82.75	81.75	37.75
χ^2	20.81	22.01	2.73	7.36
P (3 df)	>0.001	>0.001	0.50-0.30	0.10-0.05

by changes in the space allowed for mating. Although D. pavani males seem more sensitive, there is no consistent trend in their activity. D. pavani females always tend to discriminate more against foreign males than do D. gaucha females. This may be due to the great receptivity of these latter females, independently of the male to which they are confronted. Inversely, D. gaucha males have a much lower activity than do D. pavani males.

Table 2, which summarizes the percentage of females inseminated at each density, shows on the other hand, that mating activity is affected by density. There is a decrease in the number of females inseminated with an increase of mating pairs. This is most striking when

Table 2. Percentage of D. pavani (p) and D. gaucha (g) females inseminated by D. pavani (p) or D. gaucha (g) males at different densities (N = 400 pairs in each combination).

	♂ p		♂ g	
Density	% ♀ p	% ♀ g	% ♀ g	% ♀ p
5	76.50	79.75	96.5	54.75
10	75.00	75.50	80.5	33.50
20	71.25	82.00	84.75	25.75
40	52.00	70.50	72.00	24.50
χ^2	71.77	17.36	91.22	103.82
P (3 df)	>0.001	>0.001	>0.001	>0.001

D. gaucha males are confronted with D. pavani females.

These observations on "density effect" upon mating activity of both D. gaucha and D. pavani are different than those found for other species by Spiess (1970) and Spiess and Spiess (1969). These authors observed that females seem to require a courtship summation before mating, and that mating increases when the number of courting pairs is greater. In the present case, there seems to exist some type of interference among mating pairs, which reduces the receptivity of the females independently of the space available for their activity.

References: Koref-Santibañez, S., 1964 Evolution 18: 245-251; Koref-Santibañez, S. and E. del Solar, 1961 Evolution 15: 401-406; Spiess, E., 1970 Evolutionary Biol. 4: 315-379; Spiess, E. and L. Spiess, 1969 Evolution 23: 225-236.

(Research financed by grants from the Faculty of Medicine, Grant No. 41/67 of CONICYT and Multinational Genetics Program of the O.A.S.).

Kuroda, Y. National Institute of Genetics, Misima, Japan. Effects of substances with ecdysone and juvenile hormone activity on the growth of embryonic tissues from D. melanogaster in culture.

Ecdysterone and inokosterone, which have been isolated from plants and previously shown to have ecdysone activity in the differentiation of eye-antennal discs of Drosophila mature larvae in organ culture (1), were tested for their activity to promote the growth of embryonic Drosophila tissues cultured in medium K-6' supplemented with 10% calf serum. The result is shown in Table 1.

Table 1. Effects of ecdysone analogues on the growth of embryonic Drosophila tissues in culture.

Ecdysone analogue	No. of explants tested	No. of explants in which growth was observed	Percent growth
Control	34	28	82
Ecdysterone, 0.1 mg/ml	20	17	85
0.01 mg/ml	23	22	96
0.001 mg/ml	24	16	67
Inokosterone, 0.0001 mg/ml	20	4	20

Among ecdysone analogues tested ecdysterone at the concentration of 0.01 mg/ml had a slight growth-promoting effect, whereas inokosterone at as low concentration as 0.0001 mg/ml had an inhibitory effect.

Dodecyl methyl ether (DME), a substance acting as juvenile hormone, was tested at various concentrations for its growth-promoting effect on embryonic Drosophila tissues. The results are shown in Table 2.

Table 2. Effects of DME on the growth of embryonic Drosophila tissues in culture.

Concentration of DME (mg/ml)	No. of explants tested	No. of explants in which growth was observed	Percent growth
Control	16	12	75
10.0	13	2	15
1.0	5	1	20
0.1	8	7	88
0.01	22	18	82

It was found that 0.1 mg/ml DME stimulated the growth of tissues, whereas with higher concentrations than 1.0 mg/ml an inhibitory effect was observed as compared with the control cultures without it.

Reference: 1. Kuroda, Y., 1969 Japan. J. Genetics 44, Suppl. 1: 42.