

borderline of activity in the optic disk seems to cut the disk into the antennal and eye parts. The staining patterns are highly reproducible. To rule out impermeability for certain staining components in the unstained areas, disks were injured or cut into pieces prior to the aldehyde oxidase test. The activity patterns were the same as in intact disks.

Thus at least the antennal disk can be used for studies with genetic mosaics. In gynandromorphs mosaic antennal disks have been found and are now being analysed in detail. This work was supported by the Deutsche Forschungsgemeinschaft.

References: Courtright, J.B. 1967, *Genetics* 57:25; Dickinson, W.J. 1970, *Genetics* 66:487; _____ 1971, *Develop. Biol.* 26:77; Janning, W. 1972, *Naturwissenschaften* 59:516.

Chinnici, J.P. Virginia Commonwealth University, Richmond, Virginia. Preliminary data on the effect of mono-sodium glutamate on viability and crossing over in *Drosophila melanogaster*.

The effect on human health of the food additive mono-sodium glutamate (MSG) has been a topic of concern since 1968 when Schaumberg et al. first described the "Chinese Restaurant Syndrome" in man and associated it with ingestion of the flavor enhancer MSG. Evidence presented by Ghadimi et al. (1971) indicates that the symp-

toms of this syndrome (headache, sweating, nausea, weakness, thirst, flushing of the face, a sensation of burning or tightness, abdominal pain, and lacrimation) may be the result of "transient acetylcholinosis", since glutamic acid is readily converted to acetylcholine when excess sodium is present, the symptoms being due to the effect of the excess acetylcholine on the parasympathetic nervous system.

More serious concern about the effect of MSG on development has resulted from several reports that MSG causes lesions in the hypothalamus of the brain and/or degeneration of the retina of the eye of mice, rats, and rhesus monkeys (see, for example, Olney and Sharpe, 1969; Arees and Mayer, 1970; Olney, 1971; and Burde et al., 1971). However, several other reports have failed to substantiate these findings (see, for example, Adamo and Ratner, 1970; Oser et al., 1971; and Reynolds et al., 1971), so that no clear cut conclusions may be drawn. A possible contributing factor to the effect of MSG on brain development is the finding that MSG briefly but significantly depresses glucose uptake by mice brain cells (Creasey et al., 1971).

Two brief reports on the effects of MSG on development and productivity in *D. melanogaster* have been published. Turner and Wright (1971) have reported that 1 and 3 percent solutions of MSG do not change the number of adults emerging from cultures. Data from Forman and Majumdar (1971) show that a 10% MSG solution reduces the number of adults emerging from cultures by 57% while the percentage of females emerging from these cultures rises from the control value of 49.95% to 60.1%. Also, flies allowed to drink a 10% MSG solution for 24 hours produced 39% fewer offspring than the controls, with the sex ratio of these offspring not being affected. I am currently studying the effect of MSG on viability, fecundity, and crossing over in *D. melanogaster*. Some of the preliminary data from this study are presented below.

The effect of a 10% MSG solution (10 grams of MSG added to 100 ml of a standard dextrose-yeast-agar medium) on egg to adult viability in the Oregon-R wild type strain was measured as follows. To each of 30 vials, each containing the 10% MSG supplemented media, 25 eggs were added. A similar number of eggs was added to each of 30 control vials containing media unsupplemented by MSG. The results are presented in Table 1. In the control vials, 74% of the

Table 1

Treatment	N	No. of Adults Produced	Percent male Offspring
		$\bar{x} \pm s$	$\bar{x} \pm SE$
Control 0% MSG	30	18.73 \pm 3.45	50.33 \pm 2.15
10% MSG*	30	12.83** \pm 3.79	51.06 \pm 3.20

N = Number of vials set up, each containing 25 eggs.

* = 10 grams per 100 ml of media solution

ANALYSIS OF VARIANCE (TREATMENT VS. CONTROL)

** : $P < .01$

others not significant

eggs developed into adults, while only 51% of the eggs developed into adults in the MSG vials. This is about a one-third decrease in egg-adult viability, a significant reduction, though not as great as reported by Forman and Majumdar (1971). However, the sex ratio of the adults is not altered by their development on the MSG media. This finding is at variance with the results of Forman and Majumdar.

To test the effect of MSG on altering crossing over, the following experiment was performed. Females from a stock homozygous for the four sex linked mutants scute (*sc*, 1-0.0), crossveinless (*cv*, 1-13.7), singed (*sn*³, 1-21.0), and miniature (*m*, 1-36.1) were mass mated with males from a wild type Oregon-R stock in half pint bottles containing media supplemented with 5%, 10%, 15% or no (control) MSG. The offspring (heterozygous females and hemizygous mutant males) were aged two days and then were single pair mated in vials containing control media (no MSG added). After 8 days, the parents were removed from the vials and the offspring were scored to determine the amount of crossing over in the female parents. The results are presented in Table 2. The following facts are evident from this table: (1) Fecundity of the

Table 2

Treatment	N	No. of Offspring $\bar{X} \pm s$	Percent Males $\bar{X} \pm SE$	Mean Percent Recombination and 95% Confidence Limits		
				<i>sc-cv</i>	<i>cv-sn</i> ³	<i>sn</i> ³ - <i>m</i>
Control	24	132.20	48.25	14.1	5.6	14.9
0% MSG		± 13.38	± 0.73	13.0-15.2	4.7-6.5	13.7-16.2
5% MSG*	19	142.68	48.31	13.1 ^o	4.6	13.5
		± 22.18	± 0.67	11.1-15.2	3.8-5.5	12.0-13.7
10% MSG*	26	124.07	48.73	11.0**	4.7	12.4**
		± 14.76	± 1.3	9.5-12.6	4.1-5.3	11.2-13.7
15% MSG*	20	141.10	48.30	8.0**	3.7**	10.5**
		± 31.21	± 0.86	6.8-9.2	3.2-4.3	9.1-11.9

N = Number of females tested

* = Grams per 100 ml of media solution

ANALYSIS OF VARIANCE (TREATMENT VS. CONTROL)

** : P < .01

others not significant

flies is not reduced by growth on MSG supplemented media; (2) the sex ratio of the offspring is not affected by growth of the parents on MSG media; (3) growth of the parents on media supplemented with 10% or 15% MSG has a significant effect on reducing the amount of crossing over between the four sex linked loci. Additional experiments are currently underway to determine the repeatability of the above results, and to gain more information concerning the heritability and the mechanism of the action of MSG on reducing crossing over.

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