Bulletin of the Psychonomic Society
1981, Vol. 18(3), 106-107

Saccharin, quinine, and novel foods consumption in male and female northern grasshopper mice (*Onychomys leucogaster*)

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Saccharin preference (.01%-.10%) quinine rejection (.002%-.020%), and novel foods consumption were examined in male and female northern grasshopper mice (*Onychomys leucogaster*). Both sexes showed similar increases in saccharin preference as concentration increased. Quinine rejection became more pronounced with increasing concentration, but males rejected the highest concentration more strongly than females. Both sexes showed similar low levels of novel foods consumption.

The genus *Onychomys*, consisting of northern (*O. leucogaster*) and southern (*O. torridus*) grasshopper mice, displays a number of behaviors that are of considerable interest for comparative analyses of rodents. Both species are highly predatory, with 75%-90% of their diet consisting of animal material (Bailey & Sperry, 1929; Flake, 1973). More impressive than the sheer quantity of animal material, however, is the fact that these small rodents frequently kill and consume prey with formidable defenses (e.g., scorpions) (Bailey & Sperry, 1929) and depend heavily on learning for the effective development of such predatory attack (Langley, in press). These species show highly developed pair bonding and intensive care of the young by both parents (Horner & Taylor, 1968; Ruffer, 1965). In contrast to many species of mice (Ewer, 1968; Poole & Fish, 1975), *O. leucogaster* also shows intensive play behavior (Davies & Kemble, Note 1) and, unlike rats (Beatty, 1979; Beatty & Beatty, 1970; Meany & Stewart, 1981), fails to display sex differences in kind or amount of play, predatory efficiency, or open-field behavior (Davies & Kemble, Note 1). The present experiments compare consummatory reactivity to saccharin and quinine solutions and novel foods of male and female *O. leucogaster*.

METHOD

Subjects and Apparatus

The subjects were 23 northern grasshopper mice (*O. leucogaster*) derived from four pairs of wild mice trapped near Elkhart, Kansas. Male subjects (N = 13) weighed 31.0-45.0 g and females (N = 10) weighed 26.2-45.0 g at the beginning of testing. The mice were individually housed in Wahmann (LC/75A) cages adapted to hold two 15.0-ml drinking tubes. The drinking spouts were positioned 2.0-4.0 cm above the floor of the cage and 1.5-3.5 cm apart. The mice were maintained in an animal room (21°C-23°C) that was illuminated from 0800 to 2000 h and had ad-lib access to Purina Lab Chow and water throughout testing. All testing was conducted in the home cages.

The authors would like to thank William Langley for supplying the breeding pairs of grasshopper mice and Benjamin Arthur, who assisted in some data collection.

Procedure

Body weights and daily food and water consumption were measured for 5 days prior to preference testing. During this time, the position of the single water tube was alternated daily. Two-bottle preference tests were then conducted for three increasingly concentrated saccharin solutions. One drinking tube contained .01% (.01 g saccharin/100 ml water), then .05%, and, finally, .10% saccharin solution, and the second tube always contained water. Each saccharin concentration was presented for 2 days, with the positions of saccharin and water tubes alternated. The mice were given 24 h (single tube) access to water between each 2-day test. Following saccharin consumption, two-bottle tests with three increasingly concentrated quinine sulfate solutions (.002%, .004%, and .020%) were administered as previously described. Forty-eight hours after quinine testing was completed, consumption of four novel foods was measured. A small dish containing five pieces (approximately 7 x 7 x 2 mm) of each novel food (raw potato, apple, carrot, celery) was placed in each cage, and the number of items consumed after 15 and 30 min was recorded.

RESULTS AND DISCUSSION

Male mice (means = 39.1-41.7 g) were consistently heavier than females (means = 35.6-39.0 g) during the 5 days of preliminary measures [$F(1,21) = 5.72, p < .05$]. There was no change in weight over days and no Sex by Days interaction (ps > .10). The food consumption of males (means = 4.8-6.5 g) was also higher than that of females (means = 4.4-5.3 g), although this difference was only marginally significant [$F(1,21) = 3.26$, $p < .10$], with no suggestion of a Sex by Days interaction ($p > .10$). The water consumption of both sexes (means = 4.1-6.8 ml) was similar throughout these measures, with no suggestion of sex differences or a Sex by Days interaction (ps > .10).

The results of two-bottle preference testing are summarized in Table 1. Consumption of the flavored fluids is expressed as a percentage of total fluid intake during each 2-day test. The preferences of males and

0090-5054/81/080106-02$00.45/0

Table 1
Percent Saccharin or Quinine in Daily Fluid Consumption in Males and Females

	Saccharin						Quinine					
	.01%		.05%		.10%		.002%		.004%		.02%	
Group	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Male	41.9	10-68	76.8	16-96	87.3	73-96	35.0	5-95	44.3	14-92	20.4	4-55
Female	42.4	13-78	69.4	24-89	85.8	47-100	50.2	13-85	32.2	5-78	32.7	7-71

females for saccharin, and their rejection of quinine, were compared by analyses of variance. Like rats, some mice showed pronounced position preferences that largely disappeared at higher solution concentrations. It can be seen that the saccharin consumption of both sexes increased steadily as concentration increased [$F(2,42) = 36.09$, $p < .001$]. There was no sex difference and no Sex by Days interaction ($ps > .10$). It can also be seen that quinine consumption declined as its concentration increased [$F(2,42) = 6.66$, $p < .01$]. Although there was no significant sex difference ($p > .10$), males consumed less .002% and .02% quinine and, curiously, more of the .004% solution than females did [Sex by Days, $F(2,42) = 5.07$, $p < .05$]. Stronger rejection of .02% quinine by males was primarily responsible for this interaction ($p < .05$). Little of the novel food was consumed in 15 min (males, mean = 1.3 pieces; females, mean = 1.6 pieces; $p > .10$), with 15 of 23 mice consuming 0-1 piece of food. After 30 min, females had consumed slightly more of the novel food (mean = 4.4 pieces) than did males (mean = 2.8 pieces), but this difference was not statistically significant ($p > .10$).

Although *O. leucogaster* are quite obviously responsive to the taste properties of saccharin and quinine, they seem to be somewhat less sensitive to these solutions than are rats (Kemble, Levine, Gregoire, Koepp, & Thomas, 1972). Methodological differences may be important, of course, but it is also possible that these differences are partially attributable to the largely carnivorous diet of *O. leucogaster*. The absence of sex differences in saccharin preference and enhanced rejection of quinine by males also contrasts with available data for the rat but, given the variable pattern of results among rodents (see Beatty, 1979), is perhaps not surprising. The significance of such species differences in taste reactivity remains to be elucidated.

REFERENCE NOTE

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(Received for publication July 10, 1981.)