cal environment. Resemblance of the lecithin bimolecular leaflet to the arrangement of the lipid fraction in our current picture of the cell membrane may be only superficial (*7*); however, both the forces that stabilize assemblies of this component and the leaflet's influence on its aqueous and ionic environment are probably involved in the organization and behavior of the cell membrane.

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8. I thank Dr. D. Small for his supply of excellent data and Dr. D. L. D. Caspar, Dr. B. A. Pethica, and Prof. J. Th. G. Overbeek for critical comments.

30 November 1966

Sex Differences in Taste Preference for Glucose and Saccharin Solutions

Abstract. *Taste preferences of mature male and female rats for caloric and noncaloric sweet solutions have been found to differ. Although females do not drink more water than males, they consume significantly greater quantities of a slightly sweet 3 percent glucose and a very sweet 0.25 percent saccharin solution. When given a choice, males switch their initial preference for a saccharin solution to a preference for a glucose solution after several days, while females maintain a preference for the saccharin solution. Females also prefer significantly higher concentrations of saccharin than males do.*

With the exception of sexual and maternal behavior, there are relatively few categories of response tendencies in which reliable differences between male and female rodents have been reported. The presence of ovarian-dependent activity cycles in the female has been well described (*1*). Less clear are the reports of sex differences in emotionality based upon open-field (*2*) and avoidance tests (*3*).

With a growing interest in the genetics of behavior (*4*) and in the possibility that steroid hormones administered at critical periods may influence the central nervous system to develop in a feminine or masculine direction (*5*), behavior tests that demonstrate sex differences are likely to be useful. While studying the factors that influence taste preferences in animals, we observed that, in general, male and female rats respond differently to solutions of glucose or saccharin.

Mature rats of the Holtzman albino strain (68 males and 55 females) were housed in individual cages and had no experience with sweet solutions prior to testing. Different rats were used in each of three experiments; they were adapted to the test cages for approximately 1 week. Because mature male and female rats differ in weight at the same age, we used groups of animals that varied in age from 80 to 325 days and varied in average weight from 211 to 420 g. In all experiments, Purina Lab Chow and two different solutions in bottles were available to the animals at all times. Each day the 24-hour fluid consumption was measured, bottles were washed, and fresh solutions were provided. Spilled fluid was captured in plastic cylinders mounted under each drinking tube. The solutions were mixed with distilled water; concentrations are expressed in terms of grams in a total of 100 ml of fluid. The saccharin used was sodium saccharin (sodium-*o*-benzoic sulfimide).

In the first experiment six males and six females were given a choice between tap water and a 3 percent glucose (0.165 mole) solution that is just perceptibly sweet to humans. Fluid consumption was measured daily for 5 consecutive days. Both sexes preferred the glucose solution, but the females consumed significantly more of this fluid (Fig. 1). In view of the fact that females consume less water in general (average daily consumption of water is 30 ml for females and 35 ml for males) when this is the only fluid available, the results suggest that the female, in comparison to the male, exhibits an exaggerated response to the sweet solution.

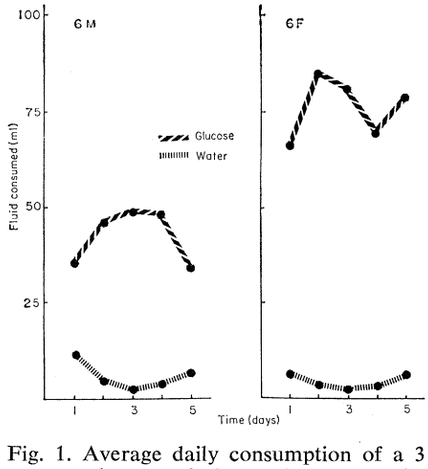

Fig. 1. Average daily consumption of a 3 percent glucose solution and tap water by male (M) and female (F) rats. The average body weight for males at the start of the experiment was 301 g; it was 250 g for females.

In a second experiment (repeated three times), groups of female and male animals were provided with a choice between a 3 percent glucose solution and a 0.25 percent saccharin (0.01 mole) solution that is almost sickeningly sweet for humans. This saccharin solution is approximately at the point of maximum preference judged by the fact that rats tend to consume less of solutions with either much higher or lower concentrations (*6*). Animals of both sexes consumed more of the saccharin solution at first, but by the 3rd or 4th day the males started to switch to a preference for glucose (Fig. 2). In contrast, the females consumed greater amounts of the saccharin solution and did not switch to a preference for glucose. Regardless of the age and weight of these mature animals, average daily consumption of the saccharin solution reached an asymptote at approximately 60 ml for the females and 35 ml for the males. Although males prefer a 0.25 percent solution of saccharin to tap water for a prolonged period of time, they gradually switch their preference when provided with a less sweet glucose alternative. The females, which show a greater positive response to mildly sweet glucose so-

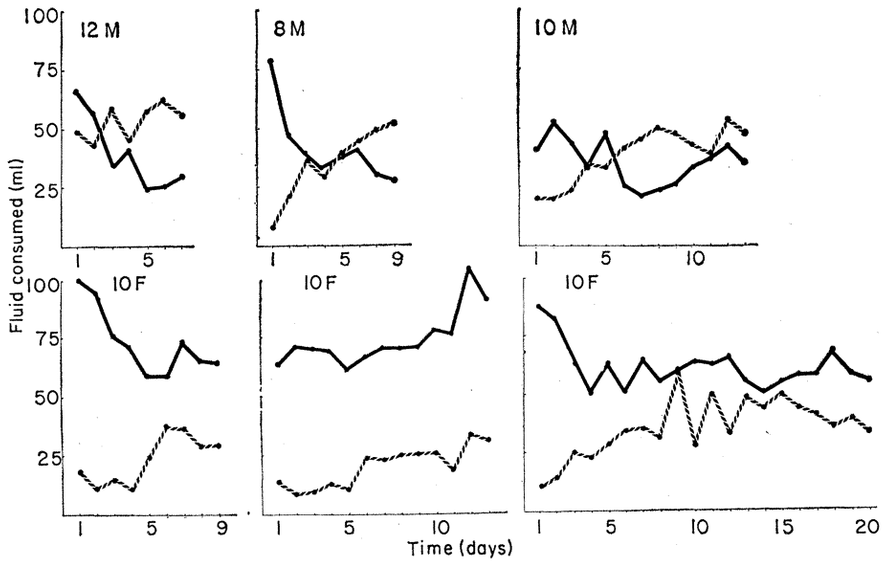

Fig. 2. Average daily consumption, by males (M) and females (F), of a 0.25 percent sodium saccharin solution and a 3 percent glucose solution. (Left to right) Average body weight at the start of the experiment for the males was 370, 370, and 315 g; for the females it was 420, 211, and 266 g. Solid line, saccharin solution; broken line, glucose solution.

lutions (experiment 1), are able to consume large quantities of a very sweet saccharin solution for prolonged periods. We are not suggesting that the saccharin and glucose solutions differ only in sweetness. Indeed, it has been shown that although a 10 percent glucose solution is less sweet than a 0.25 percent saccharin solution, the former is preferred (*7*).

In the experiments described above, the glucose and saccharin solutions were placed in the same positions each day. To rule out any difference between the sexes in the persistence or strength of any preference due to position, the second experiment was repeated. Seven males and seven females were tested with the same procedure used in experiment 2, except that the positions of the glucose and saccharin solutions were reversed each day. The results were essentially the same as reported above; the males, but not the females, switched from an initial preference for saccharin to one for glucose.

Furthermore, to determine if the switch in preference observed with male animals was peculiar to the concentrations of saccharin, we tested 13 male animals with the saccharin solution diluted in half (0.125 percent). This change seemed to have no effect on the results; these males switched to a clear preference for the 3 percent glucose solution on the 5th day.

In experiment 3, 12 males and 12 females were tested with successively higher concentrations of saccharin solutions to determine whether females exhibit a preference for sweeter solutions than males do. Animals were provided with tap water and a saccharin solution (0.25 percent) on the 1st day. The concentration of the saccharin solution was increased 0.05 percent daily through day 9, and from days 10 to 13 it was increased 0.10 percent each day. As in the first two experiments, the females consumed more of the sweet solutions than the males did (Fig. 3.) By the 4th day the males consumed no more of the saccharin solution than of tap water. When the saccharin concentration was increased to 0.75 percent, the males preferred water. The females continued to exhibit a clear preference for the saccharin solution, and even a concentration of 1.05 percent was significantly preferred to the tap water.

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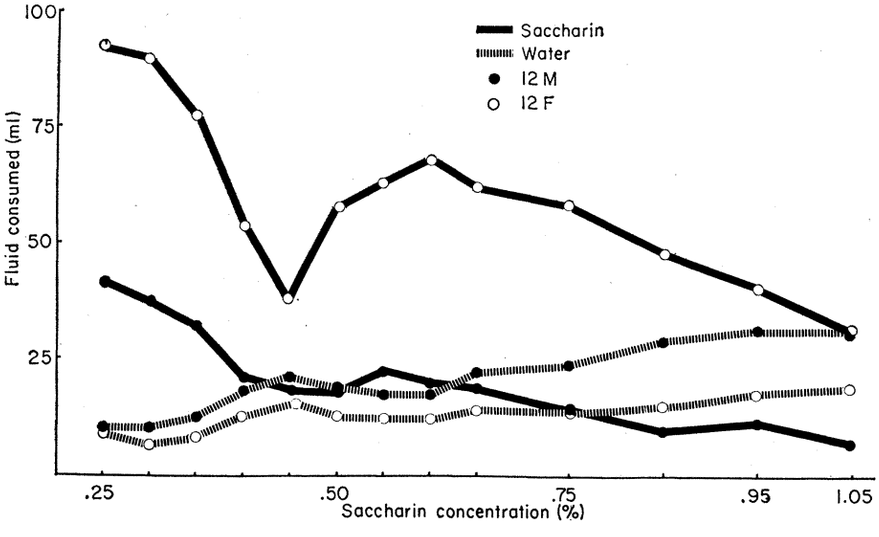

Fig. 3. Average daily consumption, by males (M) and females (F), of different concentrations of a sodium saccharin solution and tap water. The average body weight for males at the start of the experiment was 295 g; it was 275 g for females.

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8. Supported by NIH research grant M4529, NIH career development award MH-4947, and NASA research grant NsG 437.

3 April 1967