

BRIEF NOTE

THRESHOLD PERCEPTIONS OF PHENYLTHIOCARBAMIDE:
ABSENCE OF SEXUAL DIMORPHISM¹

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OHIO J. SCI. 82(1): 66, 1982

Divergent taste responses to Phenylthiocarbamide (PTC) were first described by Fox in 1931. Since that time, numerous investigations by a variety of sampling techniques have confirmed the taster-non-taster dichotomy in many human populations and have concluded that the inability to taste PTC is due to the homozygosity for an autosomal recessive allele (Snyder 1932).

Assessment of PTC perception has been used extensively in the science classroom to demonstrate human diversity. It is assumed in those demonstrations that PTC tasting ability occurs with equal frequency in males and females. In one of our classes at Michigan State University during the Winter of 1978, however, it was discovered by routine sampling of 80 students that more females were PTC tasters than males and

the difference was highly significant (see table 1).

A review of the literature indicates that, in general, females have lower threshold values for PTC perception than males. Such sex differences in thresholds were first suggested by Blakeslee (1931) and further substantiated by Hartman (1939) and Falconer (1947). They report that females, on the average, can detect higher dilutions of PTC producing different distributions of thresholds for the two sexes. Other studies have suggested that PTC taste sensitivity decreases with age (Harris and Kalmus 1949). From these reports it is unclear if threshold differences reflect effects of age, sex, or a combination of these factors. In view of finding a significantly disproportionate female to male PTC tasting ratio and the previously reported sex and age differences, the present study was designed to investigate these factors in a relatively large sample of individuals within a narrowly de-

¹Manuscript received 23 May 1980 and in revised form 31 October 1980 (#80-26).

TABLE 1
Results of routine testing of PTC
variability—Winter 1978.

	No. Males		No. Females	
PTC Tasters*	(23)	58.9%	(33)	80.0%
PTC Nontasters	(16)	41.4%	(8)	20.0%
	(39)		(41)	

*Tasters vs nontasters.
 $\chi^2=4.39$ $P<0.05$

fined age range of 18 to 23 years.

During the fall of 1979, we assessed the responses of 949 students for their ability to taste a series of compounds, among which were included three different concentrations of PTC. A stock solution of 81.25 mg of PTC was prepared, then diluted to give two additional solution concentrations of 40.63 and 20.31 mg/l, respectively. We chose the solution of 81.25 mg/l because it has been most commonly used to identify individuals as tasters or nontasters (Harris and Kalmus 1949, Allison and Blumberg 1959). The two additional solutions were added to detect whether at lower concentrations there were sex differences in threshold perceptions of PTC.

Three to four drops of each solution were applied to the tongue of each test subject in succession, commencing with the most dilute concentration of PTC and continuing until all three concentrations were sampled. Between each sample application, the subject was instructed to chew an unsalted cracker and then rinse the mouth thoroughly with distilled water. We recorded individual taste perceptions as well as age and sex.

As can be seen in table 2, a greater percentage of nontasters occurred at the lowest concentration. The percentage of 41.8 for nontaster males at this concentration was only slightly greater than that for nontaster females (40.2%). We observed a similar trend at the concentration of 40.63 mg/l. At the highest concentration used (81.25 mg/l), the nontaster frequency for females of 24.6% was slightly greater than that for

TABLE 2
Frequency distributions of PTC taste responses.

Concentration of PTC in mg/l	No. Tasters		No. Nontasters	
	Males	Females	Males	Females
20.31	212	350	152	235
	(58.2%)	(59.8%)	(41.8%)	(40.2%)
40.63	245	401	119	184
	(67.3%)	(68.5%)	(32.7%)	(31.5%)
81.25	280	441	84	144
	(76.9%)	(75.4%)	(23.1%)	(24.6%)

males (23.1%). These differences were not statistically significant.

These findings varied with our earlier sampling (table 1) using the filter paper technique in which we observed a significantly greater proportion of nontaster males. This variation could be due to differences in sampling techniques (*i.e.*, filter paper *vs.* solutions). These results, however, also appear to conflict to some degree with a number of previously published reports in that we are unable to confirm any significant differences in PTC threshold perceptions between the sexes within the average threshold ranges of PTC concentrations of 20.31 to 81.25 ml/l.

ACKNOWLEDGMENT. We wish to thank our colleagues of the Department of Natural Science who assisted us in this taste perception study.

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