

## On sweet Taste perception for P. T. C.

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### Introduction

A recent publication (Skude 1959) described observations compatible with an autosomal dominant inheritance for sweet perception for phenylthiourea (P.T.C.). The material collected for the family investigation was utilized for an estimate of the frequency of sweet tasters in the general population, tentatively assessed at 7.16 per cent. The present report<sup>1</sup> gives data on the prevalence of sweet tasters for P.T.C., found in an independent series of young men and women.

### Material and method

Students at the university of Lund and probationers from Södra Sveriges Sjuksköterskehem (Training Centre for Nurses in South Sweden) were used for the investigation, of these 32 were men, aged 19 to 32, mean age  $22.2 \pm 2.9$  (S.D.) years and 35 women, aged 20 to 33, mean age  $22.9 \pm 2.2$  years.

They were examined with P.T.C. solutions prepared in accordance with Harris and Kalmus (1949) but with distilled water instead of boiled tap water. Dilutions (1:2, 1:4, 1:8 etc.) were prepared from a stock solution, containing 1300 mg. P. T. C. per litre solution. The stock solution was numbered 1 and the dilutions 2 to 14. The examinee was given four beakers with P. T. C. solution and four with distilled water and requested to arrange them according to taste.

The subjects were also tested with the following solutions for taste sensation in comparison with distilled water:

Substance	Concentration		
Quinine sulphate	0.00005%	0.00010%	0.00100%
Sucrose	0.1%	0.2%	2.0%
Hydrochloric acid	0.0015 N	0.0030 N	0.0300 N
Sodium chloride	0.04%	0.08%	0.80%

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Separate beakers made of paraffined paper were used for each solution. All solutions were kept at room temperature.

### Results and Discussion

The results of the investigation with P. T. C. solutions are given in Figure 1, which shows the threshold values of the 67 persons. Of these 16 (23.9%) are non-tasters if the dividing-line between tasters and non-tasters is drawn between solution 6 and 7. The threshold value is defined as the number of the weakest solution recognized by the examinee.

As indicated, 2 persons (2.99%) were able to distinguish correctly between distilled water and P. T. C. solutions which they declared as sweet and 4 persons (5.97%) classified the samples as "sweet and bitter". In the previous paper cited earlier a

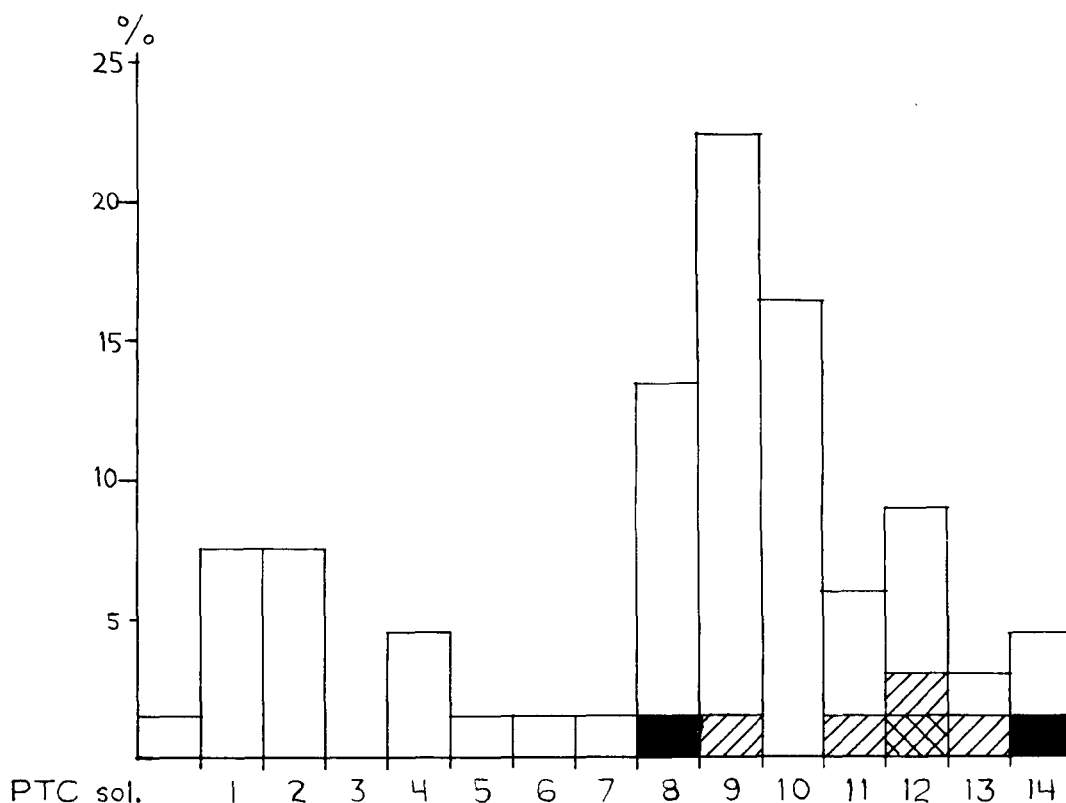


Fig. 1. P. T. C. threshold solutions for 67 persons. Black areas denote the persons who described the solution as sweet. Hatched areas indicate the persons who declared the solution as "sweet and bitter". The double hatched area indicates the person unable to define the taste

sweet taster was defined as a person who described any P. T. C. solution as sweet, before, after or simultaneous with a bitter taste, and who distinguished sweet from bitter when tested with various compounds. With this definition 6 (8.96%) of 67 persons were sweet tasters in this series, which agrees with the estimated value from the earlier investigation or 7.16 per cent.

The man, who described solution 8 as sweet, tasted solutions 7 and 8 as sweet, weaker solutions as tasteless and stronger solutions as bitter. A woman stated that solution 14 tasted sweet, she was able to distinguish this solution correctly, but found stronger solutions bitter. A man tasted solution 9 as both sweet and bitter. One man stated that solution 11 tasted sweet and musty, he was able to distinguish this solution, but found stronger solutions bitter. One woman was unable to define the taste of solution 12 but found stronger solutions bitter. Another woman reported that solutions 9 to 12 tasted sweet with a bitter after-taste, she could distinguish between these solutions and distilled water, solution 8 and more concentrated solutions were bitter. One man described solutions 11 to 13 as "sweet and bitter"; the bitterness increasing with the concentration of P. T. C., solution 10 and stronger solutions tasted bitter.

None of these sweet tasters for P. T. C. tasted any solution of the other compounds as sweet, except the solutions of sucrose. Sweet taste perception for quinine sulphate was found in 2 of the other 61 persons, for hydrochloric acid in 3, and for sodium chloride in 2 cases. In the control group of the preceding investigation 3 of 22 persons were sweet tasters for quinine sulphate, this gives a frequency of 3 to 14 per cent for sweet tasters for the used solutions. 22 (59.5%) of the probands (sweet tasters for P. T. C.) were also sweet tasters for quinine sulphate (Skude 1959). A comparison of the frequencies indicates an association of sweet taste perception for phenylthiourea and quinine sulphate.

The examinees often reported a bitter taste of a solution, when they were given a single beaker. When given 4 beakers with this P. T. C. solution and 4 beakers with distilled water, however, they were not able to assort them correctly. Correct assortment required a more concentrated solution. This might help to explain the low frequency of non-tasters (11.34%) in the examination of the school children in the preceding investigation, in which the examinees were given a single sample instead of an assortment.

### Summary

67 persons aged 19 to 33 were examined with P. T. C. solutions by the method of Harris and Kalmus (1949). Two persons (2.99%) distinguished between distilled water and a P. T. C. solution which they described as sweet. Four persons (5.97%) distinguished distilled water from P. T. C. which they, however, described as "sweet and bitter". When both these categories were regarded as sweet tasters, the frequency was 8.96 per cent.

The observed frequency supports the hypothesis of an autosomal dominant mode of inheritance for sweet taste perception for P. T. C. (Skude 1959).

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### References

- HARRIS, H. and H. KALMUS: 1949. The measurement of taste sensitivity to phenylthiourea (P. T. C.). *Ann. Eugen.*, Lond., 15:24.
- SKUDE, G.: 1959. Sweet taste perception for phenylthiourea (P. T. C.). *Hereditas*, 45 (4).

### RIASSUNTO

67 persone d'età tra i 19 ed i 33 anni furono sottoposte ad esperimento con soluzioni P. T. C. secondo il metodo Harris e Kalmus (1949). Due persone (2,99%) trovarono una differenza fra l'acqua distillata e la soluzione di P. T. C. che descrissero come « dolce ». Altre quattro persone (5,97%) identificarono le soluzioni di P. T. C. ma le trovarono « dolci e amare ». Unendo queste due categorie di persone la frequenza osservata di coloro che provano una sensazione di dolce sale a 8,96%.

La frequenza osservata dà appoggio all'ipotesi che la capacità di provare una sensazione di dolce assaggiando feniltiourea (P.T.C.) sia ereditaria secondo una dominante autosomale (Skude 1959).

### RÉSUMÉ

67 sujets âgés de 19 à 33 ans ont été examinés au moyen d'une solution de P.T.C. suivant la méthode Harris et Kalmus (1949). Il y en eut deux (2,99%) qui déclarèrent que le goût de la solution limite administrée était doux. Quatre autres de ces personnes (5,97%) trouvaient que leurs solutions limite avaient un goût « doux et amer ». Si nous réunissons ces deux catégories en une seule classe que nous appellerons les percepteurs de goût doux, nous obtenons une fréquence de 8,96%.

La constatation de cette fréquence soutient l'hypothèse selon laquelle la perception d'un goût doux pour la phénylthiourée (P.T.C.) serait héréditaire selon une dominante autosomale (Skude 1959).

### ZUSAMMENFASSUNG

67 Personen im Alter zwischen 19 und 33 Jahren wurden nach der Methode von Harris und Kalmus (1949) mit einer P. T. C.-Lösung geprüft. 2 Personen (2,99%) konnten zwischen destilliertem Wasser und P. T. C.-Lösung unterscheiden und beschrieben Letztere als süß. Vier Personen (5,97%) erkannten destilliertes Wasser zum Unterschied von einer P. T. C.-Lösung und beschrieben diese jedoch als « süß und bitter ». Wenn man diese beiden Kategorien als Süßgeschmacksempfinder betrachtete, so betrug die Häufigkeit 8,96 Prozent.

Diese Beobachtung über die Häufigkeit unterstützt die Vermutung, dass die Wahrnehmung eines süßlichen Geschmacks bei P. T. C. autosomal dominant vererbt wird. (Skude 1959).