**Phenylthiocarbamide (PTC) and the “taster” phenotype**

**Background on PTC:**

Believe it or not, the difference in people’s ability to taste PTC was first discovered by accident. While two researchers were (not carefully) working with PTC one complained about the bitter taste of the dust. The other researcher, surprised, did not believe that the dust tasted like anything (Fox, 1932). An inconspicuous discovery about two people’s differences in taste perception began seven decades of research into the topic that has only recently culminated in the discovery of the molecular mechanism for PTC tasting (Kim *et al.*, 2003).

 At the center of the matter is the fact that some people are able to unequivocally taste PTC while others are not. The ability to taste PTC has traditionally been viewed strictly under a dominant/recessive Mendelian framework where either you possess the ability to taste PTC or not. Like all things biological, the truth seems to be more complicated than that. In 2003, the GPCR for PTC tasting was identified and subsequent analysis has determined that people are not just “tasters” or “Non-tasters” (Kim *et al., 2003*). In fact, most “non-tasters” *can* taste PTC at a high enough concentration. Along the way to these discoveries, many correlations between PTC and other phenotypes were deciphered. For example, smokers tend to be “non-tasters”, women tend to be more sensitive than men to PTC (according to some), and people with a sensitivity to quinine (a bitter chemical) are also sensitive to PTC. Additionally, it has been suggested that age may affect the ability to detect PTC.

**Objective**

Each student will propose an experiment involving PTC and the “taster”, “non-taster” phenotype. Your experimental proposal should be an outline of an experiment you would like to conduct with your classmates as participants. The three best proposals will be selected by the TA and the very best of the three proposals will be decided by a classroom vote. A good proposal will consider many important aspects of experimental design, including:

- Bias : How do we keep people objective

- Sampling error: how do we overcome or negate sampling error

- Data Collection: What is the best way to collect the data for later interpretation?

- Negative or positive controls: can we include them?

- Confounders: how do we control for factors that can ruin our data?

Additionally, a good proposal will include testable statements (hypotheses) at which the procedure is aimed at answering. Examples of hypotheses we may want to test include:

- Do men and women differ in their ability to taste PTC ?

- Does the concentration of PTC matter to a taster or non-taster?

- Does a person’s age influence their ability to taste PTC?

- Is a smoker more likely to also be a “taster” (or *vice versa*)

- Do racial or ethnic considerations influence a person’s ability to taste PTC?

- Is there a correlation between sweet tasting (sucrose) and bitter (PTC)

There are many more hypotheses we can test than just the ones listed above. It is important that before you write the proposal you **review the primary literature** sources posted on the web at: [**http://bioserv.fiu.edu/~biolab/labs/Genetics/genetics%202009/Background%20Materials%20and%20Sources.htm**](http://bioserv.fiu.edu/~biolab/labs/Genetics/genetics%202009/Background%20Materials%20and%20Sources.htm)

Many of the ideas listed have been tested before and we are perfectly free to adapt their methods for our classroom environment. Realistically, you cannot write a worthwhile proposal without reviewing the literature on the website or without finding your own sources.

 The format of the proposal is not important so long as the proposal is organized and clear. Sometimes a diagram or series of diagrams can illustrate a proposal better than just words!

**Writing the Paper**

After the experiment has been conducted, each student is to write a journal style paper according to the requirements listed on the genetics website (see “how to write a paper” as well as samples 1 and 2). Your papers should attempt to analyze and interpret the data you collected. Your paper should also connect your work with the previous literature in a way that demonstrates how your work fits. This means making inferences, suggesting ideas, and discounting other ideas in your discussion (supported with literature citations). This should be done in a way that demonstrates to the reader how your work is relevant. Your paper must contain a hypothesis (or more). Your paper must not only analyze but also **interpret** your results.

**Materials**

To do your proposals you will need to know what resources are available in the classroom.

We will have available:

-PTC dissolved in water at a variety of physiological concentrations

- Tonic water with Quinine

- Drinking water for rinsing the mouth

- 24 human subjects (students) who can if required complete a short and anonymous questionnaire.

- Sucrose dissolved in water at a variety of concentrations

**Students can be asked to volunteer information about themselves such as age, gender, and smoking status. However, it is up to the proposal-writer to create a system whereby the students can remain anonymous to the rest of the class.**