Chapter 15

**OLFACTION AND TASTE**

1. Classic theories of taste perception have suggested that flavors are coded by a combination of basic taste sensations. The four basic tastes have generally been defined as sweetness, saltiness, sourness and bitterness. Recently, some researchers have suggested a fifth taste, umami, which corresponds to meatiness or savoriness. Can you think of any other possible “basic taste sensations”?

*Hints and discussions: Students may be stumped here though you can raise the possibility of whether spiciness or piquancy (the burning of capsaicin) are basic tastes. Metallic tastes also may be fundamentally different from the others.*

1. It is possible to take an analytic approach to the sense of taste. For example, the taste of an orange can be analyzed having a certain degree of sweetness, a fair degree of sourness, maybe a hint of bitterness (especially if you eat any of the pith), and very little if any saltiness. The flavor of an apple would thus be distinguished from an orange by a different combination of these basic taste sensations. But what about the sense of smell? Is it possible to analyze smells in the same way? Can you think of anything that would qualify as a “basic smell sensation”?

*Hints and discussion: The question should help students introspect about the nature of taste and smell experience. They may be unlikely to identify any sort of basic smell sensation.*

1. Anyone who has ever drunk orange juice after brushing their teeth knows about taste interactions. This one is an example of sensory suppression. Compounds in the toothpaste temporarily suppress the sweet receptors, altering the flavor of the orange juice toward the sour and bitter components. There are also sensory enhancers such as the famous “miracle fruit” Synsepalum dulcificum. After holding the berry in your mouth, anything you subsequently eat will taste even sweeter than usual. A compound in the fruit seems to enhance detection of sweetness. What other taste, or even taste and smell interactions, can you think of?

*Hints and discussion: This open-ended discussion is designed to help students think about the phenomena of taste, and of the relationship between taste and smell.*

1. Do you think it could be possible to localize the source of a smell? How can you tell where a smell is coming from?

*Hints and discussion: This question is designed to help students think about what sort of information is needed to specify the location of a smell source. A key piece of the puzzle is smell intensity. As one gets closer to a smell source, one passes through a gradient of intensities. As it turns out though, humans may not be very good at this, having only a rough idea of whether a smell is near or far. Other species, such as rats, have a remarkable ability to navigate by smell.*