Different types of papillae are located on different parts of the tongue. This observation has contributed to the theory (not entirely correct) that different parts of the tongue are specific to different taste qualities.

The Four Basic Tastes (cont’d)

- **Salty:**
  - Salt made up of two particles: Cation, anion
  - Ability to perceive salt: not static
  - Liking for saltiness is not static
  - Gestational experiences may affect liking for saltiness

The Four Basic Tastes (cont’d)

- **Sour:**
  - Acidic substances
  - At high concentrations, acids will damage both external and internal body tissues

The Four Basic Tastes (cont’d)

- **Bitter:**
  - Quinine: Prototypically bitter-tasting substance
  - Cannot distinguish between tastes of different bitter compounds
  - Many bitter substances are poisonous
  - Ability to "turn off" bitter sensations—beneficial to liking certain vegetables
  - Bitter sensitivity is affected by hormone levels in women, intensifies during pregnancy

The Four Basic Tastes (cont’d)

- **Sweet:**
  - Evoked by sugars
  - Many different sugars that taste sweet
  - Appetite and artificial sweeteners
The Four Basic Tastes (cont’d)

• The special case of umami:
  – Candidate for fifth basic taste
  – Monosodium glutamate (MSG)
  – Glutamate: important neurotransmitter
  – Safety issues in human consumption

The Taste Pathway

• Transduction occurs when different taste substances cause a change in the flow of ions across the membrane of a taste cell.
• Different substances affect the membrane in different ways.
  – Bitter and sweet substances bind into receptor sites which release other substances into the cell.
  – Sour substances contain H+ (hydrogen) ions that block channels in the membrane.
  – Salty substances break up into Na+ (sodium) ions which flow through the membrane directly into the cell.

The Neural Code for Taste

• What tastes do we taste?
  – The four basic tastes are sour, sweet, salty, and bitter.
  – All of our taste sensations can be described as a combination of these four basic tastes.
• Different taste receptors (and therefore different parts of the tongue) are most sensitive to different tastes.

Specificity vs. Distributed Encoding for Taste

• Specificity encoding:
  – There are fiber tracts that are responsible for a specific taste sensation (e.g., there is a "salty" tract, or a "sweet" tract).
• Distributed encoding:
  – A taste sensation is the result of a pattern of activation of the different taste cells. Substances that cause similar patterns of activation will taste similar.
Experience of Taste

- Your experience of taste depends on:
  - your internal state (things always taste better when you’re hungry),
  - on your past experiences (familiar foods generally taste better than unfamiliar foods),
  - and your genes (people have different sensitivities to certain tastes).

- Taste experience is also subject to effects of adaptation
  - Why does orange juice taste gross after you’ve just brushed your teeth?

- Our sensation of taste also depends heavily on smell and texture (touch).
  - Ever notice how food just doesn’t taste that good when you have a stuffed up nose?