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MAPPING TASTE SENSATION: HISTORICAL PERSPECTIVES AND MODERN RESEARCH

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The tongue is a muscular organ located in the oral cavity that assists in the mechanical processing of food, the act of swallowing, the formation of speech, and, most importantly, taste perception. Taste perception has always been a subject of scientific inquiry, evolving from early theories of localized tongue mapping to contemporary understanding of taste receptors and their variable influences. This literature analysis aims to analyze historical and modern perspectives on taste mapping, addressing key debates, taste disorders, and variations according to factors like gender and age.

Historically, the mapping of the tongue suggested distinct regional taste sensations (e.g., sweeter at the tip, bitter at the base), but modern studies disagree with this theory, leading to demonstrations that taste receptors for all sensations are broadly distributed across the tongue and oral cavity. Recently, five tastes were known: umami, sweet, bitter, sour, and salty. But in contrast, emerging research also identifies a 6^{th} taste sensation called oleogustus- also known as the taste of fat. (Running et al. 2016)

The tongue consists of tiny structures through which taste is known to have a perception, which are called papilla with taste buds. These taste buds consist of stratified squamous epithelium, which gives rise to microvilli on the taste receptor cells. Taste receptor cells expressed two types of the taste receptors: G-protein coupled receptors and channel-type receptors. Sweet, umami and bitter tastes tend to be mediated by G-protein coupled receptors while salty and sour tastes are mediated by channel-type receptors. Fat taste, which is elicited by fatty acids, taste may be detected by specific G-protein coupled receptors

The positions of these taste receptor cells determine why taste perception is not distributed in some locations of the tongue. However, when these structures have distortions or are destroyed, it can lead to taste disorders such as dysgeusia, hypogeusia, or ageusia. Techniques like Automated Fungiform Papillae (FP) quantification and Electrostimulation (e.g., Digital Lollipop) contributed to theories of the papillary density effect on taste perception. (Ranasinghe and Yi-Luen. 2016) For instance, higher FP density correlates with heightened bitter sensitivity, particularly in the anterior tongue.

Age and gender significantly modulate taste functionality. Children exhibit greater bitter sensitivity, but while aging, this ability tends to decrease, reducing taste acuity. When considering gender. Females consistently show superior taste sensitivity, likely due to hormonal influences, taste bud regeneration, and neural processing. (Ullah et al. 2023)

Thus, in conclusion, the tongue has an intricate anatomy supporting the function of taste buds or papillae while also understanding that various factors such as age or gender can also affect the perception ability of taste. Taste mapping is a dynamic interplay of anatomy (FP density), physiology (receptor distribution), and individual factors (age, sex, and genetics). At present, this tongue mapping is obsolete, but some research still is being conducted to investigate whether the taste can be mapped on the human tongue.