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Academic Advance

English is basic to the academic advance

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I have discovered again for the 4th time that the would-be medical students who understood English made up only 10 percent of this year's 170 candidates. The impact of this is tremendous--just imagine how could our doctors-to-be communicate in English which is getting even more popular. I am not saying that this is the end of the world, but rather to address a serious problem in hoping for the courage to tune the medical personnel's attitude to the positive side. And in the near future English could be demonstrated as a real language of medicine in Thailand. Here are the words to encourage the needy, "Even the native speakers have to learn their own languages, some unfortunate one towards Ph.D."

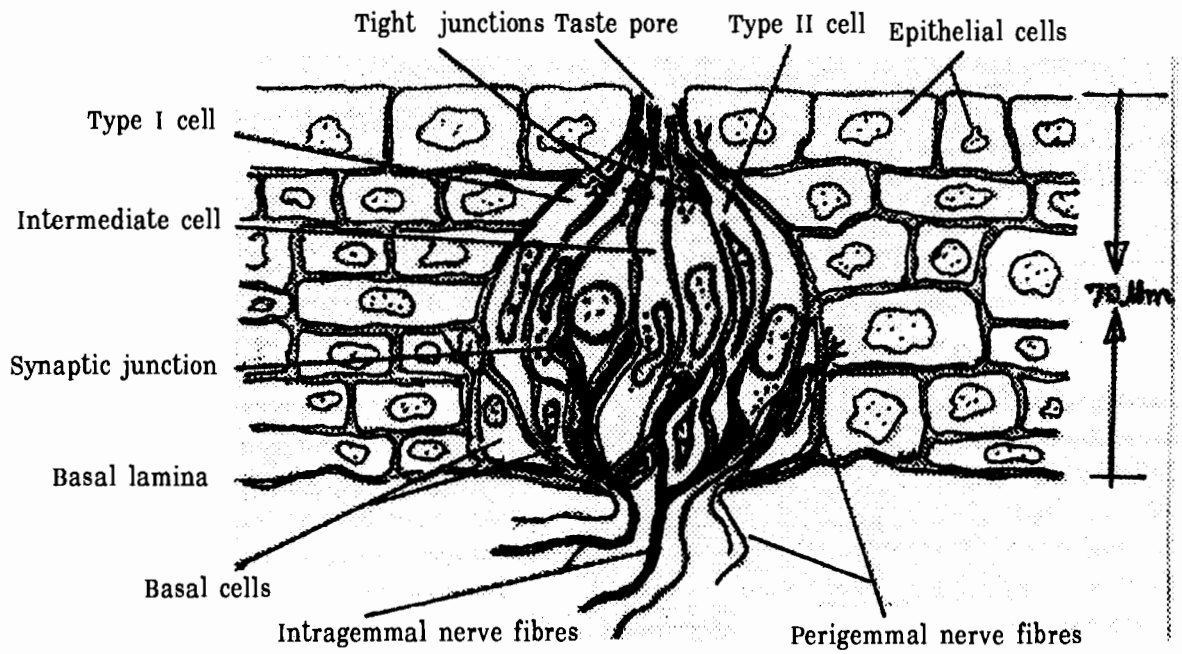
This issue of S M J is providing you an update on morphology of the taste buds and map of the tongue. Come and enjoy the new knowledge !

Morphology of the taste bud

(From BDJ October 9,1993)

Each taste bud consists of 50-150 neuroepithelial cells arranged in a compact, pear-shaped structure (see below). They extend from the basal lamina of the epithelial layer to the epithelial surface and the cells are arranged within the taste bud like the segments of an orange. A single taste bud is about 70 μm high and has a diameter of 40 μm. There is a small 2-10 μm opening in the epithelial surface called the taste pore which allows direct access of gustatory stimuli to the apical membranes of the exposed receptor cells. The cells within the taste bud are called intragemmal cells and cells adjacent to or on the periphery of the bud are called perigemmal cells. Those cells found outside the taste bud are extragemmal cells. There are bundles of filamentous material associated with the perigemmal epithelial cells. Recent ultrastructural studies have shed new light and controversy on the morphology of the intragemmal cells. There has been considerable speculation concerning the classification, lineage and functions of these cells. It is generally agreed that the taste bud is made up of cells of varying morphological types but there is still no firm agreement in the literature about the functions or classifications of these types. It is generally agreed that there are four types of intragemmal cell: basal cells, type I (dark cells), intermediate cells and type II (light cells).

The basal cell is a small, undifferentiated, round cell from which it is thought that the other cells are derived. The non-basal cell types are elongated,



bipolar cells and have been collectively termed gustatory or taste receptor cells because they extend from the basal part of the bud where they synapse with the afferent fibres to the apex of the taste bud where they have microvilli processes that project into the taste pore. The apices of these receptor cells are recessed within the pore and tight junctions between the receptor cells restrict the access of the gustatory stimuli to the apical microvilli.

Over half of the recptor cells are type I cells. These have long microvilli and dense, membrane-bound granules near the cell apex. The lighter, type II cells have an electron-lucent membrane and have shorter microvilli.

The intermediate cell types have morphological characteristics of both type I and type II cells. The existence and classification of these different morphological cell types does not necessarily imply that they have different functions or that they come from different cell lineages. There is no common agreement at present concerning the classification into different cell types or whether the different cell types are derived from one or more cell lines. Consequently, at present, it is not possible to do anything but speculate on the different functions of these socalled cell types. Recent evidence suggests that the different morphological types of cells represent different stages of cell development, with basal cells differentiating into dark cells, which in turn, develop into light cells. The intermediate cells being stages midway between the development of light from dark cells. However other evidence suggests that light cells are a separate cell line. The taste bud complex is a dynamic system in which there is rapid turnover of cells within each bud. The life span of an individual receptor cell is about 10 days. Cells are continually being born, maturing, performing their gustatory function and eventually dying.

Tongue maps

Finally, many readers will wonder why I have not added to the drawing of the tongue a map showing the areas that are sensitive to each of the four basic tastes. Many textbooks and detailed reviews contain pictures of the dorsal surface of the tongue showing sweet on the tip, salt on the front edges, sour on the rear edges and bitter on the back. According to Millar & Bartoshuk, in the book entitled *Smell and taste in health and disease* published recently, togue maps are incorrect. I quote from their review:

Tongue maps are incorrect. They owe their origin to a misunderstandung of the work of Hanig in the laboratory of Wilhelm Wundt in 1901. Hanig's thesis (written in German) concerned the thresholds of the four basic tastes on various loci; front, edges, and rear of the tongue. Hanig showed that the thresholds for each of the four basic tastes did not remain constant as locus was varied. Rather, the threshold for sweet was slightly lower on the front of the tongue, the threshold for bitter was slightly lower on the rear of the tongue, etc. For example, Hanig never meant that perception of sweetness occurred exclusively on the front of the tongue. The misunderstanding occurred when Boring, an experimental psychologist at Harvard, decided to present Hanig's data in a new way. He plotted the reciprocal of the threshold values to show the sensitivity of each area. The reciprocals were misinterpreted by subsequent readers who did not realize that the differences in sensitivities across loci were actually very small. An application of moderate concentrations of substances with the four basic tastes shows that all four tastes are perceived well on all loci with taste receptors. This explains my own observation of first year physiology taste practical classes, over a number of years, that students only manage to produce a tongue map after they have been informed of what is in the textbooks. It is the present author's hope that he has not perpetuated any similar misunderstandings during the course of this review.

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