connexion between the chemical composition of sapid substances and the different kinds of taste to which they may give rise. Thus acids are usually sour; alkaloids have a peculiar soapy taste; salts may be sweet, like sugar of lead, or bitter, like sulphate of magnesia; soluble alkaloids, such as quinine or strychnine, are usually bitter; and the higher alcohols are more or less sweet. Substances which taste sweet or bitter often contain definite groups in the molecule, especially in the hydroxyl (HO) and amido (NH2) groups. By altering the chemical composition of a substance having a characteristic taste (changing the position or relations of the radicles), the substance may become tasteless or intensely bitter. The sensation of taste may also be excited mechanically, as by smartly tapping the tongue, or by the stimulus of a continuous current. In the latter case electrolytic change may be the exciting cause; but that the sense organs may be stimulated electrically is proved by the fact that rapidly interrupted in­duced currents, which produce little or no electrolysis, may also excite taste. Sensations of taste are heightened by increasing the area of the tongue affected, and by mechanical stimulation, as when the tongue is pressed against the lips, cheeks or palate. A temperature of about 40º C. is most favourable, either ex­treme heat or cold apparently benumbing the sense for a time. Gustatory sensations affect each other: that is to say, a strong taste will affect the taste of another body taken immediately after it. Thus sweetness will modify bitterness, and sourness will modify both. Moreover, the application of a sapid sub­stance to the tongue will affect taste in other parts. If the same taste is excited on each side of the tongue, although there are two sets of gustatory nerves, one for each lateral half, the sensations are blended into one; while if two different sub­stances, say one sweet and the other bitter, are simultaneously applied, one to each side, the observer can distinctly differen­tiate the one from the other.

Tastes have been variously classified. One of the most useful classifications is into sweet, bitter, acid and saline tastes. Insoluble substances, when brought into contact with the tongue, give rise to feelings of touch or of temperature, but excite no taste. If solutions of various substances are gradu­ally diluted with water until no taste is experienced, G. G. Valentin found that the sensations of taste disappeared in the following order—syrup, sugar, common salt, aloes, quinine, sulphuric acid; and Camerer found that the taste of quinine still continued although diluted with twenty times more water than common salt. The time required to excite taste after the sapid substance was placed on the tongue varies. Thus saline matters are tasted most rapidly (∙17 second), then sweet, acid and bitter (∙258 second). There are many curious examples of substances of very different chemical constitutions having similar tastes. For example, sugar, acetate of lead and the vapour of chloroform have all a sweetish taste. A temperature of from 50º to 90º F. is the most favourable to the sense, water above or below this temperature either masking or temporarily paralysing it.

As a general rule, bitter tastes are most acute at the back of the tongue, near the circumvallate papillae, and sweet tastes at the tip, but there are considerable individual variations. Some persons taste both bitter and sweet substances best at the back, while others taste bitter things at the tip. Many experience salt tastes best at the tip, and acid tastes at the sides of the tongue. When we consider that there are three kinds of papillae on the surface of the tongue, one would expect to meet with different degrees of sensitiveness to different tastes, even while we admit that the papillae may also have to do with sensations of touch and of temperature. By experimenting with fine capillary tubes containing sapid substances, observations have been made with individual papillae. Some are found to be sensitive to many tastes, others to two or three, others to only one, while others are insensitive to taste altogether. Again, it has been found that a mixture of sapid substances, say of quinine and sugar, may taste sweet when applied to one papilla and bitter when applied to another. The inference must be that there are special terminal organs for different tastes. Assuming that there are different kinds of taste-cells, it might be possible to paralyse some without affecting others, and thus different sensations of taste might be discriminated. This has been done by the use of the leaves of a common Indian plant, *Gymnema sylvestre.* If some of these be chewed, it has been found that bitters and sweets are paralysed (neither quinine nor sugar giving rise to sensation), while acids and salines are unaffected. Again, certain strengths of decoctions of the leaves appear to paralyse sweets sooner than bitters. These observations show the existence of different taste-cells for sweets, bitters, acids and salines; and it is clear that the region of the tongue most richly supplied with taste-cells sensitive to sweets will respond best to sweet substances, while another region, supplied by taste-cells sensitive to bitters, will respond best to bitter substances. In like manner the argu­ment may be applied to other tastes. Suppose, again, a set of taste-cells sensitive to bitter substances: it is conceivable that in whatever way these were irritated, a bitter taste would result. If so, a substance which, applied to one part of the tongue, would cause a sweet sensation, might cause a bitter if applied to a part of the tongue richly supplied with taste-cells sensitive to bitters. This may explain why sulphate of magnesia excites at the root of the tongue a bitter taste, while applied to the tip it causes a sweet or an acid taste. Saccharine, a peculiar toluene derivative, in like manner is sweet to the tip and bitter to the back of the tongue. It has also been found that if the sweet and bitter taste-cells are paralysed by *Gymnema,* electrical irritation of the tip by a weak interrupted current does not give rise to an acid taste mixed with sweet, as it usually does, but to sensations somewhat different, which may be described as metallic or salt or acid. This experiment indicates that the action of the interrupted current on the terminal organ is analogous to the action of sweet or bitter substances (Shore). No direct observations of importance have yet been made on single circumvallate papillae. Further experiments with capillary tubes show that fungiform papillae destitute of taste buds, and areas of the surface of the tongue having neither papillae nor taste buds, may still, when stimulated by sapid substances, give rise to tastes. Taste is often associated with smell *(q.v.),* giving rise to a sensation of *flavour,* arid we are frequently in the habit of confounding the one sensation with the other. Chloroform excites taste alone, whilst garlic, asa- foetida and vanilla excite only smell. This is illustrated by the familiar experiment of blindfolding a person and touch­ing the tongue successively with slices of an apple and of an onion. In these circumstances the one cannot be distinguished from the other when the nose is firmly closed. Taste may be educated to a remarkable extent; and careful observation— along with the practice of avoiding all substances having a very pronounced taste or having an irritating effect—enables tea­tasters and wine-tasters to detect slight differences of taste, more especially when combined with odour so as to produce flavour, which would be quite inappreciable to an ordinary palate. As to the action of electrical currents on taste, observers have arrived at uncertain results. So long ago as 1752 J. G. Sulzer stated that a constant current caused, more especially at the moments of opening and of closing the current, a sensation of acidity at the anode (+ pole) and of alkalinity at the katode (—pole). This is in all probability due to electro­lysis, the decomposition products exciting the taste-bodies. Rapidly interrupted currents fail to excite the sense.

Disease of the tongue causing unnatural dryness may interfere with taste. Substances circulating in the blood may give rise to subjective sensations of taste. Thus santonine, morphia and biliary products (as in jaundice) usually cause a bitter sensation, whilst the sufferer from diabetes is distressed by a persistent sweetish taste. The insane frequently have sub­jective tastes, which are real to the patient, and frequently cause much distress. In such cases, the sensation is excited by changes in the taste-centres of the brain. Increase in the sense of taste is called *hypergeusia,* diminution of it *hypogcusia,* and