

The medical properties of tea.

What then is tea made of? 'Of the total solids extracted, some 40% are polyphenols, often referred to incorrectly as tannins, 20% are proteins and amino acids, 5% caffeine, 5% inorganic ions and 3% miscellaneous substances including lipids, carbohydrates and vitamins.'¹ Clearly the largest constituent is the polyphenols or 'tannins'. This tannin constituent was emphasized in the Japanese way of drying and making tea. As we have seen, the way of curing the tea seems to have been designed to keep the maximum amount of the natural juices in the leaf. As Morse wrote, 'The tea for home consumption is only slightly fired and therefore retains most of the aroma. As a consequence lukewarm water is all that is necessary for the first infusion, while with us, "unless the water boiling be", etc. is a well-know maxim.'² This may account for the unusually high tannin content. The tannin content was a good deal higher in green tea than black tea; one estimate puts it at 26 per cent to 15 per cent.³ Elsewhere it is estimated that while the loss of soluble tannins in green tea manufacture is 'slight', in black tea manufacture two thirds are lost. It may, however, be the case that the fermentation process of black tea, which increases the micro-organisms in the leaf may have compensated by creating some useful, bacteriostatic, or possible antibiotic, substances.⁴ Sometimes this was unpalatably strong, hence the methods of adding less than boiling water, pouring away the first brew etc. Once an acceptable mixture had been made, yellowish red with tannin and drunk without milk or sugar, a brew had been made that contained not only the stimulating effects of caffeine to revive the spirits, but an astringent content which probably lay in the tannin. What then is 'tannin'?

In 1911 tannic acid was 'official in both the British and United States Pharmacopoeias', being used in various medical preparations. These have an astringent taste, except when made into **gallic acid**. Its medical value is described thus. 'When applied to broken skin or exposed surfaces it coagulates the albumen in the discharges, forming a protecting layer or coat. It is moreover an astringent to the tissues, hindering the further discharge of fluid. It is a powerful local haemostatic, but it only checks haemorrhage when brought directly in contact with the bleeding point. It is used in the treatment of haemoptysis in the form of a fine spray, or taken internally it will check gastric haemorrhage....In the intestine tannic acid controls intestinal bleeding, acting as a powerful astringent and causing constipation; for this reason it has been recommended to check diarrhoea. Tannic acid is largely used in the treatment of various ulcers, sores and moist eruptions. The glycerin is used in tonsillitis and the lozenges in

¹Marks, *Clinical Effects*, 711

²Morse, i, 27

³Lloyd's *Encyclopaedic Dictionary*, 1895

⁴ For the increase of micro-organisms and the process of fermentation, see Ukers, *Tea*, i, pp.526-536.

pharyngitis. For bleeding haemorrhoids tannic acid suppositories are useful, or tannic acid can be dusted on directly. The collodium stypticum is a valuable external remedy.⁵

This description of the effects of one of the main ingredients of tea would no doubt have gladdened the heart of Eisai. But we can take the analysis one stage further. We may ask the question, what then is the powerful constituent in tannin which seems to act as such a strong disinfectant? Although this may not be the whole answer, part of it seems to be that tea tannin is another name for one of the most powerful antiseptics known to man, namely phenol.

Tannin 'is a hardening and astringent substance...⁶ Ukers provides a useful overview of the nature of tea tanins.⁷ We are told that 'Tannins may be subdivided into two groups; one group consists of esters of polyhydroxy compounds and phenolic acids...⁸ The polyphenol content is of central importance in tea. 'The quality of tea, as drunk, is largely determined by its polyphenol content, which is responsible mainly for the strength and colour of the infusion, its mouth-feel and the ability to form 'tea cream' - a precipitate of complexes of polyphenols with caffeine.'⁹ These polyphenols "are formed during conversion of fresh leaf to black tea by oxidation of flavanols, flavandiols and theogallin.' We have seen that 40% of the solid content are polyphenols.) What then are the virtues of polyphenols.

We know that 'Phenol was the first of the disinfectants and antiseptics and its germicidal activity was dramatically demonstrated by the work of Lister in 1867.'¹⁰ Lister first used 'carbolic acid, the remarkable efficacy of which in deodorizing sewage made Lister regard it as a very powerful germicide.'¹¹ If we look at carbolic acid, an obsolete name for phenol (hydroxybenzene), 'It has a characteristic smell, and a biting taste...and acts as a powerful antiseptic. It dissolves in water...' Carbolic acid 'is an efficient parasiticide, and is largely used in destroying the fungus of ringworm.'

⁵Enc. Britannica, 1911, s.v. tannin

⁶Enc. Brit.

⁷ Ukers, Tea, i, pp.516ff.

⁸Chambers Enc.

⁹Marks, Clinical Effects, 729

¹⁰Clegg, Man Against Disease, 174

¹¹'Lister' in Enc. Brit.

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Taken in even moderate quantities internally, it is poisonous, but if mixed with soluble sulphate, it may be safely consumed. For instance, 'Taken internally, in doses of from one to three grams, carbolic acid will often relieve obstinate cases of vomiting.'¹²

The polyphenols in tea are 'astringent', "these compounds are chemically quite distinct from hydrolysable or condensed tannins. Their reactions with protein - unlike those of tannic acid and other commercial tannins - are reversible and there is no evidence that they damage the intestinal mucosa."¹³ Furthermore, it is likely that the tea polyphenols, containing other condensed tannins, act in a different antibacterial way than that of phenol (carbolic acid).

¹²Enc.Brit. 1911 under 'carbolic acid'

¹³Marks, Clinical Effects, 730; cf also Stagg, Tea (xerox), 1447