

Food Microscopy

(An Annotated Bibliography)

PART IIIB. BEVERAGES

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Beverages comprise a wide range of very different products including chocolate, cocoa, coffee and tea (with or without substitutes), fruit drinks and juices, milk-derived drinks, mineral waters, vegetable juices and alcoholic beverages.

Much early work was done on the histology of the plant tissues involved in the manufacture of these various beverages; revived interest is being shown in the microscopy of these primary materials using newer techniques such as electron microscopy (TEM and SEM), fluorescence microscopy and histochemical methods.

Where coffee and tea are concerned, the microscope has been used in the detection and identification of adulterants and permitted alternatives, e.g. chicory. The phenomenon of "creaming" in concentrated tea infusions has been studied microscopically, and the morphology of the various types of coffee (ground, spray-dried and freeze-dried) is now well established. Less well studied are sediments and deposits left by coffee and tea infusions.

Considerable work has been done on the identification of fruit tissues and other particulates in juices and soft drinks, both by light and electron microscopy, and there is much interest in the micro-phenomena involved in the stabilisation of cloud in soft drinks. Other microscopical aspects studied include the microbiology of citrus products (including bacteriology and fermentation by yeasts), and the effects of concentration, freezing and ultrasonics on fruit juices. Spray dried fruit juices have also been studied microscopically.

The microbiological study of wine making stems from the work of Pasteur, and much early microscopical work on brewing and wine making is still extant. The light microscope is widely used for the classification, differentiation and identification of yeasts and for studying bacterial spoilage of wine. More recently, fluorescence microscopy has been used to investigate sediments in

beers, for the differentiation of dead and live micro organisms in wines, and for the quantitative analysis of yeasts in beverages; light and electron microscopy have been employed for the identification of asbestos fibres in drinking waters, beers and wines.

The following references provide an introduction to this very wide field.

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