The fact that the inflow of oxygen makes such a strong line as L_3 disappear completely shows that the O_2^+ bands must have enormous transition probabilities, just as mentioned by Price and Collins.

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X-Ray Examination of Tooth Structure

THE study of the structure of teeth by X-ray diffraction methods[1] has shown that the apatite crystals of the enamel are preferentially oriented whereas those of the dentine are arranged at random. The enamel orientation is such that the crystals tend to have the [001] direction (that is, the hexagonal axis) in common.

It was found in the case of human tooth enamel that the fibre-axis could take up one or both of two positions, referred to as orientation (i) and orientation (ii) respectively. Also variations in the extent of the enamel orientation were shown to exist. In addition, it was shown by radiographic methods that differences in degree of calcification between neighbouring portions of a tooth could be detected.

An attempt is being made to link up the variations in structure revealed by X-rays with the histology and surface texture of teeth, and the present note gives a very brief summary of some results recently obtained.

Sections of human deciduous teeth have been examined by X-ray diffraction methods and by radiographic methods, and the tooth surfaces have been examined by X-ray diffraction methods. 'Good' enamel has been taken to be enamel which is smooth on the surface, is free from pigmentation in section and does not take up stain. 'Bad' enamel, on the other hand, has been taken to be enamel which is rough or uneven in its surface texture, and is pigmented in section. The criteria chosen for 'good' and 'bad' enamel are in fact those put forward by Mrs. Mellanby in her "Diet and the Teeth"[2].

From the results so far obtained, it is tentatively suggested that it is desirable for the following conditions to be satisfied by enamel:

(*a*) Radiographs should give no indication of poor calcification.

(*b*) The enamel should contain a large amount of preferentially oriented apatite, the degree of perfection of orientation being high.

(*c*) Orientation (ii) should occur (see above).

A few of the individual results may be of interest. For example, the work shows that the arrangement of crystallites is, on the average, not the same at the surface of the enamel as in the interior. This is indicated by the fact that whereas orientation (i) is almost always predominant in the enamel sections, orientation (ii) is often predominant in surface enamel.

It has also been shown that, generally speaking, a tooth is entirely enclosed by a thin layer of hypercalcified tissue. The outer enamel layer may possibly act as a protective layer and play some part in preventing caries.

A further point concerns the nature of translucent zones in the dentine. It has been generally felt that these were zones of hyper-calcification, and the X-ray evidence has confirmed this view. Moreover, similar hyper-calcified zones exist which are not translucent to light but are of normal opacity.

The work is being carried out on behalf of the Dental Disease Committee of the Medical Research Council, to which I am indebted for permission to publish this note. A full account will appear elsewhere.

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Natural Sources of Fluorine and 'Mottled Teeth' in Maldon, Essex

ACCORDING to Leon Williams[1] "mottled enamel is an endemic dystrophy of this tissue. The teeth are characterised by a dead white and milky appearance which is varied by brown and yellowish spots and bands". Fluorine in the drinking water is now known to be the cause of mottled teeth. That such low concentrations as one part per million can be effective is remarkable[2]. Fluorine from chemical works or resulting from volcanic activity can get into soil and pasture and cause fluorosis in cattle[3].

To investigate to what extent, in a mottled teeth area, fluorine is likely to be taken in by man and animals by means other than in water, a few determinations of fluorine were made in materials obtained from Maldon, Essex, and its environs, the only region in England where mottled teeth have been recognised[4].

		Fluorine
Teeth of wild rabbit from	near Maldon	contained 0·0283 per cent.
,, ,, ,,	Surrey	,, 0·0053 ,, ,,
Grass from Maldon		,, 0·0003 ,, ,,
,, ,, London		,, 0·0001 ,, ,,
Pond water from Maldon		,, 1·2 parts per mill.
,, ,, ,, London		,, 0·5 ,, ,, ,,
Well water from Maldon		,, 5·0 ,, ,, ,,
Main water in London		,, 0·5 ,, ,, ,,

That very low concentrations of fluorine in drinking water can be effective might be explained by the fact that simultaneously fluorine is being ingested in plant and animal foodstuffs. Though such sources are less important, they should be considered as possible contributory sources. The reason why acquisition through the water supply has seemed to be the all important is no doubt due to the fact that the fluorine in water occurs as sodium fluoride, whereas in foodstuffs it more likely occurs combined with calcium, in which combination it is known to be less toxic.

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