

Nature of Dental Caries

IN a recent paper on the cause and nature of dental caries, J. J. Enright, H. E. Friesell and M. O. Trescher describe experiments designed to elucidate the part played by local factors in the etiology of this disease (*J. Dental Res.*, 12, 759; 1932). The authors first discuss the two chief theories of causation and point out that Miller's bacterio-chemical theory does not explain all the facts. For example, carious areas produced artificially by acid have not simulated natural caries in certain particulars; the carious process may halt for indefinite periods and, finally, dirty mouths are frequently free from caries. After a review of the relation of diet to dental caries, the authors conclude that improper diet is at least an important predisposing factor in the causation of tooth decay, since diets rich in vitamins A, C and D and yielding an alkaline ash, when utilised systematically during the period of development, produce teeth less liable to decay. After eruption, the structure of the enamel cannot be changed by factors acting from the pulp, because there is no circulation in this structure. Moreover, the ameloblasts, the enamel-forming cells, are lost at the time of eruption.

Clinical observation shows that caries begins at the surface of the tooth and only at certain parts of the surface, namely, in pits and fissures, and on the buccal, labial and proximal surfaces near the gum. It does not commence in areas which are scoured by the food during mastication.

In their first experiments, the authors investigated the action of lactic and citric acids at different pH values upon the enamel of isolated teeth *in vitro*. They found that artificial caries might simulate natural caries exactly, that all solutions between pH 4 and 8 etched enamel and that different enamels varied in their susceptibility to the action of the acids. Further experiments were carried out with the same solutions to which tricalcium phosphate had been added to saturation, since saliva is supersaturated with regard to this salt. It was then found that etching of enamel only occurred in solutions more acid than pH 5. It was also noticed that incipient

carious areas were insoluble in acid, apparently because they contained an increased amount of organic material: it is suggested that this explains why the natural process often comes to a stop, even when acid-producing bacteria are contiguous to the lesion.

In the authors' second series of experiments, cultures were taken from carious areas and from similar regions in the mouths of persons immune to caries and grown on blood agar and acid galactose-whey broth. Another examination of the same mouths was made 3-9 months after the first: a close correlation was found between the presence of lactobacilli on the first occasion and the advance or development of caries in the interval. The strains of lactobacilli obtained could be divided into two chief groups: Group 1 usually produces a smooth colony and acid without gas in glucose, galactose, levulose, maltose, lactose, sucrose, mannitol, sorbitol, dextrin and salicin, but no acid or gas in raffinose, arabinose, xylose or inulin. Organisms of this group grow at 15° C. and are agglutinated by a Group 1 rabbit antiserum. Group 2 usually produces a rough, fuzzy type of colony, and acid in glucose, galactose, levulose, maltose, lactose, sucrose and raffinose. This type may or may not produce acid in dextrin; it usually does not produce acid or gas in arabinose, xylose, mannitol, sorbitol, salicin or inulin. Strains of this type do not grow at 15° C. and are not agglutinated by Group 1 antiserum. Lactobacilli of intestinal origin can also be divided into two similar groups. The strains of Group 1 were the most commonly found in the mouth.

The evidence adduced in this paper confirms the view that caries is directly due to the growth of lactobacilli in the mouth, the acid produced decalcifying the enamel. Growth of the organisms and close contact of the acid with the teeth are favoured by the presence of food debris in their pits and fissures and between them. The authors state that tests on the results of reducing the number of organisms in the mouth are now in progress and will be reported later.

Fishery Research in Newfoundland

FOLLOWING upon a preliminary survey of the Newfoundland fishing situation and a report on it to the Empire Marketing Board and to the Newfoundland Government, a scheme providing for a five-year period of fishery research in Newfoundland was drawn up. Half the cost of installation and subsequent maintenance of the Laboratory is, by agreement, borne by each of these two bodies. The objects of the scheme are the investigation of the life-histories of the principal commercial fishes with the view of gaining a clearer understanding of their movements and natural fluctuations, and the improvement of some or all of the existing methods of processing and marketing of the fish and fish products. By-products and their possible utilisation also come within the scope of the investigations.

The Laboratory is situated in the outport of Bay Bulls, some 18 miles south of St. John's. It is housed in part of certain spacious fishery premises which, fortunately, were available for this purpose. The buildings are fronted by wharves standing in

water up to 20 ft. deep, so that steam trawlers can berth hard by the laboratory premises. Thus situated, right by the water's edge in an active fishing centre, and in the closest juxtaposition with a commercial concern, the Bay Bulls Laboratory appears to enjoy unique facilities for prosecuting fishery research—opportunities which it shows every indication of utilising to the full.

The scheme came into operation on April 1, 1931, and a report* upon the Laboratory's first full year's work has now been published, the main object of which is to indicate the general trend and progress of the various researches already under way.

In accordance with the scheme, the work of the Laboratory follows two main lines which may for convenience be termed (a) biological and (b) applied.

* Reports of the Newfoundland Fishery Research Commission. Vol. 1, No. 4: Annual Report for 1931. (St. John's, Newfoundland: Newfoundland Fishery Research Commission, 1932.) 1 dollar.