LEPLOTHRIX RACEMOSA IN OPEN CAVITIES.*

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The open cavity presents the advanced stage of the caries lesion. Usually the disease process is active, and is progressing at an accelerated rate. This results from the larger receptacle for retention of food material which undergoes decomposition within the cavity. If fermentable carbohydrates are present acids are produced. Such acids decalcify tooth substance - both dentin and enamel - and thus promote advancement of the lesion.

The bottom and sidewalls of the cavity are covered with a pad or film of bacterial material consisting largely of filamentous types of organisms with one end attached to the decaying dentin, the other extending outward towards the surface of the pad. At the surface there are the growing ends and fruiting heads of the long rods and filaments composing the pad, and also a great variety of other organisms from the decomposing food material within the cavity.

The purpose of this paper is to report the frequency of the presence of Leplothrix racemosa, based upon finding the fruiting heads of this organism, in cavities in a miscellaneous collection of extracted tooth specimens.

Materials and Methods

One hundred permanent teeth (75 molars, 16 bicuspids, 4 cuspids, 5 upper centrals) with large open cavities were selected from a miscellaneous collection of extracted teeth received from extraction clinics in New Orleans, and preserved in 10% formalin. They were rinsed in water,

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stained in crystal violet (0.5% in water) for about one minute or longer and then rinsed again in water. Under the dissecting microscope, with appropriate lighting from above, material was picked from the bottom or sidewalls of the cavity, teased out somewhat in a droplet of 50% glycerine (in water) on a slide and covered with a one-fourth size coverglass. The preparation is now ready for microscopic examination.

The method of handling stained tooth specimens and the facilities previously described for another purpose are also quite satisfactory for this purpose. Especially useful for removing material from the tooth for microscopic preparations in studying the composition of the film pad, is a teasing needle made by grinding to spade or spatula shape a No. 10 silver steel sewing needle driven (eye end) into a four inch length of three-sixteenths inch wooden doweling. This instrument is especially useful to run under and lift (dig) off bacterial film without breaking it up too much, as occurs when it is scraped off with other instruments.

Similarly made teasing needles, ground to very sharp, keen points, are best for teasing apart, under the dissecting microscope, as required, lumps of the film pack, to search for the fruiting heads of L. racemosa.

Prepared in this way many of the small particles of filamentous material chance to be mounted so the part from the outer surface of the pad where the fruiting heads are found lies in one direction and the deeper part, which was attached to the tooth, lies in the opposite direction. Many of the rods and filaments lie more or less lengthwise in the preparation. Usually it is not difficult to know which part of a particle represents the outer surface of the pad, when it was in situ. The fact that the pad is composed of filamentous type organisms is readily observed. If the specimen is stained for only a short period (less than one minute) the filaments and fruiting heads at the surface are heavily stained, whereas the filaments and stems are stained less or not at all, in the deeper part.

Twenty-five deciduous molars were selected from the same miscellaneous collection and were examined in the same way for fruiting heads of L. racemosa.

Whenever the first preparation from a given specimen in either lot was found negative or unsuitable a second and sometimes a third was made and examined.

At the time preparations were made and examined from cavities, preparations were also made and examined from heavy bacterial film on the surface of the tooth. With experience one soon learns to pick material from the surface (depressions and protected locations) where fruiting heads are most abundant and are most likely to be found.

Results

The findings are presented in the following table:

	Number Examined	+ cavity + surface	- cavity + surface	- cavity - surface	Total
Permanent Teeth	100	76	14	10	100
Deciduous Teeth	25	21	0	4	25

Of the 100 permanent teeth there were 76 in which fruiting heads of L. racemosa were found in the cavities and also on the surface. Of the 24 in which no fruiting heads were found in the cavities they were found on the surface of 14. Both cavities and surfaces were found negative in 10.

Of the 25 deciduous molars fruiting heads of L. racemosa were found both in the cavities and on the surface of 21, or 84%. The 4 with negative cavities also had negative surfaces.

Discussion and Comment

So far as I know L. racemosa has not been isolated in pure culture. Therefore we do not know the rate of growth of individual organisms or the influences that control fruiting and germination of spores. Neither do we know the nature of the metabolic products. All that can be said at present is that the stems of this organism are present among the different filamentous type organisms composing the more or less constant film pack on the surface of teeth, and now also in open cavities. There is no reason to suppose that this organism bears any specific relation to caries, with the exception that it is an important component of the bacterial film (plaque material) on teeth and in cavities, without which lesions do not originate or advance.

Viscentini, who first directed attention to this organism(2) claimed it was present in all mouths. J. Leon Williams stated(3) that "it is common to all mouths which I have examined." Beust recognized(4) wide prevalence of the organism. I have found it present on most of the hundreds of extracted tooth specimens from miscellaneous sources which I have examined for it.

Summary

Fruiting heads of L. racemosa were found in 76% of the open cavities in permanent tooth specimens and in 84% of those in deciduous molars.

References

1. Bass, C. C.: A Demonstrable Line on Extracted Teeth Indicating the Location of the Outer Border of the Epithelial Attachment. J.D.Res. 25:401, 1946.
2. Viscentini, F.: Bacteria of the Sputa and Cryptoganic Flora of the Mouth. London, Balliere, Tindall, and Cox, 1897.
3. Williams, J. Leon: A Contribution to the Bacteriology of the Human Mouth. Dent. Cosmos, 41:317 1899.
4. Beust, Theo. B.: Morphology of the Micro-organisms of the Oral Flora, J. Am. Dent. A. 14:389, 1927.

Legends for Illustrations

Fig. 1. Section (unstained, incident lighting) through bottom of dentinal cavity showing heavy bacterial film, BF, attached to decaying dentin, D.

Fig. 2. Section (unstained) through sidewall of cavity showing heavy bacterial film, BF, attached to disintegrating dentin, D, and some broken-off loose particles of dentin, DP.

Fig. 3. Section similar to Fig. 2 except outer part of bacterial film has been teased off, bringing out filamentous nature of organisms, FO, composing the deeper part of the pad.

Fig. 4. Section of bacterial film in open cavity embedded in egg albumin, thereby retaining growing ends and fruiting heads at the surface, including L. racemosa; filaments only, deeper in.

Fig. 5. Particle of bacterial film from open cavity, prepared by the method described in this paper, showing fruiting heads of L. racemosa at the surface side and filaments only deeper in, all the way to the attachment side.