

**DENTAL CARIES AND ITS CAUSES.
AN INVESTIGATION INTO
THE INFLUENCE OF FUNGI IN
THE DESTRUCTION OF THE TEETH**

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Dental Caries and Its Causes. An Investigation into the Influence of Fungi in the Destruction of the Teeth by Leber and Rottenstein

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LEBER AND ROTTENSTEIN

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IN THE DESTRUCTION OF THE TEETH.

BY

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WITH ILLUSTRATIONS.



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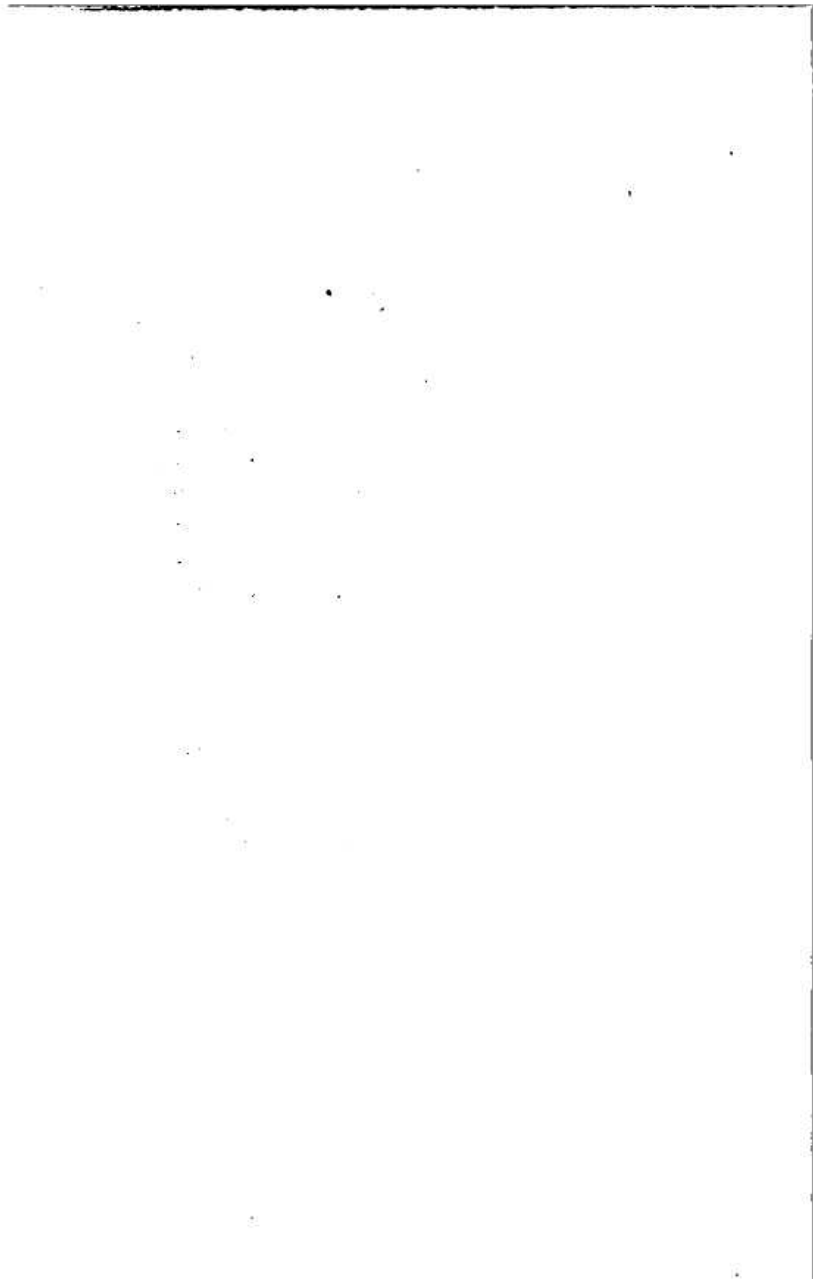
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1878.

P R E F A C E.

WE submit to the English Medical and Dental Professions the translation of a work published simultaneously in Germany and France, which contains the exposition of a theory of the process of Dental Caries. This question bears so much the greater interest as the parasitic theories become more and more the question of the day, and have gained considerable ground within the last few years. They offer, in fact, to Pathology the most satisfactory solutions, and furnish us with the most rational means of combating a number of affections which up to the present day have been ineffectually treated by therapeutic agents.

The theories which are here expounded are founded on research, and on facts so numerous that they are almost beyond any serious question. They have now the sanction of experience and of competent authors and investigators. In Dental Pathology they offer new resources of prophylactic treatment. We therefore believe that in submitting to the profession in England this work, we contribute to the progress of science; and we hope that it will receive the same favour as in Germany and France.





INQUIRIES
INTO
DENTAL CARIES.

I.

*RÉSUMÉ OF THE INQUIRIES MADE, UP TO THE
PRESENT DAY, INTO THE NATURE OF
DENTAL CARIES.*

UNDER the name of Dental Caries is comprehended a pathologic process which, after having more or less softened and destroyed the tissues, occasions a loss of substance, and ends, after the destruction of the pulp, in the entire loss of the dental organ. This process has nothing in common with caries of the bones but the name. It differs from it entirely in its nature. Nevertheless, the name of caries has come into so common use that it would be difficult to replace it by another, and as for the rest, no one will ever confound dental caries with the affection of the bones which passes by the same name.

The nature of dental caries has for ages been the subject of investigation. The ancient physicians, the dentists of their times, who engaged in this inquiry, confined themselves to making hypotheses more or less ingenious, and founded them upon experience and clinical observation. Investigation, in its proper sense, was only possible when the histologic structure of the dental tissues was known.

For a long period two hypotheses held a balanced sway:

one, *chemical*, explained caries by the action of chemical agents, acids in particular; the other, *vital*, considered dental caries as a veritable malady, caused by an organic change, and the reaction of the dental tissues against an external irritation.

The defenders of the chemical theory did not trouble themselves about the vital properties of the dental tissues. Some denied that the developed organs had any such properties; others thought they possessed so little energy that they must always yield under the action of injurious agents, without being able to react in any manner against this irritation.

For them the process followed its course just as though the vital properties had never existed.

These different opinions remain to-day unsolved in spite of the researches which have been made upon this subject. It is true, that in these later days, the chemical theory has seemed to have the upper hand, although quite recently an attempt has been made to reinstate the vitalist theory by the aid of histologic investigations. But by the side of these two hypotheses, other observers, particularly in Germany, assert the parasitic character of caries, attributing it step by step to the action of animal or vegetable parasites.

The results published by these latter authors have not as yet been criticized very vigorously; for, accepted too hastily, in Germany especially, they seem completely ignored in other countries. Messieurs Klencke and Ficinus were among the first to occupy themselves with the histologic alterations of the teeth, and, although their labors have no longer any more than a purely historic interest, we will yet give a short résumé of them.

Ficinus attributed dental caries to a putrefaction produced by the minute infusorial animalcules which live in the mouth and to which he has given the name of *Denticola*. These infusorise are found in great numbers in the mucus which covers the teeth, as well as in the carious cavities. They produce, according to him, a kind of putrefaction which, after having first attacked the enamel cuticle, pro-

ceeds to consume the enamel itself and afterwards the dentine. He thinks that the fibres described by Bühlmann, and which are no other than the filaments of the *Leptothrix buccalis*, derive their origin from the infusoriæ which he calls *denticola*, and that the former are formed by contact with the latter.

But this theory does not explain the disappearance of the calcareous salts, which are soluble only in acids, while the process of putrefaction supposes an alkaline reaction.

The investigations of M. Klencke were published a little later. This author adopts several opinions offered by M. Ficius, but he admits, besides the process of putrefaction, several species of caries.

And first he distinguishes central caries from the common peripheric caries. The former commences in the cavity of the pulp, the latter in the external portions of the teeth.

He also subdivides this latter into three different kinds.

1st. A soft caries, caused by putrefaction.

2d. A soft caries, due to the proliferation of a vegetable parasite called *protococcus dentalis*.

We must remark here that the existence of this epiphyte has not been confirmed by later observers, and that, in spite of all the pains which we have taken in the search for it, we have not been able to find it.

3d. The so-called dry caries, with which the parasites have nothing to do. It is caused by the chemical action of acids upon the dental tissues.

The histologic alterations of which the dental tissues are the seat in caries, were described for the first time with accuracy by Mr. J. Tomes. According to this author, the changes of the enamel are caused, in the majority of cases, by an imperfect development, with a greater porosity of the tissues; a porosity which increases with the progress of the caries.

The canaliculi of the dentine present remarkable alterations during caries. In a cross-section we see them surrounded by a thickish sheath. One might say that the contours of the old cells of the dentine are re-established, and

that the tissue is resolved into its primitive elements of formation. We know, in fact, that the dentine is formed at the expense of cylindrical juxtaposed cells which unite during the ossification of the dentine and become impregnated with calcareous salts. The dental canaliculi alone remain free in the mass with the soft fibrils, discovered by Mr. Tomes, in the very centre of these canaliculi.

In a more advanced stage the elements lose the sharpness of their contours and the entire tissue takes a finely granular aspect. If the destruction is rapid, we find, on the contrary, the canaliculi expanded and with badly defined contours.

The pathologic alteration proceeds along the canaliculi towards the cavity of the pulp, giving, in most cases, to the carious portion of the dentine the form of a brownish cone, with the base turned outwards. In cases where a more extended surface of the enamel has been attacked at once by caries, and where the destruction proceeds rapidly, the cone may exist incompletely, or be entirely wanting.

Around the cone is found a zone relatively transparent, in which the canaliculi contain dental fibrils calcified, which are often separated into portions more or less long, and in some preparations extend beyond the extremities of the canaliculi.

Mr. Tomes attributes this calcification of the canaliculi to an organic reaction of the dentine against the pathologic irritation, and he believes that it retards or arrests the progress of the caries.

Another manifestation of the vital properties of the dentine consists, according to him, in the augmentation of sensibility in this tissue which is observed in some cases of caries. He concludes from this that the dentine is sensitive of itself, and not through its neighborhood to the pulp.

According to Mr. Tomes, acids are the principal cause of dental caries. After having first destroyed the vitality of the parts the acids decompose them little by little. But we do not succeed in producing artificially, by the action of acids upon the dentine, histologic changes like those which we observe in carious teeth. Nevertheless, the decalcification,