

**DENTAL CARIES, A
CRITICAL SUMMARY;
AND THE PREVENTION OF
DENTAL CARIES**

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Dental Caries, a Critical Summary; and the prevention of dental caries by Henery Sewill

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HENERY SEWILL

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BY

HENRY SEWILL, M.R.C.S. & L.D.S.Eng.

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P R E F A C E .

IN the hope that these Papers may facilitate the Study
of the most important of Dental Diseases, the Author
publishes them in a permanent form.

6, WIMPOLE STREET,

October, 1884.

DENTAL CARIES: A CRITICAL SUMMARY.

At the April meeting of the Odontological Society I attempted an impossible feat. In opening the discussion on Mr. Arthur Underwood's paper I attempted to bring the whole subject of the etiology and pathology of caries within the limits of my speech. After proceeding for some length and having barely entered upon the first topics of the subject, I became aware that I had already disposed of a large portion of the time of the meeting without yet fully reaching the proper topic of debate, namely, the influence of micro-organisms in the production of the disease.

Much to my surprise, so absorbed had I been in my subject, I saw, on glancing at the clock, that I had already spoken for full twenty minutes. It was obviously useless to proceed. I had opened my subject in a manner too elaborate to allow me to complete my argument, and I therefore at once cut short my remarks. It has been suggested that I should amplify my speech, conclude it, and publish it in the Journal. I have willingly adopted the suggestion. I think it will be useful to bring together very briefly most of the main facts which we possess on the subject of the etiology and pathology of caries, and the most cogent proofs upon which these facts are based. This has not been hitherto done. There are only two works which deal exhaustively with the subject—Wedl's Pathology of the Teeth, and Messrs. Tomes' well-known Manual. The former of these, of which an American translation exists, is a most masterly work. Written by one of the most distinguished of living professors of general pathology, it is free from the narrowness which it is so difficult for any specialist to avoid, however philosophical his mental attitude. It is exhaustive; leaves no fundamental fact of any kind, and no observation of any respectable investigator unexamined; and to

dispute the clearly demonstrated deductions which it formulates is impossible. Messrs. Tomes' work is too well-known to need description; that too is deep, broad and complete, and largely based, like Wedl's, on original research. These authors are in essential points in full agreement; and although neither required the corroboration of the other, being each alone strong enough to prove his case, their agreement makes assurance doubly sure that their views are incontrovertible. But the facts are scattered through many pages, and are built up from an elaborate though necessary foundation of anatomy and physiology. Some of these fundamental truths of physiology which are really indisputable have been vaguely controverted by some recent speakers and writers.

I shall, in these papers, endeavour shortly to state what I believe we really know about caries, and to point out the fallacies of recent writers. And I must premise that I do not speak as an investigator. I deal only with facts established by others, for I have never carried out any research of more than the least importance in the pathology of caries. In view of these facts we may thus define the disease. Caries is a process of disintegration, commencing invariably at the surface, proceeding inwards, and due entirely to external agents; enamel and dentine are perfectly passive under this process of disintegration, and manifest neither pathological action nor vital reaction of any kind.

By pathological action I mean—(1) morbid changes in the tissues induced or produced by the influence of the vascular and nervous system; and (2) morbid changes in the tissues in which changes vascular and nervous influence may, perhaps, have no share, but which are not produced by external agents. By vital reaction, I mean any change in the tissues not solely induced and produced by external agents.

This definition of caries may be established on anatomical grounds. What concisely are the anatomical characters of enamel and dentine. Enamel is a densely hard almost homogeneous mass, ranking in hardness with quartz, mainly composed of phosphate of lime, and containing a mere trace, not more than three to five per cent., of organic matter barely discoverable on solution of the tissue in acid. Bödecker has recently stated that he has demonstrated this organic matter regularly distributed throughout the tissue. His observation has not yet been confirmed, and it seems doubtful whether matter in a state of such extreme tenuity

as this is so demonstrable. Enamel has no vascular or nerve connections. Dentine consists of a homogeneous calcareous matrix, in which no trace of cellular or other structure can be detected, ranking in hardness between enamel and the densest bone, permeated by minute tubes not more than $\frac{1}{43,000}$ inch in diameter. The tubes radiating from the pulp cavity, are occupied by fibrils which, proceeding from the pulp, endow the tissue with sensibility. The fibrils being so minute, their actual structure cannot be demonstrated; but there can be no doubt they are protoplasmic, and form the sole protoplasmic constituent of dentine.

The organic basis of dentine, about 28 per cent. of the mass, is contained mainly in the inner walls of the tubes surrounding the fibrils. It can be demonstrated by dissolving the earthy constituents in acid; and remains as a tough felt, even after boiling in strong muriatic acid. No cellular or protoplasmic elements are discoverable in this fibrous structure.

Dentine is in relation with the vascular pulp which it encloses, but a circumstance should be remembered which is seldom mentioned in this connection, that the vessels are not in intimate contact with the dentine—a layer of odontoblast cells, the *membrana eboris*, intervening. The dental pulp consists of vessels and nerve fibres with numerous cells and delicate connective tissue, and, it contains no absorbents (a fact of some importance), or at least none have been demonstrated in its structure.

A consideration of the anatomy of enamel and dentine—unique in the body—would, it might be supposed, be alone enough to show that they are incapable of anything like pathological action, that such action in enamel is inconceivable, and in dentine hardly possible. Wedl is the only authority with whom I am acquainted who emphasises this fact, and who rightly, in my opinion, dismisses many false speculations with the simple statement that on anatomical grounds they are impossible. I do not know whether we all ought to disregard disputers who seem to believe in various occult forces and phenomena, irreconcilable with fundamental truths of anatomy and physiology. I think a great authority like Wedl in a grave philosophical treatise may well disregard them, but I fancy they may be usefully exposed in the columns of a periodical publication.

Pathology must have its basis on anatomy and physiology; and, one might think so obvious a truth need not be stated, as that no apparent pathological phenomenon incompatible with indisputable facts of these sciences can be accepted. In presence of

our knowledge of the structure of the teeth, which, strangely, they do not seem to dispute, some recent writers and speakers have glibly talked of inflammation of enamel and inflammation of dentine; of retrograde metamorphosis of the dental tissues, and of the influence of "vital force," and of "diminished vitality" of the hard dental tissues as predisposing causes of caries. Anyone acquainted with the meaning of these terms must feel disposed to pass by such utterances with the ridicule which their gross and palpable absurdity richly deserves. But astonishing as it may seem, some of these views have been adopted and repeatedly expressed by a metropolitan teacher of dental surgery, and the hypothesis of retrograde metamorphosis has been seriously adopted by a scientific officer of a well-known society. It seems, therefore, worth while to attempt an elaborate refutation of these fanciful views, if only for the sake of the student; he, at least, seems in danger of being confused by such teachings, put forth with what to him must appear *ex cathedra* authority. It is indeed for the student that I mainly compose these papers. I cannot believe there can be any considerable number of educated practitioners who will support fantastic theories, solely based upon vague impressions and incompatible with science. Writers who, without first overthrowing established fundamental truths and forming a new basis for their hypotheses, construct elaborate theories, or put forth dogmatic statements, irreconcilable with those truths, seem to me beyond the reach of argument. Their style of reasoning reminds one of the mental attitude of certain individuals described by George Eliot. She speaks of some people who may with difficulty be made to agree that, as a rule, two sides of a triangle are together greater than the third side; but who will qualify the reluctant admission by the reservation that one must, however, be careful, for there is such a thing as carrying mathematical reasoning too far. A man who can speak of inflammation of enamel and dentine, or of retrograde metamorphosis of those tissues, must indeed, in a like fashion, believe that anatomical fact may be carried too far, and that it is better to rely, sometimes, not upon facts, but rather upon the phantasms of a vivid imagination.

Later on I shall come to deal fully with the arguments which have been put forth against the view, but shall now proceed with the proof of the truth of the above definition of caries. Admitting that the direct exciting cause is to be found in external agents, we must enquire what agents exist in the