Quotes from and Notes on: A work of Operative Dentistry in Two Volumes

Volume One

The Pathology of the Hard Tissues of the Teeth

by Greene Vardiman Black 1908

Published over 110 years ago, G. V. Black's signal work speaks to the profession yet. Please enjoy these quotations as if they were stated today.

Michel B. Haynie D.D.S.

P1- “The injuries which occur to the hard tissues of the teeth during their development and which occur to them by accident or disease after they have grown, are peculiar to the enamel and dentin.

P1-P2- “As these tissues are not subject to inflammation nor to physiological or pathological changes in the same sense in which these occur in soft tissues and the bones and as they are amenable to treatment only by artificial repair, it seems especially fit and desirable that these be considered in a group to themselves.”

P2- “The subject of dental caries and its treatment is and must remain the most important subject in conservative dentistry. No great improvement in its treatment can be had without improvement in the understanding of its causation, the conditions of the beginnings of caries of the enamel and the means to be employed in the prevention of its recurrence about the margins of fillings. To this end, extensive studies have been made of this particular phase of the subject with the view of placing that which is now known in systematized, usable form for both students in dental schools and for practitioners.”

P2-P3- “This has seemed necessary because of the general disregard of the study of dental caries in its relation to treatment by filling shown by most recent writers. It is intrinsically wrong to treat the subject of filling teeth simply from the mechanical standpoint; it is wrong in that it tends to produce in the minds of students the idea that filling teeth is a purely mechanical pursuit. In filling teeth, the closest use of our knowledge of the pathology of dental caries and of the local conditions of its occurrence, and of its recurrence after fillings have been made, should be put to full use in every case, in order that the greatest benefit may be derived from filling operations.

P3- “The fact has been kept prominent that immunity to dental caries, which may be complete, or which will approach completeness, even in persons, who, as children were very susceptible to caries, will become established in early adult life in the larger proportion of cases in which effective protection has been given by filling operations, by continuance pf active mastication of food, and reasonable care as to cleanliness. This matter, which was neglected because of previous misinterpretation of observed facts, is with continued observation, assuming greater importance in dental practice. The systemic conditions producing changes in the saliva on which susceptibility and immunity are based.”

P4- “In the technical procedures in filling teeth, the details of the adaptation of instruments to the work of cavity preparation have been brought into close systematization through notes of practical work at the chair representing actual operative experience.

“Every detail of cavity form is systematized and brought under a system of nomenclature comprised under a very few efficient rules…”

P26- “….Showing many wrinkles and deep fissures, it is generally best to grind away any small, sharp spiculae of cusps that are liable to be broken in chewing food. Then, if decay has not actually begun in the fissures, these may be dried out and filled at once with oxyphosphate of copper cement without further preparation. Often such a course will be necessary in order to do anything that will be of service to the child. A good article of this cement is often very adhesive and will remain for a considerable time in a very slight crevice and seems to prevent the beginning of decay. In the deeper fissures in which decay starts earliest, it will do excellent temporary service. When decay has made some progress the softened material should, if possible, be removed after breaking away any phosphate of copper. In many of these cases even this slight preparation will appear impracticable.”

P27-“Gold Cap” “There should be no attempt to make a full gold shell crown”

P28-“Generally the crowns will have to be made rather flat and the cusps short in order to prevent raising the bite excessively.”

28-“It is the duty of every dentist having families in his charge to see to it carefully that these atrophied molars are taken care of in this way, or some similar way, very early. After the patient has grown older the teeth have come further through the gum, other devices may be used if thought necessary.”

P29-“…. But that roots may be filled in such a manner that they may do service for the lifetime.”

P50-51-“Dr. C.R.E. tried by every device he could think of to produce the conditions seen in erosion by the use of brushes and brush wheels, aided by acids in some cases and by alkalies in others. His conclusion was that it could not be done in any of these ways. He did not have the modern electric motor to run his brushes however.”

51-“… that had the sharp, clean-cut margins so often present in the real things as it occurs in the mouth.”

P57-“I have made considerable effort to reduce the evil results by inserting fillings, but can report but few successes, and am now of the opinion that some of these apparent success were due to a coincident spontaneous stoppage of progress of the erosion, rather than from the influence of the fillings.”

57.-“…. Modern process of porcelain crowns had become successful. The treatment was simply horrible from the esthetic standpoint, but it gave the patient the full use of her teeth with perfect comfort for the remainder of her life.”

P58-“Burnishing” “By severe burnishing”

P61-(1530)”Then for the saving of the remaining parts of the tooth, the cavity is filled with gold leaf.”

P62-“Fouchard… preferred lead or tin leaf (foil)”

P62-“John Hunter writing in English (1778)… decay deserved name of mortification.”

62-“Fox(1806) Bell (1825)… dental gangrene to the place of the more common terms decay or caries.”

62-“Koker of the Philadelphia (1830) speaks of decay penetrating the enamel..”

62- “Robertson (1835) …. Is more explicit in detail. According to this view, caries of the teeth resulted from the action of an acid generated by the decomposition of food particles or fluids, which lodged at particular points about the teeth and dissolved out the calcium salts of which the teeth are composed. These points of lodgement were shown to be the points at which caries made its beginning, as in pits and deep grooves in the occlusal surfaces, between the teeth, or about the margins of the gums.”

P63- John Tomes (1860)

P65- “Dr. W. D. Miller with Dr. Koch in… the finding in the dentinal tubules of microorganisms which when growing in artificial culture in the presence of any form of sugar or starch, uniformly produced lactic acid… which completed the full explanation of the local changes taking place in caries of dentin, but the cause and the nature of caries of enamel was not so clearly made out.”

65- German writer (1530) Robertson (1835) Regnard (1838)

P65-66-“In caries of the enamel, the whole substance of the tissue is removed by dissolving out the calcium salts, there being so little organic matrix in the enamel that it will not hang together; consequently a cavity is formed by the simple solution of the calcium salts of which it is composed. This solution always begins upon the surface, never in the interior. Decay of the teeth is therefore caused by an agent acting from without the tooth, never from within the tooth. It is something extraneous to the tooth, acting upon the surface in the beginning and penetrating little by little into its substance.”

P68-“ It is sufficient here to say that caries of dentin can not occur until the enamel has been penetrated.”

68- “Therefore, in decay of the enamel, the microorganisms producing the acid are on its surface On the other hand, the dentin is everywhere permeated by the dentinal canals into which microorganisms may grow when the dentin is exposed by the destruction of the enamel.”

P75-“This localization is very important and should be very carefully considered. The points of localization are: (There are 4 bullet points highlighted here)”

75- It may be laid down as a principle that for caries to begin in the enamel of the teeth anywhere, the caries fungus, which forms an acid, must be attached to the surface of the enamel in some such way as to prevent the acid which it forms from being readily washed away and dissipated in the general fluids of the mouth. Under all the observations of the surroundings of the conception of its beginning without the existence of some such conditions.”

P89-“The student and the practitioner should be continually studying it in the mouths of his patients, making out under the conditions which he finds. This, if carefully carried out, will serve as a guide of great importance in the extensions necessary in the preparation of cavities to prevent recurrence of decay about cavity margins.”

89- “In the consideration of the beginning of caries of the enamel with reference to treatment, it may be stated, as a fundamental proposition, that the nidus of each beginning of caries will be attacked, or that may be attacked in the future, that offers the best position for the lodgment and undisturbed growth of colonies of microorganisms. These colonies and the caries will spread superficially on the surface to those lines where their further spread is limited,…”

89-90-“But if a good and perfect filling is made, restoring the original form and conditions without reference to the possible further spreading of the growth of colonies of microorganisms, such filling will reestablish the nidus…. Thus reestablishing caries beyond the margins of the filling. In this way, a well-made filling in the mechanical sense, restoring the original contour perfectly but without reference to the superficial spreading of carries, may become the cause of wider spreading of decay on the surface than would have occurred without it.”

P91-“It may truly be said that, without the presence of the principal causes no decay could occur, and also that, without reasonably favorable conditions for their action, these causes would not produce decay.”

91-“It seems to be correct to say that a large number of even the most earnest workers in dentistry are doing their work of treatment by rote, without any proper thought of the relations which their plan of treatment may bear to the conditions that have localized the decay being treated at that particular spot, and making inadequate provision, or too often no provision at all, for the prevention of a recurrence of the trouble. It is only recently that there has been any special study given to the conditions of the beginning of caries of the enamel, which really is the all-important question in the study of dental caries considered from the clinical standpoint.”

P91-92-“But this investigation was confined exclusively to the immediate active cause of caries as it occurs in dentin. Decay of enamel, or the conditions localizing beginnings of this, which constitutes the initial lesion, without which caries of dentin never occurs, was left untouched. These constitute the principal clinical features of the disease we are treating.

P92-“Very large decays often occurring while the opening to the surface remains small. These characters are common to decays beginning in pits and fissures wherever found.”

P94-“As the time in relation to the progress of the decay at which this breakage of the enamel occurs is very variable, extensive burrowing which large amounts of softened dentin is liable to be found unexpectedly in that which seemed, upon superficial examination, to be a small cavity.”

P111-“The most essential condition for the occurrence of decay of this class is a saliva favoring certain kinds of deposits upon the teeth which will cover in attached colonies of microorganisms in such a way as to protect the acids formed from free dissipation in the general oral secretions.”

P112-“Had the original beginning failed, ever so little, to penetrate the enamel and admit microorganisms to the dentin, the progress would have ceased entirely.”

P116-“We find in certain families a hereditary predisposition to caries of the teeth that is strongly marked. If a family of children is presented for treatment and it is found that the father or mother, or both, have suffered severely in early youth from caries of the teeth, we may be reasonably sure that the children will suffer likewise. We find this almost universally true of families.

116-117-“In these, where the parents are immune, or very nearly immune, to caries of the teeth, we find them presenting us with children who are very susceptible to caries. There seems to have been some change brought about in the change of climate or conditions under which they live. (city,country)”

117- “The fact that caries of the teeth is more prevalent in children than in adults, conforms with what is known of many other diseases.”

P118-“The idea that some teeth are hard and some teeth are soft, grew up in the minds of the dental profession and of the laity many years ago, and this was generally regarded as a fixed fact.”

P121-“Teeth that decay badly have just as much calcium salts, are just as heavy, and just as hard, as teeth of persons immune to caries. … to attribute this to the softness of the teeth in the one and the hardness of the teeth in the other, was a wrong interpretation….”

P121-122-“The storm of disapproval that arose when these results were published was what might be expected under the circumstances. They were regarded as revolutionary, and rightly, for the results proved that many of the ideas of dental caries that had existed before were necessarily wrong, and other opinions must take the place of those which had been regarded as correct. Many arguments were advanced from time to time in the effort to sustain the older view, most of which have disappeared.”

P124-“… but they furnish favorable conditions for the action of that cause. They must be regarded as giving opportunities for the beginning of decay….”

124-“Ordinarily, all of the deeper pits have a fairly good layer of enamel covering the dentin, but this forms no considerable barrier to the beginning of decay, for, in susceptible persons, the enamel seems to decay readily in such positions,…”

P125-(You wrote the number 14 with highlighter on the top of the page)

125-“The fact, however, that decay in them occurs so frequently, gives abundant evidence that they furnish the opportunity for its beginning. Therefore, if the teeth are really faulty in their structure so that there are open fissures as well, decay is the more certain to occur.”

P127-“…it is never repaired by dentin.”

P128-“… but dentin never repairs itself.”

P129-“It will be found by a review of the dental literature, that decay of the teeth of man was generally supposed to be because of imperfection in their structure….”

P130-“… of a few drops of the individuals saliva.”

P131-“Recently the committee of the New York State Dental Society on dental science has taken up the question of the influence of the presence of the sulphocyanids in the saliva as a special piece of work, and is making numerous examinations…. It seems that this test alone….”

P132-“The question of immunity and susceptibility to dental caries as a systemic condition as known today, was first propounded in 1895. Years will probably be required before this problem, involved in such obscurity and difficulty, can be so unfolded and simplified that the general discussion of it belongs to the journal literature rather than to books.”

P135-“Microorganisms produce caries only when they are secluded from the general saliva by some kind of covering, as has been sufficiently indicated on previous pages.”

P137-“In the meantime, the recognition of the conditions of susceptibility and of immunity, ad the more prominent symptoms by which these may be known, becomes important…. For the disappearance of superficial beginnings of decay before announcing the coming of immunity to caries…”

P138-“The best asset is the ability to read the physical expression of disease, which is acquired only by much careful observation.”

138-“We can certainly recognize it by the fact that new beginnings of decay cease to appear. (saliva)”

P142-“The profession did not appreciate the wide difference between caries of dentin and caries of enamel, and did not realize the greater importance of an understanding of caries of enamel- - which is necessarily the first tissue involved in dental caries—in the practical application of filling operations for the control of caries.”

142-“The profession has been very slow to underatnd that caries of the enamel is the principal factor to be considered in any treatment that may be instituted for the control of dental caries. We can not prevent the growth of microorganisms in the saliva, as has been determined by Dr. Miller and confirmed by numbers of men; therefore our attention must, for the present, be turned to the question of preventing or limiting the injuries they do to the teeth.

                Caries of enamel is the initial lesion and always occurs as the beginning process of dental caries. When the enamel has been penetrated and the carious process becomes established in the dentin, the only possible method of treatment is by its eradication by excavation and filling.”

P143-“… extension for prevention logically to the cases that present, and will not make the mistake of cutting too wide or of cutting too little, so frequently as is being done now by men in dental practice.

143-“The idea that dental practice is purely mechanical and not dependent upon knowledge of the pathology of dental caries, should be abandoned forever.”

143-“The planning of the filling must be such as to adapt it, not only to the cure of the particular decay, but to prevent the recurrence of caries in the future.”

143-“To do this wisely requires a closer study of the beginnings of dental caries in the enamel than has yet been made by the general body of the profession. When this has been accomplished and the better knowledge of these processes has become generally diffused, the treatment of dental caries will be far more successful than it is today. The dentists of the future must have this information. The prophylactic treatment, or systematized attention just now, can not be wisely done without a closer study of decay, and of the signs of susceptibility and immunity.”

P144-“The complete divorcement of dental practice from studies of the pathology of dental caries, which has existed in the past, is an anomaly in science that should not continue. It has the tendency plainly apparent to make dentists mechanics only.”

P146-“Danger to the pulp is indicated, however when there is much mutilation of the tooth, as by cutting away the enamel with a considerable amount of dentin over wide areas, as is often done in preparing the pulp tissue itself is developed…”

P147-“…fibrils have also the function of the maintenance of the integrity and qualities of the dentin. It goes no farther than this. The dentin has no reparative functions.”

147-“enamel easier to split off from the dentin… loses strength… becomes more brittle… rapidly…”

P148-“A perfect enamel covering, or, in case of a cavity, a perfect filling, serves to limit deterioration. Filling operations in such teeth should always be conducted on the hypothesis that they are, or will become, less strong than normal.”    “…. And the invasion of microorganisms.”

P152 (you wrote “all error”)

P154-“Today only about fourteen per cent of the people of America employ dentists or make any intelligent use of dentistry.”

P155-“The tooth brush”

P156-“Caries will not begin on well-cleansed surfaces of the teeth. If there is any one fact regarding decay of the teeth that is well fixed by careful clinical observation, it is this one.” (A cheap tooth brush)

P158-“Toothpick, ligature, tape and rubber bands.”

P161-“Until recently there was not accurate knowledge of the force used in mastication.”

161-“… the average force exerted was 171 pounds on the molar teeth, and considerably less on bicuspids and incisors.” “The variation was from 25 pounds to 275 pounds.”

P162-“the gnathodynamometer…”

P172-“The operating chair should generally be lighted by a single window.”

P177-“There is no other profession or calling in which men do so much fine vision work with binocular vision as in operative dentistry.” “… comfort of binocular vision.”

P182-“At every point where the instrument catches or there is a roughness that gives a suspicion of decay, a special examination should be given that particular point. The teeth should be cleaned and dried, and the whitening, if any, noted, or any color that is off from the normal. In this way the amount of beginning caries of the enamel may be determined, but without this cleaning and drying it is almost impossible to be sure of the extent of the injury or whether the injury is caries or some other form or roughening of the surface.

                Caries of the enamel that has whitened the surface always needs immediate attention, either in the way of filling or in cleaning.”

P183-“… they usually know the seat of the trouble or cause…”

P188-“Prophylactic Treatment of Caries by Artificial Cleaning. If the local conditions surrounding the beginnings of caries of the enamel and controlling its localization are as have been out these, or equivalent conditions, the beginnings of caries would not occur, which all logical consideration of the conditions seem to declare, the first inquiry as to treatment should be directed to the question of the possibility of preventing the beginning of caries of the enamel in susceptible localities by systematized methods of periodical removal of all deposits.

188-“This shows that the points of failure of cleaning, in the chewing of food, are the points at which the beginnings of caries occur. Then if these points could be cleaned articiially at sufficiently shor intervals, dental caries ought to be prevented.”

188-“It therefore seems certain that if such parts of every tooth as have been indicated could be kept clean, dental caries would be banished.”

P189-“The method, so far as it is yet developed, has been purely empirical. It should be directed and simplified by a much closer study of the beginnings of caries of the enamel. This will render very much of the the labor now being bestowed upon it by those who are developing this treatement, unnecessary.”

“… his manipulation almost entirely to the points of liability to beginnings of caries.”

P190-“ The only treatment that has thus far been found effective…. Porcelain and gold inlays…”

P191-“For repair by filling to be successful, it must be very minutely done. It has been said that it is not necessary that a filling be water tight to exclude microorganisms; and since we have learned that microorganisms stand in a direct causative relation to decay…”

P192-“In conditions of susceptibility to dental caries, it is necessary that fillings be absolutely water-tight.”

192-“Yet we must make our fillings so perfect that a molecule of water will not go in between the walls of the cavity and the filling material; that a molecule of acid will not go in; because, if microorganisms happen to lie on the margins of our fillings and for acid, the filling must prevent that acid from seeping in.”

192-“But, do as we may, the margins of the filling are the vulnerable lines, and these we must devise means of making tight enough so that acid may not seep in between the filling and the margins of the cavity.”

P193-“… when it has been wet with saliva,…”

193-“The necessity of making fillings water-tight in order that they may be curative has been presented. Fillings cure purely and simply by shutting out everything from contact with dentin. They should be alcohol-tight, and alcohol will go in where water fails….”

P194-“But enamel margins about it are not vulnerable.” “Remember always that we do not cure in the sense of removing the liability, except as we replace the area of liability with an indestructible material. It is only in this sense that fillings are curative.” “…. And formation of acid or… “

P195-“… in that it gives the natural use of the tooth…. “

195- “… and the whole physical man is benefited by the operation.” “What do we mean by permanent?... possibly many dentists would regard a filling as permanent if it afforded a reasonable protection for eight or ten years, or four or five years. This would hardly be the highest idea of permanent filling. There may be different degrees of permanence. Under some conditions I should regard a filling that protected the teeth for two or three years as doing good service under the circumstances….”

P196-“I should say a permanent filling should practically last a lifetime. A filling that made broad enough to protect the area of liability….”

P198-“… unless displaced, for some specific reasons…. For the cure of caries….”

P199-“Under no circumstances can other than gold be used for fillings in the six front teeth, except inlays as indicated elsewhere, and cement fillings…”

199-“…. That its power of limiting decay was so very much below that of gold, but lately, since we have had more experience with amalgams that neither shrink nor expand, it is found that the curative power of this material, when carefully and intelligently used, stands well up toward that of gold.”

P201-“There is apt to be some objection to this material in the minds of some patients of account of its color being not that rich yellow of pure gold. Because of this difference in color, they are apt to think it inferior material. This is because the public is less acquainted with the value of platinum, and is, in fact a prejudice.”

P203-“… in any parts of teeth in which these occur.”

P204-“…. Upper central incisors also.”

P205-“In very susceptible persons decay begins early in deep pits and in fissures.”

P206-“…. Especially if saturated with an antiseptic…”

206-“The principal use for oxyphosphate of zinc is for the protection of pulps nearly, but not actually exposed.”

206-“These especially, should be filled early, for, if neglected, the burrowing of decay is pretty certain to undermine the marginal ridge and a portion of the enamel of the proximal surface.”

P207-“….immediate treatment…” “All such decays occurring in susceptible children demand immediate attention.” “The appearance of the tooth had given no suspicion of the actual condition.”

P211-“Therefore, if safe fillings are to be made, the laying of the boundaries of every cavity prepared should be determined by a study of the area of opportunity for the beginning of caries reather than by the breadth of the present decay.”

P212-“Extentions”

P213-“Extentions” “No amount of extension for prevention would have been available for the prevention of extension decay….”

P214-“…extension of cavities…” “extension for prevention… extension around the angles…”

P215-“…extension… prevention…” “Extension for prevention has no relation whatever to the depth of cavities.” “expression of a principle…”

P216-“… Unbearable pain…”

P228-“I found these persons again in very bad condition on account of the great shrinkage” “First thing to do is relieve pain.”

P230-“Only the brush with water is needed.”

P234-“The condition requiring this kind of interference vary so greatly that nothing more than this very general statement can be given.”

P237-“One will often have to do that for children that will not seem to pay in dollars and cents; often it is necessary to spend time with them in which little or nothing is done; time for which one will not feel like making a proper charge. In many cases this is necessary.”

P258-“This includes the time from about the sixth to the fifteenth or sixteenth year.”

P265-“The lower first molars are usually the first of the permanent teeth to be attacked by caries.”

“There are no other teeth easier to protect by proper attention correctly timed…. And the easiest cavities to manage when taken in time. They are also the most important of the molar teeth. They are the largest, strongest and most effective in mastication. For several reasons, which have been given above, their loss causes more derangement of the masticatory apparatus….”

P267-“… the features and the remaining teeth will be obtained when they are removed some time before the eruption of the second molars, or about the ninth to the tenth year. My own observation corroborates this opinion.”

P268-“Whenever possible, cavities occurring in pits or fissures should be filled early—before considerable progress has been made—and should, if the self-control and physical condition of the child will permit….”

P270-“….introduce the paper with the globule of cement directed toward the exposure and very gently tap it into position so as to….”

P272-“Lingual pits of the lateral incisors, rarely in the centrals also, are the only other pit decays that are found at so early an age. These are no nearly so frequent as decays in the first molars, and, as a rule, occur somewhat later.”