

A REVIEW OF DENTAL LITERATURE.

APRIL, 1919, TO APRIL, 1920.

By Russell W. Bunting, D.D.Sc., Ann Arbor, Mich.

(Read before the Michigan Dental State Society, April 13th, 1920.)

THE past year has been for Dentistry a year of introspection. The voices of her leaders as expressed in the publications of the year have not rung out with a clear strong note of positive conviction but rather have their expressions betrayed uncertainty and doubt. The great problems of oral infection and its relation to the health of the body have attained such prominence that they have overshadowed and dominated all other considerations in dental practice, and in the literature we see the strongest evidence that the dental profession is assiduously striving to learn what is the truth and to so order her procedures that they will be in conformity with the truth.

But the problem has proven to be so complex that so far its solution has baffled the keenest minds and no definitely positive course of action has been presented which can be adopted universally. In the writings upon this subject which have been voluminous (indeed no issue of a journal is complete without one or more contributions) there is an almost unanimous agreement as to the grave significance of periodontal infections to the general health, and among the various types of oral infection the greatest stress is laid upon the pulpless tooth and periapical invasions. The great prevalence of periapical disturbances about non-vital teeth has focussed the discussion upon the question as to whether a devitalized tooth may under any conditions be considered free from

infection and safe to be retained in the mouth.

Among the medical and dental writers who have discussed this question, we see that there are three distinct classes, one the empiricists who say that no dead tooth is ever safe and stand unequivocally and unvaryingly for 100% vitality; second, the scoffers who doubt the significance of these periapical infections and their ability to disturb the general health; and third, those who are conscientiously studying all phases of the subject but who are attempting to keep to the middle of the road and arrive at a sane, conservative, rational policy that will successfully meet the situation. In certain sections of the country the empiricists have predominated and wherever their teachings have prevailed, the pendulum of opinion has swung so far away from the old established methods of practice that thousands of teeth have been extracted and hundreds of patients have been made edentulous. As a conspicuous example of these the writings of Novitzky (1) may be cited in which it is claimed by the writer that every devitalized tooth is infected six months after the root-canals have been treated and filled and he denies the efficacy of any method of procedure to keep them sterile for more than that length of time. He, therefore, concludes that the retention of non-vital teeth is unsafe. These opinions have been widely quoted in the lay press as well as the professional journals.

On the other hand, there have appeared a number of statements by able members of both medical and dental professions in which it is claimed that sufficient evidence has not yet been advanced to warrant the wholesale extraction of all devitalized teeth and the attitude of empiricism, which has become so prevalent, is strongly condemned. Hartzell (2) shows by statistics gathered from various sources that streptococcal diseases are a serious menace to human life and that the great majority gain entrance to the body thru the oral tissues. But he states "The individuals who advocate complete destruction of dental organs, in order to rid the body of streptococcal growth, evidence profound ignorance. Wholesale extraction of the teeth will not rid the body of streptococcal growth. One might as well advise removal of the transverse colon to rid the body of colon bacillus. A much more sane method of cutting down the inroads of mouth infection is that of a vigorous systematic mouth sanitation together with the adoption of a diet planned to prevent intestinal putrefaction.—Where teeth must be devitalized, such devitalization should be done under exactly the same kind of surgical asepsis, as is demanded of surgery of the brain or abdominal cavity." He believes that the decision as to the removal of teeth should always depend upon an examination of the patient's vital resistance. "A clinical picture, which would demand extraction might be as follows: Early history of tooth and tonsil infection, swollen glands, draining the mouth and throat area, poverty of red cells, reduced hemoglobin, and a markedly increased or decreased leucocyte count." In cases in which the patient's resistance is high he would treat periapical and periodontal infections but when the resistance is found to be low he would extract the teeth, taking but a few at a time to reduce the anaphylactic shock.

E. C. Rosenow (3) in a contribution

to elective localization with special reference to oral sepsis gives further proof of the validity of his claims as to the specificity of oral focal infections in their ability to produce systemic lesions. He states that in the clearing up of such infections the simple extraction of teeth is not sufficient but rather that they should be removed surgically in order that all dead spaces in the bone might be eliminated at the same time. But he says "If a person is perfectly well, has harbored for some years one or more devitalized teeth in which the X-ray findings are negative, there would seem to be no good reason for extraction. If, on the other hand, the person is suffering from arthritis, a heart or kidney affection, or some other form of disease for which other cause cannot be found such teeth should be removed. Owing to the reparative power of the cementum it would seem possible to devitalize teeth safely whose pulps are sterile and whose canals may be properly filled providing that the operation is done in an aseptic manner. This should be done after the removal of other sources of infection and only in teeth of vital importance for restorative needs.

"In case of beginning infection of the pulp from decay, which has not extended into the periapical tissues, attempts at sterilization, and, if necessary, removal of the pulp and filling the canal may be justified in some instances, but not until cultures have proved that the tissues are free from living bacteria, and only if the responsibility is shared conjointly by the patient and operator."

In a symposium (4) of discussion directed toward the status of pulpless teeth which was held on the Pacific coast, W. C. Alvarez, a medical man, made a strong protest against the reckless extraction of teeth. He described the deplorable condition of mouths of patients whose teeth had been ordered out by physicians who, "quite oblivious to any possible value of the teeth to their

owner, must have ordered their extraction simply because he believed it a panacea for most diseases. I believe that we have lost our heads over this thing and that the time has come to call a halt. Men have obtained such beautiful results in some cases by extracting teeth that some of them are now trying to explain most diseases on the basis of these focal infections. In practice they pull the teeth first and if the patient returns unbenefited they can then look to see what is the matter with him." He also speaks of those people who were "cured" by radical methods but who after a period of relief, are again going the rounds of doctors' offices.

He says further: "Many of the dentists have become so frightened over the terrible results which they think must follow every root infection that they are refusing to fill any root-canals at all. They feel that the risk to life and health is so great that a man should immediately sacrifice every dead tooth in his head. Certainly the thousands of people who, for the last thirty or forty years, have been chewing contentedly on dead teeth (without signs of root infection) should be grateful that these radical ideas did not prevail when they were young." He concludes with the statement that "In view of the fact that most thorough removal of focal infections often fails to cure arthritis and other diseases, let us be more honest and conservative with our patients. Let us be careful what we promise them. Let us save serviceable teeth wherever possible. Above all let us do unto our patients only what we would have done unto ourselves if their teeth were in our heads."

Guy S. Millberry in closing this symposium says: "Let us choose the middle of the road in this problem and assist nature first by endeavoring to prevent dental disease and second by conserving and restoring to health those very valuable organs intrusted to our care, the human teeth." He also quotes A. D.

Black as saying: "I have a dead central incisor and a dead lateral incisor I have carried for thirty years and I hope to carry them as long as I live for I have not been confined in bed for twenty-four consecutive hours in any one day since I was four years old."

C. N. Johnson (5) from his broad clinical experience and observation extending back over fifty years condemns the modern empirical attitude toward pulpless teeth. He says: "It would seem as if more than half a century of constant experience and observation on the part of the dental profession were to be cavalierly swept aside by a wave or two of the hand, and that the dicta of certain members of the medical profession followed by those of certain members of the dental profession were to override all the clinical experience obtained since pulpless teeth began to be filled. The impression has gone out from some quarters that the moment a tooth has lost its pulp it becomes a menace to the physical wellbeing of the individual, and should, therefore, not be tolerated in the mouth. This is so at variance with the clinical history of countless numbers of pulpless teeth that it cannot be permitted to go unchallenged. Pulpless teeth have been of such incalculable service to people * * that it will not do to sacrifice them on mere assertion. There has been altogether too much *ex parte* evidence on this subject, too much theorizing, too much panicky reasoning from illogical premises, too much reliance on laboratory experiments alone without studying sufficiently the things which actually happen in the mouth. This much is true, that if all the pulpless teeth of the past had been sacrificed, very many individuals who have enjoyed the blessings of adequate mastication would have been sadly crippled with all the consequent ills which follow a failure to properly perform this function.

E. C. Kells (6) in a paper entitled "The Crime of the Age" calls attention

to the manifest errors in diagnosis and wholesale sacrifice of teeth based on radiographic evidence alone. He shows the limitations of the roentgenogram and condemns the diagnosis of peridental disease by the physician and roentgenologist. He also says "That a dead tooth must necessarily be infected is the wildest of errors. That an infected root cannot be rendered sterile is just as fallacious. Abscessed teeth, the roots of which were filled more than twenty-five years ago, that show apparently normal conditions in the skiagraph today, and the patients in perfect health, are clinical evidences of this fact which cannot be controverted."

Don M. Graham has contributed (7) (8) two papers to this subject, in which he pleads for a middle course in the handling of pulpless teeth. He says, "let us not be swayed by the fads and fancies of the few who are ever 'chasing the will-o'-the-wisp' of a single origin for all ills. * * * * * The tendency to ascribe a single cause to most diseases may prove an easy method of diagnosis but the attempt to make the teeth, the tonsil or the appendix the scapegoat for general ill health we are quite sure will never be borne out by science." He calls attention to the many other sources of infection which may be militating against the patient's health, all of which should be taken into account when considering the significance of dental foci. He also says, "This inability to fill canals with uniform success has raised the question as to whether such operations should ever be attempted. The answer to this query, today, is that with sufficient time, equipment, and patience it is believed that the majority of single rooted teeth at least, can be filled safely if not completely, hoping that Nature can be depended upon to take care of a good deal damage inflicted upon her."

C. K. Mills, M. D. (9) delivered a very pointed paper relating to this subject before the Philadelphia County

Medical Society, Pennsylvania. He called attention to the activities of the lay press in bringing information regarding dental focal infection before the public and the possible errors that may arise therefrom. He says "I have but little doubt but that literally bushels of teeth of excellent quality have been sacrificed as the result of this atrocious article about Colonel Roosevelt. * * * * * A score or more of cases have come to my knowledge in which important mental and nervous diseases have been attributed to dental infection, and in which the teeth had been removed with results in some instances so harmful as to make me feel that the procedure was almost a criminal one." He further speaks of the other fads in medicine such as the wholesale removal of colons of epileptics, appendices, tonsils and ovaries and in conclusion says, "I protest against the too free use of the therapeutics of organic mutilation. If the craze for violent removal goes on, it will come to pass that we shall have a gutless, glandless, toothless, and perhaps, thanks to psychology and surgery, a witless race."

Thus we see that the pendulum of opinion regarding peridental infections and pulpless teeth is beginning to swing back from the position of radical empiricism toward a sane and sensible view of the situation based upon established scientific data and clinical observations. True it is that when the pendulum comes to rest it will not be at the point at which it remained so long prior to five years ago, but it is also true that it cannot remain at that extremely radical position which some of our enthusiastic friends would have us believe.

A number of commendable articles relating to the handling of root-canals have appeared in which no particularly new methods have been suggested but all accentuate the need of the highest technical skill in performing such operations. Many use the same methods of preparation of patient and aseptic technic as are

employed by the surgeon in a major operation, while others who may not be quite as drastic lay the greatest stress on the necessity of complete sterility of all instruments and the avoidance of introducing infectious materials into the canal or periapical tissues. Coolidge (10) describes his method of handling diseased and infected pulps. He quotes the statement of A. D. Black that in the radiograms of over 1500 root-canal fillings only 9% of the well-filled canals showed periapical abscesses while of the poorly filled there were 63%. The writer believes that if these good root fillings could be made aseptically the problem of devitalized teeth would be solved by reducing the 10% of failures to zero or 100% success. Coolidge uses dichloramine-T as a sterilizing agent and does not fill an infected canal under treatment until a dry dressing sealed in the canal for 24 to 48 hours is found to be sterile when examined in smear and planted in a culture medium. He believes that it is impossible to completely sterilize the dentin of an infected tooth but that it is possible to sterilize the walls of the canal and to hermetically seal the canal to prevent reinfection. In filling the canal he uses gutta-percha which he attempts to carry completely to the apical end and seal it.

A. B. Crane (11) in an unfinished article gives a detailed description of an aseptic technic of root-canal surgery. He treats of diagnosis, methods of operating, types of equipment and pleads for aseptic methods checked by cultural tests for bacteria. H. Prinz (12) asks the question, "What Constitutes Reinfection of Root-canals and How Can It Be Avoided?" He calls attention to the rapidity with which a sterilized canal again becomes reinfected and states that "An incipiently infected root-canal cannot be sterilized permanently by the antiseptic method of treatment now in vogue." To prevent the reinfection of the canals by organisms

which have not been reached by the antiseptics and germicides he says "The complete corking up of every tubule and every accessible foramen is the final desideratum we must strive for in the permanent filling of a root-canal. We thereby deposit, as it were, an antiseptic which mechanically inhibits the confined infective organisms and prevents renewal of their growth." Prinz further states "The time is not far distant when the public will demand a laboratory diagnosis of serious root-canal infections for the same reason that a bacteriologic examination of a diphtheritic throat is demanded at present. Since the sequences of imperfect root-canal sterilization in the form of focal infections resulting in metastatic disturbances of distant organs are of common occurrence, it must follow that our present methods of establishing the perfect sterility of an infected root-canal are inadequate." He, like Coolidge, uses dichloramine-T as an antiseptic and fills the canal with rosin and gutta-percha.

U. G. Rickert (13) calls attention to the uses and advantages of silver depositions in root-canal procedures, a method which was ignored by both previous writers. He gives a modification of the Howe technic by which he has eliminated the irritating qualities which the original method so commonly produced. S. E. Pond (14) of the Research Institute has published a series of tests on the efficiency of methods used in the sterilization of dental instruments and root filling materials. The data that is set forth in this paper is a valuable guide to practitioners who, by comparison, may check up the efficiency of their own particular method of sterilization and determine whether or not it is adequate.

Carl J. Grove (15) calls attention to the grave significance of injury to the periapical tissues by chemicals or traumatic force during pulp-canal operations. He believes that grave injury is being done to these tissues by operators

who attempt to completely cleanse and fill the canals, and doubts if a perfect root filling can ever be made by the human hand without doing serious injury to the tissues about the apex. He claims that out of 1000 radiograms of teeth with root-canal fillings a greater percentage of those that were filled to the end showed infections about than did those which were not completely filled. He shows a number of microphotographs of periapical tissues taken from cases which are in health and from those which have been injured by various forms of chemicals in root-canal procedures. These cuts are worthy of careful study by every practitioner.

H. Prinz (16) has written another comprehensive treatise on the diseases of the dental pulp, their diagnosis and treatment, which is now running serially in the *Dental Cosmos*. Vida Latham (17) has reviewed the minute histological structure of the root and its canals showing the nature of the structures involved in the root-canal problem. The paper is illustrated with a profusion of cuts which are very instructive.

A more comprehensive study of the histopathology of the tooth and surrounding structures by Eugene Talbot (18) is now appearing serially in the *Dental Cosmos*. He considers in detail the various pathological changes which occur in the root of the tooth, the pericementum and surrounding alveolar bone.

Perhaps the most striking announcement of the year is that of Henrici and Hartzell (19) who have found living bacteria in a large number of living tooth pulps. In an examination of a quantity of extracted teeth they sterilized the outer surfaces of the teeth, cracked them open and tested the pulp for bacteria. In no case could they find bacteria in the pulps of teeth which were fully normal, i. e., unaffected by caries or pyorrhea. But in those teeth which were affected by caries, pyorrhea, or both, 42% to 46% of the pulps were infected,

the most common organism being streptococcus viridans. In regard to their startling claims they say: "If our observations are correct, we must conclude that, in approximately one-half the number of vital teeth invaded by caries or surrounded by pyorrhea, the pulp is already infected by streptococci, a conclusion so startling that we felt some hesitation about placing our work on record at this time. Nevertheless we can find no fault in our technic supported as it is by a series of 22 normal controls with uniformly negative results." These findings are indeed startling and they by all means should be checked and corroborated by further investigation of this question. If it should be proven that bacterial invaders frequently gain entrance to the pulps of teeth seriously affected with caries and pyorrhea, it may come to pass that our present conceptions of pulp conservation for such teeth may undergo a radical change. The time may come when we will prefer a well filled sterile root-canal to one that is filled with an infected pulp. But for the present let us reserve our judgment upon the matter until the facts of the case are fully established.

In all the discussions regarding the significance of oral diseases in their relation to general health the one common ground of agreement upon which all are united is that the greatest hope of safety lies in the prevention and the early correction of oral diseases. Great as the diversity of opinion has been regarding the disposition of infected pulps and peridental tissues, all are agreed that the institution of suitable measures of prevention of dental and oral diseases would eliminate and practically solve the problems of oral infection. Frequent mention of these views are made in many of the articles devoted to the discussions of oral diseases and a number of contributions have been devoted solely to the consideration of preventive dentistry. N. S. Hoff (20) reviewed the development of

periodontia. A. H. Merritt (21) discusses oral prophylaxis as a preventive measure and concludes with the statement "oral prophylaxis when given its broadest interpretation can be made a most efficient instrument in the prevention of dental diseases; that it far outranks any service which restorative dentistry can confer; that it should be the first duty of every dentist to make the mouths of his patients clean, and teach them to keep them so; that in so doing the dental profession cannot only largely prevent the incidence of these diseases within the mouth, but what is of greater importance, prevent that vast train of diseases which have for their causes the infections associated with non-vital teeth and pyorrhea alveolaris."

H. E. Friesell (22) treats of tooth form in its relation to oral infection. He shows the importance of full normal tooth contours, marginal ridges and approximal contacts and their relation to the health of the surrounding gingival tissues. This paper should be of vital interest to all operative dentists.

Three articles (23) (24) (25) were devoted to the methods of brushing the teeth and one of them (24) contains the report of a committee appointed by the Academy of Periodontology to investigate this subject. In this report an ideal brush is described and four methods of brushing the teeth are outlined, namely; The rolling stroke, the up and down stroke, the circular stroke, and the vibratory method. The great majority of the members of the Academy favored the rolling-stroke method.

The most notable statement upon preventive dentistry is the report of A. C. Fones (26) giving the results of the work in the public schools of Bridgeport, Conn. during the past five years. This work has been largely accomplished by the dental hygienists under the direction of Dr. Fones and his assistants. The system which was adopted consisted of four parts, "First, prophylactic treatment or the actual cleaning and polishing of

the children's teeth and chart examination of the mouths. Second, toothbrush drills and classroom talks. Third, stereopticon lectures for the children in the higher grades; and fourth educational work in the homes by means of special literature for the parents." The results of this work as seen at the end of five years were very gratifying. A marked decrease of dental caries was noted which, in the more favorable schools, attained 67% reduction. Very marked results were also noted in the general health, mental alertness and progress in school of children whose mouths were kept free from oral filth and infectious materials. It was also observed the mouth hygiene is a very powerful factor in the restriction of communicable diseases in childhood. Fones concludes with the statement, "We know of no one movement from the health standpoint that would be more beneficial to the nation at large than a serious educational campaign to eliminate dental caries as far as would be possible. There is so much in this work that cannot be measured in figures—especially the moral uplift which comes to the individual when he is taught the importance of cleanliness and a wholesome respect for his body."

Several commendable papers dealing with the cause, course, and treatment of pyorrhea alveolaris have been published thru the year. Stillman (27) restates his views on traumatic occlusion and calls attention to the fact that when teeth are under excessive occlusal stress the surrounding periodontal structures are injured and thereby lowered in their resistance to infections. C. P. Wood (28) points out that by far the great majority of traumatic occlusions arise from the loss of one or more teeth and the failure to retain the space thus vacated. He places great emphasis upon the importance of tooth shifting following extraction as an important factor in pyorrhea and believes that in every case a bridge or retainer should immediately be in-

sented after the loss of a tooth. He also shows the futility of treating cases of pyorrhea in which drifting of the teeth and traumatic occlusion have taken place without first correcting these conditions and placing the teeth in harmonious relationship to each other. Merritt (29) gives a more general review of the causative factors concerned in the disease including both local and systemic causes. Just recently a chart made by J. O. McCall (29A) has been published in which the great multiplicity of factors concerned in the process are graphically set forth.

F. B. Noyes (30) describes the histological changes in the peridental membrane and surrounding bone in pyorrheal infections. He states that the destructive inflammations are caused by recurrent infections acting in an intermittent manner and that these infections penetrate the tissues along the lymphatic channels.

McDonagh in two papers (31) (32) considers the recession of the gums and its treatment. He first cites the causes of gum recession and states that it never occurs about teeth that have been properly crowned. He believes that by proper treatment labial recession may always be stopped and the tissues may usually be made to grow back to their normal position. His method of handling these cases is to remove all irritants, smooth the roots and reduce the labial convexity slightly. He then dissects back the soft tissues to the point at which they are healthy and subsequently seeks to direct an active flow of blood to the part by the application of irritants or by suction cups. He shows cuts of a number of cases in which he has successfully accomplished a new growth of gum tissues which had been retracted.

Three drugs have been suggested as specifics for the treatment of pyorrhea namely, Myristica or powdered nutmeg (33), gentian violet (34) and Dakin's solution (35). Each of these are recommended as bacteriacides or amebacides

which should be introduced into the pockets after instrumentation.

Perhaps the most notable suggestion of the year for treatment of this disease has been advanced by A. D. Black (36) (37). He recommends in advanced pyorrhea the cutting away of all overlying gum tissues about the lesions and trimming down the remaining alveolar bone to remove all diseased portions and to square up the alveolar borders. The bone surgery he accomplishes with chisels and engine burs. In this he attempts to obtain a healing of the remaining alveolar stumps about the teeth and to cover them over with mucous membrane at a lower level on the roots leaving the affected portions of the roots permanently denuded and bare. These measures suggested by Black are quite as heroic as those previously made by Zentler. Both writers tacitly admit by their suggested operation that they are unable to obtain satisfactory results by the ordinary submucous technic. It is unlikely that these methods of heroic mutilation will appeal to those who have mastered the technic of subgingival instrumentation.

Clarence Grieves (38) describes Vincent's angina as he saw it in the army camps and outlined the treatment. He warns against all operative procedures in the early stages, preferring high pressure sprays of hydrogen dioxide and potassium permanganate followed by sedatives. After the pseudo-membrane has disappeared and the infection is reduced he recommends thoro oral prophylaxis and the maintenance of oral hygiene. L. C. LeRoy (39) takes up the discussion of Grieves' paper reviewing the causes and gives his personal method of treatment. This consists first in the reduction of the infection by Dakin's solutions and later flowing into the interdental spaces and about the gingivae black copper cement which is allowed to set and remain in position for its continuous antiseptic effect. The author claims to

have had great success in treating the disease by this method.

In the realm of operative dentistry Conzett and Hollenbeck (40) have begun a detailed consideration of gold inlay technic. In the first issue, the only one that has so far appeared, the authors have treated cavity preparation and the handling of enamel margins. The National Journal has reprinted from the Journal of Mining Engineering an article on the testing of amalgams by A. W. Gray (41). In the work which Grey and his assistants have done on this subject they have found that the instruments which were formerly used by G. V. Black in the tests which he made were open to criticism and in consequence the data obtained from such instruments were of questionable value. It was found that the crushing stress of amalgams varied greatly at different temperatures, but slight changes in temperature producing marked variations in crushing strength. As Black's machine could not be corrected for temperature the readings, which he obtained, must necessarily have been profoundly influenced by the varying temperatures at which the tests were made. Grey also found that the strength of an amalgam depended upon packing pressure, i.e. the strength increased in geometrical proportion with the pressure applied in packing. He states that "Contrary to general opinion, the soft, fine-grained amalgam obtained by long continued trituration with plenty of mercury hardens into a stronger filling than does a less plastic mix. By making an alloy so that the last movement shall be an expansion of desirable amount when a practicable packing pressure is employed we secure a filling that approaches the ideal in regard to rapid hardening, final strength, plasticity and volume changes."

E. H. Mathias (42) reports experimental work on the behavior of investment plaster in the vulcanizing of rubber dentures. The author has attempted to determine the amount of expansion and

contraction which plaster undergoes in the process of vulcanization. He states that increasing the water-plaster ratio reduces the expansion of plaster but weakens the strength of the model. He finds that the finer ground plasters are the stronger and that the degree of fineness has little or no effect upon expansion. Vulcanite dentures flaked with flasking compound having plaster of Paris as a base should be cooled and removed from the flask at once upon completion of vulcanization. Vulcanite flasks should be equipped with a spring tension to allow for expansion of rubber and a large excess of rubber should not be used. The entire article is worthy of study by those who use plaster of Paris.

In the field of Crown and Bridge-work, E. H. Mauk (43) voices the opinion that the scathing criticisms which Hunter made of this branch of dentistry were not altogether fair or justifiable in that his deductions were drawn from examples of the poorest type rather from those which were of the best or even average types. Mauk emphatically states that crown and bridge prosthesis is an institution that is here to stay and quite as permanent as the cavity filling or the artificial denture. He points out, however, that certain basic principles are fundamentally necessary to successful crown and bridge prosthesis. These he outlines as follows:

1. Physiologic tone of all supporting anatomical elements and investing tissues.
2. Adequate support for the bridge structure in proportion to the work demanded of it.
3. Protection to the soft tissues by outline and contour form in accordance with dental anatomy.
4. Normal articulation implying also normal occlusion. The writer then enlarges upon the several principles outlined which he says "may not be all that is essential in determining where and

how a bridge shall be placed, but it is certain that disregard of any one of them will make its effect known in a material shortening of the term of service your bridge construction will render."

M. L. Ward (44) calls attention to the general attitude of skepticism regarding bridge-work and says that many "refrain from doing bridge-work rather than make an effort to improve the defective features and retain the good ones." He urges that those who are afraid to do bridge-work resume their efforts to place the right kind of a bridge in the right place rather than refrain from doing bridge-work. At the outset he emphatically states that "an effort to do justice to a general practice with only one type of such (bridge) work is as nonsensical as to try to serve the best interests of a general practice with one filling material, one type of surgical operation, one procedure in orthodontia, one in prosthodontia, one method of handling pyorrhea, or one way to treat the pulps of teeth. There should be no such thing in the mind of an advanced thinker as the best type or form of bridge-work to apply. The thought that should be foremost in the mind of such a man is to have such a variety of types so thoroly mastered that he is able to apply the one which seems most suitable for the case in question, and in many instances to combine two or more types in order that the maximum may be rendered and the minimum of undesirable features presented." He then calls attention to three principal changes which are being made in the practices of the more progressive bridge-workers, namely

1. Reduction in the number of full crowns used.
2. As a result of this a much smaller number of teeth are devitalized.
3. Cements which are antiseptic are used for the retention of crowns and bridges.

After reviewing the relative merits of fixed and removable forms of bridges he

says "I take this opportunity to record myself as saying that from now on the chances for infection at either the apex or cervix of the roots of teeth shall be the first thing considered when I am consulted about bridge-work. Much as I would like to place a good removable bridge in the mouths of some patients from the standpoint of mastication, and sometimes appearance, I shall have to be shown that what I am to accomplish for the patient must completely overbalance the destruction to the teeth necessary to place the bridge, which often increases the liability to apical and cervical infection. We should in my opinion adopt what appears to be a more modern tendency, viz. cut down the number of full crowns and thereby cut down the number of devitalizations, even if we are obliged to cut down the amount of both fixed and removable bridge-work." In conclusion he states that "In our practice at the present time we are using almost exclusively the red and black copper cements and the cuprous iodide in the form of copper zinc for all forms of crowns. In the cases that look to be difficult to be kept clean, we are adopting the jet black one made by Ames and Caulk, and the red ones made by Fleck and Caulk. In cases where a decidedly red or black color would be objectionable, we are using the copper zinc product, about equal parts of copper and zinc with crown and bridge powder."

In the field of surgery several commendable articles have been devoted to post war surgery and the restoration of lost portions of the face and jaws. Among the contributors to this subject are G. V. I. Brown (46), V. H. Kazanjian (47) (48) and Major H. D. Gillies (49). In the general field of surgery C. J. Lyons (50) reviews the various pathological conditions of the mouth and their treatment. He specially considers the tumors of the mouth, Vincent's angina, antrum disease, and

periapical infections. In a second paper (51) Lyons discussed the indications and contraindications for root resection and this paper is followed by a description of the technic of this operation by Carl D. Lucas. The greatest stress is laid by the first writer on the necessity of proper diagnosis taking into account both local and general conditions. C. H. Oakman (52) describes the diseases of the maxillary sinus and their treatment. He gives the etiology, pathological changes, and the various methods of operative interference calling attention to sundry complications which may arise.

W. A. Cook (53) gives a very interesting report of his findings in a research which he made in the Anatomical laboratories of the University of Michigan. In this study he examined 100 skulls making fifty-two measurements of each to determine the exact relationship of various landmarks of the skull and jaws upon which injections for conductive anesthesia might be based. From the tabulations which he made Cook succeeded in establishing certain definite relationships in the measurements and discovered a method by which the various foramina of the jaws might be definitely located in any type of jaw. The system which he has devised for locating injections for conductive anesthesia is a most valuable contribution to this particular field of dentistry.

In conclusion we would call attention to the Anniversary number of the Dental Cosmos (54) in which several very commendable histories of various departments of dentistry are given as follows:

Operative Dentistry, by Edwin T. Darby.

Dental Prosthesis, by Geo. H. Wilson.
Orthodontia, by Milo Hillman.

Dental Therapeutics, by Herman Prinz.

Oral Surgery, by Truman W. Brophy.

Dental Education, by C. R. Turner.

Dental Journalism, by W. H. Truman.

These articles give a splendid prospec-

tive view of the trend of dentistry during the past fifty years and the advancement that has been made in every branch of the profession during that time.

BIBLIOGRAPHY.

1. Dead Teeth—J. Novitsky in the Dental Summary, 1919, p. 426.
2. To Extract or Conserve Diseased Teeth—T. B. Hartzell in The Journal of the National Dental Association, December 1919, p. 1111.
3. Focal Infection With Special Reference to Oral Sepsis—E. C. Rosenow in The Journal of the National Dental Association, November 1919, p. 983.
4. The Removal or Retention of Pulpless Teeth—J. A. Pollia, W. C. Alvarez, F. L. Platt, E. D. Chipman, K. F. Meyer, Robt. Burns, Jr., and Guy S. Millberry in The Journal of the National Dental Association, February 1920, p. 175.
5. Shall Pulpless Teeth be Retained?—C. N. Johnson in The Journal of Dental Research, December 1919, p. XCIX.
6. The X-ray in Dental Practice—C. E. Kells in The Journal of the National Dental Association, March 1920, p. 241.
7. Oral Sepsis and Its Relation to Systemic Disturbances—Don M. Graham in the Items of Interest, August 1919, p. 585.
8. The Status of the Devitalized Tooth—Don M. Graham, in the Items of Interest, December 1919, p. 905.
9. The Question of Dental Infection in the Production of Nervous and Mental Diseases—Chas. K. Mills, M. D., in The Journal of the National Dental Association, March 1920, p. 309.
10. The Diagnosis and Treatment of Conditions Resulting from Diseased Dental Pulp—E. D. Coolidge in The Journal of the National Dental Association, April 1919, p. 337.
11. A Practical Root-Canal Technic—A. B. Crane in the Dental Cosmos, December 1919, p. 1193.
12. What Constitutes Reinfection of Root-Canals, and How Can It be Prevented?—H. Prinz in the Dental Cosmos, October 1919, p. 954.
13. Silver in Dental Therapeutics—U. G. Rickert in The Journal of the National Dental Association, October 1919, p. 930.
14. The Efficiency of Current Methods of Sterilization of Dental Instruments and Root Filling Materials—S. E. Pond in The Journal of the National Dental Association, April 1919, p. 350.
15. Some Causes for Periapical Infections—Carl J. Grove in The Journal of the National Dental Association, August 1919, p. 669.
16. Diseases of the Dental Pulp—Herman Prinz in the Dental Cosmos, April 1919, p. 308.
17. Histo-Pathology of the Teeth—Vida Latham in the Dental Items of Interest, October 1919, p. 768.
18. Bone Absorption Around the Roots of Teeth

Eugene S. Talbot in the Dental Cosmos, May 1919, p. 361, and continued in succeeding issues.

19. The Bacteriology of Vital Pulp—Henrici and Hartzell in the Journal Dental Research, December 1919, p. 419.

20. The Development of Periodontia—N. S. Hoff in The Journal of the National Dental Association, October 1919, p. 897.

21. Oral Prophylaxis in Its Relation to Preventive Dentistry—A. H. Merritt in the Dental Cosmos, June 1919, p. 473.

22. The Significance of Tooth Form in the Prevention of Oral Focal Infection—H. E. Friesell in The Journal of the National Dental Association, July 1919, p. 579.

23. A Definite Technic for Mouth Care—H. G. Morton in the Dental Items of Interest, May 1919, p. 381.

24. The Tooth Brush and Methods of Cleaning the Teeth—J. J. Sarrazin in The Journal of the National Dental Association, February 1920, p. 155.

25. The Ideal Method of Brushing the Teeth and Standardizing the Tooth Brush—W. J. Charters in The Journal of the National Dental Association, April 1919, p. 297.

26. Report of Five Years of Mouth Hygiene in the Public Schools of Bridgeport, Conn.—A. C. Fones in the Dental Cosmos, July 1919, p. 607, and in the Dental Items of Interest, July 1919, p. 505.

27. Traumatic Occlusion—Paul Stillman in The Journal of the National Dental Association, August 1919, p. 691.

28. Induced Malocclusion as a Factor of Pyorrhea Alveolaris—C. P. Wood in the Dental Items of Interest, September 1919, p. 684.

29. The Etiology of Periodontoclasia—A. H. Merritt in The Journal of the National Dental Association, March 1920, p. 295.

29A. The Etiology of Periodontoclasia—J. O. McCall in the Dental Items of Interest, February 1920, p. 116.

30. Pathological Changes in the Peridental Membrane—F. B. Noyes in The Journal of the National Dental Association, February 1920, p. 123.

31. The Necessity for Early Diagnosis of Periodontal Diseases—A. J. McDonagh in The Journal of the National Dental Association, October 1919, p. 873.

32. Periodontology with Special Reference to Recession of the Gums—A. J. McDonagh in the Journal Dental Research, December 1919, p. 423.

33. Myristica in the Treatment of Pyorrhea Alveolaris—Joseph Leidy in the Dental Cosmos, April 1919, p. 295.

34. Selective Bacteriostasis in the Treatment of Infections with Gentian Violet—J. W. Churchman in the Journal of American Medical Association, January 17, 1920, p. 145.

35. Dakin's Solution in the Treatment of Pyorrhea—L. P. Henneberger in the Dental Cosmos, June 1919, p. 489.

36. Diseases and Treatment of the Peridental Membrane—A. D. Black in the Dental Summary, October 1919, p. 721.

37. Treatment of Chronic Suppurative Pericementitis—A. D. Black in The Journal of the National Dental Association, February 1920, p. 134, and in the Dental Summary.

38. Ulcero-Membranous Gingivitis—Clarence Grieves in the Dental Cosmos, September 1919, p. 819.

39. A Specific in the Treatment of Vincent's Peridental Angina—L. C. LeRoy in the Dental Cosmos, January 1920, p. 93.

40. The Gold Inlay—Conzett and Hollenbeck in The Journal of the National Dental Association, December 1919, p. 1067.

41. Metallographic Phenomena Observed in Amalgams—A. W. Gray in The Journal of the National Dental Association, June 1919, p. 513.

42. A Study of the Behavior of Plaster of Paris as an Investment in the Process of Vulcanizing Dental Rubber—E. H. Mathis in The Journal of the National Dental Association, May 1919, p. 432.

43. Favorable and Unfavorable Conditions in Crown and Bridge-work—E. H. Mauk in The Journal of the National Dental Association, June 1919, p. 487.

44. Modern Tendencies in Bridge-work—M. L. Ward in the Dental Cosmos, December 1919, p. 1169.

45. Treatment of United Fractures of the Jaw—Dental Department, U. S. Army, Cape May—McCauley and Worthley in the Dental Cosmos, May and June 1919.

46. Surgical Restoration of War Injured Faces and Jaws—G. V. I. Brown in the Dental Cosmos, February 1920, p. 206.

47. Early Suturing of Wounds of the Face—V. H. Kazanjian in The Journal of the National Dental Association, July 1919, p. 628.

48. Observation on War Surgery of Face and Jaws—V. H. Kazanjian in the Dental Cosmos, March 1920, p. 283.

49. Present Day Plastic Operations of the Face—H. D. Gillies, British Army, in The Journal of the National Dental Association, January 1920, p. 3.

50. Some Pathologic Conditions of the Mouth and Their Treatment—C. J. Lyons in the Dental Summary, August 1919, p. 597.

51. Indication and Contra-indication for Root Resection—C. J. Lyons in The Journal of the National Dental Association, September 1919, p. 790.

52. Diseases of the Maxillary Sinus—C. H. Oakman in The Journal of the National Dental Association, March 1920, p. 274.

53. Anatomical Measurements Relative to Conductive Anesthesia—W. A. Cook in The Journal of the National Dental Association, November 1919, p. 1030.

54. Anniversary Number of the Dental Cosmos, January 1920.