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THE PROGRESS  
OF DENTAL EDUCATION.

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# THE PROGRESS OF DENTAL EDUCATION

By FREDERICK C. WAITE

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## INTRODUCTION

Dentistry has evolved from medicine and more especially from the surgical aspect of what we now call medicine. Until the sixteenth century, physic and surgery were separate professions, and what we now call dentistry was a part of surgery rather than of physic. For centuries physic was a calling of greater dignity than surgery. Since the major influence in modern medicine has been physic rather than surgery, this legendary relation to some extent accounts for the fact that dentistry, since its establishment as a separate profession, has not been acknowledged to be on a professional parity with medicine.

Dental education, in both Europe and America, was a part of medical education until 1840, but the dental features in medical education were only incidental, going little beyond some instruction on extraction. No sustained course of lectures on dental subjects was given in any medical school until 1837 and then in only one school. The better dentists were men who, following a medical education, had served an apprenticeship under a preceptor who was a dental practitioner, before they specialized in dentistry.

With the establishment of the Baltimore College of Dental Surgery in 1840 separation of dentistry from medicine began, and the era of distinct institutional education in dentistry inaugurated a type of training in which the mechanical aspect of dental training gradually supplanted the basic medical phase. However, training through apprenticeship, either instead of the dental school course or supplementary to it, remained an important avenue of entrance to dentistry for several decades.

In no instances was there any university control of, or interest in, dental education in its first 25 years. Inasmuch as for 50 years most of the dental schools were independent and proprietary, divorced from medical influence and lacking the broad principles that result from university control, dental education came to be mainly a training in a technical art lacking the basis of general education and also devoid of adequate knowledge of the fundamental medical subjects. In this the profession and the dental schools took pride, and American dentistry came to excel in the mechanical phases.

After the Civil War there appeared in an increasing number of States statutory regulation of both medical and dental practice. This took the form of examinations before licensing boards, but these examinations were waived if an individual were a graduate of either type of professional school. In this policy of waiver arose the stimulus for organization of new dental schools, some of which were of little worth. During the 30 years from 1840 to 1869, inclusive, 13 dental schools had been organized. Of these, 10 were in operation in 1870. During the 15 years from 1870 to 1884, inclusive, 17 new schools were founded and 4 were discontinued, leaving 23 schools in operation in 1884. In the 15 years from 1885 to 1899, inclusive, 57 new dental schools were organized and 29 were discontinued, leaving 51 dental schools in operation at the beginning of 1900. There had been organized in 60 years 87 dental schools, some of which were scarcely more than diploma mills; many of them were happily short-lived. By 1885 the desirability of some regulatory control and standardization of dental schools was apparent.

### I. AGENCIES IN THE PROGRESS OF DENTAL EDUCATION

The progress of dental education can not be properly comprehended unless there is some understanding of the leading organized agencies that were factors in this progress, and therefore we shall briefly examine these in the chronological order of their appearance.

#### 1. AMERICAN DENTAL ASSOCIATION

The practitioners of dentistry organized in 1859 the American Dental Association. Through committees it gave some attention to the problem of dental education, but this was a minor feature of the program which most interested its members. To them problems of practice were more compelling than problems of preparation of their successors for practice.

This association, in response to the need for some regulation of dental education, in 1883 appointed a committee to arrange a conference of the executive officers of dental schools, and out of this conference arose the National Association of Dental Faculties in 1884.

Even in later years the American Dental Association has itself done little constructive educational work, but it has financially supported the Dental Educational Council and thus by proxy has done a great educational service.

## 2. NATIONAL ASSOCIATION OF DENTAL EXAMINERS

In 1883 the members of the licensing boards of several States formed the National Association of Dental Examiners. This later came to include the licensing boards of nearly every State. Its problems of licensure involve a consideration of education, and throughout its career it has shown a real interest in betterment of dental education. In 1891 it appointed a committee for conference with the National Association of Dental Faculties and frequently met in the same city as did that association, in order to facilitate adjudication of differences, for it early came into conflict with the schools, especially with those proprietary schools which graduated deficiently trained men.

## 3. THE NATIONAL ASSOCIATION OF DENTAL FACULTIES

In 1884 there were 23 dental schools in operation in the United States. Seven of the 30 that had been established had already succumbed.

On August 4, 1884, 10 of these 23 schools united in the establishment of the National Association of Dental Faculties. Of these 10 schools, 7 were independent and proprietary.

The National Association of Dental Faculties was a potent factor in dental education from its organization in 1884 until its fusion into the Association of American Dental Colleges in 1923. In these 40 years it did much, but it also failed to avail itself of the opportunities to do more. The accomplishments of its earlier history are more to its credit than those of its later years. Throughout its existence the independent schools dominated its policies. Some of them were, in name, affiliated with universities but in operation were proprietary. Initially, proprietary schools in the professions were necessary and served a real pioneer purpose at the time when dental education was ignored by most of the universities, but when in later years the independent schools have resisted advance in dental education they have become a hindrance.

The primary interest of the proprietary schools, with a few mitigating exceptions, has been to secure a large number of students. Since quality of graduates is nearly in inverse ratio to number of students, the improvement of quality has never been the primary object of proprietary schools.

In its initial year the National Association of Dental Faculties recommended an increase in entrance requirements to include the elements of a good English education, which, from later developments, was seen to mean less than the completion of the grammar school. It also recommended that the number of sessions be increased from two to three and that a graded curriculum be adopted to replace the repetitive curriculum, in which a student attended in his second year upon the same instruction that was given to newcomers and which he had attended the previous year.

None of these recommendations was enforced upon the members of the association, and their value was academic rather than regulatory, for more than a decade. Gradually this association made recommendations and finally regulations to govern its member schools, and with great travail moderate advances were made, but its ideals were so moderate that after some 20 years many of the schools controlled by universities withdrew from it, and left the independent schools with slight opposition in the association, with little contact with universities.

Too large a part of the time and effort of the association was taken with regulations about the transfer of students from one school to another, based on the theory that the student was an asset of the school in which he had enrolled, and with discussions about accepting students who did not meet the avowed entrance requirements.

For 25 years this association gave its attention to matters of administration rather than to problems of teaching. Its name was a misnomer. It was not an association of faculties, but an association of deans and owners, and it gradually became decadent as the broad functions of dental education were fulfilled by other agencies. Historically, it is important in the first half of its existence but can claim little credit for the advances in dental education that have taken place in the past 20 years.

#### 4. AMERICAN INSTITUTE OF DENTAL TEACHERS

The policy of the National Association of Dental Faculties of ignoring all matters concerning pedagogy gave an invitation for formation of an association to consider such problems. In 1893, in connection with the Dental Congress at the Columbian Exposition in Chicago, 15 teachers, representing 11 dental schools, organized the National School of Dental Technics. The name was unfortunate. It was not a school, and it soon found that there were many other problems confronting dental teachers beside those in technics. In 1898 its name was changed to the Institute of Dental Pedagogics, and in 1914 to the yet more descriptive name of American Institute of Dental Teachers.

This group of teachers gradually supplanted the National Association of Dental Faculties as the leading agency for the advance of dental teaching. It was purely advisory, tried to enforce no rules, and abjured the question of finding some excuse for accepting deficient students. Also, since it was an association of dental teachers, rather than an association of owners of dental schools, it had no property rights to protect. This association of teachers received the support of all the schools, including the university dental schools.

The consideration of teaching problems for the period from 1893 to 1908 was entirely taken over by the Institute of Dental Pedagogics, where, from year to year, appeared very creditable papers usually freely discussed. At first these were confined to the teaching of dental technology, but gradually the field was widened until, in later years, the discussion of the curriculum as a whole began to appear, and finally those administrative problems which affect instruction.

With the Institute of Dental Pedagogics, later known as the American Institute of Dental Teachers, lies nearly all, if not all, the credit for whatever concerted effort there was, up to 1908, to improve the quality of teaching in the dental schools.

#### 5. DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES

The university dental schools began to withdraw from the National Association of Dental Faculties about 1900. Following its decision in 1903 to keep preliminary requirements below high-school graduation, still more of the university dental schools withdrew from that association. By 1908 the number of such schools had become enough to warrant organized effort, and in Boston on July 31, 1908, representatives of 6 of the dental schools that were integral parts of universities launched the Dental Faculties Association of American Universities, which gradually increased its membership to 13 in 1923. This new association disavowed any effort at mandatory control by rules as to accepting students and devoted itself to the real educational problems influencing betterment of the instruction within the dental school. In this it supplemented the work of the Institute of Dental Pedagogics, but since its members were more nearly in sympathy than in the varied membership of the institute, this new association was able to agree upon a concrete program of educational advance; and freed from financial interests and largely from dental politics, its accomplishments, though not widely heralded, were very substantial. The stimulus to the striking progress made by dental education in the past 10 years is largely due to the Association of Dental Faculties of American Universities.

When the beneficent results of publicity of conditions regarding medical education came from the 1910 report on medical education by the Carnegie Foundation for the Advancement of Teaching, the university association of dental schools sought a similar survey and similar publicity regarding dental education by some outside agency. This was undertaken 10 years later.

#### 6. THE DENTAL EDUCATIONAL COUNCIL OF AMERICA

The National Association of Dental Examiners had been formed in 1883, a year before the National Association of Dental Faculties. Its purpose was to approach uniformity of procedure in the determination of fitness to enter the practice of dentistry. Since each member of a State examining board is a public official, this association was supported by the power of the people as expressed through the statutes, and therefore had a status lacking in the voluntary association of schools.

Besides this association and the National Association of Dental Faculties, there was the more inclusive association of dental practitioners, which, existing since 1859, came to include in its membership the large majority of dentists of the country. It was, and is, the most powerful body in dentistry. Its attention was given to organization, to the problems connected with practice, and to advance in knowledge, technique, and methods in the various fields of dentistry. It later gave very definite help to the promotion of research. Somewhat incidentally it also gave attention to dental education through standing committees that furnished annual reports, often merely perfunctory, but sometimes with creditable recommendations.

There were thus three associations each interested in dental education from a different viewpoint; one, that of the schools, interested in the details of carrying on such education; another, that of the examiners, interested in the graduates produced by such education in so far as they could or could not, with safety to the public, be licensed to practice; and the third, that of the dental practitioners, as such interested in the capability of the men who were to become their professional colleagues and competitors.

For several years there had been suggestions of combined educational effort by those three groups, and as a result, at Old Point Comfort, Va., on August 3, 1909, two committees of five each, one from the National Association of Dental Examiners, the other from the National Association of Dental Faculties, organized the Dental Educational Council of America. They invited the National Dental Association also to appoint 5 representatives, these three groups to form a joint committee of 15.



The organization of this tripartite joint educational council marks the establishment of a powerful agency to advance dental education in this country. Potentially, it was in position to bring early order out of the chaos in that field.

The council organized for its work into three committees. One of these was on legislation; another committee was that on curriculum, charged with preparing a model course of study. Not until eight years later did this committee publish its first suggested standard course of study, and this with no indication as to sequence of subjects. It has not yet taken up any really adequate study of the curriculum, which is a purely educational matter. In fact, the council has never seized the opportunities offered it to study and work out the questions relating to teaching and courses of instruction: that is, the constructive educational aspects apart from the administrative phases. The committee which proved to be most active was that on colleges, the duties of which were to make visits to the dental schools, to ascertain their equipment and the character of their work, including the enforcement of their avowed preliminary educational requirements. The initial program included the making of an early survey of all dental schools of the United States in order to get a comparative knowledge of what was done and upon this information to organize a suggestive standardization as to administration, facilities, and instruction. No idea of classification of schools appears in its earlier statements.

From the annual reports of the council to its parent bodies one can trace its activities. Initially there was an effort to learn something about the relative situation in the schools by questionnaires. This was but partially successful. In 1911 a definite attack was made upon the indifference in administrative enforcement of the preliminary entrance requirements, which had in 1910 been advanced nominally to high-school graduation. In 1912 this same effort was continued, but practically nothing had been done yet on curriculum or inspection of schools, and there appeared little interest in the council by a majority of its membership, only a few valiant members being responsible for keeping it alive.

In 1913 the council announced its purpose to inspect all the schools and then to classify them into grades A, B, C, following the plan adopted for medical schools.

The council was favorable to the extension of the dental course from three to four years. In 1911 an effort in the National Association of Dental Faculties to secure such an advance, to begin in 1912, was defeated, but the plan continued to gain adherents. Some of the university schools announced it as a definite program; and finally in 1915, after strenuous debate, the National Association of Dental Faculties adopted the four-year dental curriculum, to

become effective beginning with the session of 1917-18. In this decision the council had a large influence and here first gave promise that it was to become the leading dental educational force of the next decade.

In 1916 the council, having in part overcome the mistrust and lack of financial support which had nearly throttled it, really began to function, for it announced that, having in the past three years inspected all the dental schools, it proposed to publish at once a "model" curriculum, and also the specifications of a class A school, and that after a year it planned to reinspect all schools and make an initial classification in 1918.

The specifications for a class A school and a suggested outline of a curriculum were published late in 1916. Those specifications were very general and liberal, referring chiefly to quantitative specifications. No direct attempt was made to standardize any conditions to obtain a betterment of quality of teaching, partly because no measure of determination had been devised, and partly because dental educators, as a class, had not yet come to appreciate the importance of quality in instruction in addition to quantity. Indeed, the whole history of dental education has been based on quantity; that is, elapsed time and number of weeks, days, and hours in the course. This is only one of the major factors of efficiency in education. There was nothing in these first specifications to keep commercially conducted schools from the highest rating. The proposed reinspection of schools in 1917 was not carried out.

In 1918 came the great opportunity for the Dental Educational Council. Among the congressional war measures late in 1917 was one providing that an enlisted reserve corps be established to which should be eligible, among others, the students of "well recognized" dental schools. Such reservists were to continue in the schools in preparation for professional service in the Army. Being already enlisted, these reservists were not subject to draft.

It became the duty of the Surgeons General to determine which were "well-recognized" dental schools, and in January, 1918, they informally asked the American Institute of Dental Teachers, which was considered the most representative body in dental education, what organization of dentists was best fitted to give this advice. By resolution of the teachers the Dental Educational Council was designated. Thereupon, by common consent, dental political opposition to the council was suspended for the period of the war. In March, 1918, the council made its first classification of dental schools for the use of the Surgeons General. This was not published until after minor revisions at a meeting in August, 1918.

At this August, 1918, meeting also was adopted a principle that a dental school conducted for profit to individuals or a corporation

does not meet the standard of fair educational ideals as interpreted by the council. This was soon after enlarged to state that such a condition would exclude a school from an A classification. Thus the council threw down the gauntlet and began the battle between the advance of dental education on the one hand and proprietary and commercial interests on the other. The war with Germany being over, the armistice with the various dental political interests was at an end, but the accomplishments of the council had already been so great that it was futile to attempt to destroy it.

The council carried out reinspections, revised its specifications for a class A school, revised its classification of schools, elaborated its suggestions of curriculum, devised some minimum specifications for facilities and equipment, and adopted as a principle that a school must have a minimum number of full-time teachers, thus definitely beginning a program for the improvement in the quality of dental teaching. In its classification it made some blunders in cases where it allowed political expediency to nullify its published principles in regard to schools conducted for profit.

In recent years the council and its officers have helpfully and whole-heartedly cooperated in the survey of dental education made by the Carnegie Foundation for the Advancement of Teaching, and the report of this survey promises to mark an epoch in dental education second to none of the epochs of the past.

In 1923 the council made one of its most far-reaching contributions to dental education when it announced that after January 1, 1926, no dental school may obtain or retain its highest commendatory A classification unless, as one of its requirements, it enforces for preliminary education one year of work in a college of arts and science in addition to completion of a four-year high-school course. In 1924 this requirement was extended to include schools of a B classification. In this the council only followed the more progressive schools, for already nearly half the dental schools had this requirement in operation, several since 1921.

The council has from time to time revised its classifications, but each classification has been only an approximation due to the ever persistent influence upon its decisions of interests other than educational.

For the past 10 years the council has been the outstanding dental educational agency. It has a history of far-reaching helpfulness to dental education, and the credit is largely due to two men of high capability and altruistic motive who served it as executive secretaries, the first through its period of early struggle, the last through the recent years of its greatest activities and trials. To these two men education and dentistry owe a great debt of gratitude. Its future usefulness must depend upon whether it can free itself from

those Machiavellian influences which still are existent in dental education, whether it can become a really judicial and constructive educational body, or must remain swayed by the winds of political and commercial expediency; whether in a word it can become more educational and less dental. Only the future can answer.

#### 7. THE AMERICAN ASSOCIATION OF DENTAL SCHOOLS

In 1923, after various conferences, a consolidation of the three associations of dental schools in America and the one association of dental teachers was effected under the above title. Since the new association is purely advisory, there is little incentive for political machination.

This new association is for discussion of educational problems, particularly those that apply to dental education. The results of these discussions are not to be enforced upon any school but are open to use by any who wish. This association should attack the problems of improvement in the quality of teaching in dental schools, the neglect of such problems through all the years since 1840 being largely responsible for the present lack of any concerted opinions and actions in the field of pedagogy as applied to dental education.

#### 8. THE CARNEGIE FOUNDATION FOR THE ADVANCEMENT OF TEACHING

As already noted, as early as 1910 some dental educators advocated a survey of dental education by some agency outside of dentistry in order that a judicial rather than a biased view might be attained. Other dental educators opposed this vigorously, claiming that only dentists were competent to judge of dental education and that the dentists were entirely capable of cleaning their own house, if perchance, as many denied, any purgation was necessary or even desirable. It was upon this theory that the survey by the Dental Educational Council was proposed. Experience has shown that that survey, while of great value, is only approximately a reliable verdict.

In 1921 the Carnegie Foundation for the Advancement of Teaching determined upon a survey in character similar to that it had made in medical education, but with the experience gained in that former activity the survey of dental education aimed to be more exact and more constructive.

The two divergent views as to whether such a survey should be made by a dental agency or by a nondental agency were happily compromised by a cooperative survey. The dental agency selected as the best informed, most comprehensive, and least biased was the Dental Educational Council. The nondental agency was the Carnegie Foundation for the Advancement of Teaching, which created a division for the study of dental education and put in charge of

this a gentleman of rare capability and tact, trained in science to know the high value of painstaking accuracy, long experienced in teaching a fundamental science in a cognate profession, and in sympathy with dentistry through contact with members of the profession in cooperative research and publication along lines of dental science.

This study of dental education has been most thorough. No time or expense has been spared, and the published result soon to appear will give a reliable basis for dental, educational, and lay information and judgment. The publicity which this report will give the relations of dental education to public health and welfare, and the needs of the moral and substantial support of the lay public will undoubtedly furnish a stimulus to more rapid constructive advance than we have yet seen, and bring to dental education the financial support it must have to fulfill its public obligations.

It has been the privilege of the writer, in common with many others, to consult parts of the manuscript of the report in advance. This has been freely used in the writing of this chapter, and indebtedness is acknowledged for many facts as to time and place which are here incorporated.

## II. ANALYSIS OF PROGRESS OF DENTAL EDUCATION

Having reviewed the more important agencies which have affected the progress of dental education, it is now logical to discuss the steps in this progress. It is impossible to ascribe these advances to any one agency, since it is the resultant of all of them. At times all have cooperated; again the policy of one agency has been opposed by other agencies, resulting in a compromise or a stalemate. Commercial interests, only ancillary to dentistry, have proven a very serious deterrent factor in the attempts at progress.

It seems best to separate the era of dental education into periods and then to consider seriatim the progress in some of the different factors that enter into this field of education:

### (A) PERIODS OF PROGRESS

The periods of progress may be roughly set down as follows: A first period from 1840 to 1883, the beginning marked by the establishment of the first dental school, the end by the formation of the National Association of Dental Examiners. This period is characterized by a lack of any coordinated educational effort, and by no great advance except the fact that in the latter third of the period six universities entered the field of dental education—Harvard in 1867, Michigan in 1875, Pennsylvania in 1878, Vanderbilt in 1879, California in 1881, and Iowa in 1882.

A second period from 1884 to 1908, the beginning marked by the formation of the National Association of Dental Faculties, the end by the organization of the Association of Dental Faculties of American Universities, the inauguration of an effective effort to enforce university ideals of dental education in contrast to the lack of educational ideals which pervaded the proprietary schools. This period is characterized by the organization of an association of teachers in 1893; by an advance to a three-session course with a partially successful attempt to establish a graded curriculum; by a gradual, but hesitant, advance of the requirement in preliminary education; and by the lengthening of the annual session.

A third period from 1909 to 1916, beginning with the organization of the Dental Educational Council, the first cooperative effort of different agencies, and ending with the adoption of a four-year high-school preliminary educational requirement and of a four-year professional school curriculum. This period is marked by very moderate increase of the nominal entrance requirements and by the establishment of a graded curriculum.

A fourth period from 1917 to 1925, beginning with the actual enforcement, in practically all of the schools, of a four-year high-school preliminary education and of a four-year professional course and ending with the enforcement in all reputable schools of a pre-dental year. This period is characterized by the introduction of the two basic sciences of biology and physics into the curriculum; by increased attention to the fundamental medical sciences; by the beginning of a policy of full-time teachers in dental schools; by extensive work of the Dental Educational Council in inspection and classification of schools; by the rapid disappearance of proprietary schools and the increase of real university schools; and finally by the publication of the Report of the Carnegie Foundation for the Advancement of Teaching, based on its study of dental education.

#### (B) PHASES OF PROGRESS

To consider all the aspects of the advance in dental education concomitantly would lead to confusion and a lack of appreciation of the relative weight of the different factors; therefore a comprehensive understanding will be facilitated by an analysis of this progress into several phases.

Of these phases there are two groups, one quantitative, the other qualitative. Progress of those phases which are quantitative can be followed readily because the records are reasonably clear. The qualitative phases, while fully as important, are more elusive and are not capable of as definite delineation. It will appear that throughout the progress has been more largely of a quantitative

nature than of a qualitative, more increase in years and weeks of instruction than improvement in quality of the instruction given in those years and weeks.

These quantitative phases may be well considered under three headings—preliminary education, length of the session of instruction, and number of sessions prerequisite to graduation.

#### 1. PROGRESS IN PRELIMINARY EDUCATION

There was apparently no inquiry, certainly no requirement, as to preliminary education for entrance to all dental schools in the years from 1840 to 1884, although individual schools definitely connected with universities did, as early as 1878, make some inquiry of prospective students in regard to previous education.

When the National Association of Dental Faculties was formed it recommended, at its first meeting in 1884, that a preliminary examination be required covering a "good English education" unless a diploma were presented from a reputable literary institution or other evidence of literary qualification given. One wonders just how much this "good English education" meant until we find in the course of the deliberations of this body nearly a decade later a very considerable debate and successful resistance when it was proposed to *advance the* preliminary education to require the completion of the grades of the grammar school.

Not until 1896 was there, even nominally, an entrance requirement by all member schools of the National Association of Dental Faculties of an education equivalent to ability to enter the high school. At this date nearly all medical schools were requiring high-school graduation for entrance.

In 1899 further prescribed, although by no means rigorously enforced, entrance requirements became effective by demanding completion of the first year of high school previous to entering the dental school.

In 1903 a further increase to two years of high-school work before entrance was adopted by the National Association of Dental Faculties, to become effective in 1904, and accompanied by an increase in the professional course from three to four years. This increase of the length of the professional course was rescinded within a few months.

In 1907 the National Association of Dental Faculties again advanced for its members the entrance requirements to completion of three years of high-school work, and in 1910 to high-school graduation. This latter was an apparent advance but not necessarily a real advance, because there were many high schools with but a two-year or three-year course and graduation from these ful-

filled the requirement. Not until 1917 was the necessary stipulation added that graduation must be from a high school with a four-year course.

Throughout this period of more than 20 years, from 1896 to 1917, while the specifications for preliminary education were gradually advanced, there was always included in the stated requirement the vitiating modifying clause "or equivalent." The equivalence frequently was so liberally interpreted as really to mean only a certificate of good moral character and the payment of fees, the latter, at least, always being relentlessly insisted upon. The National Association of Dental Faculties was paying little attention to those factors which determine the quality of instruction in the schools, but was satisfied with quantity only. Even the quantity requirements affected only the member schools and were to a large extent merely published requirements rather than enforced requirements, for as late as 1909 the president of the association in his annual address said:

It has long been a practice among the members of this body to accept students with certain conditions to be removed during their college course. This practice appears to be just and proper.

Later disclosures showed that from 1896 to 1916 in many of the schools there was resort to various subterfuges to secure "credentials" for the required amount of preliminary education for candidates who actually lacked formal schooling to the extent set down in the printed rules. It apparently was not appreciated that the purpose of entrance requirements is to assure the capability that will enable the student to secure from the outset of the professional course the complete benefit of the instruction offered him, and that without complete enforcement of preliminary education the professional course must totter on an unstable foundation.

From discussion in the proceedings of the National Association of Dental Faculties we learn that it was also a common practice to accept students some weeks after the instruction had begun and to permit them to leave the school a considerable period before the close of the session, and also, on occasion, to permit a student to take two of the years of instruction concurrently in a single year. Thus, with no attempt at control of the quality of instruction, the quantity was abbreviated by liberal entrance conditions, coupled with carelessness in their enforcement, by abbreviated attendance, and by telescoping the curriculum.

By 1912 the Dental Faculties Association of American Universities was coming to exert considerable influence. For several years its members had been requiring high-school graduation for entrance, and in most cases graduation from a four-year high school. Its



influence was indirectly reflected upon the better schools that were members of the National Association of Dental Faculties, and in 1916 that association also adopted graduation from a four-year high school as a minimum entrance requirement. The university dental schools were also looking forward to further advance, expecting to demand some college work for entrance, with the aim of bringing the preliminary education required of dental students to an equality with the two years of undergraduate college work required to enter medical schools.

The war stopped further advance, but it also clearly showed the need for a dental profession with a better general education upon which the professional training should be built.

At the end of the war the Dental Educational Council had become the most powerful agency in dental education. In 1921 many of the university dental schools began the enforcement of an entrance requirement of one year in a college of arts and science, with certain specified subjects. The Dental Educational Council, following this example, in 1923 adopted a resolution that this entrance requirement would be demanded of all schools seeking an A classification after January 1, 1926. In 1924 this requirement was extended to include also all schools of B classification. Since only A and B schools are likely to be recognized by State boards, this means that all reputable schools will in the future require one pre-dental year of undergraduate college work. However, this does not bring the preliminary requirements in dental schools to an equality with the two premedical years of college work demanded by all reputable medical schools.

Just as some schools have always been outside the standard regulations and lagged behind in every advance, so others have forged ahead and enforced more than the usual standard. There has never been absolute uniformity in requirement and enforcement of preliminary education, and probably never will be, but in time it will become stabilized close to a norm. It would be unwise for any one to predict in print what that norm is going to be or when it will be effective. It has been much discussed in recent years, and there seems a fairly general consensus of opinion among dental educators that the norm will be approximately two years of college work based on 15 units of secondary education. As to the time when it will become effective there is a great variety of opinion.

If one judges by past performances in the advance of entrance requirements, we find the increments after 1896 were at intervals of three, three, five, three, seven, and nine years, respectively, which would perhaps warrant a conjecture that the next general advance

in entrance requirements will be somewhere between 5 and 10 years after 1926. Meanwhile individual schools will independently advance, but the general advance will depend very greatly upon what comes to be the general acceptance of the number of years that are to be built upon the entrance foundation. This will be discussed in another relation.

There can be no doubt of the advantage of close uniformity in entrance requirements. In the individual school it is essential sharply to define the minimum. This stabilizes the intake of the partially finished product, which is to the dental school the raw material from which it must fashion the graduate ready for the profession. Too great variation makes for lack of assimilation into the school. Individuality there must be, but the base upon which the superstructure of the professional course is to be built must at least come up to a minimum level.

The question is whether the dental schools are, at this time, able to offer to an entrant a course of a quality that can advantageously use the information and training to be secured by a second year of work in the college of arts and science. When, in a later section, the quality of teaching is discussed, the opinion will be expressed that there is another problem fully as important as immediate further advance of entrance requirements. The problem of entrance requirements has such close interrelation with curriculum organization and improvement of quality of teaching that it can not be solved separately. These three major factors must be adjusted jointly.

## 2. LENGTH OF THE ANNUAL SCHOOL SESSION

The first session of the Baltimore College of Dental Surgery extended from November 3, 1840, to the latter part of February, 1841, with the graduation of two of the five students on March 9, 1841. This designated time was four months, but it is fair to presume that, with Christmas holidays out, the exact period of instruction was 16 weeks, which was then the usual length of session in medical schools. The length of term in most medical schools increased after the Civil War to 20 weeks and about 1880 to 24 weeks. Apparently the dental schools did not follow the medical schools in this advance, as they appear to have been still on a four-months basis in 1884, when the National Association of Dental Faculties set the four-month session to be a standard beginning in the school year 1884-85. By 1888 the standard length of session had increased to 5 months, in 1896 to 6 months, in 1899 to 7 months. In all of these cases this was elapsed time and included the holiday vacation. Deducting this vacation, the weeks of instruction were, at the dates noted, 16, 20, 24, and 28. The next increase was in 1904, to 30

teaching weeks. In many cases there were only five teaching days per week, but in 1910, when the increase to 32 weeks became effective, it also carried a specification of six days per week, exclusive of vacations. Thus in the 25 years from 1885 to 1910 the number of weeks of teaching in the school session was exactly doubled.

In the majority of the schools now there are 32 weeks of instruction, exclusive of the weeks set aside for examinations. In some schools the number of teaching weeks is 36.

### 3. NUMBER OF YEARS IN THE COURSE

The charter of the first dental school in 1840 specified that it should give a course consisting of at least one session of four months. When the Harvard Dental School was started in 1867 it specified that two sessions of four months each would be given, with required additional service under a preceptor. This was considered a very striking advance. The two-session curriculum was pretty generally adopted by the schools that were organized in the seventies and eighties, and not until the early nineties did the three-session course come to be at all general. In 1891-92 this became the rule in the National Association of Dental Faculties. There was then a period of 25 years before the four-session course became a rule, excepting that in 1903-4 an abortive attempt was made to increase to a four-session course, the decision being reversed within a few months after it was adopted. Meanwhile the length of session was gradually lengthened.

But the number of sessions in the professional school is not the whole story. For comparison of educational progress in dentistry one must count the number of years from completion of the grammar grades to the dental degree. If we assume that, even in the early history of American dental education, all students had completed the grammar grades, which we know is not true, we get the following number of years after completion of the grammar grades to gain the dental degree, current in the majority of the schools for the years specified:

1840-1869	One professional year of 16 weeks—total, one year.
1870-1891	Two professional years of 16 to 20 weeks each—total, two years.
1891-1899	Three professional years of 20 to 24 weeks each—total, three years.
1899-1902	One year of high school and three professional years of 28 weeks each—total, four years.
1902-3	Two years of high school and three professional years of 28 weeks each—total, five years.
1903-4	Two years of high school and four professional years of 28 weeks each—total, six years.
1904-1907	Two years of high school and three professional years of 30 weeks each—total, five years.
1907-1910	Three years of high school and three professional years of 30 weeks each—total, six years.

- 1910-1917 Two to four years of high school and three professional years of 32 weeks each—total, five to seven years.
- 1917-1924 Four years of high school and four professional years of 32 weeks each—total, eight years.
- 1924- Four years of high school, one year of college, and four professional years of 32 weeks each—total, nine years.

Comparing 1869 and 1925 we see that the minimum number of years between the grammar school and the dental degree is now nine times what it was in 1869. Comparing 1891 and 1925, we find that the number of sessions in the professional school in 1925 is twice that in 1891. We have already seen that the present length of session is a minimum of 32 weeks, against 16 in 1884. The number of weeks' instruction in the entire professional school course in 1884 was 32, but this was repeated instruction in a nongraded curriculum; so the actual number of weeks of new instruction received by each student was but 16. Now it is 128 weeks, or eight times as many weeks of new instruction as in 1884. When in connection with this, it is considered that the average dental student now has five years more of education before entering the professional school than he had in 1884, we may assume that his profit by instruction by reason of education and maturity is from 50 to 100 per cent increased over that of the students of 1884, which indicates a dental professional course to-day from 12 to 16 times the value of that of 1884, irrespective of any improvements in equipment and in the quality of teaching. To-day's course is 24 to 32 times as effective as that of 1869. Truly the quantitative increase has been wonderful.

One may conjecture as to the length of the dental course of the future, but the prevalent opinion of dental educators is that the dental course will finally become stabilized at four years of professional study after two years of preparation in a college of arts and science, making a total of six years from high-school graduation to dental degree, and that this will be reached within a decade.

Meanwhile, it is conceded that we shall have a period during which five years from high school to dental degree will prevail. There are two plans as to the division of these five years. One is that the present one year of college entrance and four years of professional school will continue until such a time as two years of college work can be generally required for entrance. The other plan is that the schools should immediately require two years of college work for entrance, reduce the professional curriculum leading to the initial dental degree to three years, saving time by more effective teaching and by excluding the dental specialties, and then offer the specialties and some advanced work in one additional optional year leading to a second dental degree. This plan assumes that enough more effective teaching can be at once secured to do in three years what is now

taking nearly four years to accomplish. It is conceded in this plan that perhaps ultimately this optional year will be incorporated into the required course, the initial degree abandoned, and thus lead to the stabilized program of six years from high school to dental degree.

The progress in the qualitative aspects of dental education are less definite but may be referred to under six headings: The graded curriculum, the breadth of curriculum, the equipment, the quality of instruction, the standards of scholarship, and university control.

#### 4. THE GRADED CURRICULUM

In 1884 the usual professional curriculum in dentistry, following the prevalent custom in medicine for more than a century, consisted of a single course of lectures in each of several subjects, repeated year after year. To these courses came first-year students, second-year students who had heard the lectures once, and later third-year students. If such a course were scaled for comprehension by the first-year students, it would be very elementary and lack any stimulus for the second and third year men. If it were planned for the older classes, it would be almost unintelligible for the freshmen. If it tried to compromise, it would fit none of them.

The unsoundness of this plan became fully apparent when laboratory subjects were introduced. A student might consent to attend the same lectures twice, but to repeat the same laboratory course twice would hardly be tolerated, and yet in human dissection, which is the oldest type of laboratory course in medical education, it is less than a decade since some medical schools ceased to require that a student dissect the body twice.

The repetitive curriculum was an inexpensive course to carry on, because it required only a fraction of the teachers required by the graded course. It was prevalent until the early nineties, then gradually was replaced by the graded curriculum, but it took more than two decades fully to eradicate it, and even to-day there are a few vestiges in the "circular courses."

Into this matter of graded curriculum enters another aspect, and that is the matter of sequence of courses. The justification of a graded curriculum is that progressively throughout all the years of the course the earlier subjects shall prepare for the subjects that follow, and that the later subjects shall make use of the information and training gained in the earlier courses. This fundamental pedagogical principle has not been uniformly enforced in dental education. In the university dental schools that are part of a systematic educational force the logical sequence of courses has been reasonably well regulated, but in the independent schools this has been largely ignored, and some subjects occupy unfit positions in the curriculum.

This educational problem needs careful and thorough study in order that both proper sequence and correlation of courses and subjects may be obtained. Its very complete neglect is one of the outstanding failures of the dental education.

### 5. THE BREADTH OF THE CURRICULUM

The subjects of the curriculum of the first dental school were those of the medical curriculum of that day, exclusive of any considerable attention to clinical medicine and surgery, and plus mechanical and operative dentistry. Specialties in dentistry were not yet in vogue.

As time went on, less and less attention was given in dental schools to medical subjects and more and more to the dental subjects, especially to mechanical dentistry. The average curriculum of 1870 was not as broad as that of 1850.

As dental schools associated with medical schools began to arise, there was a return to more emphasis on anatomy and physiology, though usually only in lecture courses. With the rise of cellular pathology, following the work of Virchow and his pupils, nearly coincident with the beginning of bacteriology by Pasteur and the work of Koch on infectious diseases, there came in the last decades of the nineteenth century a great stimulus to the study of bacteriology and pathology. This first appeared in the medical schools, was soon seen in those dental schools connected with universities, and slowly crept into the independent dental schools. The first laboratory course in bacteriology in a dental school was one in a university dental school in a mid-Western State about 1895. Pathology and bacteriology continued to be taught solely by lectures in most dental schools until 1917. Only in some university dental schools were laboratory courses given. The subject of dental pathology as taught in dental schools was not at all a laboratory subject, nor was it really pathology, but a conglomeration of etiology, pathology, diagnosis, and treatment, both medical and mechanical. Even at the present day many dental schools give no laboratory course on the pathology of the oral cavity. Clinical dental pathology is still similarly neglected.

Chemistry entered the dental curriculum relatively early, and with anatomy and histology has had reasonable attention for the past 30 years. Physiology has usually been only a didactic course but now is coming to have a practical laboratory phase added.

In 1917, with the inauguration of the four-year curriculum, came the greatest broadening of the dental curriculum at any one time by the introduction into the first year of the standard four-year curriculum, recommended by the Dental Educational Council, of biology, physics, English, and mechanical drawing. The most im-

portant of these innovations was the introduction of a required course in biology. This was later to be transferred to the pre dental year, but, beginning with 1917, every dental student has received systematic instruction in biology as an introduction to his professional course. The far-reaching import of this was appreciated by only a few educators at that time, but it laid the foundation upon which a great change in the conception of dentistry is to arise. This change is that dentistry is coming to be considered in its biological relations to the various functions of the human body, instead of primarily as a mechanical art in the restoration of defective or lost structures. The introduction of these academic subjects was not done without resistance. The dentists and dental educators were not at all enthusiastic about them; in fact, some of them contended that all the additional time should go to mechanical and operative dentistry.

Perhaps the attitude of a considerable part of the dentists toward a broadening of the curriculum can best be illustrated by the opinion of the nestor of American dentistry, known internationally as one of the leaders of dentistry and dental education, a graduate in medicine as well as in dentistry and a dental teacher for 40 years. In a stenographic report on page 65 of the proceedings of the National Association of Dental Faculties for 1911, in a discussion concerning giving advanced standing to medical students, he is quoted as saying: "The medical man in the first two years is devoting his time to biology and other subjects that have no bearing at all on dentistry." With such opinions from the most revered and honored leaders, it is small wonder that the policy of broadening the dental curriculum was long delayed, and when these academic subjects were introduced into the curriculum they were very shabbily cared for, either in provision of equipment or of competent and stimulating teachers.

However, it took a very short time to prove their value, and they furnished a stimulus for extension of the medical subjects and strongly influenced the appreciation of the value of pre dental collegiate work. With the introduction of the pre dental college year these academic subjects have been transferred to the pre professional school work, permitting yet more attention to the medical subjects. As a result, the curriculum of 10 years ago has been greatly improved in the way of a greater emphasis upon the fundamental sciences and a relative, although not absolute, diminution in the mechanical phase of the course of study. The results are already seen in the products of the newer dental education, who not only are better trained, but are also better able to keep abreast of the great advance in dentistry and medicine that will occur during their professional lives.

## G. EQUIPMENT IN DENTAL TEACHING

There is no adequate record of just what equipment was considered a minimum at any time in the history of dental education. A survey of the equipment of dental schools was made in 1896 by the National Association of Dental Faculties, but no organized report was printed. It seems impossible to ascertain, with any approach to accuracy, what was the usual equipment of the dental schools in early days. The catalogues tell of the "complete and modern" equipment, but to one familiar with the fanciful imaginations of some writers of fiction whose efforts appear in the professional school catalogues, this is not evidence.

When the Dental Educational Council was formed, it was hoped that a standard for equipment would be devised, but it was never done, although some rather broad and liberal suggestions were made. In the proprietary schools, even of recent years, the major part of the equipment was in the infirmary. Here the modern improvements in chairs and accessories were usually the first to be provided. The technical laboratories had little, and even to-day the dental student provides for himself most of the appliances and instruments with which he works in his dental subjects. Only the larger pieces of apparatus, like lathes and vulcanizers, are provided by the school, and in some schools not even these. The typical laboratory equipment in dental technology is a room, more or less well lighted, with drawers and lockers and tables bare of any equipment except gas jets. In better schools there are, in addition, some teaching models and charts.

When one reaches the equipment of the laboratories in fundamental subjects and medical sciences, the independent schools usually felt these hardly worthy of serious consideration, and their equipment has been very meager. In the university schools these subjects are cared for in the college of arts and science, and in university medical schools they usually have reasonably adequate equipment and facilities. As to libraries, with a few praiseworthy exceptions, these have been noticeable until recent years chiefly by their absence. To-day only about half of the dental schools have a library containing as many as 1,000 volumes.

There is even to-day no accepted standard of what equipment a dental school should have anywhere outside the infirmary. All else is simply opinion of different men whose opinions are much influenced by their major interests. If one may rely upon the recollection of older dentists, there has been great improvement, but when one tries to find any really comparative details, it is futile; and about the only conclusion that can be reached is that, in general, there has been gradual improvement in all dental schools in equip-



ment, and this improvement has been much more rapid in the past 10 years, especially in those subjects that are now taught in the undergraduate and medical departments of universities.

#### 7. THE QUALITY OF INSTRUCTION

As already suggested in various connections, the attention of dental educators in endeavoring to secure concerted action in improving dental education has been directed almost exclusively to quantitative advance, that is, to extension of the number of years of preliminary education, to the number of weeks per session, and to the number of sessions required to attain the degree in dentistry. Practically no concerted action has been taken to improve the quality of teaching, nor has consideration been given to the requisite training of the teacher in dental schools. While those engaged in dental education have been ready at all times to insist that dentistry has long since risen to the dignity of a profession, they have not appreciated that education is not only an older but also a much broader profession, in which the education of the dentists is but one small corner.

Indeed, many of those in dental education have taken the opposite view and insisted that teachers in dental schools shall be dentists, but that their further qualifications along educational professional lines are secondary or merely incidental. This has brought two results; first, that the greater part of the teaching in dental schools in the past, and only in somewhat lesser degree at present, has been done by men to whom teaching is merely an incident. Men are chosen to professorships in dental schools not because of any experience or accomplishments in teaching either past or expected but because of success and prominence in the practice of dentistry. The second and sequential result has been that these men, busily occupied in their practice, have themselves not done any considerable portion of the teaching, and so have delegated to demonstrators a large part of the intimate teaching and contact with the students.

The demonstratorships are ordinarily filled by very recent graduates. These men look upon such positions as merely temporary and serve but one year, or at best a very few years. During this time their relation to the school is an avocation, for they commonly have begun to practice immediately after graduation. These recent graduates, conventionally with no more than the minimum preliminary education and lacking pedagogical training or teaching experience in any line, have constituted the majority of the teachers in dental education throughout its history and have done the bulk of the teaching in the dental subjects, usually with mediocrity.

When, in the nineties, more emphasis began to be placed upon the medical subjects, the independent schools assigned these subjects

either to dentists or to practicing physicians whose pedagogical efficiency was little, if any, better. With the advent of full-time teachers in the medical schools, the dental schools that were integral departments of universities participated in the improvement in educational procedure in the medical subjects. When, in 1917, the academic subjects were introduced into the dental curriculum those schools intimately associated with universities benefited by the stabilized pedagogical efficiency in these subjects in the undergraduate college of the university, but in independent schools the teaching of the academic subjects was not comprehended and much neglected.

Of the many noteworthy advances in dental education accomplished by the Dental Educational Council, none is more far-reaching than its insistence that the teaching should not be entirely by men to whom teaching is merely an incident, but that there should be on every teaching staff some men to whom teaching is at least a vocation, if not a profession; and to accomplish this there should be in every school some full-time teachers. In addition, there should be an additional number of men to whom teaching is at least an avocation rather than merely incidental, and who are giving at least half of their time to teaching. The initial number designated was small, but the more significant thing was that it was specified that some of them must be in dental subjects.

It is clear that dental education from now on must be a university function, and the greatest problem in university dental education of the immediate future is not preliminary education but improvement of the quality of teaching in the dental subjects. The academic subjects will be cared for in the pre-dental year, and the medical subjects will come under the supervision of the university medical schools, which can be depended upon to conduct them acceptably, but an adequate quality of teaching in dental subjects must be worked out in the dental schools. This can be accomplished only when teaching dental subjects comes to be as dignified a career as practicing dentistry, and that end lies in the dental profession, and when, through public support, adequate salaries will attract capable graduates to a career in dental education.

The quality of teaching in dental schools showed only slight improvement for many years, but since 1917 there has been a great impetus, and we may look with confidence to a fruition of recent efforts in the next decade. As in all other phases of the dental educational problem, some schools, almost invariably those that were integral parts of universities, have led in the quality of teaching and at all times have been in advance of the general level. Now that all schools are to become of this type, we may expect effective results.

## 8. STANDARDS OF SCHOLARSHIP

No data are available as to what proportion of the aggregate dental student body year by year has been dropped for deficient scholarship. In the surveys by the Carnegie Foundation for the Advancement of Teaching one of the points upon which information was sought was the number or proportion of students that were dismissed for poor scholarship. The information thus secured showed a very sharp contrast between the procedure of the proprietary type of school and the real university school.

In the proprietary school dismissal for deficient scholastic attainment is almost unknown. Some men voluntarily withdraw from conviction of inability to carry the course or distaste for the work and some students are delayed in graduation, but there is resort to dismissal only in case of serious moral turpitude or for failure to pay tuition. Now, that dental schools are all to be under control of universities, the elimination of the unfit student can be confidently expected in the dental schools as well as in all other departments of the university. Elimination of the unfit is a cardinal principle of efficient professional education, and now that dental education is becoming more educational and less dental the application of this principle seems assured.

While graduation in dentistry carried the right to practice, the dental school became careless of the fitness of its graduates. With the advent of the procedure that graduates must appear before the State boards of examination and licensure there was a check upon this carelessness which had a salutary influence upon the quality of the dental teaching and the rigor of school examinations. When, about 1905, the National Association of Dental Examiners inaugurated a tabulation committee and issued public reports of results in licensing examinations, there came a further tightening in the requirements for graduation, for a record of many failures to obtain license by the graduates of any school diverted prospective students to other places for their dental course.

The licensing boards, in their examinations, have properly put the emphasis upon knowledge of and ability in practical dentistry, and their standards on the fundamental sciences and medical subjects have been much lower than on the dental subjects. The teaching efforts in the dental schools have responded to this differentiation.

State boards of examination therefore should have credit for aiding in improving the preparation for entrance to the practice, but have not been equally helpful in stimulating a broadening of dental education; in fact, they are at times deterrent to this effort by

imposing rules that hamper educational forces in the educational experimentation necessary to find the most desirable procedures in the education of the student.

#### 9. UNIVERSITY CONTROL

Frequent reference has been made in the foregoing pages to the conflict between the proprietary thesis of dental education as compared to real educational principles. Beginning with a single university dental school in 1867, but overwhelmed in numbers for decades by the independent schools, the university dental school has been in the minority until very recently. In the past two decades gradually appeared an appreciation that education for the dental profession is a public service that rests in the universities, both State and private, and the number of university schools has slowly increased. In recent years many independent schools have either become university departments or have effected affiliations that are educationally advantageous.

The independent dental school, with rare exceptions, did not comprehend the needs of dental education, or if it did, was unwilling and unable to provide for their fulfillment. With the extinction of the independent school there comes a distinct need for the extension of university participation in dental education. Dentistry being now recognized as a part of the health service, its correlation with medicine becomes closer and closer, and each university that feels its public duty to carry on medical education should see that there is a similar duty regarding dental education.

The curriculum is similar in the first two years except for dental technology, and even those medical schools that provide only two years of the medical curriculum could well similarly provide the first two years of the dental curriculum, the students in their later years to go to schools where more clinical material is available. However, the question of clinical teaching material in dentistry does not involve availability of hospitals, and so can well be carried on in university towns where the teaching of the clinical years in medicine is not feasible. It is to be hoped that we may see the rise in the next decade of several dental schools in connection with university medical schools at places where there is yet no dental education.

#### CONCLUSION

Any effort to trace the progress of dental education is one of difficulty, because of lack of records of accurate detail, although some general summaries have appeared from time to time, but what has been attempted here is to give to one, interested in education in general, a broad view of the problems and progress of this one field.

With that purpose in view, detailed statistics have not been included, nor discussion of the curriculum in detail or of technicalities peculiar to dental education, since this is not written solely for dental readers but as well for those not familiar with dental terminology.

At the present time we are in the midst of the most active period of progress in the entire history of this field of education. The publication in 1925 of the report on the Study of Dental Education made during the past four years under the auspices of the Carnegie Foundation for the Advancement of Teaching will make that year an epochal year in dental education, equal to 1840, 1884, 1893, 1908-9, and 1917. There can be no doubt that progress will continue. The next few years will see in dental education great advancement and a probable stabilization, and a decade hence, better than now, can be written a judicial appreciation of the results of the activities in the past 10 years.