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The American College of Dentists was established to promote the ideals of the dental profession; to advance the standards of efficiency of dentistry; to stimulate graduate study and effort by dentists; to confer Fellowship in recognition of meritorious achievement, especially in dental science, art, education and literature; and to improve public understanding and appreciation of oral health service.

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THE AMERICAN ACADEMY OF THE HISTORY OF DENTISTRY

Annual Meeting, San Francisco, October 14, 1955

In the following section of our JOURNAL we present five addresses which constitute the program of the 1955 meeting of the Academy, in addition to a paper presented by Dr. John B. Saunders "California's Fantastic Medical Profession," published by the Los Angeles Corral in The Westerner's Brand Book.

JOHN GURLEY, *Historian*

President's Address

WILLIAM N. HODGKIN
Warrenton, Va.

More years ago than one cares to remember, a young man encountered in the records of present Essex County (old Rappahannock), Virginia, a will probated in 1673. Ill equipped at the time with a general comprehension of history, harboring only rosy ideas of the sumptuous environment and grandeur of the luxury loving FFV's as gained from many a novel and other story, and doubtless hoping to find stimulating evidences of such luxury in his own background, he read:

"In the name of God Amen, I, William Hodgkin, of Rappahannock in Virginia, being bound for England and the danger of the sea to undergoe, having my perfect sense and memory, doe make this my last will and testament, etc."

Following this usual introductory passage, and after bequeathing his soul to Almighty God, the testator's bequests from his temporal estate were disappointing to say the least to the highly expectant and poorly oriented young reader. There were, for instance, items such as one ewe and lamb to the eldest son, one heifer to the youngest son, a bay mare to a brother-in-law; and the sparse furniture, bedding and household utensils, with the remaining estate in Virginia, to his loving wife, Phoebe Hodgkin. About the only sop to vanity was found in the bequest of a bay mare and colt "unto

my servant, John Booles" and "500 lbs. of tobacco unto a minister chosen by my executrix to preach a sermon in remembrance of me."

The further scant records of legal transactions of this testator—such as the 1660 purchase of four oxen from his neighbor, Colonel Moore Fauntleroy—likewise were of such humble and small nature as to be unimpressive to a youthful mind thinking in terms of the lush Eighteenth Century rather than of the hazardous and austere Seventeenth Century background into which his findings properly should have been placed. That a later and sensible scanning of contemporary wills naturally brought a reasonable orientation by acquaintance with the simple and scarce personal property common to all the settlers is but dim in memory, so clearly is the initial disillusionment recalled.

The young reader, as you have anticipated, was the present speaker. Has not his early experience of deflating disappointment, through ignorance of contemporary background, often been repeated by the beginning and casual reader of dental history?

Dental practitioners of the past appear to have been peculiarly prone to fall into the same faulty interpretation. It was common experience until lately to encounter practitioners who manifested concern and discontent as to their status and prestige in the family of professions. Fortunately, and due largely to recent and helpful emphasis on our history, the encounters are markedly less frequent. Yet, if such concerned individuals exist in any appreciable number, it would appear that we have failed lamentably in one phase of orientation of those entering the profession. It seems possible that in concentrating on development of the highest clinical standards we may have overlooked the tremendous cultural advantage of dental history in orientation of the individual toward an attitude of self respect as a suitable foundation on which to build a wholesome group prestige.

A valid evaluation of any dental historical material, quite beyond an appropriate placing in its contemporary general setting, falls of necessity in perspective against the period background of its older sister of the healing arts. Comprehensive study reveals that the dental profession has run a course somewhat parallel with that of medicine; naturally not so broad in its scope of service, and therefore not of as prompt prestige in community life, but nevertheless a reasonably parallel course in its more restricted field. Actually, any phase of either profession is but an accurate index

to the national cultural level of the period examined. The contrast is that medicine long has studied all phases of its history with objective and appreciative interest, whereas the concerned individual in dentistry has apparently sought a studied evasion of dental history as if fearful of its story. He fits aptly to the poet's observation of the inherent inclination of the man of high achievement to "despise those rungs by which he did ascend."

In view of the frequent reference to dentistry as a young and fairly recent profession, it may be as well to address ourselves to first things first and to consider just when the practice of dentistry actually began. On being asked such question, your speaker believes himself accurate in responding that the practice of dentistry began when the first human suffered a toothache. Some nearby individual, with a temerity prompted by sympathy and a natural inclination to experiment, surely sought somehow to relieve his pain—however irrationally or futilely. Moreover, that there likely was a long period of such ministrations by volunteer laymen before the existence of recognized practitioners of the healing arts and the incorporation of dental treatment into medical practice. Then, to the original question, finally responding that dentistry in its present development as an autonomous profession is largely, but distinctly, an American accomplishment—an accomplishment credited throughout the world, even among those leaders of variant ideologies who scoff at the social and political advances of the United States.

As previously noted, much of erroneous interpretation in dental history may be attributable to the examination of remnants of artifacts of a period, usually the most unsavory remnants at that, with no study of the contemporary setting from which they are taken but contrasted solely with standards of today. A more knowing and faithful interpretation, however, would suggest that the rolled foil from Dutch ducats and the improvised instruments of the early practitioner, for instance, be studied against the background of the spinning wheel and the walnut-stained home-spun, among other improvisations of the time, just as the carefully prepared filling materials, accurately designed armamentarium and well appointed operating rooms of today appropriately are studied against the associated finely spun and gaily colored products of the modern textile plant. Drawings and etchings of crude extractions or descriptive bits of operative procedure are noted with revulsion but often

without the realization that in the Middle Ages a large portion of the practitioners of the healing arts practiced their art on the street corner and in the market place.

Again, in our own Colonial period are we prone to read the precious bits of dental history as preserved in newspaper announcements—frequently the only clues to identity and the movement of these desultory individuals—and unwittingly regard them as unworthy progenitors because of immediate contrast with clinical and ethical standards of today? For a true perspective some of the crudities of Colonial life must be borne in mind.

Resorting thus to Virginia conditions—with an admitted provincialism enforced by limited acquaintance—a fair picture scarcely can be gained by reading alone from the *Virginia Gazette* that Dr. John Baker, on his arrival in Williamsburg in 1772, announces that his Anti-Scorbutic Dentifrice will “eradicate the scurvy, be it ever so bad.” It is well, for more accurate evaluation, to scan accompanying press announcements, and note in the same issues that Dr. John Tennant’s Rattlesnake Root is advanced as a panacea for all the fevers and ills of the Tidewater country, or a prominent attorney advising that he “intends to collect more money or do less business.” Many contemporary news items will yield the realization that a dental announcement at which many might now be disturbed was in perfect keeping with the forthright and often crude customs of the day. In truth, both Drs. Baker and Tennant were highly esteemed in the Colony and each of such interest as to be the subjects of biographical studies.

Nor is it broad historical perspective to look askance at the guarded operative procedures and process patents of the early dental practitioners without some knowledge of the Vaccination Trust with which medicine was beset over the same period. We have a ready ear for the cry of the prominent early dentist against the “gasconading charlatan” without hearing the like plaint of the contemporary high-minded physician against the “quacks, arcanums and bedside banditti.”

Were it not that dental historical papers must of necessity be condensed for accommodation to the limited pages of our journals, one might advocate a fairly frequent tying-in of dental items with some well-known milestone of contemporary general history. Thus, to relate the dental services of Dr. Benjamin Fendall to the Lees of Stratford prior to 1781 is to record merely a cold figure scarcely

registering with the reader, whereas to associate those services to the year of the surrender of Cornwallis at nearby Yorktown seems to lend it more warmth and meaning in ready orientation.

The pioneers who later pushed Westward doubtless fared even worse in attention to physical ills, dental included, than their settled brethren; armed usually only with a copy of one of the standard books on household medicine and remedies, occasionally attended by a venturesome health practitioner who sought more exciting and promising territory for his recorded therapy of "Bleed, Blister and Purge."

More basic than any of the problems encountered by the pioneer was that of health. Unless the settler survived, all other problems were relegated into insignificance; he simply never got around to them. Dr. Nathaniel Potter, one of the editors of the *Maryland Medical and Surgical Journal*, writing of the Western country, reported the heavy incidence of every affliction then known to man and susceptible of diagnosis, save that of hypochondria. The ever moving horse and buggy dentist of the day fitted perfectly into the picture of restless and precarious living.

If there were lacking here an abiding conviction that medicine is one of the noblest endeavors in which man may engage, the above use of the medical background might be held as in questionable taste. Yet, there is the strong persuasion that dental history is meaningless save against that coincident medical and general cultural setting.

It would be difficult to measure the results of a succession of papers devoted to the objective, yet appreciative, study of phases of dental history—particularly in view of the higher level of scholastic achievement and obvious advantages of the entering dental student of today. Not, of course, repeating to him the greatest fallacy in history—that the dental practitioner until recent years was but a craftsman—and part blacksmith at that. Rather, acquainting him truly of that nucleus of great and cultured figures who built the American dental profession through the generations, and who would have graced any noble calling, despite a general inaccurate appraisal resulting from a number of untrained men who pretended and obtruded for profit.

The Academy has a most promising and useful role as the medium of stimulation in its objectives to present dental history in its proper perspective.

The Significance of the Fauchard Manuscript

GEORGE B. DENTON
Chicago, Ill.

The significance of the Fauchard manuscript is largely biographical and bibliographical rather than historical. It in nowise alters the position of Fauchard's book as the pioneer and most important work in the professional history of dentistry. It throws some light on the relation of the author to his work and gives information on the way in which the book was written and published.

Somehow the manuscript came into the possession of J. R. Duval, the most learned dentist of his era, who was greatly interested in the history of the profession. Born in 1759 only a few years before Fauchard's death, he could not have received it directly from the author, and it is likely that the manuscript remained with the printer and was not returned to the author. Dagen,¹ the historian, suggests that it is probable that the manuscript was preserved by the publisher of the third edition and by him passed on to Duval, but there is no reason to assume that the publisher of the third edition should have had the manuscript of the first edition.

A note on a fly leaf of the manuscript indicates that Duval gave the manuscript to his grandson René Marjolin, also a dentist and physician. In this inscription Duval refers to himself as a member of the Royal Academy of Surgery since 1813; therefore this is the earliest date at which the manuscript could have been passed on to Marjolin. The note is written in an extremely shaky hand—a fact that suggests that the writer was very old. Duval died in 1854, at the age of 95, and it would seem likely that the presentation of the manuscript was near that time.

Later it passed into the possession of the Faculty of Medicine of Paris. In 1892 it was discovered in the library of that school by George Viau² who mentioned his discovery briefly in the preface of a book published at that time. A full description and discussion of the document was given by him in 1923 on the occasion of the bicentenary celebration of the completion of the first manuscript version of Fauchard's book.

The manuscript in the Faculty of Medicine of Paris has been examined and studied with more or less thoroughness by only three persons; namely, Viau, B. W. Weinberger³ in 1924, and Georges Dagen in 1931. Each of these has written brief articles on the manuscript. In 1935, in a paper read before the Medical Library Association,⁴ I had occasion to discuss the Fauchard manuscript, basing my comments on the accounts given by the aforementioned authors and on the facsimiles of a few pages of the manuscript published by Weinberger and Dagen. At that time I concluded that, "What is known of the manuscript proves, whatever else, the need of photostatic reproduction and a close textual study." Judging from the comments of the men who had examined the manuscript, and especially Weinberger, I was convinced that it would be difficult to persuade the Faculty of Medicine of Paris to allow any sort of copy of the manuscript to be made, and therefore did not attempt to secure the reproduction which I felt was needed. When, in 1951, I learned that Dr. Harold Hillenbrand was to attend the meeting of the Fédération Dentaire Internationale, I suggested to him that he might use his influence to secure a copy of the manuscript. As a result, the Fédération Dentaire Nationale of France had a microfilm of the manuscript made, which in 1952 was presented to the Secretary of the Association, along with the two-volume, first edition of *Le Chirurgien Dentiste*, Fauchard's work, published in 1728.

The present paper is a preliminary study of the manuscript as it appears in this microfilm.

The writers who have commented on the Fauchard manuscript from a first hand study and from various conjectures about it, have offered numerous opinions with regard to what the manuscript is and what it represents. Some of these statements should be reviewed and re-evaluated in the light of a new study of the document.

First of all, the physical nature of the manuscript may be described. Viau has pointed out that the manuscript is made up of a number of unbound sewed fascicles numbering about 400 sheets, approximately 13 inches high and 9 wide, with a margin of about one third of the page on the left. The leaves are written on both sides. Writing in 1924, Weinberger described the manuscript as "a large leatherbound volume of 400 pages," and Dagen declared that the manuscript was bound shortly after publication. From

these variant statements it must be inferred that the manuscript was bound between the time Viau first saw it in 1892 and the time Weinberger examined it in 1924.

THE PRINTER'S COPY

The question has been raised by Weinberger as to the stage in the writing of the book represented by the extant manuscript. He wrote:

Upon examining the manuscript, I found that it was but a part of the original edition, and consisted of only the first volume. This puzzled me a great deal, until after a study and an analysis of the photographed plates. My observations lead me to believe that this manuscript was that of his original writings and the part corrected by his medical friends. After five years, having been in the hands of twenty of his colleagues, it needed a revision and rearrangement of material so that it was necessary to recopy all of it, in order that a printer could easily set it up in type. The second volume, being Fauchard's own, and not having someone superior to him at the time in prosthetic knowledge, needed no revision, was used by his publisher as it was originally written. The revised copy of the first volume, as Fauchard originally wrote it, has not been found.

Weinberger's speculations are plausible, but untrue. The manuscript bears conclusive evidence that it was the printer's copy for the first edition. Throughout the manuscript for both volumes, the signature marks have been inserted with the number of the first printed page, in a hand quite different from other hands in the manuscript.

(For those who are unfamiliar with bookmaking, the term *signature* as used by the printer and bookbinder may be explained. *Signature* is the collective term for all the pages printed on one sheet of paper. The signature marks are letters or numbers placed at the bottom of the first page of the signature and also sometimes on other pages for the purpose of indicating how the sheet shall be folded and the sequence of the signatures in the bound book. Signatures are in multiples of four—usually four, eight, twelve, or sixteen.)

Since the signatures could be determined only after the type had been set, it is certain that the printer used this copy.

Why the printer should have marked the manuscript copy with the signature marks is not clear to me, since the type would already have been set for a signature before its designation could be determined. Certain liberties that have been taken with the manuscript

by adding irrelevant comments indicate that the printer did not expect to return the copy to the author. The suggestion offered by Dagen that this copy might also have served for the preparation of later editions is likewise untenable, since the first edition contains everything in the manuscript, whereas later editions include material and modifications not found in the manuscript.

As quoted, Weinberger, in 1925, asserted that the manuscript was for Volume I only, and I called attention in 1935 to the fact that Dagen published facsimiles of pages of the manuscript which belonged in Volume II. An examination of the microfilm reproduction of the manuscript shows that all the chapters of both volumes are present. If any part is missing, it is not considerable.

THE VARIOUS HANDWRITINGS

One of the most important problems that has arisen in regard to Fauchard's book is the question of authorship. From the close of the eighteenth century, there have been persons who claimed that Fauchard was only partly responsible for the work that was published under his name. These persons have given more or less credit to Jean Devaux as co-author with Fauchard. This ascription is based on the assertion of Pierre Sue, the younger, who in 1772, published a comment on the works of Devaux. This assertion has been since supported by many commentators on Fauchard.

"Aside from Sue's positive assertion, there are circumstances which give color to Devaux's participation. Among the published approbations of *Le Chirurgien Dentiste*, one by Devaux was not only the earliest—being written shortly after the manuscript was first prepared for printing—but also the most descriptive of the organization and content of the work. This familiarity with the work, some think, is in itself sufficient to mark Devaux as one of its authors.

"Moreover, Devaux's reputation and talents as a literary man among physicians make the hypothesis more plausible. He was a commentator and translator of earlier works, and is reputed to have aided other medical men to bring forth their books."⁴

The problem of authorship has never been conclusively solved.

The various handwritings appearing in the manuscript have been regarded as important in throwing light on the part played by any possible collaborators of Fauchard. Viau, and both Weinberger and Dagen following him, have detected three handwritings in

the manuscript. The bulk of the manuscript is in a regular and formal hand which has been interpreted, undoubtedly with justice, as the hand of the scribe or copyist who prepared the manuscript for the printer just as today a typist would transcribe it for this purpose. A rather bold irregular hand in passages characterized by occasional misspelling and incorrect syntax have been ascribed to Fauchard. A fine scholarly hand, appearing in corrections and annotations, according to Viau, Weinberger, and Dagen, has been ascribed to Devaux. To these hands others should be added, certainly at least a fourth, which belonged to the printer or somebody in his establishment.

As stated above, most of the manuscript is in the hand of a copyist or perhaps two or three copyists and there are numerous corrections and additions to this text.

A considerable amount of additional matter appears also in the irregular hand ascribed to Fauchard. To one who is not an expert in the French language, these passages do not appear to be any more incorrect than one might expect of the copy submitted by a professional man today. They are in a running hand (one word often connecting with the next) that would suggest a person with confidence and with purpose and competence. In the microfilm version of the manuscript, this hand is much easier to read than any other. A study will be made of parts of the book in this handwriting, especially as regards the known dates of the material. In general, it may be said that these passages are of material which was added after 1723, when Fauchard says he had a first completed version of his work ready for publication.

The very finely written annotations and corrections, usually in the margins of the manuscript and presumably ascribed to Devaux, appear to me to be for the most part the corrections of one of the copyists in a diminutive version of his regular hand. There are, however, numerous detailed corrections of spelling and diction in a somewhat less condensed and more disjointed hand which may be that of another person.

There are two types of emendations which, judged by the handwriting, may have been ascribed to Devaux. One that occurs in a few instances is a moderately large, beautiful, curved and shaded penmanship. This seems to me more likely to be that of a scribe—not, however, the copyist who did most of the manuscript. The other type, which occurs in long annotations crowded into the

margin of the page is a microscopic hand with a regular slant. When it is considered that Devaux was born in 1649 and died in 1729, some doubt may be cast on the likelihood of his being the writer of either of these types of writing. He was, at the time, eighty years of age and died the following year. Such manual skill at that age is at least unusual.

Dagen was puzzled by certain peculiarities in the text. He wrote:

On page 183, the text has been modified as regards style, but the original text has not been stricken out, and, curiously enough, there is to be noticed in the second version, interpolated among the lines of the revision, the following: "Teeth longer than their neighbors. Monsieur, I have the honor," and further on also, "Monsieur!"

"What a scribe this is who amuses himself in the text!" Dagen exclaims. However, he was mistaken in supposing that the interlineations were corrections of the text: they are word for word an exact repetition of the text. The hand is not that of the copyist, but it bears some resemblance to it. The obvious explanation is that somebody, probably in the printer's establishment, after the manuscript had been set up in type and was no longer copy, used the scribe's formal hand as an example for a lesson in handwriting. The added words "Monsieur" and so forth help to confirm this inference. There are several such instances of copying the text and adding irrelevant remarks on other pages.

So far as I know, nobody competent to pass on the identity of the various allegedly different hands has examined the manuscript. The opinion of a chirography expert is needed. The problem of handwritings may require a more detailed scrutiny than can be afforded by the microfilm.

WINSLOW'S APPROBATION

The Approbation of the surgeon Winslow appears first among the Approbations in Volume I of the published work and also first in the manuscript. In the manuscript it appears also at the very end of the document. Winslow was the royal censor and read Fauchard's manuscript as part of his official duty. The handwriting of the Approbation at the close of the manuscript appears to be somewhat different from any other in the manuscript and was probably written and signed by Winslow himself. Dagen has also noticed this point and inferred that Winslow's approval was so placed on the manuscript to give the publisher official permission

to issue the work and safeguard him against action for unlicensed publication. As it is dated December 8, 1727, Winslow could have read everything in the manuscript as published, except part of Observation 4 in Chapter XXXII, in which Fauchard refers to an incident early in February 1728, and six of the Approbations which were dated 1728.

DATE OF THE MANUSCRIPT

At the beginning of Chapter XXIV of Volume II, Fauchard declared that he had been ready to publish his book in 1723. Some commentators have concluded that the manuscript was completed, and without further change, was reserved until publication in 1728. This can hardly be true, since the book contains a great deal of material regarding circumstances which occurred after 1723 up to early in 1728. The basic text in the hand of the copyist, however may have been prepared earlier, and the later material may have been added in the hand of Fauchard or a collaborator. It is interesting to attempt to fix approximately the date when the original copyist finished his work. A check on the dates of cases published (in Chapters XXIII-XXXVII of Volume I) shows that the latest date of a case written in the hand of the copyist is April 5, 1724, and that the earliest date of a case appearing in the hand of Fauchard or a collaborator or a second scribe is May 15, 1724. It is likely, therefore, that the basic manuscript was completed by the scribe shortly after the April 1724 date. It is to be noticed that the date of Devaux's Approbation (March 29, 1724) is very close to this latter date. A considerable amount of the manuscript, probably all that was written after 1724, is not in the hand of the original copyist.

There is some indication that the original scribe worked on the manuscript more than once. For instance, the number of cases in a chapter, given in the chapter heading, will often be corrected as many as three times, all but the final number being stricken out. In one instance, Chapter XXXII of Volume I, the original number of cases was two; then a third case was added in the hand of the same scribe; and finally a fourth case in the hand ascribed to Fauchard. The third case, it may be inferred, was added by the scribe at a second writing, possibly between 1723 and 1724.

ORGANIZATION OF THE BOOK

The order of the parts of the manuscript as it is today is not significant, for as Dagen says:

. . . since many of the pages have been differently numbered afterwards, the binder, embarrassed, has sometimes bound together fascicles which are not consecutive. We have often been obliged to seek a following part in the midst of the manuscript.

The chapters, however, are numbered as to an earlier position in the manuscript as well as to their place in the published book.

With the exception of very few chapters in either of the volumes of Fauchard's book, none of the chapters finally appeared in the published work at the points occupied by them in the original manuscript. It is difficult to discover in all cases, where a chapter stood in the original plan, since the numbers have often been changed three or four times.. Although the old numbers have not always been stricken out, the final placing of the chapters has been indicated in practically all cases in the margin near the chapter heading, in these words: "This chapter should be chapter so and so, volume so and so." The handwriting of these directions is small, light, and rather irregular. It might be that of Devaux.

The organization of Fauchard's published book was for the most part logical and well arranged. The first volume dealt with the anatomy and pathology of the mouth with illustrative cases. There was little of the technique of practice. The second volume dealt with the technique and was intended for the dentist and dental student. In the original arrangement of the chapters, as far as their position can be ascertained, there was little logic. In two respects, subjects that certainly belong in the second volume were found among chapters intended for the first volume. These deviations were:

1. the description of an extraction instrument and
2. four obturators for cleft palate cases.

These chapters, certainly, are definitely technical. Within the manuscript of the first volume, the order of chapters appears to be without reason, as for instance when two chapters discussing caries are separated by at least ten others and when the chapters dealing with various conditions of the soft tissues fail to follow directly the general discussion of diseases of the gums.

The earlier arrangement of the chapters, however, may not always be as illogical as it appears. For instance, the introduction of the four chapters on obturators in Volume I as originally planned may be explained by the fact that in the preceding chapter on the harmful effects of caries on the surrounding tissue, Fauchard indicated that loss of palatal substance may be due to carious teeth.

In the published book, at this point he calls attention to his discussions of obturators in Volume II, as a means of correcting these defects.

The order in the manuscript for the second volume is in the main, fairly logical, although it was considerably altered in the final version.

The arrangement of chapters in the manuscript is worthy of more consideration than is given here.

MANUSCRIPT COMPARED WITH BOOK

To what extent the manuscript, in minor details, is at variance with the published book, has not been ascertained, since a sufficiently close comparison has not been made. But there are at least two such deviations. At the close of Volume I, the last four words of the manuscript "in the same field," appear in the published version, "in this matter." The change neither alters the sense nor improves the style.

Also the dating of Fauchard's correspondence with the surgeon Juton, in the manuscript, is at variance with that in the book. In the latter, both Juton's letter and Fauchard's reply are dated 1727; in the manuscript Juton's letter is dated 1725, and the last digit of the date of Fauchard's letter is blotted and cannot be deciphered.

Changes of this sort could be made, of course, after the manuscript was set up in type.

DEVAUX'S CONTRIBUTION

Of the many marginalia, only one appears to be a criticism of the text. Having occasion to mention the celebrated surgeon Dionis, the text gives a lengthy recital of the qualifications and distinctions of that notable. The passage has been bracketed by the commentator and in the margin he has remarked: "This should be put in a note in order not to interrupt the continuity of the narrative" (*la suite du cours*). This comment is certainly not a direction to the printer, but a suggestion for the author, since the reason for the change is stated. If Devaux, the critic, added anything to the manuscript, this certainly would be his correction. The note is written in an uneven hand very much like the marginal notes at the head of each chapter indicating their proper position in the book. These facts suggest strongly that Devaux was responsible

for the final arrangement of chapters. It also suggests that he did not write the chapters himself, for if he had, he would have organized them in the beginning as they were finally arranged.

SUMMARY

This preliminary study has been productive in clearing up the following:

1. The manuscript has the complete text of Fauchard's first edition, 1728, consisting of first and second volumes.
2. It was not a preliminary manuscript, but was the one used by the printer.
3. The marginalia are either revisions of the text or directions to the printer; in only one instance is there an apparent criticism of the text.
4. Although the problem of various handwritings in the manuscript has not been settled,
 - a. It is unlikely that any extended passages of the document are in the hand of Devaux.
 - b. The considerable sections ascribed to Fauchard's hand are not impeccable but they are creditable as regards correctness and style.
 - c. Many of the emendations, sometimes ascribed to Devaux, are probably in the hand of the scribe who copied most of the work.
 - d. There was probably more than one copyist, one that made additions after 1724.
 - e. Somebody in the printer's establishment made notes on the manuscript, notably the signature marks.
 - f. Winslow's Approbation at the end of the manuscript is probably a holograph.
5. There are some slight variants from the manuscript in the published book.
6. The organization of the work as published is very different, as regards arrangement of chapters within each volume, from what it was in the manuscript before revision, and it is notably more logical.
7. The manuscript reveals nothing that points toward substantial collaboration by Devaux or anybody else, although of course it does not preclude that possibility.

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Thomas William Parsons, Jr.

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In the Boston Almanac for 1852 will be found the names of 75 dentists, who at that time were practicing in Boston. Among these are the names of two who became famous. One of them, known wherever dentistry is practiced, is that of William T. G. Morton, the demonstrator of sulfuric ether as an anesthetic at the Massachusetts General Hospital, October 16, 1846. The other, Thomas William Parsons, Jr., almost unknown to the dental profession of the present, was equally distinguished in his day and generation as a scholar, poet and translator of Dante.

By coincidence both were born in the same year and the same month: Morton on August 9, 1819, Parsons nine days later, on August 18. Among others in Boston who were their contemporaries, was J. Foster Flagg, the last of the three generations of the Flagg family, and Nathan C. Keep, founder and first dean of the Harvard Dental School.

Parsons, Jr., was born in Boston, the son of Thomas W. Parsons, a graduate of the Harvard Medical School in 1818, who is said to have practiced both medicine and dentistry in Boston.

At the age of nine, young Parsons entered the Boston Latin School, famous at the time for its devotion to the classics. Here he became an outstanding student, especially in Latin and Greek, graduating at the age of fifteen. Two years later, his father took him to Europe where he spent a year or more in Italy. Having a remarkable gift for languages, he soon mastered Italian and became

as familiar with it as with his native tongue. It was during his stay in Italy that he became enamored with the poetry of Dante, especially the *Divine Comedy*.

Very early in life he was recognized as one of the foremost Dante scholars in this country. It is reported of him that he could repeat from memory all of the *Paradise* in the Italian language consisting of more than 4500 lines.

On his return to Boston he entered the Harvard Medical School where he continued for a year and a half, leaving without a degree, following which he engaged in the practice of dentistry. Since there were at that time no dental schools and no laws governing the practice of dentistry, it would seem probable that he acquired what knowledge he may have possessed, in the office of some practitioner of that day—possibly his father. (There being no biography of Parsons, some things must be left to conjecture.) He appears to have continued in practice up to the latter part of his life, mostly in Boston, though he is reported as having practiced in London for a year or more in the early 1870's, at which time he was made a member of the exclusive Atheneum Club.

He is usually referred to as "Dr. Parsons" though there is no record of his ever having received a doctor's degree. Nor is there any evidence of his having made any contribution to his profession. From what information is available it would appear that he had little interest in dentistry beyond that of making a living.

For this he is hardly to be blamed. Dentistry as it is known at present, did not exist when he entered the Harvard Medical School in 1837. Moreover, his interests were centered in the literary world. To this he gave the best that was in him—a scholarly mind, talents such as are given to but few, plus the publication of four volumes of verse, insuring him a permanent place in American literature. Nevertheless, he continued in the practice of dentistry throughout most of his life, numbering among his patients some of the elite of Boston.

While a student at the Harvard Medical School, there appeared a poem by Parsons entitled, "On a Bust of Dante," referred to by an English poet of that day, Mary Russell Mitford, as "by far the finest poem that ever left America." It is generally referred to as one of his best and will usually be found in most American anthologies.

In 1843 when Parsons was twenty-four years of age, there was published anonymously a small volume of 83 pages bearing the

title of "The First Ten Cantos of the Inferno of Dante, Newly Translated into English Verse." It was most favorably received, critics according it "high rank for its nobility of style and its verbal felicity." James Russell Lowell characterized the translation as one that "ranks with the best for spirit, faithfulness and elegance." Seven additional cantos were later added by Parsons. The study of Dante plus the writing of poetry always occupied first place in his life.

In 1857 Parsons married Anna M. Allen of Boston, who is said to have shared his literary interests. It was she who was instrumental in bringing together his poems which over the years were published in four small volumes, now long out of print and hard to find. Among them there is an elegiac poem on the death of Daniel Webster on October 24, 1852—one of the finest tributes ever paid to the great statesman. The last verse is often quoted as "one of the gems of American Literature":

"We have no high cathedral for his rest,
Dim with proud banners and the dust of years,
All we can give him is New England's breast
To lay his head on, and his country's tears."

Since Webster's home was in Marshfield, only a few miles south of Scituate where Parsons lived the latter part of his life, it is possible he may have known Webster personally.

In another poem entitled "To James Russell Lowell" reference is made to the use of ether with a footnote stating that it was "Written just after the discovery in Boston by Morton of the surgical use of ether." This reference will be found in the following lines:

"For us, to whom a wisely—ordering Heaven
Ether for Lethe, wire for wings, has given . . .
Life's all a miracle—and every age
To the great wonder-book but adds a page."

The words "wires for wings" doubtless refers to telegraphy which came into use almost simultaneously with surgical anesthesia.

By nature, Parsons is reported as having been reserved, sensitive and deeply religious. He was a life long member of the Episcopal church and a translator of its litany into verse. It was predicted by a clergyman of Boston "that he would be honored ages after the mediocrities who first surpassed him in fame, have been forgotten."

Parsons also had a social side and was closely associated with the

literary life of Boston, numbering among his friends such well-known poets as Lowell, Longfellow, Emerson and Holmes.

He was one of that small group who frequented the Red Horse Inn at Sudbury where it is said he spent some of the happiest hours of his life. Longfellow respected Parsons for his literary talents and immortalized him by making him the Poet in the "Tales of a Wayside Inn." He did not tell the stories attributed to him but it is said "he could have told them and made them live."

Parsons was a literary craftsman who took such pride in his work that he labored over it, rewriting and polishing it, which explains why his output was relatively small and his great work on Dante was never finished. He was apparently indifferent as to the fate of his poems and equally so as to his repute as a poet. Though urged by his publisher to make a definitive edition of his poems, it was never done.

Parsons died at his home in Scituate in 1892 by falling into a well, following what is believed to have been a stroke.

In 1893 the best of his poems were brought together and published in a single volume of 250 pages, plus a companion volume containing his translation of Dante. It is as scholar, poet, student and translator of Dante that he will always be known.

When Parsons began the practice of dentistry there was no dental school, no anesthesia, no knowledge of dentistry as a health service, and practically no professional organizations. Dentistry as an organized profession did not exist. Nevertheless he continued in the practice of dentistry throughout the major part of his life—a scholarly, cultured member of the dental profession who deserves an honored place in the history of American dentistry.

Whatever place Thomas William Parsons will occupy in the literary or professional world, his place as Poet in Longfellow's "Tales of a Wayside Inn" will always remain as one laurel that will never fade.

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Our Recorded and Unrecorded History

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What history is and what its objectives are have been variously stated, and these range from Henry Ford's dictum that history is bunk, and Voltaire's (or is it Napoleon's?) "a fable agreed upon," to Henry Sigerist's scholarly statement that "history is the past seen through the medium of the human mind," and though it deals with a dead past, it is never dead itself, but "one of the most powerful driving forces of life."¹

In a sense, the study of history is part of the humanities, which are "distinct from sciences and social sciences in being centered about the meaning of life to man as an individual."² In another sense, history may be considered a great discipline of the social sciences.

On the writing of history, Sigerist says that it "is a highly responsible task. The historian must submit to the iron discipline imposed upon him by the methods of historical research. They set sharp limits to his interpretations and forbid him to ascribe to an individual either actions or words unless he has documentary evidence for them. . . . The picture he gives of the past must be true, for only true history is fertile; faked history, written uncritically, or frivolously for purposes of propaganda is always destructive. . . . The poet, the novelist, and the dramatist also recreate aspects of the world. They too must be true if they want to be persuasive, but they enjoy much more freedom than the historian. They may create people, while the historian can only recreate them."³

Judged by these strict rules of Sigerist, our recorded dental history has not often been written critically. In fact, laxness of scholarship and of accuracy seems to find favor with some publishers and editors. And when critical reviews of such histories are written, they are not published. In so doing, we fool only ourselves and certainly not the scholars and historians of the rest of the world about us. When a profession restrains and tones down even the semblance of critical analysis of so-called literature, scholarship sails under false colors, if it sails at all.

To be more specific, I have in mind a history book that was

published some years ago.⁴ It was badly written, replete with errors, to say nothing of its complete lack of documentation. A critical review of it was prepared by one whose life-work has been history of dentistry, and who is better qualified than most of us to evaluate historical material. His evaluation of this book was rejected for publication. Had it been accepted and published and then heeded, the same gross and inexcusable errors would not have reappeared in later editions of the same book.

In the most recent edition⁵ and under his picture, Arthur D. Black is referred to as the contributor of an accompanying article on the development of operative dentistry,⁶ yet nowhere in the book could that article be located. Here, Wilhelm Konrad Röntgen, after the misspelling of his middle and last names,⁷ is said to have made his epochal discovery at the University of Strasbourg, while in another chapter Wilhelm becomes William, Konrad and Röntgen are again misspelled, the scene of the discovery moves from the University of Strasbourg to the University of Wurzburg, Germany, and Wurzburg is incorrectly spelled "Wurtzberg."⁸

Of Sir William Hunter the book says that he gave his famous lecture (on the role of oral sepsis) in 1910;⁹ somewhere else in the book the date becomes 1911.¹⁰

The dates for S. P. Hullihen, the so-called father of oral surgery, are given as 1810-1857; his medical degree is stated to have been acquired from the Medical Department of Washington College at Baltimore, whereas his dental degree is said to be honorary.¹¹ Somewhere else in the book Hullihen becomes Hullien at least twice, the dates change to 1828-1895, and both degrees become honorary.¹²

The author tells the reader that Edward H. Angle removed to St. Louis in 1887; three lines farther on in the same paragraph the date changes to 1895; and, as a Missourian, I object to the spelling of Missouri to end with "y".¹³

To spell Greene Vardiman Black's given name as the color green, and to do so repeatedly, though no sin in itself, reveals carelessness of authorship which is no attribute of any book.¹⁴

These are only a few of the errors which were spotted at random, and although some of them are not serious errors, they all detract from the weight of authorship which the student of dental history likes to attribute to his source of knowledge. Furthermore, without documentation a history book becomes one of opinion.

Yet the publishers say, in a personal communication to me, that

the book has been completely revised and is a great improvement over preceding editions; and to compound the insult to scholarship, the publishers, in their letter, spell "preceding" incorrectly!

The student of dental history laments the preponderance of this uncritically prepared material and deplores the dearth of studies of men who raised dentistry to its present professional level. In the latter, he is somewhat comforted by the fact that dentistry is not alone in this lack. For only recently, and fifty years after his death, there was published the first full-length study of Rudolf Virchow, the pioneer cellular pathologist, anthropologist, and German statesman of the latter half of the last century.

In another ten years G. V. Black will have been dead fifty years, and will a grateful profession come forth with a worthy full-length study of the man to whom American dentistry owes more than it does to any other single man—living or dead? Nineteen fifty-three marked the one-hundredth anniversary of the birth of W. D. Miller, yet there was not a ripple to memorialize the scientist whose theory of dental caries has not been refuted or basically altered or improved upon sixty-five years after it was first advanced in 1890. In 1957 Miller will have been dead fifty years, yet not even the learned *Encyclopedia Britannica* seems to know that he ever lived or to have contributed anything to science or dental science. J. Leon Williams, William Taggart and Greene Vardiman Black are, to the *Encyclopedia Britannica*, also unknowns. Of the four Blacks it lists, one was a Scottish publisher, one an American lawyer, one a Scottish chemist, and one a British novelist, but G. V. Black is not among them. There is, however, a fleeting reference to Horace Wells and William Thomas Green Morton, and others of lesser light in other fields.

This lack of worthy studies is a handicap also to other historians than those of dentistry. For example, in the *Encyclopedia of American History*, a one-volume reference work, prepared by specialists and experts, and edited by a professor of history, there is, under the heading of Medicine and Public Health, only this reference to dentistry:¹⁵

"1839-41. Dentistry. *Amer. Jl. of Dental Science* (1839), College of Dental Surgery (Baltimore, 1840), American Soc. of Dental Surgeons (1840), Ala. introduced licensing of dentists (1841)."

The biographical section of this encyclopedia contains sketches of 300 notable Americans, one of whom was a dentist. These 300

American men and women were selected by a group of American historians, after careful and profound study of the American past and present, because of their lasting contributions to humanity. It is gratifying to know that dentistry has been recognized for at least one such everlasting contribution. Now if you were to be asked, either collectively or individually, to name the dentist who in your considered judgment contributed the most to our human society, it would be reasonable to assume that, though the answers would vary within a limited range, an agreement amongst you would not be difficult to reach. But I venture to say that, with due respect to the honesty of your judgment and to your command of dental history, none of your selections, not even that of the scholarly George B. Denton, would coincide with that of the experts, the specialists, and the observers of the American scene.

Naturally, the question arises: Why the difference? Before attempting an answer, and while you are guessing the identity of the dentist upon whom greatness has been thrust, I will review that study,¹⁶ the value of which is open to conjecture. My conjecture is that its value parallels that of the sports writers' selection of the All-American star team, and merely satisfies our mania for collecting facts, which often border on the ridiculous.

The rules for the selections were ground rules and arbitrary, with room for exceptions. First, an American was defined to mean that, prior to 1776, any person who had spent the greater part of his life in the American Colonies; after 1776, a citizen of the United States. Naturalized citizens were included only when their contributions post-dated their American citizenship. Secondly, the contribution must have been notable for its time and place and must have had a measurable impact on American life; it also had to have staying power. Thirdly, accumulation of wealth was not enough. The businessman also had to have contributed to organization and development of industry and commerce, and to public service. Fourthly, the list had to have a well-rounded representation of the major fields of human activity. Perhaps that is why dentistry was included.

Now the results of that study. Two hundred and four of the 300, came from privileged backgrounds which were not necessarily wealthy.

One hundred ninety-nine of the 300 had advantages of college education; 157 of the 199 graduated from college, but there was

no close correlation between high scholastic grades and great achievement. For example, Louis Brandeis and Douglas MacArthur had high grades, whereas Franklin D. Roosevelt did not. And some of these American notables were even expelled from college—James Fenimore Cooper, John C. Fremont, James Whistler and Mark Hanna.

Of the 300, only 16 were women, explained by their previous lack of opportunity for professional advancement.

The majority of the 300 came from rural backgrounds. Only 31 were naturalized citizens. Of these only five came from Southern or Eastern Europe, because previous to the 1880's most of the immigrants came from Northern and Western Europe.

Only 84 were self-made notables. Of these three had been slaves, one with the stigma of illegitimacy, two born out of wedlock, one was virtually blind, one deaf, one had lost the sight of one eye, two were victims of tuberculosis, one had a series of nervous breakdowns, one was lame, and another was a polio cripple. And, if I may add a note of my own, it is not known how many wore bi-focals or artificial dentures, because no such statistics are available!

These statistics remind one of what O. Henry once wrote: (Mr. Pratt talking to Mrs. Simpson)

"Let us sit on this log at the roadside," say I, "and forget the inhumanity and ribaldry of the poets. It is in the glorious columns of ascertained facts and legalized measures that beauty is to be found. In this very log we sit upon, Mrs. Simpson," say I, "is statistics more wonderful than a poem. The rings show it was sixty years old. At a depth of two thousand feet it would become coal in three thousand years. The deepest coal mine of the world is at Killingworth, near Newcastle. A box four feet long, three feet wide, and two feet eight inches deep will hold one ton of coal. If an artery is cut, compress it above the wound. A man's leg contains thirty bones. The Tower of London was burned in 1841."

"Go on, Mr. Pratt," says Mrs. Simpson. "Them ideas is original and soothing. I think statistics are just as lovely as they can be."¹⁷

The Presidents of the United States—all 33 of them—head the list of 300, because it was agreed that no one elected in his own right to the highest office of the land is not notable, regardless of whether he did anything else to distinguish himself or his office. Jurists and lawyers came next, with twenty names to their credit. There were 33 statesmen, 18 military and naval figures; 40 in the group of belles lettres, philosophy and social sciences; 13 artists; 6 architects, and 6 from the theatre and allied arts. Musicians and

composers numbered 4, religious leaders 14, and educators 14, among whom is Abraham Flexner, to whom medical education and, indirectly, dental education, owe a great deal. Social reformers and labor leaders placed 15; journalists, editors and publishers 8; pioneers and explorers 10; business leaders 18; inventors 16. Finally came the scientists with 32, one of whom is William Thomas Green Morton, the dentist.

It is not my intention at this time to revive the century-old controversy of who should receive full honors for the discovery of surgical anesthesia. But dentistry has long recognized Horace Wells in this field, whereas other historians have favored Morton.

While preparing this paper I was attracted by a book review, captioned in big and bold type, "Dangerous Dentist." So here, one thought, was another rare dentist who found an author and a publisher, and whose biography seems to have merited space in the *Saturday Review*.¹⁸ But, unfortunately, this folklore adds nothing to the annals of dentistry. Briefly, it is about a legendary figure of the Wild West, one Doc Holliday, a dentist-turned-gambler who, because of tuberculosis, ended his Georgia practice in 1872 and moved West. He stopped at Dallas, where he practiced dentistry, the handling of cards and of the knife and the gun, and where he committed his first murder before leaving town in a hurry. He was chased out of other towns, too, for he was too tough even for the then Wild West, where he committed other murders and teamed with one Big Nose Kate, a free-lance prostitute of uncertain last name. The only dear thing about this book is its price; it retails for \$4.75.

I mention all this simply to illustrate the kind of dental biography the literary world will read or read about if dentistry were to continue to neglect the stories of its great men. If the world of history is indifferent to us, we, alone, are to blame.

For dentistry to discount learning and learned people is to ignore history. The influence of learning and learned people on civilization has been tremendous. America of the eighteenth century had that respect for learning. John Adams, John Quincy Adams, Ben Franklin, Thomas Jefferson, James Madison, Alexander Hamilton and John Marshall were only a few of the many who molded the foundation of the United States as a great nation. Woodrow Wilson was also a so-called egghead. Therefore, the influence of learning in shaping the destiny of America cannot be discounted. And the

influence of learning and learned dentists who laid the foundation of modern dentistry should no longer be hidden from the eyes of the practicing dentist and the world. And unless the world knows more, and fully and correctly, about the great men of dentistry and their contributions to human society, the world will continue to be ignorant of what it is entitled to know. To attribute this ignorance to the lack of glamour on dentistry's part is to resort to oversimplification.

One hopes that one day scholarly dental histories and biographies will be written and will be available to dentists and other scholars. And when they are written, they will not be the product of chance or of inspiration handed down from above. They will have to be planned and commissioned before they are prepared. Scholars and not dentists-turned-makeshift-scholars will have to prepare them. And those who will have to plan and commission them are the official bodies that represent dentistry and its history. This will constitute a worthy contribution to the humanities, a phase that dentistry has long neglected.

Do dentists read and will they read their history? My observation is that dentists do read whenever they are given something worthwhile to read. That not many dentists read their official publications, considering the numbers who receive them, is a reflection not on the dentist but on the quantity and quality of the reading matter he receives. For whether he reads it or not, he will continue to receive it and to dispose of it. The source, however, will continue to supply him with more of the same, because our subscriptions, like the hidden taxes, have to be paid if we want to continue in the good graces of organized dental society.

The reader—more correctly the recipient—of our official dental publications, because of his patience and generosity, is entitled to an occasional and perhaps an annual bonus, or a five- or ten-year dividend in the form of a scholarly historical novel or a well-documented history that he may read and enjoy. He will then learn that he is the beneficiary of professional status, not because of the techniques and gadgets he exchanges for lucre in a lucrative practice, but because of the idealism, scholarship and scientific contributions of those who preceded him. Thus our pioneers, though dead, would be alive in books and in the memory of humankind.

Volumes have been written on Horace Wells and William Morton, but one is unaware that these volumes have been critically

analyzed and evaluated. It is time that some impartial historians are assigned the task of evaluating and synthesizing this material for arbitration of a needless and fruitless controversy which can and should be resolved. Perhaps one day we will have books such as *The Discovery of Anesthesia; Greene Vardiman Black and the Rise of American Dentistry; Willoughby D. Miller, Dental Caries and Mankind; William Taggart, the Man Who Revolutionized the Practice of Dentistry; Science, Dentistry and J. Leon Williams*. We are not too old to dream, and I do not think the dream is far fetched.

Having lived for a while in the North Arabian Desert, I am well acquainted with desert life, its barrenness and its patient camels. I must also add that even that desert has its scholarly literature, and has a philosophy sometimes too deep to fathom. Part of that philosophy is that, while the camel driver has a plan, the camel also has a plan. But I am not yet convinced that dentistry has a plan for its history.

If I have bored you I am consoled by the knowledge that I am not the first dentist to do so at a dental gathering. But I do hope that I shall be the last.

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The Research Institute of the History Of Dentistry of Berlin

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The Berlin Research Institute of the History of Dentistry (*Forschungsinstitut für die Geschichte der Zahnheilkunde*) was the first and until the present time the only one of its kind in the world. It was partly destroyed in 1944 or 1945 and does not longer exist. I shall give you first a short survey on the development of this institute, or better, a statement of the idea to establish such an institute.

It was started in 1907, in a sort of embryonic anlage without the faintest idea of future possible developments. I was at that time a second year student of dentistry at the University of Breslau. I saw in the window of an art dealer a photograph of an oil painting then in the Royal Art Gallery of Dresden. This was by the 17th century artist, Gerard Dou, representing a dentist shortly after the act of drawing a tooth from the mouth of a boy who, wretched and suffering, bending down his head, touches with his finger the place where the tooth had been. The dentist, standing behind the sill of the window on which his opened case of instruments, a barber's basin and his diploma, are lying, looks through the window with the expression of pride in his features, showing in his raised hand the extracted tooth.

This was the first picture representing a dentist which I purchased, and which caused a chain of reactions during the next twenty years, leading to the establishment of the Berlin Research Institute. Since this picture made a great impression on me I looked for other works of art representing the same or similar subjects, not in the least realizing that there existed many paintings, drawings, copper plates, lithographs, sculptures and other techniques of art representing the dentist and his patients. At first I relied, and not without success, on chance to find them. A few years later, however, in 1911, an article appeared in the German Monthly Journal for Dentistry (*Deutsche Monatsschrift für Zahnheilkunde*) by Rudolf Koch on *Zahnärztliche Motive in der bildenden Kunst* (Dental Subjects in Art) which gave me important information on the existence of such

works and therefore the possibility of searching for them more systematically.

Another publication of greatest influence on my interest in the development of dentistry and its literature was the *History of Dentistry* by the Italian dentist, Vincenzo Guerini. This comprehensive and very accurate work of a man with a wide cultural background, covering many fields of science, was for the first time based on original source material and not, as usually then and sometimes now, compiled from other publications. It is still a classic in the field of the literature on the history of dentistry.

From then on I had the good fortune to secure a large collection of old dental books, dental pictures and instruments in the original, and photographs which I exhibited for the first time in 1921 in Breslau at the Annual Meeting of the *Centralverein Deutscher Zahnärzte* (Central German Dental Society), the association which corresponds in Germany to the A.D.A. in the United States. This exhibition gave me an opportunity to discuss the subject of the foundation of a Museum and of an Institute of the History of Dentistry before a large audience with the result that Professor Partsch, the Director of the Dental Institute of the University of Breslau, gave me permission to place my collection in a large room of the Institute under the official name of *Zahnärztlich-Historische Sammlung am Zahnärztlichen Institut der Universität Breslau* (Dental-Historical Collection at the Dental Institute of the University of Breslau) where a Research Institute and a chair in the History of Dentistry might be established.

The inflation in Germany after the First World War with its appalling consequences made a speedy end to all these plans. There was a rush to the dental schools with a relatively short study of dentistry by a large number of young men who could not find any employment in commercial fields, especially by officers discharged from military service. For this large number of students all available space was needed so that space used by the collection had to be given up. The complete lack of any funds for new foundations made the establishment of a Research Institute of the History of Dentistry impossible.

However, every thing has its two sides! The rush to the dental schools and the development in German dentistry of the newly created title *Doctor Medicinae Dentariae* (D.M.D.), resulted in an extraordinary large number of doctor theses which were obligatory

for receiving this title. A large part of these theses were required in the field of the history of dentistry. Most of them were written under the guidance and supervision of Karl Sudhoff, the world-famous Head of the Institute of the History of Medicine at the University of Leipzig, and based, without exception, on the original texts.

Sudhoff himself had just published his excellent *History of Dentistry* in 1921, the still unsurpassed work in this field. It is indeed regrettable that this brilliant book is not yet available in an English translation.

Sudhoff's work and that of his students introduced a dental-historical movement, the heroic age of the history of dentistry in Germany, which flourished during the twenties and the beginning of the thirties until Hitler came to power. The quantity and the quality of these publications and some exhibitions of my collection in various cities of Germany, and in 1926 in Philadelphia, on the occasion of the Seventh International Dental Congress, stimulated interest of some influential men of the *Reichsverband der Zahnärzte Deutschlands* (The German Organization of Dentists) in the history of dentistry. The result was that in 1927 the German dental association took over my collection and established a Museum and a Research Institute of the History of Dentistry of which I became Director.

The founding of this Institute was an important step, not only in the *development* of the history of dentistry, but also in the *history* of dentistry. Up to that time it was a matter of individual interest of some historically minded dental practitioner who was responsible for the development of dental-historical literature and for collecting dental-historical material.

The collection, located in the *Deutsches Zahnärztehaus* (German Dentists Building), was now installed in the Bülowstrasse in Berlin in especially designed show cases. The office of a dentist of about 1820, consisting of his operating room and his laboratory, equipped, not with replicas, but with the original old furniture, apparatus and instruments of that time, was set up.

The Museum depicted the evolution of dentistry, from fetish, amulet and charm worship, through worship of Apollonia,¹ the saint to whom people pray for relief from toothache, up to empiricism, followed later on by rational and experimental procedure.

We tried to represent each stage in development through old instruments, old dental books, documents, paintings, engravings, copper plates, lithographs and photographs representing dental scenes in the various centuries. Artificial teeth and dentures, sculptures, medals, portraits of dentists, clippings from old newspapers with advertisements of dentists, handbills, various representations of Saint Apollonia, and many other items in both original and copies, are displayed.

Highlights in this collection are a richly ornamented pelican of about 1550; a copy of the 1536 edition of the first dental book, the *Zene Artzney*, which exists in six copies only (the first edition was published six years earlier); the earliest known full denture about the end of the 15th century; the original document of regulations given in 1716 to the barbers, surgeons and dentists by the Roman-German Emperor Charles VI, written on parchment and bound in red velvet; the famous Meissen porcelain group by Kaendler of 1741 representing a dentist, his patient and assistant; and the largest collection in existence of toothpicks, starting with luxuriously decorated toothpicks of the Renaissance and comprising toothpicks up to the middle of the nineteenth century. It also contains many objects donated by dentists to whom appeal had been made in dental journals and in personal letters to donate whatever they possessed in obsolete instruments and apparatus, old ledgers, letters, books, photographs, journals and other items out of practices of older generations of dentists.

The Museum has helped to bring dentistry into broad comprehensive relations with medicine and with the general development of culture, and to improve the understanding of the public of the value of dentistry.

All this material of the Museum is catalogued, described and classified on index cards. We made photostatic copies of all dental historical articles and notes of interest found in available dental journals, medical journals and journals of other disciplines, as for instance those of archaeology, palaeography, ethnography, anthropology, general history, history of art, and many others. It is very convenient to have needed reference articles in photostatic copies on the table instead of a heap of bulky, bound journals. Besides this advantage for our own work, these photostats were also of great

¹ See J. Am. Col. Den. 12, 101; 1945, June.

help to those who worked outside our Institute as we could so easily send them out.

As you will understand from these remarks, the goal of our Institute was not only to have a good dental-historical museum and a good functioning workshop for ourselves, but, still more important, to have a place where students could get help and reliable information founded on source material for their dental-historical work.

Shortly after the establishment of the Institute we published in the official publication of the *Reichsverband der Zahnärzte* (German Dental Society), the weekly *Zahnärztliche Mitteilungen* (Dental Magazine), every month short articles and important notes in the field of the history of dentistry, called *Beiträge aus dem Forschungsinstitut für Geschichte der Zahnheilkunde* (Contributions from the Research Institute of the History of Dentistry) which increased interest in this subject. It was our goal to transform this appendix into an independent journal devoted exclusively to the history of dentistry.

Another project planned for the future was the cataloguing of all dental books published before 1900, listing the names of the various libraries and, if possible, of the large private collections where these works could be found, a task similar to the outstanding American publication, the *Union List of Serials*.

It is not possible to give more details about everything we had done or planned to do in a short paper. But it is to be hoped that the seeds which were laid will bear fruit. Not much has been done since. In 1944 or 1945 the rich library and the valuable collection were destroyed or looted. The organization which was a center of research and an agency for information came to an end.

The Fourth Dimension of Dental Education*

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EDITOR'S NOTE: *Educator, dental student, practicing dentist—all should enjoy the accompanying paper by Doctor Fleming, who always seems to put into interesting reading or listening a pedagogical, yet practical, challenge to the status quo of dental education.*
A. E. S.

THE GENERAL THEME of this inaugural ceremony is "New Dimensions of Learning in a Free Society." This indicates that we are gathered to discuss the future. The use of the phrase "New Dimensions" implies that our discussions are not to be bound by the traditional dimen-

sions of learning, such as the length of the curriculum, the width of its subject spread or the depth of the learning experience, but rather that we are to be concerned primarily with all that is new today and promised for tomorrow, and how these things may reshape our concepts of learning: we are to be concerned with the past only as it may help to bring into sharper focus our projection into the future. This brings us to the title of this paper, "The Fourth Dimension in Dental Education." Here we are face to face with the subject of relativity, an area completely devoid of angels who fear to intrude.

The introduction of relativity and the time-space continuum concepts in a discussion of education may not be as far fetched as at first it might appear. Certainly, education is not a static fixture in our society. It is constantly moving—and we hope it is moving forward—but in order to measure its motion, we must remember that this motion is relative to our social, economic and political activities, which in turn are moving at variable speeds. In other words, education, and I speak primarily of dental education, is moving in relation to social change, economic change and political change. We are much the same as a small aircraft moving at a pace quite satisfactory to the occupants, in this case the dental profession. However, this plane, viewed from a faster aircraft, the rest of our economy, may

* Presented during inauguration of Dr. Edward H. Litchfield as twelfth chancellor of the University of Pittsburgh, May 10, 1957.

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not only appear to be moving backwards, but may appear to be off course and lacking in altitude. There are some who believe that this is the case in both dentistry and medicine. As passengers in the small aircraft operating in three-dimensional space, it is difficult for us to know. However, if it is true, and the people in the faster plane tell us it is, it would appear that we had better correct our positions relative to the other parts of the world in which we live.

This is not an easy task to perform: there is no pat answer or easy formula. We must view the past and the present in their true perspective and ferret out the relationship of our profession to the variables of the society within which we function.

As we view the past in an effort to get our bearings in the present and to make a projection into the future, we cannot help but be impressed by the fact that continual change has characterized dental education and the dental profession. Our history has been a series of educational changes to meet changing objectives and the increasing responsibilities of dentistry. In rapid succession we have gone from no educational program to the apprenticeship type of education, with its emphasis on mechanics and trade secrets, through a minimal, formalized, yet mainly technical type of schooling, until shortly after the turn of the century, when the discovery that oral infection is related to general health stimulated the development of our educational program to the point when it eventually emerged as a true university discipline. Up to this point, dentistry was still more art than science, and the pre-clinical sciences were included in school programs somewhat as a window dressing, in an effort to identify ourselves as a respectable part of the health sciences, but few dentists were able to apply them to clinical practice. With the advent of focal infection, there seemed to be a real basis for the knowledge of these subjects. Preprofessional education at the college level soon was accepted as a necessity to our educational system. Other influences forced their imprint on the profession and dental education: World War I, with its mass recording of the high incidence of dental disease: followed by the Gies Report in the twenties, with its lift to dental education and dental research: and the depression of the thirties, which opened up the social implications of health and welfare. Following the depression came World War II, which emphasized the importance of dental disease among the health problems of the country, and stimulated an increase in public demand for dental services. The shortage of dental and medical manpower

during the war, and the special selective service treatment of dentists and physicians, tended to put dentistry and medicine on parallel planes in the public mind.

During these years of transition and change, dentists have become important and respected members of the health professions. As our stature grew, we had need for more broadly prepared personnel to meet our new responsibilities, and the preprofessional educational program was increased to provide a better prepared and socially conscious person to study and practice dentistry. The surge of applicants for admission to dental schools after the last war is testimony to the prestige and importance of dentistry in our social and economic way of life. The period following World War II, and the one in which we find ourselves today, is a period characterized largely by an acceleration of the social, political and economic changes which are affecting our health programs today more than in any period of our history. Specifically, what are these factors?

In the early days of our economy, only the "survival" items of food, clothing and shelter were important, but with the growth of greater economic security, other items have been added to the basic list of "necessities." Preservation of health was one of the first to be added, and the people have demonstrated an increasing willingness to give health expenses a high priority in the family budget. In 1953, an unprecedented 5 per cent of the nation's yearly income was spent for the maintenance of health. Socio-economic developments, such as the welfare funds of the unions and the spread of medical and hospital insurance, and the acceptance of post-payment and prepayment plans, have all had their impact on the financing of health service. The union welfare funds, a large part of which are devoted to health, are now counted in the billions. In measuring the growth of hospital insurance, we find in 1940 that 9 per cent of the population carried some type of hospital insurance. Today, this percentage is about 66 per cent, with corresponding increases in surgical and medical insurance. On the west coast we see evidence of the success of the pre-payment plan, where the International Longshoremen and Warehousemen's Union—Pacific Maritime Association Welfare Fund has set up a plan for dental service for children. Already, the California State Dental Association has formed a service corporation to deal with contractual relations with other groups.

Recent experiences have shown legislators that recommendations for group practice and health insurance are no longer instruments of

political suicide, and that support of health programs have increasing political significance in our legislative halls. The politician today can plead for American motherhood, lower taxes and health for his constituents with equal facility, and hope for an increased number of votes.

Most recently the state legislatures have come to recognize that concurrently with the promotion of health service, there must be promotion of educational programs for the health sciences. The sovereign states have been willing to relinquish enough of their sovereignty to set up regional educational programs in medicine, dentistry and veterinary medicine, with nursing and dental hygiene possibly soon to be added. I refer to the Southern Educational Board, the Western Interstate Commission for Higher Education and the newly formed Regional Board in the Northeast. This is, indeed, a major accomplishment, when one considers that the formation of these groups required legislative approval, and to some extent call for an exchange of state funds across state borders. Another social change which will have an increasing influence on dentistry and on dental education, is the great population expansion, with an anticipated 200,000,000 people in 1975. Along with the already great population increase, there has been a relatively small increase in the number of dentists, and unless the challenge is met fully and changes are instituted, there can be no greatly expanded output of new dental graduates in the years ahead.

This poses a sort of "Alice Through the Looking Glass" problem. You will recall in one of the episodes that Alice and the Red Queen ran as fast as they could and finally, all out of breath, ended up the same place they started. The Red Queen explained that in that country one had to run to stay in the same place, and that if one wanted to go to another place, one had to run twice as fast. Dentistry is in somewhat the same predicament as Alice, except that despite our running, we are actually losing ground. We are turning out more graduates than ever before, but the population growth is such that we are not holding our own. At the present time, we have a population ratio of 1,800 per dentist, with 35 per cent of the population requesting dental service. In 1975, we face a population ratio of 2,400 per dentist, with close to a 50 per cent demand for service. Even if we have the additional schools that are in the "talk-talk" stage, we will be far short of the needed dental manpower.

Another point must also be emphasized, and that is that not only

are we facing a continuously increasing ratio of population to dentists, but we are experiencing also an increase in requests for dental service. On the credit side of the ledger, we have the advent of fluoridation and the reduction of dental caries in children. It is too soon to say positively, but it would appear that we may face the paradoxical situation when the very retention of these teeth, as a result of fluoridation, may bring about an increased demand for dental service to preserve them. The fluoridation program will result in our carrying more teeth into adulthood, but in turn it will mean that we will be faced by a greater demand on dental time to maintain these teeth. Added to this is the aging population, which will increase the demand for dental services to cope with the degenerative diseases of the periodontium. Fluoridation promises better and healthier mouths, but not necessarily less demand for dental service; in fact, we should plan for more demand.

During this period of approximately fifty years from focal infection to fluoridation, what changes have occurred in dentistry and in dental education? There have been many advances in technical and clinical dentistry and in public health. In this short span we have changed the status of dental caries from a "treatment only" disease to one that can be effectively controlled. Prevention seems to be attainable in this area. Progress, but not as much, has been made in the matter of periodontal disease: however, our knowledge of etiology in this area is very meager. The degenerative characteristics of this disease in its relation to over-all systemic problems indicate that it will be some time before it can be classified properly as preventable.

The progress in the control of these diseases has been brought about largely by an increased knowledge of etiology or cause, accompanied by considerable progress in the area of health education. The latter is important because any disease that is subject to control measures must have an informed and cooperative public, and, thus, any successful control program is based upon an effective program of health education. The development of the Dental Hygiene Curriculum, as well as the Councils on Dental Health, is a reflection of the recognition of the value of health education in our present attempts to control dental caries and periodontal disease.

We have reached a point in our professional competency where we are able to control partially periodontal disease to about the same degree that medicine can deal with cancer. We can control dental

caries much more effectively: in fact, to about the same degree that the medical profession can control diabetes. Obviously, our next step is toward the prevention of these conditions. This step can be taken only through the increased knowledge of etiology. This is synonymous with research. We need a great deal more research before we can add dental caries to the list of preventable diseases, and prevention of periodontal disease appears to be still further in the future.

There has been some measurable change in dental research, but unfortunately, most of the research has come from relatively few schools and institutions, one can point with pride to the research on fluorosis of the teeth and to the increased productivity of the research reports in our journals and at our meetings, but as one examines the dental curriculum, one cannot help but wonder what measurable effect this has had on the dental faculties and the dental courses of instruction.

We have come to realize with awful clarity that we are lacking not only in research, but particularly in the manpower to perform it; and even given the manpower to perform the research, we are lacking the teaching faculty to apply it. Our dental faculties are largely populated with clinical dentists, the majority of whom possess unusually fine clinical competence. However, most of these men have little basic science preparation or a window-front dressing which is old and fly-specked through disuse. Here and there, of course, one sees an exception, yet the highlight cast by these exceptions only emphasizes their rarity. The realization of this important shortcoming has resulted in a great and frenzied quest for qualified research people and teachers. All sorts of schemes have been developed: the Yale Plan, the Harvard Plan, the Rochester, Zoller, Guggenheim and other graduate and postgraduate programs, including the Army, Navy and Air Force graduate and residency plans. And recently the U. S. Public Health service has begun to emphasize teaching programs and training centers.

There is no doubt that during these fifty years dentistry has come to occupy a shoulder-to-shoulder relationship with the other health sciences, the calibre of the dentist and the dental student has greatly improved due to the expansion of educational requirements and to our increased stature through public acceptance of the dental profession.

This is all progress of which we can be and are proud, but if we

are to get our bearings in four-dimensional space, as we started out to do, and if we are to see ourselves in full relationship to the other activities in a changing and complex world, we must dwell not on accomplishment alone, but we must investigate most carefully where accomplishment is lacking. It has been pointed out that in the area of research there is need for re-evaluation, and that some steps have been taken in this direction. As we look at the dental curriculum as an entity, we cannot help but feel that the need for re-evaluation is great and urgent. During all the period from focal infection to fluoridation, our dental educational program at the professional level has been plodding along with only a few changes here and there usually in the form of additions to meet obvious needs. These changes were consolidated in the thirties in what is known as the Blauch Curriculum Survey. There has been little change since that time in the over-all picture of the average dental curriculum. True, a few schools have tried an experiment here and there in undergraduate education, but these have been mainly curriculum shufflings, with no basic change. The one exception was the Harvard School of Dental Medicine. This genuine attempt to experiment in dental education received only opposition from the official organizations dealing with dental education. A number of new schools have started in recent years, but here again, there has been little attempt to experiment. For the most part these schools have followed the same old pattern and have failed to take what appeared to be a God-given opportunity to break away from the old traditions and try a new approach. Some schools have emphasized graduate and post-graduate activities; others have emphasized research, and one or two seemed to have concentrated on expanded and elaborate physical facilities. There has been little or no change in the basic dental curriculum or in dental educational philosophy.

As one examines the present undergraduate curriculum, one has grave doubts that it can be improved by any simple shuffling of courses and hours—the addition of five o'clock classes, evening classes, required summer sessions, or even a fifth year of dentistry or a required internship "tacked on" to the present curriculum. The present dental curriculum was established in the days when dental care was "treatment only." It follows pretty much the same pattern in all of the schools. Variations appear, but these are not fundamental, and many times are the result of local action, influence by faculty compromise, log rolling, personal prejudices and expedien-

cies. The student performs almost isolated from the rest of the world by the pressure of his course requirements. The emphasis is still on the attainment of skills with the newer knowledge being sandwiched in here and there.

If dental education is going to assume its part in providing the necessary manpower requirements, it is going to have to do some self-analysis and initiate certain fundamental changes. This is going to be very difficult (one thinks of, but hesitates to use the word "impossible"), because these changes will affect all the other segments of the dental profession, and will necessitate a change in the "follow-the-leader" attitudes we seem to have adopted in recent years. It may mean that our greatest need in the future will be to break with the traditional dictums of today's leaders, and one is tempted to paraphrase Winsor's "Space-Child's Mother Goose":

Little Bo-Peep has lost her sheep
And Univac Computer has failed to find them,
But, they will meet face to face
In fourth dimensional space,
Preceding their leaders behind them.

In the beginning of this paper I tried to picture dentistry as the occupant of a small aircraft faced with the necessity of correcting its readings to bring it into position in relation to the other speeding planes labeled "Social, Economic and Political Changes." Actually, dentistry at present should be portrayed not as one airplane, but as several: Dental Education, American Dental Association, the Boards of Dental Examiners, the Specialty Boards, and so on, all moving at varying rates of speed. If this analogy has any merit, it must be pretty apparent that it would be helpful, and perhaps essential, if the dentists moved as a unit, not as a series of parts.

The dental profession exists for a number of reasons, but mainly to provide dental service to the people. Our other functions are to expand the frontiers of dental knowledge, develop new procedures, educate our successors, supervise and discipline members of the profession and provide guidance and leadership for the people in the area of our special competence. In order to help us accomplish these ends, the state has granted us a virtual monopoly to practice dentistry. For this monopoly the state expects us not only to set the objectives, but the means by which these objectives can be reached.

That is why over ten years ago it was suggested that there should be a total survey of dentistry—a survey of all of its parts. This was

voted down, but its need soon became so obvious that it has finally been approved. In fact, it was only a few months ago that the American Dental Association announced that, together with the Rockefeller Brothers Fund and the Hill Family Foundation, it is supplementing the Kellogg Foundation Grant of a quarter of a million dollars and other grants to make this total survey possible.

If dentistry is to catch up with the rest of the world around us, our first and most important objective must be to provide the dental manpower to meet the demand for dental service in the years ahead. Undoubtedly, that segment of the profession dealing with dental education will be a most important part of the over-all survey, because it is the schools that provide the source of dental manpower. What can we anticipate from such a detailed survey of the dental curriculum—a survey which it is hoped will correlate the objectives of dental education and the profession within the always moveable framework of an ever-changing society? One thing we can hope for is that it will *not* be the curriculum survey of the thirties brought up to date with the publication of a "Revised Red Book," with neatly prescribed courses, and the implication of a "One and Only" program. The curriculum survey of the thirties was an admirable contribution; in fact, on a par with the Gies Report of the twenties. However, since the thirties, dental education has grown past the state of "Father Knows Best."

Great latitude should be allowed and educational experimentation encouraged, not frowned upon and actually opposed as it has been in the past. Attempts to standardize and force into patterns should be avoided. Practically all of the schools are integral parts of universities and can be trusted to embark on legitimate programs.

Prescription of predental subjects should be liberalized. For example, physics may be dropped in some schools and the humanities emphasized. It must be clear that we cannot inject a dental student with even a fraction of the new knowledge. Therefore, in his preprofessional years, should we not prepare the student to find his way around in the Land of Knowledge, stimulate his intellectual curiosity, and provide him with methods of obtaining information and with habits of learning that will give him a liberal approach to his professional education?

Selection of students must be reappraised. We have rather good measuring devices today to identify the student who has promise of developing as a competent practitioner, but little or no way of iden-

tifying the applicant who has the potential to develop as a professional man, with all of the intangible attributes and qualities of personality which we like to see in such people. Such identification will not be easy. A great many programs to accomplish this objective will have to be tried. The time to start them is now.

An analysis should be made of every branch of the curriculum with the idea of eliminating the unimportant and delegating to the ancillary groups and to postgraduate studies that which, in the opinion of the profession, can be delegated. There should be a critical eye cast at the specialty groups other than orthodontics and oral surgery. Is there enough fundamental knowledge in these fields to justify formal academic work and a degree beyond the D.D.S.? Cannot a great deal of this be attained by a coordinated series of refresher courses extending over a number of years? Why is it necessary for a graduate of a four year dental curriculum, who has practiced a few years, to return to school for two additional years of postgraduate instruction to qualify for his specialty? Why not a curriculum of "Majors" and "Minors" which will prepare for specialty practice in certain fields? One school prepares undergraduates for the specialty practice of orthodontics. This program has been in successful operation for over twenty years. (Let us pause for a moment and listen to the cries of anguish coming from the various specialty academies and the Council on Dental Education, which has granted formal recognition to seven specialties in dentistry!) It is hoped that such an analysis will point up the need for experimentation at the local level of the individual school.

It is to be hoped also that the survey will recognize differences in regions, where local interests and practice are different. Eventually, internships will be required in some localities. One of the states already requires an internship for eligibility for State licensure. Certainly, the technical courses should be altered to meet local requirements, and where needed, there should be an expansion of training facilities for the auxiliary dental groups.

It is anticipated that, with the proper latitude and with educational experimentation being given an aura of respectability, each school individually will have to consider seriously what its own objectives are to be: what knowledge it should attempt to impart to its undergraduates; what skills the student should have when he graduates. For example, how much knowledge and what skills should the recent graduate have in the area of denture prosthesis? Should

he have the theoretical knowledge of immediate dentures, cleft palate and temporomandibular joint complications, reserving the skills in these subjects for study after graduation? Should he have a comprehensive knowledge of the field of oral surgery, but only the skills and clinical experience in the extraction of teeth with exposed crowns?

All of these questions and problems will go into the mill of the survey, but the major question still remains, "How are we going to meet the dental manpower needs in the years ahead and at the same time maintain and improve the quality of our professional service?" There seem to be three ways to accomplish this, but to the speaker each by itself appears unrealistic, and yet with modifications and in combination they might be made to work. They are:

1. The expansion and delegation of broader duties to the auxiliary dental services. The ultimate in this direction is the dentist-technician.
2. A sharp increase in the number of dental schools to a number far beyond what is even being discussed at the present time.
3. An increase in enrollment of the present schools.

It is reiterated that in the opinion of the speaker, these ideas, as they stand, are unrealistic, and in fact, I am flatly opposed to the second part of number one, the dentist-technician. However, I am of the belief that the dental manpower needs can be met by combining the expansion of the numbers of auxiliary dental personnel, developing some new dental schools and the more efficient use of the present dental educational facilities. This last idea needs some explanation.

At the present time the usual dental curriculum covers 32 weeks per year for four academic years, or a total of 128 weeks. If this curriculum were changed to three calendar years of 46 weeks, with a week of vacation at Christmas and in the spring and four weeks in the summer, we would have 138 weeks of instruction and our students would graduate in three years in place of the usual four. This is not the "Accelerated Program" as we remember it from the war years, because we would admit and graduate only once a year. At first glance it does not appear that we would increase the number of graduates. However, let us take an example of a school with physical facilities to maintain four classes of 100 students each—a total student body of 400, with 100 graduates per academic year. If this school were to operate under this three year plan, and continue to admit 100 students, the total student body would never be more

than 300 students. Theoretically, this school would have the space and facilities for a student body of 400 and would be able to admit graduate classes of 133, or an increase in its output by one-third. Obviously, there are practical problems such as staffing, size of classrooms, the special facilities of the clinical years, loss of student summer employment, to say nothing of the uprooting of old habits and traditions.

This is not offered as anything like a final solution, but is presented as an example of the type of thinking which will be essential to the ultimate solution of the manpower problem: a willingness to break with tradition if necessary and to experiment in the field of administration as freely as we know we must in the science laboratories.

In conclusion, let us again think of those airplanes rushing through four dimensional space, and let us admit that there are faster planes from which dentistry's plane seems slightly off course, but let it be pointed out that the occupants of that small aircraft started the correction of their readings when they decided on the over-all survey of dentistry. It is my belief that we, as dentists, have faced up to solving the problem of relating dentistry and dental education to the world around us. We have come to the realization that if we do not, non-dentists will do it for us, and history has shown that when problems are solved by legislatures it is only the quantitative aspects that are solved. We are strongly aware that the people granted us, through licensure, a monopoly to practice dentistry and for this expect us to produce competent dentists and to render good dental service. This we have done and are doing. Further than this, the people expect us to provide leadership and guidance in the field of our competency. This we recognize, even though it leads us out of the present dimensions of practice. We know that the members of a profession must be concerned with the *total* welfare of the people, not a segment—particularly our own segment. When we think of ourselves only as a profession with isolated problems to be solved, it is three dimensional thinking. When we think of ourselves in relation to the world around us, we are approaching fourth dimensional thinking, even if this means "preceding our leaders behind us."

CALENDAR OF MEETINGS

CONVOCATIONS

November 3, 1957, Miami, Fla.

November 9, 1958, Dallas, Texas

September 20, 1959, New York, N. Y.

October 16, 1960, Los Angeles, Calif.

BOARD OF REGENTS

November 1, 2 and 4, 1957, Miami, Fla.

Ethiconomics

EDITORIAL

Is there a place for the hard-headed policies of business in the high-minded ethical codes of the healing-art professions? Is there a common meeting ground toward which the alien worlds of commerce and the healing arts should stride? Can ethics and economics be fused into one new science?

Historically, business is much older than the professions. The Bible is filled with accounts of transactions, some of which were corrupt, some honest, and some rather questionable. In all transactions the prime motive of both parties is gain. The desire to acquire money, property, goods, services, food, shelter, brings both buyer and seller to the market place. If the deal they strike is a sound one, both parties depart feeling they have done a smart piece of business, for each will have that which he desired more than that which he had. If they meet again they will meet as friends and further transactions will be expedited.

Not so when the satisfaction is one-sided. By means of persuasion and misrepresentation many a transaction is forced through and the deceived person leaves with the seeds of dissatisfaction and distrust germinating within him. Unless he is a fool, further business between these two is forever blocked. Blinded by avarice, the sharp dealer has taken the one golden egg but driven away the goose.

Business began to be ethical when its leaders discovered that ethics had a high dollar value, that a reputation for fair dealing was a priceless asset. The rapidly rising standards of business ethics are the result of the clear thinking of executives who are planning for the future. These business leaders are approaching professional status—they are the “doctors of commerce.”

From tribal witch doctor to the highly trained medicine man of today is a long jump. Yet the commodity each has had to offer has been the same: Relief. Relief from pain, fear and the imminence of death. In rendering this relief, mystery and secrecy has shrouded our every step. No one should deny that much of this mysteriousness was necessary to the development of the art and to the ultimate welfare of the patients, particularly in the days of empirical treatment. Nor can it be denied that the unscrupulous practitioner

took advantage of the desperation of his patients and the very convenient mantle of professional secrecy.

Recognizing the need for a code of professional behavior by which physicians could judge themselves and be judged by others, Hippocrates formulated his famous Oath, which still serves as the classical code of medical ethics. That physicians have given heed to his teachings is attested by the high esteem in which they are held in every civilized country, by rich and by poor.

The physician and dentist have been trained to diagnose conditions by taking a detailed history, making a full examination and then verifying doubtful points by special methods including consultation. They can then prescribe according to their diagnosis and they maintain contact with the case until all is well.

But this is not the whole of their ethical responsibility. They should be equally able to determine a fair fee and arrange for its payment, keeping contact with that phase of the case until the obligation is discharged.

Dentists have good reason to look askance at much of the advice they have been given under the name of practice management. For many years non-dentists did most of the lecturing on dental economics. This was natural as they wanted to develop and enrich their market and our need was so great. Their approach to the problem was unfortunately often below the standards of the profession but they did awaken us to our ignorance, so that a few dentists and lay-economists began teaching management technics that attempted to combine the time-tested procedures of commerce with the ethical requirements of the healing arts. Eventually a sound system of ethical economics must emerge that will meet the two fundamentals previously discussed: that the welfare of the patient must come first; and that both parties to a transaction must be satisfied.

J. C. ALMY HARDING

Convocation
American College of Dentists
Miami Beach, Florida
Sunday, November 3, 1957

PROGRAM

MORNING MEETING, 9:00 A.M.

Pompeian Room, Eden Roc Hotel

INVOCATION

EXECUTIVE SESSION

Minutes

Report of the Secretary

Otto W. Brandhorst, St. Louis, Mo.

Report of the Treasurer

William N. Hodgkin, Warrenton, Va.

President's Address

Gerald D. Timmons, Philadelphia, Pa.

Report of the Necrology Committee

Coleman T. Brown, Tampa, Fla.

Report of the Nominating Committee

Willard C. Fleming, San Francisco, Calif.

Indoctrination

Jay H. Eshleman, Philadelphia, Pa.

THE PROGRAM

PANEL DISCUSSION

TOPIC: "CONTINUING EDUCATIONAL EFFORTS AND OPPORTUNITIES FOR
PROFESSIONAL ADVANCEMENT"

PARTICIPANTS:

"THE PHILOSOPHY OF THE PROFESSION IN THE SHARING OF KNOWLEDGE AND
THE BASIC PRINCIPLES TO BE CONSIDERED IN A CONTINUING EDUCATIONAL
PROGRAM"

Cyril F. Strife, D.D.S., New York, N. Y.

Chairman, Committee on Continuing Educational Effort

"THE NEED FOR CONTINUING EDUCATIONAL EFFORT BY THE PROFESSIONAL
MAN AND OPPORTUNITIES AVAILABLE"

Philip E. Blackerby, Jr., D.D.S., Battle Creek, Mich.

Chairman, Committee on Education

"CONTINUING EDUCATIONAL OPPORTUNITIES AT THE UNIVERSITY OR DENTAL
SCHOOL LEVEL"

Francis J. Conley, D.D.S., Los Angeles, Calif.

Vice Chairman, Committee on Education

"OPPORTUNITIES THROUGH STUDY CLUBS, SEMINARS, ETC."

George W. Redpath, D.D.S., Portland, Ore.

Vice Chairman, Committee on Continuing Educational Effort

"SCIENTIFIC LECTURE PROGRAMS: THEIR CONTRIBUTION TO CONTINUING EDUCATIONAL EFFORT"

Charles S. Kurz, D.D.S., Carlyle, Ill.

Chairman, Council on Scientific Session, American Dental Association

"THE PREDOMINANT ROLE OF LITERATURE"

Thomas F. McBride, D.D.S., Columbus, Ohio

Chairman, Committee on Journalism

GENERAL DISCUSSION

(Doctors Strife and Blackerby will also act as moderators of this discussion)

LUNCHEON, 12:30 P.M.

La Ronde Room, Fontainebleau Hotel

*Under the auspices of the Florida Section of the American College of Dentists,
Rupert H. Gillespie, Chairman*

ADDRESS: "A FLYING TRIP TO INDIA. OBJECT: TIGER HUNT"

Kenneth C. Pruden, D.D.S.

Past President, American College of Dentists, Paterson, N. J.

AFTERNOON MEETING, 3:00 P.M.

Pompeian Room, Eden Roc Hotel

INVOCATION

ADDRESS: "THE PROFESSIONAL MAN AND HIS EDUCATION"

Millard E. Gladfelter, A.B., M.A., Ph.D., D.Sc. in Ed., LL.D., LittD.,
L.H.D.

Provost and Vice President of Temple University, Philadelphia, Pa.

CONFERRING OF FELLOWSHIPS

EVENING MEETING, 7:00 P.M.

Pompeian Room, Eden Roc Hotel

DINNER

INTRODUCTION OF GUESTS

INSTALLATION OF OFFICERS

PRESENTATION OF SERVICE KEY TO GERALD D. TIMMONS

J. Ben Robinson, Morgantown, W. Va.

INAUGURAL ADDRESS

Alfred C. Young, Pittsburgh, Pa.

ENTERTAINMENT: SONGS AND BALLADS

Jim Symington, St. Louis, Mo.

The American Association for the Advancement of Science

Proceedings of Section Nd—Dentistry at the One Hundred Twenty-Third Annual Meeting*

Edited by
GEO. C. PAFFENBARGER, D.D.S.**

EDITOR'S NOTE: *The four sessions of Section Nd—Dentistry consisted of a Friday morning session on the "Contribution of Science to Everyday Practice"; a Saturday morning and a concurrent afternoon symposium on "The Human Dentition in Forensic Medicine"; and a concurrent symposium on "Anti-enzymes." George C. Paffenbarger was the program chairman and Earl O. Butcher, College of Dentistry, New York University, was the local chairman.*

The present membership of Section Nd—Dentistry is 1,137; a gain of 330 during 1956.

Isaac Schour, Dean, College of Dentistry, University of Illinois, was elected vice president of the AAAS and chairman of Section Nd, and Joseph C. Muhler, College of Dentistry, Indiana University, was elected a committeeman-at-large. Maynard K. Hine, Dean, School of Dentistry, Indiana University, is the program chairman for the 1957 meeting which is to be held in Indianapolis, Indiana, December 26-31, 1957. Suggestions for this program should be sent to him.

I. Contributions of Science to Everyday Practice

H. Trendley Dean, presiding

I. The Influence of William J. Gies in the Recognition Of Dentistry by the American Association for The Advancement of Science

Geo. C. Paffenbarger
Senior Research Associate
American Dental Association Research Division
National Bureau of Standards
Washington 25, D. C.

William John Gies, the noted biochemist, spent the best part of an unusually active life in promoting and advancing dental

* Held in New York City, December 26-30, 1956.

** Member of the AAAS Council representing the American College of Dentists.

health service. Since his activities are too numerous to mention in this brief time, your speaker will confine his remarks to one small aspect of Dr. Gies' service to dentistry; that aspect dealt with his persistent efforts regarding the recognition of dentistry by the American Association for the Advancement of Science.^{1,2}

The Section on Medical Sciences was created in 1905 as a result of Dr. Gies' efforts. He served from 1905 to 1909 as its secretary and active promoter. It was in 1909, that Dr. Gies' active interest in dental affairs began.³ His success in creating a medical section in the AAAS encouraged him to attempt to create a dental section. At the outset of that effort and through several years of it he was not successful. It can best be told in his own words as extracted from his letter of January 18, 1956, to your speaker. "... informally, members of the medical section objected to the proposed dental recognition; they said that dentistry is 'inactive in science.' By a compromise agreement, my *proposed* dental section was later made an acceptable *subordinate part of the medical section*. I believed this would be only a temporary condition, dependent upon recognized growth in research in dentistry."

The compromise agreement of which he speaks was the admittance of the American College of Dentists in 1931 as an associated society. In 1932 the American Association of Dental Schools and the American Dental Association successively became associated with the AAAS.

In 1932 the American College of Dentists conducted an all-day associated dental session under the auspices of Section N.⁴ Dr. Gies served as the program chairman. Similar meetings were held in 1933 and 1934 under the auspices of the three associated societies. In April 1935 the AAAS admitted the American Division of the International Association for Dental Research as an affiliated society with a representative on the AAAS Council and created in Section N (Medical Sciences) a subsection N₁⁵ on Dentistry. Dr. Theo. B. Beust was the first chairman and Dr. Wm. J. Gies, the first secretary. Dr. Gies declined reelection because he wanted to increase the recognized activity of selected dental leaders. So the 1936 program of the Subsection on Dentistry was arranged by Drs. Thomas J. Hill, J. L. T. Appleton and M. L. Ward, who continued in such capacity until the 1939 meeting. Since then Drs. Paul C. Kitchin, Isaac Schour, and Russell Bunting have served as secretaries of the Subsection on Dentistry.

Further recognition for dentistry came in 1954 when the AAAS organized a Section Nd (Dentistry) with the consent of Section N (Medical Sciences). The first chairman of the new section was Dr. Willard C. Fleming. Dr. H. Trendley Dean served as chairman in 1956 and 1957. Dr. Russell Bunting serves as secretary.

The dental programs in the AAAS have been excellent. In fact, four of them have been published by the AAAS as symposium volumes.

Thus, it is seen that through Dr. Gies' persistent efforts and his faith in the development of dentistry as a scientific discipline, the recognition came. It is indeed small homage that we pay Dr. Gies when we dedicate this meeting to him.

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2. Kitchin, Paul C. International Association for Dental Research. *J. Amer. Col. Dent.*, 4:214, Dec., 1937.
3. Friesell, H. Edmund. Wm. J. Gies, a biographical sketch. *J. Amer. Col. Dent.*, 4:164, Dec., 1937.
4. Gies, William J. American College of Dentists. Scientific Proceedings of the First Meeting of a Dental Organization with the American Association for the Advancement of Science. Atlantic City, New Jersey. December 30, 1932. *J. Dent. Res.*, 13:135, April, 1933.
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ABSTRACT

2. Vertigo Attributable to Mandibular Joint-Dental Bite Abnormalities

Herbert T. Kelly
Graduate School of Medicine
University of Pennsylvania
And David J. Goodfriend
Philadelphia, Pa.

Anatomical, histological, x-ray and clinical data show the pathogenic effect of mandibular joint abnormalities upon the ear and the role they play in the etiology of vertigo. The differential diagnosis of mandibular joint-dental bite abnormalities, methods for their correction, and the criteria of these corrective procedures in the treatment of vertigo are discussed.

This work follows a previous study by one of the authors (DJG) which was reported in the *Archives of Otolaryngology* of July, 1947. This previous study showed a high statistical correlation between mandibular joint abnormalities and certain symptoms of which vertigo and neuralgia occurred most frequently; and were the most responsive to the correction of mandibular joint-dental bite abnormalities.

The problem of vertigo is broad and complex. Medical literature shows that vertigo may be caused by innumerable diseases including those of the ears and eyes, brain tumors, and abscesses, meningeal involvements, infections, arteriosclerosis, cardiovascular diseases, and many others; as well as by abnormalities of the mandibular joint.

The purposes of this present work included determination of the statistical incidence of the mandibular joint cause of vertigo in medical practice, and of the effectiveness of dental procedures in the treatment of vertigo. All patients of the Medical Department of the Urologic Clinic of Philadelphia were studied during a period of three years. Of about 600 patients observed, 65, or about 10 per cent had case histories of a group of symptoms which we classified as vertigo. These symptoms included light-headedness, lateral walking, disturbances of equilibrium with change of posture, slight to severe dizziness, nausea, vomiting, and clouding and complete loss of consciousness. Of the sixty-five patients with these symptoms, sixty-three had mandibular joint abnormalities and dental bite defects which were suspected to be factors in the etiology of their vertigo. Fifty-four patients cooperated in accepting treatment of their mandibular joint-dental bite abnormalities. Fifty-two or 96.8 per cent of the 54 patients were relieved of their vertigo symptoms to the extent that indicated that mandibular joint abnormality was the primary cause of their vertigo.

These included many who had been treated medically for many years without permanent relief of their vertigo symptoms. One had suffered with these symptoms for over 20 years and had submitted to two cranial operations. Another had retired from an important executive position because his condition was aggravated by a seeming fusion of voices which came from different directions of the conference table. The third had been diagnosed as one who suffered from altiphobia and claustrophobia. Her vertigo symptoms made her fearful of steps. As a result, she was reluctant to travel. The most serious cases were those where vertigo resulted in a

complete blackout of the victims. These blackouts occurred without warning and involved the danger of accidents and possible erroneous medical diagnosis that included strokes and heart attacks.

Of the 54 patients who submitted to dental treatment, 52 patients received relief. The two patients whose symptoms were not relieved included an 82-year-old woman with a cardio-vascular disease. The other was a 76-year-old woman whose vertigo was at first completely relieved; but who found later that she preferred the former attention of her family; and by removing her bite-correcting appliances, could bring on an attack of vertigo. The 52 patients whose symptoms of vertigo were eliminated by the dental bite treatment included the woman who had previously undergone a cranial operation, and the business executive who found that he could again successfully conduct conferences without the return of his vertigo disturbances.

The ages of the treated patients ranged from 8 to 89 years. In elder patients, it was found important to cure the vertigo in order to prevent them from falling and causing body injuries. The 8-year-old boy who had vertigo suffered from vomiting spells every time he ate solid food. His parents and pediatrician considered this a behavior problem and resorted to psychological correction and discipline. Before being treated, he was under-nourished, fearsome, and shy. His dental bite was so badly out of line that hardly any contacts between his upper and lower teeth existed. The lower jaw was retruded and the lower front teeth bit into his palate. On the basis of the dental studies, and x-ray findings made, his bite was corrected and in short order it resulted in a spectacular cure of his vomiting. He was immediately able to eat solid foods and retain them. During the 18 months since wearing these appliances, he has not vomited once. He has fully recovered from his under-nourishment and resumed a normal life with his friends in play and school.

The mandibular joint abnormalities and bite defects that were found to cause vertigo were those in which the bite was overclosed, and traumatic, the condyle was displaced upward and backward in the mandibular fossa resulting in injury, deformity, and degeneration of bone, cartilage, blood vessels and nerves of the joint-ear area.

Diagnosis was based on history of mandibular joint and/or ear disorders, irregularity of jaw movements; loss of bite-supporting teeth; inadequate dental restorations and replacements; interlock-

ing deep overbites; and abnormal intermaxillary relationships as shown by landmark studies of the face and mouth.

The final diagnosis of mandibular joint abnormalities was made by x-ray studies of the joint-ear areas. These were made from the lateral and vertex aspects and showed the relationships of the condyle to the fossa, the external auditory meatus, the middle ear and eustachian tube. It was found that these studies were indispensable in the diagnosis of joint conditions which were pathogenic to the ear and contributed to the vertigo symptoms. These x-ray studies were essential to check the establishment of normal joint-ear relationships by correcting the dental bite defect.

The treatment of vertigo attributable to mandibular joint-dental bite abnormalities consists of repositioning the mandible to establish normal intermaxillary and intra-mandibular joint relationships; and reconstructing the dental bite so that it articulates in harmony with the normalized joints. These procedures include posturing the mandible by means of bite blocks as guided by landmark relations and muscle reflexes until the x-ray studies show that the intra-articular relationships, and the relationship of the joint to the ear are normal. The occlusal surfaces are then plotted to reproduce, or to parallel Kirk's basic dental curve from the mesio-incisal point to the mandibular joints. These plotted occlusal surfaces are constructed, either as fixed splints, or as dentures or bridges, as the masticating surfaces of both the upper and lower bicuspids and molar teeth. These curved occlusal surfaces usually guide the mandible to the planned position. In extreme repositioning, it may be necessary to arrange counter-sunk pyramids on the biting surfaces of the bite planes, or inclined guides on the posterior upper and the anterior lower portions of the bite-planes. It is usually necessary to spot-grind and adjust the occlusion of the bite planes or replacements during a period of a month or two, because the bite relationships change with the regeneration of the normalized joints. Within two to six months, the bite relationships become static and, if the mandibular joint was the cause of the vertigo, it is either markedly improved or eliminated.

The second phase of bite-joint treatment is to establish the corrected bite and occlusal relationships with dental restorations and replacements. Mandibular joints that have been pathogenic are particularly sensitive to subsequent occlusal trauma. In replacing the treatment bite planes, the height and form of the occlusal

surfaces should be accurately reproduced in the biting surfaces of the dental restorations. While tooth carvings are advisable, intercusp interference should be avoided. The balanced articulation of the occlusal surfaces and its harmony with the normalized mandibular joints must be preserved.

Psycho-neurotic factors are important in the etiology of vertigo attributable to mandibular joint-dental bite abnormalities. Patients with unresolved psycho-neurotic conflicts are more susceptible to vertigo. The persistence of unexplained, unrelieved vertigo symptoms contributes to the vicious cycle of psycho-neurotic factors. The experience of this study shows that a combination of psychotherapy with correction of the mandibular joint-dental bite abnormality is far more effective in the treatment of vertigo than is either form of treatment alone.

The relief of vertigo in about 97 per cent of patients treated in this study by correcting mandibular joint-dental bite abnormalities indicates that the physician should consider this cause early in diagnosis, and suggest a dental study early in the treatment of vertigo.

3. A Clinical Study of the Mortality of Teeth

Harold W. Krogh
Washington, D. C.

In 1929 Brekhuis published his findings after the extraction of 13,909 teeth from 2,723 patients at the University of Minnesota Dental School Clinic. Caries and periodontal disease were responsible for 96.62 per cent of the extractions and the remaining 3.38 per cent were due to impactions, cystic conditions, supernumerary teeth and accidents. Caries loss was highest during the growth and development periods whereas periodontal disease began to take its toll after maturity and increased with age, with a corresponding decrease in loss due to caries.

Allen in 1944 at the University of Michigan Dental School Clinic analyzed the causes of extraction of 1,424 teeth from 353 patients. Caries accounted for the loss of 48.8 per cent of the teeth, periodontal disease for 40.7 per cent and only 2.8 per cent were lost because of prosthetic reasons.

This study was undertaken at the suggestion of Dr. George Paffenbarger and planned under the guidance of Dr. A. L. Russell. Its primary purpose was to help answer the question "is periodontal disease responsible for the loss of more teeth than caries or vice versa?" However, the data to be presented are concerned with all the causes of tooth loss in a private oral surgery practice among a middle income group in the city of Washington over a period of one calendar year.

A total of 8,420 teeth were removed from 3,037 patients during the year. The same person x-rayed every tooth preoperatively, determined the specific reason for each extraction, performed the surgery and transferred the data to the punch cards. A punch card was made for each tooth extracted. Taking all these teeth into consideration, dental caries caused the loss of more than twice as many teeth as periodontal disease, 42 per cent for caries as compared to 18 per cent for periodontal disease. Equalling periodontal disease as a major cause of tooth loss were those teeth lost for prosthetic reasons, a surprising 18 per cent. Many teeth in the latter category were justifiably lost to facilitate prosthetic restorations but a substantial number were lost needlessly.

The detailed analyses to follow are based upon 744 males with 2,331 extracted teeth and 1,593 females with 4,478 extracted teeth; all of whom were judged to be of middle status economically. The data therefrom have been analyzed by Dr. A. L. Russell at the NIDR.

The significant findings of this study were:

1. Caries is about twice as destructive to the human dentition as periodontal disease.
2. Males lost substantially more teeth from periodontal disease than females.
3. In females more teeth were lost from caries than from periodontal disease in all decades except that from 50-59, where the proportions were about equal.
4. In males periodontal disease led caries as a cause of tooth loss in the three decades between 40 and 69 years of age.
5. At ages 70 and over, more teeth are lost from caries than from periodontal disease in both sexes.
6. Females tended to lose appreciably more teeth than males for prosthetic reasons. They lost more teeth for that reason than for periodontal disease.
7. In both sexes caries took its greatest toll in the 20-29 decade and continued predominantly in the 30-39 decade with periodontal disease building up to parity between the ages of 40 to 70.
8. On the whole, males retained their teeth about two years longer than did females.

These findings do not bear out the commonly heard statement that "after the age of 45" or some other age "more teeth are lost from periodontal disease than from any other cause."

4. Recent Advances in Orthodontic Diagnosis and Treatment Planning

Robert E. Moyers
School of Dentistry
University of Michigan
Ann Arbor, Mich.

An understanding of recent advances in orthodontic diagnosis and treatment planning may be understood best by studying the current trends in orthodontic research. These may be grouped under four headings as follows: (1) Cephalometrics, (2) Development of Occlusion, (3) Electromyography and Other Muscle Research, (4) Socio-economic and Public Health Aspects of Orthodontic Treatment.

The field of cephalometrics, while being the most productive single area in diagnosis and treatment planning, has been widely misused. However, there are significant signs that it is being better understood and more sensibly and rationally applied. Recently orthodontic research in the field of occlusal development has concentrated on the patterns of transition during the mixed-dentition stage, and the relationship between tooth widths and alveolar arch perimeter. Increasing emphasis on early orthodontic treatment suggests that study of the transition stage is apt to be very active for several years to come. Particularly controversial at this time is the question of whether or not extraction of permanent teeth should be a part of orthodontic treatment. In consideration of the permanent dentition perhaps the most difficult problem at the moment is that of determining where teeth should be with regard to the supporting bone. Studies in great number have computed mean values for angulation of various teeth, but no opinion is yet universally adopted and much work will likely be done in the future.

Electromyographic papers have studied the action of the muscles moving the mandible, the muscle patterns in Angle Class II malocclusions, cleft palate, response to myotherapeutic exercises, lip and facial musculature, age changes in facial muscle action and centric and other mandibular relationships. Electromyography de-

mands a different philosophic approach than do cephalometric and other more orthodox research aids in orthodontics. It does not breed dogma quite so readily because of its infinite complications in recording and interpretation. Research in the oro-facial musculature is now on a relatively sound basis and the findings will undoubtedly have a strong influence on diagnostic and treatment planning procedures for some time to come.

One of the biggest problems in diagnosis and treatment planning lies in the field of diagnosis and treatment for the community's total need. We know well how to serve the individual patient, but we have not yet begun to learn how to extend our service in orthodontics to all the people needing it.

5. An Appraisal of the Use of Rustless Metals in Everyday Practice

Saul M. Bien
New York, N. Y.

The dentist and the manufacturer of jet airplanes use some of the same rustless metals and frequently have similar problems in using the metals which are available. The wrought metal used for making appliances which straighten teeth is also used to make tank cars which move milk. Rustless metal alloys developed for casting partial dentures and surgical implants are now being used in industry because they are among the hardest, toughest metal alloys known. Research by dental scientists in their field of application has industrial applications and research by scientists in industry benefits dentistry.

Various alloys chiefly constituted of nickel-chromium-iron, nickel-chromium-cobalt and chromium-cobalt-molybdenum used in the everyday practice of dentistry today are light, strong and resistant to corrosion. They are capable of being in contact with or of being imbedded in body tissues without eliciting an inflammatory response.

Rustless metals are used to make orthodontic appliances for moving the teeth and jaws into good function; to make surgical appliances for preserving the teeth and jaws in good function after attack by disease or accident; and to make prosthetic appliances and obturators for replacing the teeth and jaws whenever they have been lost.

6. The Present Status of Knowledge in the Treatment And Prognosis of Peridontal Disease

Samuel Charles Miller
College of Dentistry, New York University
New York, N. Y.

One of the most common health problems of today is the reduction of bodily health and the loss of teeth due to periodontal disease. At least one-half of all teeth that are lost succumb to this affection of the supporting structures. In addition, the absorption of pus, bacteria and noxious products of tissue inflammation and destruction is harmful to the entire body creating a greater susceptibility to disease and premature aging. The reduction of chewing efficiency by the loosening and loss of teeth from this cause is an important factor in the induction of nutritional deficiencies.

Periodontal disease is definitely curable with the methods known today. Teeth can be tightened and pus pockets can be eliminated. The cause is now known. It is not due to infection but is caused by a combination of factors from three categories: dysfunctional, irritational and systemic.

By the application of correct principles of prevention and treatment as they are known today, it should be possible for most people to avoid wearing full artificial dentures.

Symposium: Part I

II. A.M. Session. The Human Dentition in Forensic Medicine

Geo. C. Paffenbarger, presiding

7. The Determination of Personal Identity By Means of the Teeth

Robert D. Wyckoff (DC), U.S.N.
Dental Division
Bureau of Medicine and Surgery, Navy Department
Washington 25, D. C.

Although fingerprints are considered the best means of determining personal identity, the teeth possess enough of the require-

ments in a system of identification to provide information which will lead to the identity of some individuals when fingerprints or other recognizable characteristics are not available.

In the Navy and Marine Corps where hazards of the air and sea take a toll in time of war and in peace, there is a continuous need for dental records to identify individuals who have met violent death by means of fire, force or submersion. Without the record, the teeth give only clues which may assist in identification by giving evidence of age or race.

Factors which make the teeth unique as a means of identification are their indestructibility and the fact that there is little chance of there ever being two individuals with identical sets of teeth, due to the combination of caries, restorations, missing teeth and abnormalities which are present in most dentitions.

Establishment of personal identity is not only a passive sort of comfort to the next of kin but is oftentimes a requirement in settling legal entanglements. It is within the capability of all persons in the dental profession to assist in the identification of the dead when teeth are involved. The determination of personal identity by means of the teeth, therefore, is a service to the other forensic sciences which may be rendered by the dental profession.

8. Criteria for Age Determinations by Means of Teeth and Identification of Fragmentary Teeth

David B. Scott
National Institute of Dental Research
National Institutes of Health
Bethesda 14, Md.

In the handling of unknown post-mortem material it is customary to estimate age of the individual. Information relative to age can be gained from gross and microscopic examination of teeth. Age determinations by means of teeth are of special importance in the case of mutilated or fragmentary specimens. The various laboratory methods for estimating age from isolated teeth will be described and evaluated. Other laboratory techniques, useful in the examination of fragmented solid matter, thought possibly to be tooth or bone, will be discussed.

9. Calcification Pattern of Human Teeth

Maury Massler
College of Dentistry
University of Illinois
Chicago, Ill.

The enamel and dentin forming cells are extremely sensitive to minor aberrations in calcium metabolism which may occur during the period of enamel and dentin formation and calcification. This is especially true of the enamel forming cells (ameloblasts). Major and minor events in the life history of the child are recorded permanently and clearly within the structure of the enamel and dentin in the form of growth rings and as variations in the degree of calcification of these tissues. Every primary tooth contains a neonatal ring in the enamel and dentin as a result of the metabolic changes incident to birth and neonatal adjustment. This line clearly demarcates the almost perfect degree of prenatal calcification from the imperfect calcification of the tissues formed during infancy.

Another ring is found constantly in the enamel of permanent teeth at the level forming at 10 to 12 postnatal months (the infancy ring). The origin of this ring is unknown. It demarcates the imperfectly calcified tissue formed between birth and 10 months of life, from the much better calcified tissue formed after the first year. Other rings are found consistently at 2½ years (early childhood ring) and at 5 years (later childhood ring). In the third molars, a ring of arrested growth and zone of imperfect calcification are found at the level forming at the time of puberty.

These rings or lines of arrested growth and zones of good and poor calcification have been carefully analysed and dated in each one of the primary and permanent teeth. This resulting calcification pattern permits the precise indexing of unknown teeth by the characteristic location or level of the neonatal ring in the primary teeth and the infancy ring in the permanent teeth. Prematurity is easily determined by this technique as are the character and extent of the infancy and childhood periods.

Severe disturbances in systemic metabolism are recorded as enamel hypoplasias (defects in enamel formation). These can be analysed grossly without recourse to histologic sectioning. Dating is easily accomplished by reference to a standard chart on tooth development. The pattern of enamel hypoplasias follows the pattern of calcification very closely. The majority of enamel hypoplasias occur during the period of infancy (birth to one year).

Histologic analysis of the calcification pattern offers a simple and accurate method of cross-indexing unknown tooth samples. Furthermore, it permits analysis of the stresses and strains which occurred during the early life of the individual. Since the teeth are often the only remnants available for identification, analysis of the calcification pattern may offer valuable clues and means of identification.

10. Time and Sequence of Tooth Eruption

V. O. Hurme

**Forsyth Dental Infirmary for Children
Boston, Mass.**

Use of teeth as a criterion of age is hampered by remarkable variability of the process of teething. Tables of eruption available in textbooks can be misleading to the medicolegal expert. Author recommends use of the 95 per cent range derived from his analyses of eruption data on almost 100,000 white children. Sex differences in timing and sequence of eruption exist, the lower canine being the most distinctly sex-linked member of the dentition. Deviations from general averages are frequent, and many children today reveal an order of eruption that was once supposed to be a primitive human trait. Wisdom teeth are of relatively little value in estimating age or sex of human skeletal remains. Racial differences do not appear striking, excepting perhaps somewhat early teething in African Blacks. As for the primary, or milk teeth, no universal standards of eruption have been developed yet. Intensive studies of the monkey indicate that serial records on teeth can be used in the future to assign a birthdate to a war orphan or a foundling with no birth certificate. The timing of the baby's first teeth may also be of value in settling disputes of contested paternity.

II. P.M. Session. The Human Dentition in Forensic Medicine

David B. Scott, presiding

11. Criteria of Individuality in the Teeth

Albert A. Dahlberg

**Zoller Memorial Dental Clinic and Department of Anthropology
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Chicago, Ill.**

The form and markings on teeth reflect the sum total of a variety of possible conditions in the experience and history of the tooth

or dentition. Dependability of these recordings as individualistic and useful in identification stems from the biological laws and concepts involved in tooth development. Seven general categories of evidence found in teeth are:

1. Anatomical components (specific units of form and structure)
2. Genetic factors (inherited variations and units)
3. Recorded developmental incidents
4. Physiological processes (timing and sequence of loss and emergence of the teeth)
5. Artificially produced markings or alterations
 - a. Fillings and restorations
 - b. Injuries
 - c. Deliberate decoration or mutilation of the teeth
6. Evidences of aging
7. Effects of environment and of use.

These various evidences are sometimes common to many individuals. The frequency with which they are apt to occur in differing groups allows for statistical weighing of the separate points of evidence. In combination the individuality factor spirals to astronomical figures of probability or improbability as the case may be.

12. Racial Traits in the Human Dentition

Gabriel W. Lasker and Marjorie M. C. Lee
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Detroit, Mich.

If the scattered investigations of tooth morphology made by different observers throughout the world are classified according to the main racial groups, some differences in the dentition are seen to be racial. Although there are also differences in dental traits between subgroups and local populations, their analysis would require more systematic sampling of populations. Furthermore, when sex is unknown, the differences between male and female teeth complicate racial diagnosis.

In respect to the teeth, Mongoloids may be defined to include not only Chinese, Japanese, Malays and Javanese, but also Eskimos, Aleuts and American Indians. Asiatic Indians are like Europeans and American Whites in dental characteristics and therefore can be grouped with Caucasoids. Little satisfactory data is available for Negroes except for South African Bantus. Other groups studied include Bushmen, Australian Aborigines, Melanesians and Lapps.

In Mongoloids there is very high incidence of shovel-shaped incisors (especially the upper lateral incisors, but also the central incisors) and the related development of lingual marginal ridges

in canines and lower incisors. In marked cases the shovel-shaped trait is indicated by longitudinal grooves on the labial aspect of the teeth. Premolars are comparatively smaller and usually show one short undivided root. They occasionally show an enamel pearl on the occlusal surface which occurs more frequent in the lower second premolars than the other premolars. The crown of the upper molars tends to be bulbous, usually with 4, 4 and 3 cusps respectively on the first, second and third. This occlusal surface appears to be more or less wrinkled especially in the third molar. The roots of the upper molars are short and straight and have a high tendency to fuse. This is associated with large pulp cavities (taurodontism). In the lower molars the cusp pattern is usually Y5 in the first, and +5 in the second and third. There is higher incidence of the proto-stylid tubercle in the lower first molar and it occurs also in the second. An extra third root situated disto-lingually is quite common in the first lower molar, less in the third, rarely if ever in the second. Both upper and lower molars tend to show enamel prolongations between the roots. Sometimes there are enamel pearls in this location. Congenital absence of the third molars is most frequent in Mongoloids.

In Caucasoids, the incisors are usually chisel-shaped, the upper lateral incisors are frequently much smaller than the central. Roots of the incisors and canines tend to be long and pointed. Compressed bucco-lingual dimension of the lower second premolars, although rare, has been reported only in this race. The incidence of divided roots in the premolars is relatively high. Molars tend to have few cusps and simple fissures. There is a high incidence of Carabelli's tubercle in the upper first and sometimes also second molars. Roots of molars are long and divergent.

Among South Africans, teeth tend to be large in the Bantu though small in Bushmen, and there is a tendency for two or even three roots in premolars in the Bantu. As in Mongoloids there is little reduction of molar cusp number. There is a high tendency of fusion of roots and taurodontism in the second and third molars in some groups (Bushmen) but not in other groups (Bantu).

On the average Australians have the largest teeth and long roots. The second lower molar tends to be larger than the first, and fourth molars occur more frequently than in other races. Melanesians also have large teeth.

Very few criteria for racial differentiation have been described in the primary teeth. Shovel-shaped incisors and primary lower

second molars with a protostylid may be seen in primary as well as in permanent teeth; so may Carabelli's tubercle on the upper second primary molar.

From the standpoint of forensic medicine and dentistry, only rather general and somewhat guarded racial diagnoses are usually possible on the basis of teeth. In this respect teeth are little, if any, better or worse than hair, skin, blood or bony remains. Small inbred groups of men may show unusual frequencies of congenitally absent lower incisors or of fourth molars, etc. The major racial groups, however, are largely abstractions; they show considerable intragroup and inter-individual variability overlying and partly obscuring the differences between them.

13. The Genetics of the Human Dentition

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Tucson, Ariz.

Data will be organized as follows: 1) comprehensive descriptions of the dental features of a skeletal series; 2) twin studies of such subjects as pathological entities, occlusal types, incidence and topologies of caries, anomalies, etc.; 3) intensive studies of single entities, such as shovel-shaped incisors, or Bolk's paramolar tubercle as they are manifested morphologically and incidence-wise over various populations. On a sample of 200 Whites, 30 Negroes, 50 Papagoes, 30 White Mt. Apache, 130 Yaqui, and 30 Chinese, dental casts were secured and details of tooth-crown morphology were studied (premolars and molars, especially lower Pm 1). Ethnic differences in 16 morphological traits were tested for significance.

13a. (The following paper was given in the form of an extended discussion.)

13a. Hereditary Pathological Traits in The Human Dentition

Carl J. Witkop, Jr.
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Certain hereditary pathological traits in the human dentition can be used for medical-legal identification if they happen to be present. These traits have been identified during a survey of 94,671 school children in the State of Michigan.

Amelogenesis Imperfecta

1. Hypoplasia of enamel—inherited as a sex-linked dominant trait.
2. Hypocalcification of enamel—inherited as an autosomal dominant trait.
3. Hypomaturation of enamel—inherited as a sex-linked recessive trait.
4. Pigmented hypomaturation of enamel—inheritance unknown.
5. Local hypoplasia—inherited as an autosomal dominant trait.

Dentinogenesis Imperfecta

Inherited as an autosomal dominant trait linked with phenylthiocarbamide taste trait.

Dentin Dysplasia

Inherited as an autosomal dominant trait.

Other inherited defects affecting the formation of the teeth, jaws and skull may also be used.

Three cases have been presented wherein these factors were utilized for identification purposes. They include a skull from an Indian reservation, a father in a disputed paternity case and an heir in the settlement of an estate.

14. Roentgenographic and Physiographic Appraisal Of Cephalo-facial-dental Individuality

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The face of a person has always been considered as the characteristic of his individuality.

For purposes of identification the face was studied in *two ways*: externally by means of a special photographic technique, the physiograph; internally by means of oriented roentgenographic cephalometry. The Sassouni-Krogman physiograph is a setting by means of which a calibrated millimetric grid is projected on the face while the picture is taken by a camera placed at right angle. The physio-print represents the face in profile. The lines of the grid permit the evaluation of the face in the three dimensions of space. The physio-print, comparable to the fingerprint, is characteristic of the individual and is of potential use for identification purposes.

Roentgenographic cephalometry, on the other hand, provides the means to study the bony architecture of the face. A set of proportions and positions devised from the lateral and frontal X-ray films enable us to reconstruct a face from the remains of it.

On the lateral X-ray film four horizontal planes are traced: supraorbital, palatal, occlusal, mandibular. These four planes (more often, any three of them) meet at a focal area "O" situated posteriorly.

From "O" as center, two arcs are drawn: one anterior passing through the root of the nose, the anterior nasal spine, the upper incisor, the most forward chin point; one posterior, passing through dorsum Sella and the jaw angle. The palatal plane divides the face vertically in two parts equal in size and position.

On the frontal X-ray film, the bigonial diameter equals the bi-orbital diameter.

From the combination of the lateral and frontal X-ray films, we find that the corpus of the mandible and the anterior cranial base, as seen from above, form equilateral triangles. The length of the corpus of the mandible = the length of the cranial base (Sella-Nasion) = posterior facial height (Sella-Gonion).

The deviations from the optimum pattern give the characteristic of the individuality.

This is a preliminary report subject to later and more intensive investigation.

III. Antienzymes

Ed F. Degering, presiding

15. Insulinase-Inhibitors

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The destruction of insulin *in vitro* and *in vivo* is dependent upon the action of an enzyme system, insulinase, which is relatively specific in catalyzing the hydrolysis of insulin. This system is inhibited irreversibly *in vitro* by Cu, Zn, Hg, iodoacetate, p-chloromercuribenzoate and a large number of other sulfhydryl poisons. In contrast, with the irreversible non-specific inhibitors of insulinase is the competitive type of inhibition produced by an hepatic factor. The hepatic factor appears to be a small peptide and is effective in enhancing the hypoglycemic action of insulin in the rat. Similar

insulinase-inhibitory activity is exerted by three hour acid hydrolysates of a variety of proteins. Studies of such hydrolysates led to the observation that L-tryptophan inhibits the destruction of insulin by the intact mouse. The oral administration of L-tryptophan produces a significant hypoglycemia in the normal but not in the severely diabetic rat. Studies of various metabolic derivatives of L-tryptophan revealed that a similar insulinase-inhibitory and hypoglycemic action is produced by anthranilic acid, niacin, nicotinuric acid, indole-3-acetic acid, 5-hydroxytryptophan and 5-hydroxytryptamine. Since indole-3-acetic acid is a natural plant growth regulator and since the other effective compounds fulfill some of the known structural requirements for plant growth regulatory activity, the insulinase-inhibitory and hypoglycemic action of other plant growth regulators were studied. Nearly all known synthetic plant growth regulators were found to act as did indole-3-acetic acid. Studies with man revealed that indole-3-acetic acid produces a small but significant hypoglycemia in normal subjects and a more marked hypoglycemic response in patients who developed diabetes mellitus after 40 years of age. These studies support the hypothesis that in the majority of instances, diabetes mellitus in man is due to an increase in the destruction of endogenous insulin consequent to a decrease in the synthesis of an insulinase-inhibitor.

16. Antimetabolites and Semienzymes

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Since the purpose of this symposium is to discuss antienzymes, the description of both antimetabolites and semienzymes is most appropriate. The antimetabolites are highly specific antagonists to the action of a wide variety of enzymes and semienzymes. A basic understanding of the mechanism of these effects, and of the natures of the substances involved, can lead to advances in knowledge and to useful practical results.

The basis of action of the antimetabolites will be discussed. This action is to compete with the structurally related substrate for the active site of a specific enzyme.

Semienzymes are specific proteins which combine with certain essential molecules, but which, unlike the enzymes, do not then alter these molecules. The semienzymes occur widely in nature, and are represented by such proteins as hemoglobin, avidin, various apoen-

zymes, antibodies, and perhaps by receptors for some of the hormones. The actions of these semienzymes can be specifically blocked by a suitable antimetabolite of their substrate.

The case for the semienzymes will be illustrated by showing how a typical enzyme can be converted into a semienzyme. Thus chymotrypsin has been made to function as a semienzyme rather than as an enzyme by construction of the proper kind of "substrate" for it. This substrate behaves toward the protein as a hapten does to its antibody. The enzyme which is now functioning solely as an antibody can then be made to act as the enzyme again by suitable alteration of the substrate. When the enzyme is made to act as a semienzyme or antibody, by the use of this special substrate, it is powerfully inhibited from acting as the enzyme. The net result is the realization of potent and specific inhibitors of chymotryptic activity.

The semienzymes which act as receptor sites for hormones will be discussed. The serotonin receptors may be used as an illustration. By knowing the chemical configuration of the natural substrate for this receptor (viz. serotonin) it has been possible to construct antimetabolites which block the activity of these receptors. One of these antimetabolites was so constructed as to exert a selective effect on the receptors in the periphery of mammals. However, it was excluded from those in the brain. This was an essential point, because it was shown that those antiserotonins which penetrate into the brain cause mental disorders. With this selective one however it was possible to block only peripheral receptors. By so doing it has been possible to control the high blood pressure of human beings suffering from essential hypertension. Presumably this disease arises from an excess of the hormone serotonin in the periphery. The successful conclusion of this work has shown that it is entirely feasible to develop new series of drugs by use of the antimetabolite approach, provided only that sufficient attention is paid to the understanding of some of the basic principles.

17. Chemical Aspects of Enzyme Inhibition

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The use of chemical reagents as enzyme inhibitors has yielded information concerning the mechanism of inhibition and the role in

catalysis played by active groups on the protein apoenzyme, the coenzyme or the metal component. Inhibition analysis has also furnished valuable clues concerning the architecture, chemical properties and catalytic mechanism of the active site of the enzyme. In many cases *in vivo* effects of inhibitors can be closely correlated with *in vitro* inhibition of purified enzyme systems. The effects of antimicrobial and anticancer agents, insecticides, and drugs can often be explained in terms of enzyme inhibition. The design and synthesis of new inhibitors offers great promise when applied to the control of undesirable organisms, and to the prevention and cure of disease in the immediate future.

18. Organic Structure Capable of Inhibiting Bacterial Glycolysis

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Many dental investigators have had the goal of discovering therapeutic means of preventing dental caries, by search for substances which would arrest the formation of acid by bacteria which accumulate in films on the teeth. These accumulations of bacteria have the ability to form acid from sugar in foodstuffs, and this acid is believed by many investigators to be capable of etching enamel sufficiently to permit dental caries to begin. Our general efforts have been to find new types of organic structures which might show promise as inhibitors of this type of glycolysis. Such inhibitors would deserve further study as possible additives to dentifrice, chewing gum, or foodstuff. The equipment for testing glycolysis was arranged to make two additional requirements of inhibitory chemicals—that they be able to diffuse through a thin layer of bacterial sediment resembling “dental plaques” on teeth, and that they be able to resist rinsing for at least one hour.

Of the 3,000 substances tested, over 250 had a persistent glycolysis-inhibiting action. Occasional inhibitor actions were found among a wide variety of common organic structures such as alcohol, phenols, amines, aldehydes, ketones, acids, amides and urethane derivatives. Phenol and substituted phenols showed inhibitory action. Several derivatives of methyl alcohol sometimes involving ring structures were also inhibitory. Some of the alcohol derivatives possessed struc-

tural formulas resembling the pyranose forms of glucose. Eight of such compounds were tested at different concentrations with the glucose substrate, but no evidence of competitive inhibition was observed.

Generally, the inhibitory structures were highly specific, and closely related compounds were inactive. Of 70 tests on aldehydes, there were 6 compounds which produced inhibition of glycolysis by 60 per cent or more, but three possessed other structures which could cause inhibition. The three remaining aldehydes were simple compounds; aldehydes with very similar structures were non-inhibitory. There were tests on 112 ketones with 6 showing activity; in each instance inhibitory action could be explained on the presence of some other group or on the possibility of enolization to form a cyclic secondary alcohol. There were over 250 structures possessing carboxyl groups and only 2 showed appreciable inhibitory action; these were cyclohexenyl—or cyclopentenyl derivatives of 5 or 6 carbon fatty acids. There was evidence of a high degree of specificity since closely related structures were inactive. Among amides, inhibitory action was less specific. Of the 222 amides studied there were 13 having an inhibitory action of 40 per cent or greater. Except for a piperazine derivative and a sarcosinate, the active substances were either monosubstituted alkyl amides or lactamides containing 11 to 21 carbon atoms. Specificity was extremely great among the carbamates studied; of the 162 substances tried, only two of the total appeared promising. These two were the N-carboisopropoxy derivative of pyrrolidine and piperidine. This group appeared to be highly specific since five other pyrrolidine compounds were negative and 11 compounds with carbamate in a five-membered heterocycle were without effect.

There were two other reports presented at the AAAS meeting that had special import to dentistry. The first, given in Section Q (Education), follows:

The Fluoridation Controversy—A Study in the Acceptance of Scientific Authority

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One of the most pressing needs in our time is for public decisions on issues involving the sciences. For example, it will be necessary

soon for our society to decide on the amount of radiation it will permit through industrial and military applications of atomic energy. New public health procedures, such as the Salk vaccine, cannot be adopted without a decision as to permissible risk.

The bases for this kind of decision are complex. Decision makers in our society must themselves understand the issues involved. Unfortunately, in many cases, the issues are too complex for those individuals in whose hands policy decisions lie, to arrive at such an understanding. Here, there is little that can be done beyond accepting the advice of scientific authorities.

When we move from the realm of decision makers to that of the population as a whole, there are even greater difficulties. For such a decision as that to continue with or suspend the testing of the H-bomb, it would be optimal that the bulk of the population understand the crux of the issue. Only in that way will widespread fears and panic be averted. Thus, one of the primary problems of the scientist becomes that of communicating either the bases for his decisions or the basis of his authority in making these decisions.

The controversy over fluoridation represents a test case in which the problems of scientific authority raised above have been encountered in a very severe form. The fluoridation of public water supplies has been urged for some years as a measure for the prevention of dental caries. This procedure has been accepted as one which is relatively free of risk and which has good social consequences by virtually all of the appropriate scientific authorities in the field. Nevertheless, there has been considerable public opposition to the adoption of fluoridation. In at least half of the communities in which a referendum was held over the issue, the adoption of fluoridation was defeated.

Why the controversy? Firstly, the very nature of the procedure rouses fears of being poisoned in some, and of an invasion of individual rights in others. The evidence for it is based on an epidemiological analysis which is not easily communicated. Secondly, fluoridation was usually introduced from the top through conferences between scientific authorities and public health officials. Thus, the population was often given the feeling that there was a conspiracy involved; that is, that the public health officials were "putting something over." There has been enough public disagreement among people who seem to be reputable authorities in the field, so that it is not clear to the general public that consensus has been reached among the experts. Lastly, once the controversy arises and the is-

sue has been polarized, the methods used to educate the public have been inadequate. The major approach has been to dismiss the opposition to fluoridation as "crackpot," and to rely on the prestige of scientific authorities.

That this approach is inadequate was demonstrated in the city of Northampton, Mass., in which a referendum on fluoridation was held, and in which the issue was defeated by a two to one vote. The writer carried out two public opinion polls; one before the referendum, the other a year after it. The first of these polls, in which the results of the referendum were predicted accurately, found that by and large, those people who voted for fluoridation had accepted the authority of the scientists who were for it. Those people who voted against fluoridation were unwilling to accept this authority. It was found also that the bulk of the opposition was concentrated among older, less well educated individuals in working class and middle class circles, especially among people without children. Those for fluoridation were primarily younger, better educated, middle-class and professional people with young children.

The second survey attempted a more comprehensive study of the psychological processes back of opposition to or acceptance of fluoridation. In this poll, the respondents in the sample were asked to indicate why they had voted for or against the measure. Those individuals who were for fluoridation mentioned most often that it was "good for people," and that "authorities are for it." Only ten per cent had any clear idea of the reasons for its adoption. Individuals who were against the measure most frequently gave as their reasons, their opinion that the measure was ineffective or unnecessary, that it was harmful, that authorities were against it, and that it violated individual rights or tampered with nature.

Among the voters for fluoridation, those who had higher educational levels more frequently mentioned the fact that "authorities were for it." Those with *less* education more frequently had a clearer idea of the benefits to be derived from the procedure. Apparently, the few less well educated people who were for fluoridation were those who had really been convinced of its merits.

The conclusions to be drawn from these findings can be applied both to an understanding of the specific problem of the acceptance of fluoridation and to the broader question of education in the sciences. For the former, certain conclusions are possible. Firstly, the proponents of the measure should have stressed a clearer under-

standing of the issues. In the main, neither those who accepted fluoridation in Northampton, nor those who rejected it really understood what it was about. Secondly, it seemed to be an inadequate device to dismiss the opposition to fluoridation as "crackpot" or irrational. Only a minority was willing to accept this point of view.

There are some general implications in this study for education in the sciences. The reactions of better educated people in Northampton indicated that on the whole, they were either unwilling or unable to make the effort to follow the sense of the issue. Their reaction was primarily based on their acceptance or rejection of the bona fides of the authorities involved. Certainly, there were failures in the education of these people. What conclusions can we make on the basis of these failures? Firstly, that the present attempt to teach the substance of the sciences to all well educated citizens so that the actual bases for such decisions can more clearly understood is certainly laudable. However, something more is needed. Apparently, many individuals must at some point in their lives resign from the necessity for following the content of issues. Therefore, it is necessary that we, as educators, develop clear-cut criteria as to the acceptance or rejection of expertness.

The second report, given in a joint session of AAAS Section Q (Education) and the American Educational Research Association, follows:

Testing for the Profession of Dentistry

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Unlike most fields of education, business, and industry, "evaluation" and "testing" have legal status in the fields of the health professions. From the time of the early state boards for licensing dentists, groups have been empowered with the authority for and given the responsibility of evaluating the competence of individuals who wished to practice their profession on the public.

In the field of dentistry, the examiners (i.e., members of the state boards of dental licensure) have recognized the need for attacking the problem of testing on a scientific basis. The examiners have conducted series of seminars for improving their testing techniques at

the state level and the national professional association—the American Dental Association—has promoted the development of testing programs at the national level. From this has come the testing program of the National Board of Dental Examiners which is conducted by the American Dental Association.

Dentistry, through its accrediting agency—the Council on Dental Education—which is an agency of the American Dental Association, has developed and conducted other testing programs designed to improve the selection of students both in dental schools and now in dental hygiene schools. The Council has also promoted additional programs of testing through the schools for evaluating the achievement of students and for encouraging educational research projects.

Dentistry has found all of its agencies concerned either with licensure or with education sincerely interested in developing new and better methods of evaluation. There are few groups that have shown their interest in utilizing the sound educational principles of teaching and sound methods of psychometrics as has the dental profession through its consistent 100 per cent cooperation.

From the outset of the five-year experimental program in the field of aptitude testing, all of the dental schools have entered into the program, with the result that student selection has been improved and student mortality or loss through the professional program has been reduced tremendously. Ten years ago, some schools found it necessary to fail or drop as many as 50 per cent of their first-year class whereas today, about one-fourth of the schools have no losses during the first year and nation wide, only about 7 per cent are lost from the original number entering all schools. This is the lowest mortality figures for any of the health professions.

The dental profession also works with the other associations representing its dental auxiliaries. At the present time, a program of aptitude testing is being conducted through the joint efforts of the American Dental Association's Council on Dental Education and the American Dental Hygienists' Association. A testing program is being developed by these same two agencies for an achievement evaluation of students; and it is anticipated that this will evolve into a national board program for the licensing of dental hygienists. Another phase of testing which is being planned is that for the certification or recognition, through examination, of dental assistants and dental laboratory technicians.

These testing programs have many values, as evidenced by the

fact that during the last ten years all of the dental schools have developed committees for the study of their admissions problems, others for the restudy of their curriculum and still others for studying their methods and standards of promotion. Dental education can well point to the last decade as the period during which the most progress was made due to dentistry's recognition of the importance of sound evaluation practices, and through the close cooperation of all of the agencies concerned.

NOTICE

The National Opinion Research Center of the University of Chicago, at the request of the American College of Dentists, and in cooperation with the Walter G. Zoller Memorial Dental Clinic, is currently engaged in a study of procedures and problems of dental practice. Personal interviews with a nationwide sample of active, practising dentists are now being conducted. Results of the study, which will be useful to the entire dental profession will be made generally available in summary terms toward the end of the year. The main interest of the study is in the procedures and problems of dental practice, including their preventive aspects.

Prepayment Group Dental Care Programs*

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WHILE PREPAYMENT dental care plans are by no means new, with the exception of government operated programs they have until recently found little favor. This mechanism for group care may be characterized generally in five types:

Insurance or indemnity plans in which a properly constituted commercial agency provides dental care in return for the payment of a premium for the insured. The services are usually restricted to a greater or less extent depending upon the premium and in many instances the accumulated dental need of the insured must be eliminated before he is eligible for participation. Plans of this type have been slow to develop but we are experiencing a greater interest in them and more are being initiated currently.

Employers dental programs are in the main of limited extent and many are restricted to dental examination and emergency care.

Employees, usually union organized, occasionally have operated their own programs.

Combined Employee-Employer plans of the fringe benefit type created through negotiation between management and labor, financed largely by employers and conducted by Welfare Funds or joint committees are in operation today. This is the type of which I will speak later.

Services provided by tax-collected funds. The largest and probably the most successful is the Veterans Administration dental care program. There are many public school plans which vary greatly in administration and extent of service provided. In general these are very restricted. It is likely we will see the development of a mechanism for the dental care of dependents of armed services personnel.

MANNER OF RENDERING SERVICE

If we can generalize without too much oversimplification, the

* Presented before the Texas Section of The American College of Dentists, Mineral Wells, Texas, December 8, 1956.

manner of rendering dental care may be classified into three categories.

Open Panel in which there is complete freedom of choice of dentist.

Partial or Limited Open Panel. Here the choice of dentist may be limited to practitioners having certain qualifications, such as being members of the A.D.A., state and local societies or those having agreed to accept patients under the plan.

Closed Panel. In this circumstance there is no choice of dentists or at most it is extremely limited.

PAYMENT FOR DENTAL SERVICES

Under the open panel or partial open panel obviously the payment is made to the private practitioner. This may be upon a previously published fee schedule to which the dentist subscribes either before or at the time he accepts the patient. Less often the plan permits the dentist to bill for his services in the same way he would in the case of a patient not included in the prepayment plan. Payment is usually guaranteed by the agency providing the patient though there have been and perhaps are today programs that assure payment only and insofar as funds are available.

The closed panel may and usually does operate on a salary based upon the time given to the clinic, the skill of the dentist and his bargaining ability. A percentage basis is, of course, an alternate method of profit sharing over and above a minimum salary.

THE ILWU-PMA WELFARE FUND CHILD DENTAL CARE PROGRAM

It is my purpose to speak to you about a particular prepayment program, that of the International Longshoremen's and Warehousemen's Union and the Pacific Maritime Association administered through their Welfare Fund. The plan was started as a pilot program in the winter of 1954-55, extended to June 30, 1955 and again for the year July 1, 1956 to June 30, 1957. This gives a certain degree of permanence to this fringe benefit but it could be discontinued at the end of any bargaining period.

The plan was designed to give comprehensive dental care to dependent children of union members from birth to age fifteen. The age range was selected by union and management negotiators without consultation with organized dental groups or, for all I know,

individual dentists familiar with the problems of child dental care. It was not intended to include orthodontic treatment or restorations of essentially aesthetic nature such as anterior porcelain jacket crowns. Certain other dental operations were eliminated in geographic areas where the type of contract program budget would not permit their inclusion.

Because of the experimental nature of the plan, the time schedule for starting the service and certain differences of opinion between the dental associations upon the west coast there resulted considerable variety in the type of prepayment plans now in operation. In California a union member has a choice between a closed panel operating under contract with the trustees of the Welfare Fund and an open or semi-open panel conducted by the Continental Casualty Company. Under the former the child is entitled to comprehensive dental care exclusive of orthodontics and aesthetic dentistry and the latter \$75.00 limit determined by a fee schedule meeting the approval of both California state dental associations.¹

Washington and Oregon have programs which differ from one another only in details. Both have established corporate bodies which are separate and distinct from the state dental associations though the majority of the board of directors of each are chosen directly or indirectly by the state association. Both Dental Service Corporations can negotiate contracts with other agencies for dental care of either children or adults and Washington has done so. In Oregon the agreement between the dentist and the service corporation becomes effective when the dentist signs a statement agreeing to the fee schedule which is on the form he completes as an estimate of services needed. In Washington the dentist is required to contract with the service corporation in advance of taking a patient. In the latter state there is a formula for post checking of selected samples of completed cases while in Oregon this procedure is not formalized.

In both states samples of union children were examined in surveys in which the dental schools participated for the purpose of estimating the extent of dental care needed and in consequence the cost per average child according to the fee schedule agreed upon. As a result of data thus accumulated the Welfare Fund agreed to pay the service corporation \$100.00 per child and make specified expectations to comprehensive care in addition to orthodontics and

1. Group Dental Health Care Programs, Council on Dental Health, A.D.A. 1955.

aesthetic dental restorations. The amount was to include overhead and nonprofessional expense not to exceed 8%. In both Oregon and Washington the union member originally had a choice between the state dental service and indemnity plan conducted by the same company as that operating in California except that the total limit of service was \$95.00 and the fee schedule was that accepted for dentists on the open panel program. There were certain other insurance benefits identical with the California plan.¹

OREGON DENTAL SERVICE AND THE ILWU-PMA WELFARE FUND

In the pilot program, representing the first year of operation, there were 1666 children enrolled and of this number 1260 or 76% visited a dentist. About 85 children reached their 15th birthday in the pilot period and a little less than half of them did not see a dentist registered with the Oregon Dental Service. A total of 243 dentists received \$75,897.00.

There have been certain changes in the program for the current year, July 1, 1956 to June 30, 1957, as might be expected due to the relative increase in participating children who have benefited by complete dental care and are now on a maintenance basis. For new children in the program the Welfare Fund pays \$80.00. This also applies to children who have not been seen by a dentist for 12 months. However, for children who are on a maintenance or follow-up basis, an annual amount of \$45.00 is paid and this applies to children transferred from areas where another service agency, indemnity program or closed panel has been responsible for their care.

A distinct difference in the current program is that because of lack of interest in the indemnity plan it was discontinued. This is true in Washington as well. In these two states only the dental service program is in operation.

STATISTICS

In the state of Oregon a survey of union children indicated that the average cost of services excluding the items that the Welfare Fund felt they could not afford was \$92.00. Actually, the estimates of dentists fell short of this amount \$58.68, yet the actual billing was very close to estimate \$59.82. One reason for this discrepancy between the survey figure and cost realized was the overestimate of the

1. Group Dental Health Care Programs, Council on Dental Health, A.D.A. 1955.

number of dentists that would include topical application of sodium fluoride and the next most influential factor was that only 48.2% of children 14 years of age came to a dentist. Neither of these circumstances was anticipated.

The program was received almost without dissent from either the parents or the dentists. I think I could make this observation about the patient as well though there were some who protested on entering the operating room!

The American College of Dentists is making a study of the Welfare Fund Program conducted in Oregon and California and I hope it will be extended to Washington. In California it is being conducted by the School of Public Health with cooperation of the College of Dentistry, University of California, in Oregon by the Department of Political Science of the University of Oregon and the Dental School. Both studies are closely correlated. I shall give you some of the early findings which we may have to modify as later returns are tabulated.

Of the dentists interviewed, 115 are in general practice and 5 restrict their patients to children. There is one area where most dentists avoid children and one practitioner in that region has 200 children on the program. The average number of children per dentist is 11. An appreciable number of dentists would like to add space maintainers to the services now rendered. The average compensation from union patients is \$14.95 and the average for non-union children is \$15.70 per chair hour. Of 118 replies to the question asking recommendation for fee schedule changes, 84 had no suggestions. There were 105 replies that had no suggestions for changes in records or paper work. Only five dentists said they refused to accept children on the program and of these four indicated they had a full practice and one did not take children. One hundred would like to see other unions adopt a similar program.

SUMMARY AND CONCLUSIONS

As we appraise the program at this point we must conclude that in the state of Oregon the plan has been successful. Many children have received comprehensive dental care who would have had little or none. This is important in a state that is retarded in its concept and approach to comprehensive dental care particularly for children.

Sampling of over half of the participating dentists indicates the

program is well received. Similarly, the union families are happy with it. There has been no complaint in giving up the indemnity plan.

No small factor in the professional acceptance of the program has the full publicity given all relations with the Welfare Fund both in literature sent to dental society members and in open meetings. Great credit should be given Dr. Harold Kramer for this approach.

We have proceeded on the basis that the Welfare Fund was honest and forthright in its approach to the profession and after two years we have no reason to revise our opinion.

The dental profession has been saying for years that it genuinely wished to provide dental care for the entire population—this approach is one mechanism for doing just that.

Second Annual

Writing Award Competition

Sponsored by
The American College of Dentists

The American College of Dentists again is promoting a competition in the writing of papers and essays, and the preparation of manuscripts, for graduating students in the dental schools of the United States and Canada.

The purpose of the competition is to create reader interest, to stimulate the more wide-spread use of libraries and to develop competent dental writers.

A prize of \$500.00 and a plaque will be awarded the national winner. In addition, an appropriate plaque will be given the winner of each school entry.

RULES AND PROCEDURES

- 1) The competition is open to all senior students in the dental schools of the United States and Canada.
- 2) Students will be notified of the competition in the spring of their junior year, and manuscripts must be received by the Secretary of the American College of Dentists by February 1 of their senior year. This will allow ten months for preparation. Announcement of the winner will be made not later than April 1. The time and occasion of awarding the prize and the plaques shall be determined by the schools, but it is suggested that this take place prior to the graduation of the recipients.
- 3) Deans will be asked to designate a faculty member to promote the competition, to decide how the competition will be conducted, and to determine the manner in which the winner is selected, in each school. Only one essay may be submitted from each school in the National competition.
- 4) Manuscripts submitted shall be accompanied by a letter from either the faculty member designated to conduct the competition, or from the dean of the school from which they originate, assuring the authenticity of the manuscript submitted.
- 5) For each annual competition, the American College of Dentists will select and announce a topic.

- 6) The topic will be in a non-technical aspect of dentistry. The ethical, social, historical, or cultural relationships of dental practice, education, research, organization and journalism will be the areas from which the topic will be selected.
- 7) No hard and fast rule concerning length of the manuscript will be established. However, it is suggested that the manuscript not exceed ten double-spaced typewritten pages, exclusive of bibliography, tables and charts and illustrations. White bond paper, 8½ x 11 inches must be used.
- 8) The original and five (5) copies must be submitted; this is for judging purposes. Manuscripts must be sent either flat, or folded once in the center. Pages must be held together by clips or fasteners. Footnotes must be designated by placing them at the bottom of the appropriate manuscript page, separated from the text by a line. References and bibliography must be on separate pages and must conform to the style adopted by the American Association of Dental Editors and the American Dental Association. Tables, charts and illustrations also must be on separate pages. Good compositional form must be followed.
- 9) Manuscripts will become the property of the American College of Dentists. None will be returned. The winning manuscript will be published in the JOURNAL OF THE AMERICAN COLLEGE OF DENTISTS.
- 10) The Committee on Journalism of the American College of Dentists will assume the responsibility of determining the winner. Its decision will be final.
- 11) Manuscripts will be judged as they reflect these general qualities: purpose, scholarships, accuracy, impartiality, neatness, objectivity, and as a contribution to the periodical literature of the profession.
- 12) The topic selected for the 1958 competition is: "*Ethics in Dental Practice.*"

For details concerning this competition consult your dean, your faculty advisor or write to:

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American College of Dentists
4221 Lindell Blvd.
St. Louis 8, Missouri

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