

JOURNAL OF THE AMERICAN COLLEGE OF DENTISTS

Vol. 9 DECEMBER, 1942 No. 4

Contents

A Standard Procedure for Determining Abrasion by Dentifrices. <i>Maurice L. Tainter, M.D., and Sidney Epstein, D.D.S.</i>	353
Concerning the Character of the Age Changes in Enamel and Dentin and Their Relation to the Vital Dental Pulp. <i>Charles F. Bodecker, D.D.S.</i>	380
Critical Analysis of Dr. Bodecker's Paper. <i>Wm. J. Gies, Ph.D.</i>	390
Dentistry Takes the Initiative. <i>Albert L. Midgley, D.M.D., Sc.D.</i>	400
Won't You Walk a Little Faster? <i>Willard C. Fleming, D.D.S.</i>	404
American College of Dentists:	
Proceedings of St. Louis Meeting: Board of Regents and Committee Chairmen, Aug. 27-28, 1942:	
Reports of Committees:	
Education. <i>Willard C. Fleming, D.D.S., Chairman</i>	409
Necrology. <i>John V. Conzett, D.D.S., Chairman</i>	412
Preventive Service. <i>L. A. Cadarette, D.D.S., Chairman</i>	416
Report of the Board of Regents. (Including report on Sectional Meetings.) <i>Otto W. Brandhorst, D.D.S., Secretary</i>	418
Meeting of New York and New Jersey Sections: Action Relative to the <i>Journal of Dental Research</i> . <i>Lowrie J. Porter, D.D.S., Secretary, New York Section</i>	433
Journal of Dental Research: William J. Gies Endowment Fund, Report of the Treasurer. <i>Leuman M. Waugh, D.D.S., Treasurer</i>	436
Editorials: Dental Literature, 447; Indium in Dentistry, 448; War, Accidents and the Future, 450; Work But Not for Pay, 452; Foes Within and Foes Without, 453; <i>Journal of Dental Research</i> : William J. Gies Endowment Fund, 453.	
Erratum	454
Correspondence and Comment:	
Additional Opinions on the Recent Commercial Exploitation of the <i>Journal of Dental Research</i>	455
Further Comment on "Admiralty in the Navy Dental Corps".....	461
Notes: Dental Research and Commercial Entanglements, 464; Personalities at Dental Meetings, 466; Does Yes Mean No?, 467; New Information About the "Harvard Plan", 468; Attendance at U. S. Dental Schools, 471; Decency Prevailed, 471.	
Book Announcements	472
Register of Membership.....	474
Supplement	519
Index	521
Title pages and contents: Volume 9.....	i-vi

Published quarterly at 99 South Van Ness Avenue, San Francisco, California

By THE AMERICAN COLLEGE OF DENTISTS

Office of Publication: 350 Post Street, San Francisco, California

Subscription Price: \$2.00 per Volume

Entered as Second Class Matter July 13, 1940, at the Post Office at San Francisco under the Act of March 3, 1879

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AMERICAN COLLEGE OF DENTISTS

Convocations have been held on this schedule (since organization in *Boston*, Aug. 20 and 22, '20): (1) *Chicago*, Jan. 26, '21; (2) *Milwaukee*, Aug. 13 and 18, '21; (3) *Montreal*, Jan. 25, '22; (4) *Los Angeles*, July 16 and 19, '22; (5) *Omaha*, Jan. 23, '23; (6) *Cleveland*, Sep. 12, '23; (7) *Chicago*, Mar. 5, '24; (8) *Dallas*, Nov. 12, '24; (9) *Louisville*, Sep. 22, '25; (10) *Philadelphia*, Aug. 22, '26; (11) *Chicago*, Jan. 26, '27; (12) *Detroit*, Oct. 23, '27; (13) *Minneapolis*, Aug. 19, '28; (14) *Chicago*, Mar. 24, '29; (15) *Washington, D. C.*, Oct. 6, '29; (16) *Denver*, July 20, '30; (17) *Memphis*, Oct. 18, '31; (18) *Buffalo*, Sep. 11, '32; (19) *Chicago*, Aug. 6, '33; (20) *St. Paul*, Aug. 5, '34; (21) *New Orleans*, Nov. 3, '35; (22) *San Francisco*, July 12, '36; (23) *Atlantic City*, July 11, '37; (24) *St. Louis*, Oct. 23, '38; (25) *Milwaukee*, July 16, '39; (26) *Baltimore*, March 17, '40; (27) *Cleveland*, Sep. 8, '40; (28) *Houston*, Oct. 26, '41; (29) *Boston*, Aug. 23, '42, cancelled; Regents met in *St. Louis*, Aug. 27-28, '42. [Next Convocation to be announced.]

Sections and dates of meetings in College year of 1942-43 (between convocations):—(1) *Kentucky*: Sep. 14, '42. (2) *Northern California*: Sep. 17, '42. (3) *Maryland*: Sep. 18, '42. (4) *New York City*: Sep. 18, Dec. 6, '42; Feb. 19, May 21, '43. (5) *Minnesota*: Sep. 19, Dec. 3, '42; Mar. 5, May 5, '43. (6) *New England*: Sep. 17, '42. (7) *Wisconsin*: Sep. 16, '42; Mar. 21, '43. (8) *Colorado*: Sep. 14, '42. (9) *Pittsburgh*: Sep. 16, '42. (10) *Iowa*: Sep. 20, '42; May 4, '43. (11) *Illinois*: Sep. 16, '42. (12) *St. Louis*: Sep. 15, '42. (13) *Oregon*: Sep. 19, Dec. 19, '42. (14) *Texas*: Sep. 19, '42. (15) *Florida*: Sep. 19, Nov. 10, '42. (16) *Indiana*: Sep. 17, '42. (17) *Southwestern*: Sep. 16, '42. (18) *Washington (D.C.)*: Sep. 17, '42; Jan. —, '43. (19) *New Jersey*: Sep. 18, Oct. 30, Dec. 22, '42; Feb. 23, Apr. 27, '43. [Revised as of December 18, 1942.]

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A STANDARD PROCEDURE FOR DETERMINING ABRASION BY DENTIFRICES

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and

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CONTENTS

1. Introduction	353
2. Previous Investigations	357
3. Apparatus	363
4. Setting of the Teeth	365
5. Moistening Fluid	365
6. Methods of Measurement	366
7. The Round-Robin Procedure	367
8. Effect of Concentration of the Slurry	370
9. Abrasion with Standard Calcium Carbonate	371
10. Synthetic Bristle Brushes	373
11. Abrasion Caused by Brush Alone	374
12. Sensitivity for Traces of Abrasive Impurities	374
13. Abrasion of Dentin and Cementum Compared with Enamel	376
14. Conclusions	378
15. Bibliography	379
16. Illustrations	following 376

I. INTRODUCTION

It is probable that recognition of the desirability of cleaning the teeth arose simultaneously with the first recognition of the need of cleanliness of the body in general.¹⁴ Apparently, in earliest historical times, teeth were cleaned mainly by direct brushing rather than by dentifrices. In the early writings of the Greeks, Romans and Buddhists and in the Talmud of the Hebrews are references to toothpicks, chewsticks, and sponges used in hygienic rituals of cleaning teeth, but no references are made to dentifrice materials. How-

¹⁴Supported, in part, by grants from the American College of Dentists and the California State Dental Association.

ever, in the famous papyrus of Ebers, dated about 4000 B.C., appear formulas for mouth washes and other applications for strengthening teeth. The basic ingredient of these were green lead, honey, verdigris, incense and powdered flintstone. The early Chinese listed many such concoctions containing vinegar, salt, mustard, and related substances. In the writings of the Greeks and Romans, particularly Hippocrates, Pliny, Scribonius Largus, Avicenna, Guy de Chauliac and Giovanni de Arcoli numerous preparations composed of dried animal parts, herbs, honey and minerals are suggested as dentifrices. In the sixteenth century, when the theory of worms as the cause of dental caries prevailed, much thought was given to the desirability of keeping the mouth and teeth clean. The preparations used ranged from mouth washes containing water and wine, to a few drops of "oil of vitriol" (sulfuric acid). The latter compound undoubtedly cleaned the teeth too thoroughly, if used for more than a short period of time.

Fauchard, in his famous book "*Le Chirurgien Dentiste*," recommended cleaning teeth with a fine sponge or the end of a marsh-mallow root, together with a paste, powder or mouth wash, and stated that "the failure to properly do so was ordinarily the cause of all the maladies leading to their destruction." Guy de Chauliac recommended rinsing the mouth with a teaspoonful of one's own urine. Even that finds some justification today in the preparations suggested for mouth washes containing urea or ammonia. It is, therefore, possible to trace through the ages, attempts to develop preparations which aid in the care of the teeth or in the correction of oral conditions.

Primitive men cleansed their teeth by using them on coarse and unpurified foods. However, the great changes in dietary habits caused by civilization have robbed us of this particular method of oral hygiene. We, therefore, have to use other ways of removing the soft adhesive debris which adsorbs on the teeth under modern conditions.

The ideal composition of dentifrice preparations is still an unsettled problem. The three classes of products used are powders, pastes, or liquids. The proponents of these various forms promote

their respective claims with little or no regard for acceptable evidence, or facts. A thorough search of the dental literature has revealed that studies which attempt to define the conditions under which optimum cleansing power can be secured are extremely sparse. Many casual observations are recorded without adequate controls, or exact determination of the properties of the powders or other abrasive materials used which would permit conclusions of general applicability.

It is important that this class of products, which is used by most individuals throughout the greater part of their lives, be thoroughly understood, particularly as to their proper composition and physical properties, so that optimum benefits may be derived with a minimum of harm. Therefore, we have undertaken to determine the basic factors necessary for the efficacy of dentifrice materials, in an attempt to establish the optimum composition of such preparations for practical use. The need for a standardized procedure and method of study, which could be duplicated by others, was of paramount importance. These or equally valuable standards should be established for governmental and scientific regulation of these preparations.

Previous investigators have frequently used metal plates as test objects, on which the amount of abrasion produced by the dentifrice in question was measured. Such metal plates undoubtedly reveal abrasion under certain conditions, but it is by no means established that these give an index of abrasive power by which the amount of abrasion on teeth might be predicted. This is due to the fact that a tooth is not a homogeneous material. Rather it is a highly specialized tissue composed of enamel, dentin, cementum, and other elements which vary tremendously in their hardness, and presumably in their resistance to abrasion. Moreover, these components vary widely among themselves, from individual to individual, and from tooth to tooth even in the same mouth. Owing to such marked variations, it is rather hazardous to depend on a metal plate for predicting the abrasive power for this tissue. Such a prediction might be valid providing an adequate sample of teeth were tested to give a

value, representative for the group. This, however, cannot be done on a single tooth for obvious reasons, and, thus far, there has been no attempt to determine the number of teeth which would constitute an adequate sample.

Another factor of fundamental importance in the powder and paste dentifrices is the influence of the size of particles on the amount of abrasion. It is by no means certain that an optimum particle size for one dentifrice ingredient would also be the same for some other. Until these factors have been determined the attempt to develop an ideal formula for a dentifrice must be largely dependent upon unproven hypotheses.

Twenty-five or thirty ingredients are commonly found in dentifrices, each adding to, or modifying in some degree, the abrasive power of the total mixture. The amount of abrasion to be allocated to each one of these constituents remains to be established. It also needs to be determined whether the individual abrasive powers are exerted to their fullest extent in the presence of the other constituents. The question whether the amount of abrasion is related to the average diameter of the particles, to their surface area, or to their average weight also remains to be established. Another problem of great practical importance is the amount of a highly abrasive impurity that can be tolerated in a dentifrice without causing undue damage. In other words, what degree of purification of the individual ingredients is needed to eliminate scratching or unnecessary wear on the teeth.

These and many other problems urgently need answers in terms of factual data. Until these are answered it cannot be confidently predicted what the effects of a given change in a formula might be. With these needs in mind, the American College of Dentists established research grants for studying the basic phenomena of dentifrice action. These funds, supplemented by others provided by the California State Dental Association, have made possible rather extensive studies carried out over a period of four years.

This paper describes the fundamental procedures developed, together with the apparatus required, and some of the basic factors of a standardized testing procedure. In future reports, there will be

discussed the influence of individual dentifrice materials on the amount of abrasion, the relationship of particle size to abrasion, the effects of various detergents on the amount of wear, the abrasive power of representative commercial dentifrices, the influence of fluoride on abrasion, and the suitability of metal and glass plates in these determinations instead of the more variable human teeth, etc.

2. PREVIOUS INVESTIGATIONS

Miller¹ seems to have initiated, in 1907, the modern investigation of dentifrice materials. He fixed teeth in plaster of Paris and brushed them with various dentifrices by hand, using a regular tooth brush. He observed that many of the commercial products wore away the teeth very rapidly, while nearly all of them cut the teeth appreciably after only relatively short brushing. He also observed that even precipitated chalk cut the dentin rather rapidly, and that prepared chalk wore the teeth at a rate dependent upon the amount of impurities, presumably silica, which it contained. Hypoplastic teeth with defective enamel were abraded much more rapidly than was normal dentin, and dentin normally wore away fifteen to twenty times as fast as enamel. It is probable from the amount of wear which he demonstrated that the dentifrices available at that time were considerably more abrasive than those in current use.

These studies by Miller were developed more fully by Gies about ten years later when he investigated some of the more commonly used commercial products available at that time. Gies' results, presented in a series of articles with various collaborators,² left no doubt that there were many products on the market at that time which were undesirably abrasive. Later, McGehee³ reported on the relationship of hardness of certain dentifrice ingredients to the amount of abrasion produced. Adequate results were not reported by this observer to establish a quantitative relationship between the amount of abrasion on teeth and hardness of the dentifrice constituents considered. About the same time, Brody expressed the opinion, again as a result presumably of general impressions rather than actual experimentation, that the amount of soap permitted

should be less than 25 per cent, since otherwise a solvent action on the epithelium of the mucosa of the mouth would occur.⁴

In 1927, Van der Merwe reported experimental data on the relation of the amount of abrasion to the composition of various dentifrices.⁵ He mounted cuspids and bicuspid teeth in brass containers over which brushes moved perpendicularly to the long axis of the teeth. Pressure of the brush was produced by means of the spring of the bristles obtained by adjusting the tension against teeth with a clamp. He used natural bristles in the tooth brushes. It was necessary to readjust the tension every half hour and to trim the brushes every hour, so that apparently the procedure did not permit quantitative control of the pressure applied. The abrasion was measured with a micrometer gauge to one-thousandth of an inch. Such a gauge would be inadequate for measuring the abrasion of enamel, unless the powders tested were abnormally abrasive or the duration of brushing was prolonged to many hundred thousand strokes. Van der Merwe estimated that a normal individual brushed his teeth approximately ten thousand double strokes a year. This was probably an underestimate for a person who brushes his teeth each day. He tested a number of commercial dentifrices, many of which are still in common use, and recorded abrasion ranging from four-thousandths of an inch down to no detectable wear after one hundred thousand strokes. Inasmuch as the formulas of these commercial products have probably been changed many times since then, the records on the individual powders are probably of no value today. However, the data indicated that there were dentifrices on the market at that time which were sufficiently abrasive to cut the teeth appreciably after amounts of brushing not beyond that to which the teeth might be expected to be ordinarily exposed. Van der Merwe compared bone with enamel and found abrasion of the former was more than ten times as great, from one-fifth the number of strokes. This great difference in the abrasion produced on enamel and bone apparently gave him some concern. He, therefore, attempted to determine whether this was due to differences in the hardness of the enamel of individual teeth by testing the abrasion on six different teeth selected so as to differ as much as possible in color and

opalescence. One powder was used for two hundred thousand strokes without any appreciable difference in the abrasion of the six individual teeth. He stated that this confirmed Miller's work, and that there was no difference between the abrasion exerted by the same agents on different teeth. Judged in the light of the results reported in this paper, it is suggested that Van der Merwe's inability to demonstrate differences between individual teeth was a result primarily of not having an adequate measuring instrument with which the amount of abrasion could be accurately determined. Two years later Bödecker investigated another powder,⁶ and found it to contain sharp-edged crystals which would presumably be unduly injurious. This powder is apparently no longer generally used in this country. In another paper he pointed out the possible relationship of some cases of erosion to undue abrasion from the toothbrush.¹⁵

Little progress could be expected in this field until methods were developed and applied to control the variable factors inherent in these procedures. A start in this direction was made by Hodge and McKay in 1933.⁷ They investigated the hardness of teeth using the "micro-character," or diamond-cut method. This method consists of drawing a diamond across the surface of the tooth under carefully standardized conditions and measuring the size of the groove or scratch in the surface. They reported that the normal hardness of dentin is 150 on the micro-hardness scale and the enamel about 330. However, the outer shell of enamel may run up to a hardness as high as 2050 with intermediate values depending upon the location tested.

Because of the inherent variability between individual teeth some investigators have preferred to rely on measuring the abrasion of metal plates rather than teeth. A study of this sort was that of Ray and Chaden reported in 1933.⁸ They described an apparatus consisting of a revolving plate on which an antimony block was abraded by the powder in question under a weight of 100 gms. The antimony block had a Brinell hardness of 64 and a micro-hardness of 250, as determined by the Spencer micro-character apparatus. This hardness was somewhat greater than that of cementum or dentin but softer than normal surface enamel. In order to duplicate the abra-

sive effects on the harder portions of the teeth, hardened steel with a Brinell hardness of 440 and a micro-hardness of 990 was used. This was stated to be softer than normal surface enamel, especially on the occlusal-surface, but nearly equal in hardness to the average enamel, as found around the cemento-enamel junction. A paraffine block was pressed against the metal plate in a slurry of powder and the loss in weight after five thousand revolutions determined. Unfortunately, there was no measurement of the size of particles of the fifteen powders tested and the information cannot be used for comparison with later data. The paraffine block was used rather than a toothbrush because Ray and Chaden believed that brushes would not be constant enough to give results which could be readily duplicated. This was because natural bristles do not retain their initial shape and are not uniform. These objections to the toothbrush are no longer valid since artificial bristles have become available. The main conclusion was that there were great differences in the abrasion of the antimony by various toothpaste ingredients. The most effective ingredient was about twenty-five times as abrasive as the least effective material. It was also concluded that the abrasive power of toothpaste on antimony was similar to what it would have been on cementum or dentin. However, since no measurements on these two structures were reported, this conclusion is hardly justified. The scratching power on polished silver was about the same as that on antimony, but no appreciable abrasive action was observed on the hardened steel under the conditions used.

More recently, Wright and Fenske have made new determinations on the same apparatus as Ray and Chaden.⁹ Teeth were used instead of a metal block, the amount of abrasion being determined with a micrometer graduated to 0.01 millimeter (0.0004 inch). Under a load of one hundred grams, a waxed disk, onto which a slurry was fed so as to maintain conditions for abrasive action, was rotated against a tooth. Ten thousand revolutions were used as the standard period of application. In the absence of an abrasive material, no detectable abrasion of the teeth was produced by this procedure. Comparisons were made with the loss of weight of an

antimony block to determine whether the metal could be used to predict the amount of abrasion to be anticipated on teeth. The average abrasiveness for teeth was determined by calculating an empirical factor which summated the amount of abrasion observed on the enamel, dentin and cemento-enamel junction. When this average value was compared with the loss of weight of an antimony block there was general agreement between the values. That is, those abrasives which were not abrasive for the teeth were also not abrasive for the antimony. However, there were one or two compounds which fell out of line, so that the rank correlation coefficient between the results on teeth and antimony (as calculated by ourselves) was $+0.54$. Unfortunately, these data were presented as averages without standard errors or related information being included. As a result, it is not possible to determine how much of the lack of correlation is due to inherent variability in the test materials and how much to other factors which cannot now be assessed. Twelve determinations, at least, were stated to have been made with each antimony block and twelve to forty determinations on the teeth. We have found that somewhere between 10 and 20 per cent variability is to be expected from the average of twelve teeth. If adjustments within this range of variation can be applied to the reported data of Wright and Fenske, the correlation between the two series can be made to be above $+0.9$.

The discrepancies in the abrasion were interpreted by these authors as being due to surface flow of the antimony block rather than to possible variability in the other materials or the experimental procedures. Unfortunately, no factual data are presented as to the presence of surface flow and, if present, how much this might affect the results. Thus, the importance of this phenomenon cannot be evaluated. It was concluded by Wright and Fenske that tests of abrasive properties of dentifrices on antimony or other metal blocks do not give a true measure of the comparative abrasive action of these materials on tooth structure.

This conclusion was vigorously attacked by M. L. Smith,¹⁰ who concluded from his own interpretation of the published data of Wright and Fenske that there was a satisfactory agreement between

the abrasion on the plates and teeth. He emphasized that biological variability was not adequately considered and also that it would be highly desirable, in any future studies to establish properly the physical characteristics of the powders, so that the results could be compared with those obtained under other conditions. In another article,¹¹ Smith expanded on the procedures for testing abrasive materials in dentifrices. He pointed out that examining a metal plate for scratches gives a type of data which is complementary to measuring the amount of the surface removed by a quantitative method. The scratch procedure is particularly useful in detecting small traces of highly abrasive materials present as impurities. He reported the first attempts to correlate the amount of abrasion with the size of the particle. A series of precipitated chalks of known particle sizes were used with which it was demonstrated that the finer particles were less abrasive than the larger ones. The harder the material, the more important was the particle size, since increments in size of particles caused much more abrasive effect with hard materials than did similar increments of soft powders. The possibilities of surface flow of an antimony block was considered, and the importance of this minimized by resurfacing the antimony plate under standardized conditions at regular intervals. Smith believed, without, however, carrying out extensive tests to support this viewpoint, that the metal plates would be adequate for predicting the amount of abrasion on tooth structures. He recognized the great variability of teeth, and particularly of the different structures within an individual tooth, and therefore apparently felt that the metal plate procedure would be of more general value than any arbitrary value obtained by measurements on such variable objects as human teeth.

The Federal Government has had a similar problem of setting up appropriate specifications for dentifrices for use with the armed forces and other agencies under its control. In the "Federal Specifications for Dentifrices"^{12, 13} the physical properties and permissible ingredients are defined in accordance with standard practice in this field. The abrasiveness of the preparation is directed to be ascertained by rubbing the paste or powder on a glass microscope slide with a metal similar to that of a five-cent coin. If the denti-

frice scratches the glass plate, it is assumed that it is too abrasive, and therefore, is rejected. This test undoubtedly is effective in eliminating dentifrices which are seriously contaminated and which would cause damage to the enamel. It is not certain that this test would be adequate to eliminate a dentifrice of high abrasive power, which would cause undue wear when used over long periods of time, as against cutting scratches in the enamel after a single application. We shall have occasion, in a future report, to report data on the correlation between the abrasive power for teeth and scratching of glass slides as determined under a variety of conditions.

This discussion of the reports in the literature is important in indicating the complexity of the problem of abrasiveness of dentifrices, and that the data of such tests as have been made are inconclusive. Because no one previously has made sufficiently extensive observations on the various factors affecting abrasive power, under conditions which would permit repetition of the tests by other investigators, it appeared worthwhile to reinvestigate thoroughly this field from all possible angles, and to establish, if possible, standardized procedures which could be used in future with the assuredness of obtaining consistent and reproducible results. This paper presents a description of the apparatus used together with the results of part of the investigation of the fundamental factors affecting the amount of abrasive power. Other papers will be presented in due course, describing results with various substances and dentifrices in current use.

3. APPARATUS

The apparatus used during the first year was that developed by the Pepsodent Company and loaned freely to us for these studies. When it became apparent that more extensive investigations were desirable, a larger apparatus was designed and built with funds from the American College of Dentists, and the California State Dental Association. This apparatus retained the basic principles of the Pepsodent Company's machine, and introduced modifications consisting chiefly in doubling its capacity and refining details of construction and operation.

A photograph of the apparatus is presented in *Figure 1*. In the center is a motor with a built-in reducing gear mounted on a cast aluminum base plate 19 inches square. The shaft of the reducing gear operates on eccentric shaft to which are attached four secondary shafts on each of which three brushes are mounted. The eccentric transforms the circular motion of the gear shaft to a linear motion of $1\frac{1}{2}$ -inch stroke. The main moving parts are fitted with ball-bearings to assure maximum smoothness of operation and freedom from wear. The brush holders, shown in greater detail in *Figure 2*, are heavy metal blocks weighing 237 grams each, which carry a slotted holder in which the head of a toothbrush is fastened by means of a set screw. This toothbrush holder is adjustable in both horizontal planes so that the brush can be made to rest evenly on the surface of the teeth or plates to be abraded. The holders themselves are pivoted on the secondary shafts so that the full weight of the holder rests firmly on the teeth at all times. These brush holders travel in cast metal cups 4 inches long, 1 inch high and 1 inch wide at the base and $1\frac{1}{2}$ inches wide at the top. There are three of these for each secondary shaft or a total of twelve for the entire apparatus.

Attached to one shaft is a standard counter to summate the total number of strokes by the apparatus. This has been modified by attaching a latch switch which opens the circuit and stops the apparatus when a given number of strokes has been reached. In this way, it is possible to set the apparatus in advance so that it shuts itself off after a given number of strokes has been applied. It runs at a speed of 7000 strokes an hour, or 168,000 strokes in twenty-four hours. A spirit level is mounted on the bed of the apparatus and there are levelling screws to permit adjustment of the level so that even distribution of the materials in the cups is obtained.

Balancing the two shafts on opposite sides of the main drive shaft and installation of ball bearings have resulted in a smoothness of operation which cuts down the amount of abrasion under standard conditions from that with the original Pepsodent machine. Aside from this, the operation and performance of the machine are suf-

ficiently similar to that of the original model to allow free interchangeability of data obtained with both models.

4. SETTING OF THE TEETH

For measuring the abrasion of teeth, metal plates have been cast to fit snugly in the bottom of the individual cups, without play. Mandibular molars, free from caries on the occlusal surface, were cut in half at the cemento-enamel junction in a plane parallel to the occlusal surface. Three of these were mounted on each plate with the occlusal surfaces in the same plane and parallel to the base of the cup.

The teeth were mounted on the plates with "sticky wax," a tough adherent rosin wax. A melted drop of this was put on the plate and the tooth pressed firmly into it so that the high points of the cut surface of the tooth made firm contact with the upper surface of the metal plate. Control tests demonstrated that teeth mounted in this way did not shift during brushing unless, through inadvertence, the tooth was cracked off the plate completely.

5. MOISTENING FLUID

After being mounted, the teeth were soaked in a solution of equal parts of glycerine and water for about three days, since this was the liquid used to moisten the dentifrice powder or paste. At the end of this time, the teeth attained a constant state of hydration, and thereafter measurements were reproducible within the limits of error of the measuring instrument. When teeth were removed from this liquid and allowed to dry in the air, they decreased steadily in size for about eighteen days. After such drying, even prolonged soaking in the water-glycerine mixture did not bring them back completely to their original size. Therefore, care was taken throughout that the teeth were mounted in the moist condition, and were immediately conditioned by soaking for three or four days in the water-glycerine mixture before use. Thereafter, they were kept at all times in this liquid, if not in actual use in the machine, so as to preserve their initial state of hydration and size.

Fifty per cent glycerine in water was selected as the moistening agent, since plain water evaporated from the cups at an uncontrollable rate varying with the humidity and temperature. In runs lasting twenty-four hours the powders moistened with water became too dry, and no longer flowed freely over the surface of the teeth, thereby giving irregular and unpredictable abrasion, and modifying the degree of hydration and size of the teeth. Attempts were made to replace the water at a predetermined rate by allowing some to drop in slowly through a system of tubing. This, however, was difficult to adjust, and could not be varied to compensate automatically for changes in rate of evaporation caused by atmospheric conditions. Pure glycerine was undesirable for this purpose, since it would not permit free dissociation of the salts in the various dentifrices, and therefore, would not reflect the normal effects of hydrogen ion concentration in these materials. However, the use of some glycerine was desirable for moistening, since it is commonly used as the liquefying constituent of pastes, and would be present in many materials tested. Therefore, it was decided to use the mixture of 50 per cent glycerine in water, since the glycerine is hygroscopic and such a solution did not change appreciably on standing under the conditions.

6. METHODS OF MEASUREMENT

The amount of abrasion of the teeth was measured on the original machine by a micrometer caliper. When the new machine was developed, this caliper was replaced by a Starrett jewelled dial gauge, which measured to one one hundred thousandths of an inch. The accuracy of setting the instrument was tested each time before use by measuring a test block made especially for this purpose.

To determine how accurately measurements could be made with this dial gauge, a series of six measurements of each of twelve cusps of mounted teeth were made and the average and deviations computed. It was found that the average deviation of an individual reading from the mean was 0.000,033 inch and that the standard error of the mean of the entire series of 72 reading was

$\pm 0.000,003,1$ inch (3.1×10^{-6}). This standard error indicated that the mean of a series would fall within about 3 millionths of an inch of the true value in two out of three series, or 6 millionths of an inch in nineteen series out of twenty. Deviations, therefore, greater than these values could not be ascribed to variability inherent in the measuring technic itself.

Before this rather expensive dial gauge was obtained, attempts were made to obtain reproducible measurements of abrasion by weighing the teeth mounted on the plates, when wet, and after drying in dessicators for various time periods. It was impossible to obtain reproducible wet weights on the teeth, in successive control weighings, since the water adsorbed was not constant. When attempts were made to weigh dry teeth, cracks developed in the enamel before constant weights had been attained, which made them unsuited for the abrasive tests.

7. THE ROUND-ROBIN PROCEDURE

It was recognized from the outset that the inherent variability of the teeth themselves was a factor which could not be avoided. This had to be taken into account and properly evaluated in order that a basis might be afforded for determining, in observations to be presented later, whether abrasion of metal plates could adequately predict the abrasion actually observed on teeth. In addition, in order to compare the abrasiveness of individual dentifrices, or their ingredients, it would be necessary to have some common standard of reference whereby the differences in hardness of the teeth themselves could be eliminated from the effects observed. To achieve this purpose, a standard powder was selected of precipitated calcium carbonate U.S.P., with particles whose median diameter by the microscopic method¹⁶ was 5 microns, range, 2.5 to 12.5 microns. A more complete physical characterization of this powder will be given in another paper, where the effects of size of particles on abrasive activity are considered. Suffice it to say here that these characteristics were established adequately and that the same powder was used throughout as a standard of reference for comparison with

the other materials tested. In one of the six cups on each side of the apparatus this standard calcium carbonate was always used with five or ten other materials, in the remaining ten cups, whose activity was to be measured. A 24-hour run was made with these materials and the abrasion recorded. Since there were three teeth in each cup, and four cusps to a tooth, twelve separate measurements were obtained in each cup. Then the cups were refilled with the materials, rotating each material but not the teeth, to the adjoining cup, and the abrasion measured again during a second 24-hour run. This was repeated successively until the abrasion of each material had been measured in each of the six cups on a side, and, therefore, on eighteen individual teeth making up the set. Since twelve cusps were measured on each plate, this gave a total of seventy-two measurements for each individual powder. When the run was not exactly 200,000 strokes, the observed abrasion was multiplied by an appropriate factor to adjust it to this length of run.

It was hoped that this round-robin procedure would eliminate variability in the teeth, inasmuch as the same teeth were used to test each of the six materials. In addition, the inclusion of the standard calcium carbonate provided an extra way of eliminating the variability inherent in the teeth themselves by permitting reference of all abrasive activity to that of this standard of reference. However, this was not particularly effective, as can be seen by reference to *Table 1*. When duplicate tests were made consisting of two complete "round-robins" on a material at different times and on different sets of teeth, the percentage difference between the pair of results average 19.0 per cent when the absolute abrasion in inches was used without reference to the standard. When the abrasion observed was translated into percentage of the standard powder, the average variation between the pairs was 18.2 per cent. This indicated that reference of the results to that of a standard of comparison did not lessen the variability below that already obtained from the wide sampling secured through having seventy-two individual readings to use for calculating the averages. Nevertheless the standard CaCO_3 was usually included in each set-up as an additional control.

Comparison of amount of variation in duplicate determinations when the observed abrasion was calculated in terms of inches rather than per cent of the control value for calcium carbonate.

TABLE I

Product	Variety	Percentage variation in duplicate tests, when the observed abrasion was expressed as	
		Inches	Percent of Calcium Carbonate (Control)
Glycerine	50% in water	61.6	29.5
Calcium Carbonate	5-15 microns	2.4	18.9
	15-30 microns	30.3	14.3
	Sturge "130"	14.1	22.7
	Sturge "50"	13.7	5.7
	with detergent	5.6	4.8
	with fluoride	24.7	24.1
Dicalcium Phosphate	1-5 microns	15.4	0.8
	5-15 microns	3.4	11.7
	15-30 microns	23.2	39.2
	"Monsanto fines"	35.7	17.7
	"Victor Coarse"	8.0	11.5
Dentifrices	A	2.9	11.6
	B	24.0	36.4
	C	20.7	23.6
Mean		19.0	18.2

8. EFFECT OF CONCENTRATION OF THE SLURRY

One of the first variables to be considered was the optimum concentration of the slurry for study of abrasive effects. In order to measure this, concentrations of the standard calcium carbonate ranging from 6 to 40 per cent were made up in the glycerine-water mixture. Higher concentrations than 40 per cent calcium carbonate were not feasible, because these mixtures were so thick that they did not flow over the surface of the tooth and therefore did not exert their abrasive action in a complete manner. Two "round-robin" tests of the abrasion from these varying percentages of calcium carbonate were run on separate occasions, and the average results summarized in *Table 2*.

TABLE 2

Effect of concentration of the calcium carbonate slurry on the amount abrasion of teeth.

Concentration of Slurry Per cent	Mean Abrasion Inches $\times 10^6$	Standard Error of Mean Inches $\times 10^6$
40	19.5	± 2.60
33	18.3	± 2.81
25	18.0	± 2.39
20	20.7	± 2.24
12.5	16.8	± 2.09
6.0	16.0	± 3.53

It can be seen that there was a very slight increase in the amount of abrasion as the percentage of calcium carbonate increased over the range tested. A straight line calculated for this data by the method of least squares had the formula: $Y = 0.163 + 0.00085X$. X is the concentration of calcium carbonate in the slurry and Y the absolute abrasion measured in ten thousandths of an inch. The con-

centration of calcium carbonate in the slurry obviously affected the amount of abrasion very little as indicated by the very small value of the X quantity in the equation.

Therefore, as a standard procedure, the concentration of this standard calcium carbonate was 20 grams of the powder suspended in 40 cc. of the 50 per cent glycerine in water solution. This corresponds to a concentration of 33 per cent according to the method used for expressing the concentration in *Table 2*.

9. ABRASION WITH STANDARD CALCIUM CARBONATE

It was essential to determine the absolute abrasion under various conditions with the standard calcium carbonate powder, as a preliminary to comparing the abrasiveness of various ingredients and combinations. For this purpose, a number of complete runs of seventy-two determinations each were made with the standard calcium carbonate under fixed conditions. To these were added the values obtained during the experimental periods for the calcium carbonate controls included in each series. These data have been summarized in *Table 3*. There were seven such series with the original machine, and twenty-eight series with the new machine, of seventy-two measurements each.

The average amount of abrasion with the old machine was 38×10^{-6} inches in the 200,000 strokes. With the new machine, this was reduced to 23×10^{-6} inches, a value significantly smaller. This difference resulted from changes in the operating characteristics of the two instruments. The standard error of each series is also presented in *Table 3*. This indicates that the variability of the means averaged approximately 15 per cent of the values obtained. Since a variation of 15 per cent was obtained from as many as seventy-two individual measurements, it is unlikely that more extensive data, within the realms of practicability, would be significantly more reliable. With a 15 per cent variation in the mean of seventy-two individual measurements, the variability of the individual values was of the order of 200 to 300 per cent. The average amount of abrasion in the entire series grouped together was 25.8×10^{-6} inches

Average abrasion with standard precipitated calcium carbonate, U.S.P. at various times in two different models of the same machine. Each value is the average of the abrasion of the 4 cusps of each of 18 molar teeth with 200,000 strokes under standard conditions.

TABLE 3

Date Month—Year	Mean Abrasion Inches x 10 ⁶	Standard Error of Mean Inches x 10 ⁶
Original Machine		
9-39	55	±6.7
11-39	44	±4.2
12-39	23	±3.8
1-40	34	±4.7
2-40	26	±5.2
4-40	32	±4.8
6-40	54	±7.6
Mean	38	±5.3
New Machine		
1-41	12	±1.8
2-41	20	±3.5
2-41	21	±3.5
3-41	10	±1.6
3-41	10	±1.3
5-41	22	±3.5
5-41	22	±3.9
6-41	10	±1.9
6-41	10	±2.2
7-41	09	±1.6
7-41	14	±3.4
11-41	12	±1.6
11-41	12	±1.5
12-41	15	±1.4
2-42	12	±2.5
3-42	12	±1.9
11-40	30	±5.7
11-40	33	±5.5
11-40	35	±6.5
11-40	29	±5.3
11-40	34	±7.0
11-40	40	±6.5
11-40	42	±5.8
11-40	40	±6.9
11-40	44	±5.4
11-40	29	±4.3
11-40	32	±5.1
11-40	25	±4.1
Mean	23	±3.7

in 200,000 double strokes with a standard error of this mean value of $\pm 4.06 \times 10^{-8}$ inches.

10. SYNTHETIC BRISTLE BRUSHES

The next variable factor which required consideration was an appropriate brush for the tests. At the time these studies were begun, there had just become available brushes with synthetic bristles marketed under the trade name of Exton bristles, made from a synthetic plastic substance similar, if not identical with, the plastic Lucite. Since these bristles were made synthetically, and therefore consisted of fibers which were identical in composition, weight, diameter and texture it was believed that a more uniform degree of abrasion could be secured than with natural bristles.

Therefore, using the standard calcium carbonate, two test runs were made in which one-half the brushes were of the best obtainable natural bristles and the other half were the synthetic. All brushes had three rows of bristles and were of the grades labeled "Hard Bristle" by the manufacturer. They were trimmed to the same length. The natural bristles caused abrasion of the teeth 35 per cent greater than the artificial bristles. In addition, at the end of the 200,000 strokes the natural bristles were worn down to short stubs in the center of the brush, where the greater part of the wear occurred, as shown in *Figure 3*. Those bristles remaining at their normal length were soft, had lost most of their resiliency, and many were fractured at the base so that they exerted little cleansing power. In marked contrast, the synthetic bristles were firm and relatively free from wear, and would have been satisfactory for subsequent runs, if this had been desired. The difference in the appearance of these brushes after use is clearly shown in *Figure 3*. Probably the added wear by the natural bristles is due to the short stiff stubs of the broken fibers.

These results indicated that the synthetic bristles were far superior to the natural bristles in their resistance to wear and maintenance of effective function and would be economical at a price several times that of the natural bristle brush. Inasmuch as the synthetic

bristles did not produce more wear than the natural bristles, there would seem to be no contraindication to their general use in preference to those previously available. Therefore, this variety of synthetic brush was used in all the tests.

In setting up the apparatus, the bristles were clipped to a uniform length and made parallel with the base of the brush. In setting the brushes in the brush holders, they were carefully adjusted to rest evenly on the occlusal surface of the teeth. When this condition was not properly established at the outset, the brushes tended to bounce across the teeth instead of moving smoothly.

II. ABRASION CAUSED BY THE BRUSH ALONE

Having selected the brush for the abrasive test, the next problem was the determination of the amount of abrasion caused by the brush itself independently of any abrasive material. In order to measure this, test runs were made in which the cups were filled with the glycerine and water solution without other ingredients. Each run was made according to our round-robin technic, comparing the abrasion in the liquid alone with that of the same liquid plus the standard calcium carbonate. Three such series, or a total of 216 measurements, showed that the abrasion of the moist brush alone averaged 9.9×10^{-6} inches, which was 57 per cent of the abrasion caused by the control calcium carbonate on the same teeth. In other words, approximately one-half the total abrasion produced by the standard calcium carbonate powder was due to the abrasion of the calcium carbonate, and the remainder to the brush. This value is of some importance in the interpretation of results to be presented later with liquid dentifrices where values less than that with the brush alone were obtained in certain instances.

12. SENSITIVITY FOR TRACES OF ABRASIVE IMPURITIES

It was desirable to determine whether the method developed was sensitive enough to reveal the presence of traces of highly abrasive materials, and, if so, what were the limits of such impurities for appreciable effects. As the abrasive material, a sample of 240 mesh

silica was tested. Microscopic measurements showed this powder to have particles of 12.5 micra median diameter, range, 5 to 80 micra. The physical characteristics of this powder will be described in detail in another report where the significance of these measurements for abrasive power will be considered. Various amounts of this silica were incorporated in the calcium carbonate standard powder to make concentrations ranging from 0.078 to 5 per cent. Two series of test runs were made against the standard calcium carbonate according to the round-robin procedure. The data obtained are summarized in *Table 4*, which indicates the abrasion in per cent relative to those with the standard calcium carbonate, together with the standard errors of the mean values.

TABLE 4

Abrasion caused by small amounts of silica in standard calcium carbonate. Slurry consisted of 20 gms. standard calcium carbonate and 40 c.c. of 50% glycerine in water to which were added varying percentages of 240-mesh silica.

Concentration of Silica Per cent	Mean Abrasion Per cent	Standard Error of Mean Abrasion
0	100	± 16.9
0.078	103	± 25.8
0.156	158	± 17.8
0.312	180	± 14.9
0.625	200	± 16.9
1.25	273	± 18.3
2.5	300	± 17.2
5.0	308	± 12.9

The amount of abrasion with 5 per cent silica is not reliable, since this high concentration cut such deep grooves in the teeth that the bristles slid off the cusps and did not exert their full abrasive action on the spots being measured. With this exception, the data in *Table 4* plotted out rather closely to a straight line on logarithmic paper, indicating that the abrasion and the concentration are related in a relatively simple manner. It is seen that concentrations of silica over 0.078 per cent produced increases in abrasion beyond that due to the variability in the measurements themselves. Therefore, as little as 0.1 per cent silica could be detected by this test, a concentration which might be present as an impurity in a dentifrice.

The data on the effects of different concentrations of calcium carbonate (*Table 2*) indicate that the concentration effect is directly related to the hardness or the inherent abrasive property of the substance, since the slopes of the concentration—abrasion curves are markedly different. We are not prepared to report as yet on the nature of the relationship between the concentration required for a given degree of abrasion and the hardness of the substance in question; but this obviously is worthy of some study, since it should indicate the degree of purity needed in material of various hardnesses designed for practical use as dentifrices.

13. ABRASION OF DENTIN AND CEMENTUM COMPARED WITH ENAMEL

An attempt was made to determine the abrasion of dental structures other than the enamel. Preparations of dentin and cementum were made by mounting sections of these structures on the metal plates and grinding down the sides so that they projected above the surface with a contour resembling that of the cusps of enamel in the standard procedure. These were abraded in parallel with the enamel by the standard calcium carbonate according to our procedure. A total of 144 measurements of dentin and 136 of cementum were obtained for comparison with 2266 of enamel. The abrasion in 100,000 strokes is summarized in *Table 5*.

16. ILLUSTRATIONS



FIGURE 1. PHOTOGRAPH OF COLLEGE OF PHYSICIANS AND SURGEONS ABRASION MACHINE, SHOWING MOTOR, WITH BUILT-IN REDUCING GEAR, ECCENTRIC SHAFTS, BRUSH HOLDERS, AND CUPS, COUNTING AND SWITCH MECHANISM, ETC.

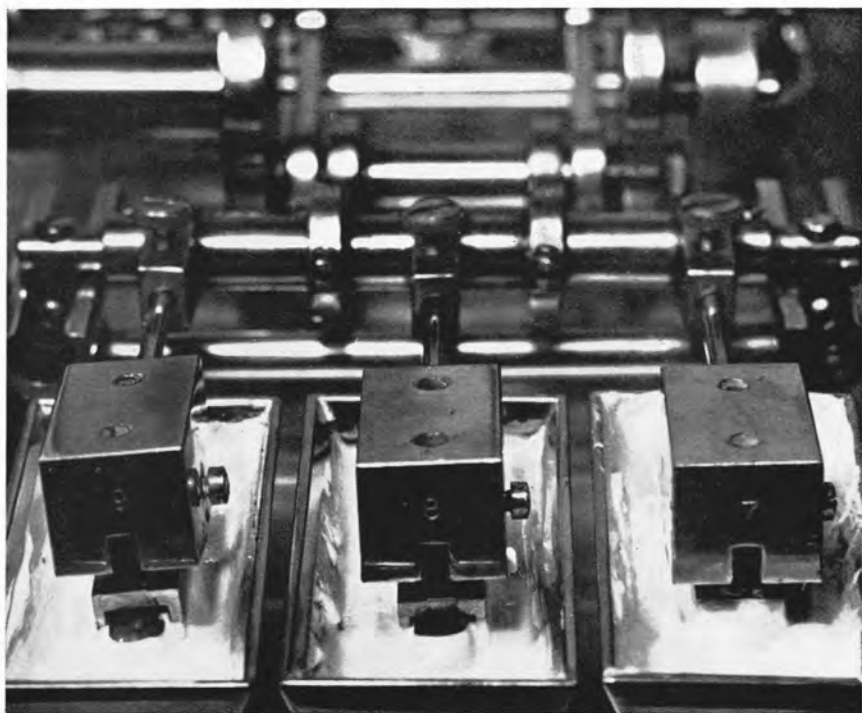


FIGURE 2. CLOSE VIEW OF BRUSH HOLDERS IN CUPS CONTAINING SLURRY. THE SET-SCREWS ARE SHOWN BY WHICH THE PLANE OF THE SURFACE OF THE BRUSHES CAN BE MADE PARALLEL TO THAT OF THE SURFACES OF THE TEETH OR METAL TO BE ABRADED.

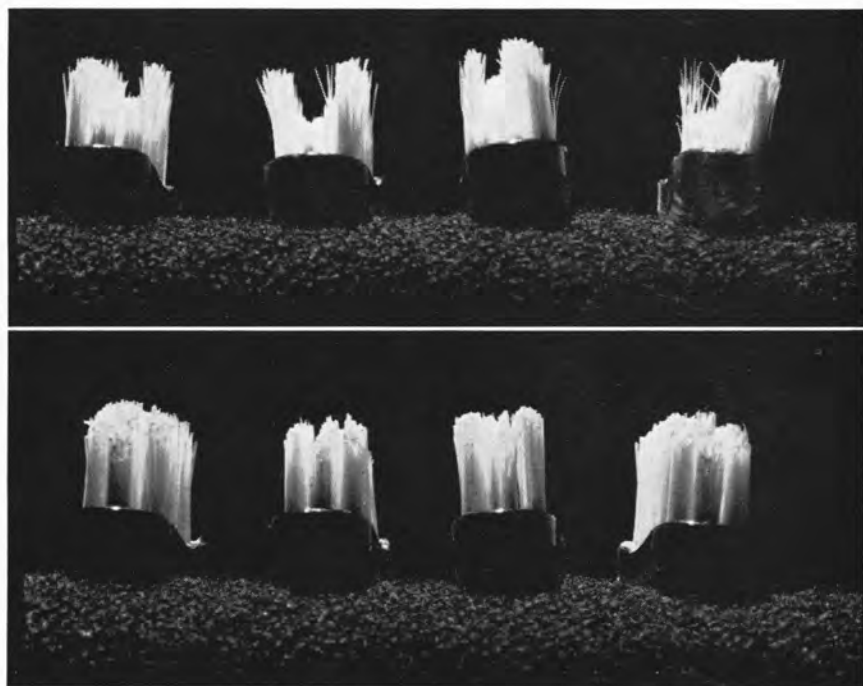


FIGURE 3. COMPARISON OF CONDITION OF NATURAL (ABOVE) AND SYNTHETIC (BELOW) BRISTLE BRUSHES AFTER 200,000 STROKES ON TEETH IN A SLURRY OF THE STANDARD CALCIUM CARBONATE POWDER MOISTENED WITH GLYCERINE AND WATER.

TABLE 5

Comparison of mean abrasion with standard calcium carbonate on enamel, dentin and cementum in 100,000 strokes. Slurry was 20 gms. of calcium carbonate in 40 c.c. of 50% glycerine in water.

Structure	Number of Measurements	Mean Abrasion Inches $\times 10^6$	Standard Error of Mean Inches $\times 10^6$
Enamel	2266	12.9	± 2.03
Dentin	144	377.0	± 45.2
Cementum	136	453.0	± 39.0

The dentin and the cementum were so soft that it was possible to submit them to 10,000 strokes only instead of the 200,000 used as the standard for enamel. The values in *Table 5*, therefore, have been converted to the amount of abrasion produced in one hundred thousand strokes, although it is true that such a large number could not be applied to the softer structures. The results in *Table 5* show that the amount of abrasion of the dentin was about twenty-five times that of enamel. For the cementum, it was approximately thirty-five times greater. In spite of the smaller number of observations, the variability in the results with these two softer structures was not greater than that with the enamel, indicating that these soft structures would serve as satisfactorily for studies of their resistance to abrasion as does enamel.

We have not attempted to explore the resistance to abrasion of localized areas of enamel, dentin or cementum, although it is recognized that this will probably vary widely as judged from the tests of hardness by Hodge and McKay.⁷ Our results on enamel were obtained on the hardest part of the tooth structure, and therefore, represent the minimum amount of abrasion which might be expected under the test conditions used. It must be realized that abrasion of any other part of the tooth, or even of enamel in other locations, would be considerably greater than that reported here for the enamel cusp tips.

14. CONCLUSIONS

1. An apparatus and a method are described for determining the abrasion of dentifrice materials on the various structures of teeth under carefully standardized conditions. The procedure consists in measuring the amount of abrasion, using a standardized calcium carbonate powder as a standard of reference and a "round-robin" procedure which reduces the inherent variability of the teeth. With this procedure, the mean abrasion can be determined on the seventy-two cusps of eighteenth teeth, with a variability of about 15 per cent.

2. The use of a tooth brush with bristles made of synthetic plastic material, instead of natural bristles, causes less wear on the tooth than the natural bristles. In addition, the synthetic brushes are much more resistant to wear, so that the use of these more than compensates for their greater cost.

3. Under controlled conditions, about one-half the abrasion produced by the precipitated calcium carbonate of the U. S. Pharmacopœia, adopted as a standard of reference, was found to be due to the calcium carbonate itself, and the remainder, to the abrasion of the brush. These tests were made in the presence of a liquid consisting of 50 per cent glycerine in water, as a constant lubricant throughout.

4. The concentration of the calcium carbonate in the slurry affected the amount of abrasion to only a minor degree. However, when even small amounts of silica were added to the carbonate, a great increase in the amount of abrasion was quickly demonstrable. Accordingly, traces of contaminants would be increasingly important in a dentifrice as the hardness of the contaminating material increased, whereas large amounts of relatively soft materials might be tolerated without increasing the abrasiveness.

5. Dentin was found to be worn approximately 25 times faster than the enamel tips of the cusps of the mandibular molars studied, and the cementum about 35 times faster.

6. The apparatus and the standardized procedure described affords a means of testing the abrasion of dentifrice ingredients, and

of determining various factors affecting the degree of abrasion, under reproducible conditions not previously available.

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CONCERNING THE CHARACTER OF THE AGE CHANGES IN ENAMEL AND DENTIN AND THEIR RELATION TO THE VITAL DENTAL PULP

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CRITICAL ANALYSIS

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CONTENTS

CHARLES F. BODECKER:

I. Introduction	380
II. Enamel	382
III. Dentin	383
IV. Protective Metamorphosis	384
V. Radioactive Phosphorus	385
VI. Discussion	386
VII. Conclusions	387
VIII. Bibliography	389

WILLIAM J. GIES:

IX. Critical Discussion	390
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BODECKER and GIES:

X. Concluding Remarks	398
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I. INTRODUCTION

Whether or not post-formative changes occur in the calcified dental tissues is of considerable importance. If they do not take place in the dentin and enamel after the eruption of the teeth, dental caries is due indeed to purely environmental conditions. In other words, food retention, bacteria and saliva are then the sole factors which determine whether the teeth remain sound or fall a prey to destruction. On the other hand, if changes do occur in the teeth *after* their eruption, another factor may be added to the problem of dental caries.

The other organs of the body have a vital resistance to infection. The following briefly mentioned observations are evidence supporting the working hypothesis that the teeth likewise have an individual resistance to attack, involving either the whole tooth or occasionally only localized areas. This resistance may be dependent on the activity of the odontoblasts present in the dental pulp.

A series of papers has been published in the *Journal of Dental Research* under the heading of "Vitality" of the Calcified Dental Tissues" by William Lefkowitz and the author. The term "vitality," as well as the occasionally used "nutrition," has been criticized by William J. Gies in a personal letter to the author dated November 11, 1941, as follows:

"Your first paragraph on page 383 [*J.D.R.*, 20, August, 1941] states¹²: 'Information concerning the nature of the products furnished to the dentin and enamel by the dental lymph is mostly in the realm of speculation. Present knowledge suggests that mineral salts and a protein are present. The composition of the dental lymph is not identical with the blood necessary for the nutrition of soft tissues; it may approach the nutrient fluids of bone. Hence the terms *nutrition* and *vitality* when used in connection with the calcified dental structures may be objectionable to some investigators. The sense in which nutrition has been used by the writer is the activity of any product or products necessary for the full maintenance of function. The physiological changes which occur in enamel after the eruption of the teeth seem to warrant their being designated as resulting from *nutrition* in a limited sense.'

"This appears to indicate your arrival at a concept that accords with your findings, and is only moderately affected reminiscently by previously expressed hopes, wishes and preferences. If instead of 'vitality' and 'nutrition,' and the implied doubts and qualifications indicated by the quotation marks, you were to use terms in complete accord with the factual conditions, I believe your comment in this regard would be not only more realistic but also less confusing for many—and more constructive for all."

Dr. Gies was asked to give definitions of the terms "vitality" and "nutrition" which he did in his letter dated November 19, 1941:

"a. A *vital* tissue is one that is alive or capable of living.

"b. *Life*, in a tissue, is its active (or potential capacity for) growth and self-preservation (replacement, repair) by processes *within it* of assimilation (construction) and excretion (elimination).

"c. *Nutrition*, in a tissue, is the sum of the processes by which it assimilates materials needed for its maintenance (growth and self-preservation) and also eliminates the corresponding waste products."

It has always been realized that enamel of a fully formed tooth shows no signs of growth, replacement or repair and hence the term "life" cannot be applied to it in the fullest sense of the definition. For this reason "vitality" and "nutrition" have been placed in quotation marks. In the discussions on enamel and dentin we have per-

sisted in using the terms "vitality" and "nutrition," in order to emphasize our observations, which show that the *changes which occur in enamel and dentin are dependent on and affected by the degree of vitality of the dental pulp* for some years after the eruption of each tooth.

The following exceedingly brief summary of our investigations beginning early in this century present histological evidence that changes in dentin and enamel are the result of the activity of the dental pulp.

The investigation started with the hypothesis that dentin and enamel were subject to systemic influences even after eruption of the teeth; that such influences might bear some relation to the activity of dental caries; and that these two structures might be affected by a fluid originating from the dental pulp. The latter was known to have a profuse blood supply, far beyond that necessary for this small organ, hence it seemed plausible that its purpose was to supply the dentin and possibly the enamel with some form of a secretion.

II. ENAMEL

The first step to determine the soundness of this hypothesis was to ascertain the degree of permeability of the enamel and the possible presence of organized channels through which a secretion from the pulp might penetrate. The dentin was known to contain dentinal fibrils, processes of pulp cells, and it seemed likely that a fluid could penetrate these structures up to the enamel. However, the enamel was regarded as a purely inorganic structure at the time this investigation was begun. This concept was shaken when the specially devised celloidin decalcifying method³ showed that enamel of recently erupted teeth contained an appreciable amount of organic matrix. This evidence was accepted generally in Germany¹⁸ where the work was begun. In the United States, however, it was not believed until Gies¹⁵ showed that the residual enamel material, after decalcification, was protein in character.

Specimens of decalcified enamel disclosed a number of organic structures which were named lamellae, enamel rod sheaths and tufts.^{3, 4, 5} The lamellae had previously been regarded as cracks in

the enamel, while the tufts were described as "poorly" calcified areas, intimating an abnormal condition.

J. Leon Williams²⁶ made the histology of dental enamel his principal work and was not convinced easily of the presence of the organic matrix. After a month of daily personal conferences, he finally subscribed to the new findings. A discussion was arranged between Williams, Gies and the writer²⁷ which somewhat clarified the conception of the enamel and established the presence of the organic enamel matrix.

A number of papers^{6, 7, 8} attempted to show the practical significance of the organic enamel matrix, with further evidence of its permeability to dyes in *in vivo* experiments.

Summary on enamel. On the basis of the evidence presented, the enamel of teeth that had been in the mouth for less than five years was considered to be permeable from within and the channels were found to be composed of the following organic structures: the enamel rod sheaths, tufts, spindles and lamellae.

III. DENTIN

The next step in testing the original working hypothesis was to determine the mechanism which might carry some of the products from the pulp into the dentin and the enamel.

The presence of the dentinal tubules and enclosed Tomes fibrils was generally accepted. Careful microscopic examinations of routine histological slides of dentin under exceedingly high magnification disclosed that the fibrils in transverse section showed occasional vacuoles. This suggested that the "fibrils" contained a fluid which occasionally did not completely fill the channels and that it coagulated when the specimen was fixed. Accordingly, fresh dentin was washed in pyridine under a vacuum pump to replace any fluid, including possible proteins. In this manner the latter would not be coagulated within the tubules. Sections of such dentin showed that the process of the odontoblast was not a fibril but a tube.^{9, 10} It was realized that tubes within the dentinal tubules would be able to transmit fluid more rapidly and in greater quantity than fibrils. The path was therefore open for a fluid, originating from the pulp, to pass through the dentin into the enamel.

The above brief description of observations gave *histological* evidence^{13, 14} that the contents of the dentinal tubules was fluid in a recently erupted tooth and that this fluid later changed in character resulting in a "protective metamorphosis" of the dentin. However, histological evidence is rarely given credence, because reproductions of photomicrographs in printed reports are never as clear as are subjective observations at the microscope, and the expense of such cuts prohibits a convincing number.

The fluid in the dentinal tubules was named "dental lymph" in order to differentiate it from body lymph.¹¹ The working hypothesis that the fluid was secreted by the odontoblasts seemed feasible on the basis of investigations of Beams and King² showing that these are secretory cells. The exact chemical composition of the dental lymph is still unknown. On the basis of histological observation of various types of specimens and their reaction to fixatives and other chemical reagents, it is believed normally to contain water, mineral salts and lipids.

The statement was made above that *histological* evidence of the presence of the dental lymph was not generally accepted. Vital staining experiments on animals and man, conducted by W. Lefkowitz, gave irrefutable proof of the presence of the dental lymph. It was shown¹⁶ that the enamel of dog's teeth is highly permeable and that there appears to be a two-directional diffusion of the dye in the dentin; also that the dental lymph originated from the dental pulp. Finally, it was demonstrated that the surface of the enamel is impermeable from without,²¹ showing that the saliva is not responsible for the post-formative calcification of dentin and enamel.

IV. PROTECTIVE METAMORPHOSIS

Changes in the contents of the dentinal tubules occur five or more years after the eruption of the teeth.^{10, 14} These start in the crown and progress apically. Protective metamorphosis is caused primarily by differences in pulpal activity but is hastened by external irritation such as attrition, abrasion, erosion and chronic dental caries. The dental lymph within the dentin undergoes metamorphosis causing the tubules to be blocked finally by a gas and calcific plugs. As this

change greatly reduces the penetration of dental caries, it has been named *protective* metamorphosis.

The term "sclerotic dentin," frequently applied to areas which have undergone protective metamorphosis, seems incorrect because it has been shown²⁴ that a marked increase in calcification is not always found. Occasionally, however, a hypercalcification was observed by Applebaum¹ in groups of dentinal tubules supplying an area of incipient enamel caries.

Finally, one of the most significant observations made in our experiments^{16, 17} was that the removal of the dental pulp resulted in an excessive increase of permeability of the enamel, dentin and cementum. As long as the pulp is vital, the dental lymph carrying the experimental dye diffuses along organized channels. This picture changes completely after removal of the pulp in the teeth of dogs; the dye not only saturates the entire tooth but passes out through the cementum into the surrounding alveolar bone. Physiologists consider this radical change in permeability a significant finding. It suggests that the pulp exercises a vital control over the calcified dental tissues.

W. Lefkowitz²² has reported on the histological examination of 106 human teeth of known age to determine a possible relation between protective metamorphosis and post-formative tooth age (number of years that each tooth has been in the mouth). *Figure 1* shows that metamorphosis begins in the crown, which part of the tooth is completely matured between the ages of 20-30 years. The change progresses apically so that the middle third of the root is matured between the ages of 30-55 years. Roots are rarely completely metamorphosed.

Added evidence (not as yet complete for publication) that metamorphosis seems to be effected by the dental pulp is that this change does *not* occur after the removal of this organ. This investigation is being continued.

V. RADIOACTIVE PHOSPHORUS

Since the publication of the investigations cited above, isotopes have been used to define minimal metabolic activities which substantiate our histological observations and *in vivo* experiments in tissues. Hevesy¹⁹ introduced this method but it was not until recently

that radioactive phosphorus was used on teeth. So many observations have been made during the last two years that a mention of all workers is not feasible in this paper. McCauley²³ includes an extensive bibliography.

After the injection of radioactive phosphorus into the blood stream or administering by means of a stomach tube, traces of this element were defined in the inner portion of the enamel, more in its surface layer and still more in the dentin.²³ Crowns were placed on teeth in an effort to eliminate the saliva as a source of the radioactive phosphorus defined in the enamel.²⁵ The result of these experiments showed traces of the isotope in the enamel and a greater quantity in the dentin. McCauley²³ concludes that by employing isotopes as tracers: "It has been found possible to demonstrate that the fully erupted tooth has a small but definite mineral metabolism."

VI. DISCUSSION

The above abstracted histological observations and *in vivo* experiments on man and animals show that:

1. A fluid is present in both the dentin and enamel.
2. These structures are most permeable, and the quantity of fluid is greatest, in recently erupted teeth.
3. This fluid has been designated as "dental lymph" in order to differentiate it from body lymph because it appears to be secreted by the odontoblasts.
4. Organic structures in dental enamel (rod sheaths, tufts and possibly lamellae) serve as channels for the distribution of the dental lymph in recently erupted teeth.
5. The dental lymph, occasionally, increases the calcification of the dentin when incipient caries attacks the enamel. As normal pulp activity occurs rarely under present dietary conditions, it is suggested that this common abnormal condition of the pulp may be responsible to some extent for the present high activity of dental caries.
6. Some time after the eruption of the teeth, the dental lymph undergoes a change which increases the resistance of the dentin to caries; hence this change was called "*protective metamorphosis*."
7. Because dyes of large molecular size, such as trypan blue, form

PERCENTAGE OF PERMANENT TEETH SHOWING METAMORPHOSED DENTIN

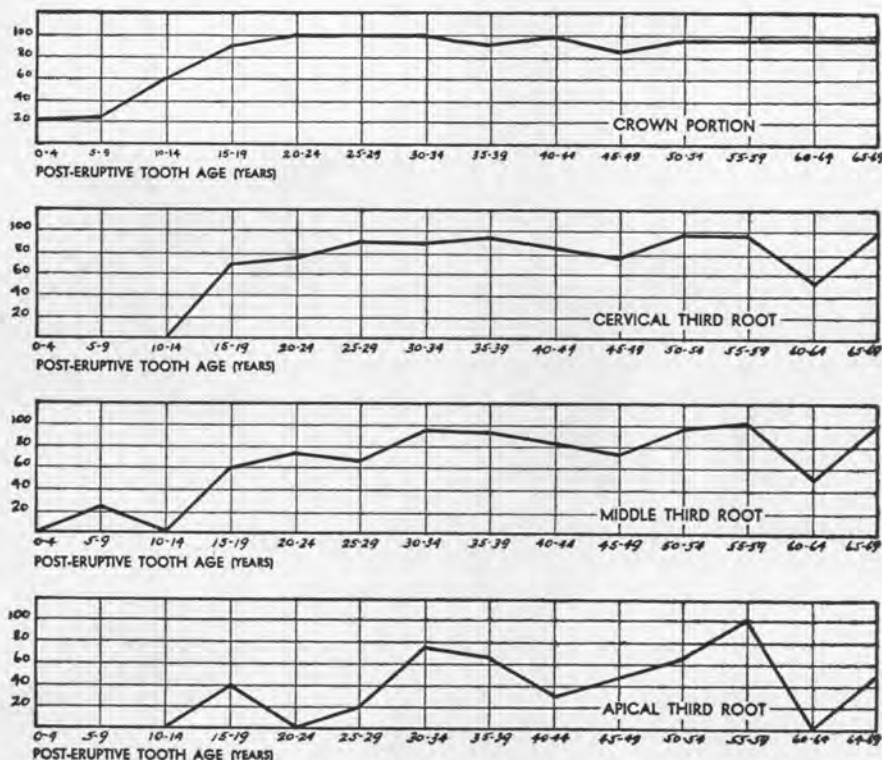


FIG. 1. DATA ON THE POSSIBLE RELATION BETWEEN PROTECTIVE METAMORPHOSIS AND POST-FORMATIVE TOOTH AGE (W. Lefkowitz).

insoluble combinations with the organic matrix of the enamel during the formative stages of this structure, they are not removed.

8. Dyes having a smaller molecule than trypan blue, such as eosin, gentian violet, argyrol and silver nitrate, have been shown to penetrate the permeable channels of the enamel of the teeth of dogs and recently erupted human teeth. The largest deposits appear to gather at the terminal branches of the dentinal tubules after the lapse of an hour or more.

VII. CONCLUSIONS

It was necessary to summarize the results of previous experiments and histological observations in order to present the follow-

ing question: *Are the changes observed in the dentin and enamel related to "vitality"?* As stated at the outset, we realize that the changes in the enamel cannot be described as fulfilling the definition of vitality. Even dentin, which is considered by most workers to be vital, does not fulfill the definition of vitality. If, for instance, the dentin root is injured by resorption, repair results only in the form of secondary cementum.

In spite of the fact that enamel shows no sign of growth, replacement or repair, certain changes occur in this structure after the eruption of the teeth. The contention is that no "vital" changes can occur because the formative organ is destroyed when the tooth erupts. The point at issue is: Does the enamel organ complete the enamel in every respect before it is destroyed? Hardness tests²⁰ as well as clinical observations show that enamel of recently erupted teeth is less hard than that of mature teeth. What is the source of the mineral salts which cause this change in condition? Evidence has been presented which shows that the saliva cannot be instrumental in accomplishing this hardening. The only other source is the dental pulp, a natural conception in view of the profuse blood supply of this organ, a supply far beyond its own need. The answer to the above question may be stated logically as follows: As the enamel organ does not completely calcify the enamel before its destruction, post-formative changes are accomplished by the dental lymph, a product of the dental pulp.

Changes, such as hypercalcification and protective metamorphosis, which cannot occur as a result of exogenous influences, have been observed in the dentin. These also are therefore considered a result of the activity of a vital pulp.

The question arises: *By what term shall these changes be designated?* Although the definition of "vitality" does not make it completely applicable, evidence has been presented that the changes in the enamel and dentin are due to the presence of a *vital* pulp. If, therefore, the dental pulp effects changes in the dentin and enamel, it is a logical working hypothesis that the normal activity of this organ may be responsible for the occasional resistance of teeth to caries.

Most workers have attacked the problem of dental caries primarily by an intensive study of extrinsic factors such as food retention, bacteria, saliva surrounding the teeth. Further progress in this problem may be made by more investigations of the intrinsic factors. These would include the function of the dental pulp and the effects on this organ of calcium-phosphorus and vitamin D disbalance as well as other systemic disturbances. Such studies might throw more light on the vexing problem of dental caries.

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IX. CRITICAL DISCUSSION

WILLIAM J. GIES

At Dr. Bodecker's invitation, I have cooperated in a discussion of some features of his interpretation of the findings summarized in the foregoing paper. The spirit of this friendly collaboration was expressed in the following pair of sentences in my letter dated November 11, 1941, from which Dr. Bodecker quoted on page 381.

"This [series of published concessions] appears to indicate your [Bodecker's] arrival at a concept that accords with your findings, and is only moderately affected reminiscently by previously expressed hopes, wishes and preferences. If instead of 'vitality' and 'nutrition,' *and the implied doubts and qualifications* indicated by the quotation marks, you were to use terms in complete accord with the factual conditions, I believe your comment in this regard would be not only more realistic but also less confusing for many—and more constructive for all."

I have not doubted the correctness of the histological observations or experimental findings of Dr. Bodecker and his associates, but have regarded as unwarranted some of the related interpretations, especially the ascription of vitality and nutrition to enamel of fully formed human teeth. When, in a scientific discussion, common words like vitality and nutrition are used, they presumably indicate the conditions these terms ordinarily express. Therefore, when such common terms are given arbitrary or modified meanings, the deviations from their customary import should be explained, to prevent misinterpretations. Quotation marks applied to well-known terms intimate that the words thus designated are used in senses other than those usually attributed to them. But the reader does not learn, from quotation marks, just what deviations are implied or intended. All such uncertainties can be prevented by the selection of terms that clearly convey definite meanings.

On page 381, Dr. Bodecker makes this important and timely explanation:

"It has always been realized that enamel of a fully formed tooth shows no signs of growth, replacement or repair and hence the term 'life' cannot be applied to it in the fullest sense of the definition. For this reason 'vitality' and 'nutrition' have been placed in quotation marks."

This admission of arbitrary rather than factual employment of the terms vitality and nutrition suggests that Dr. Bodecker may discontinue this procedure. As a justification for his former arbitrary use of the terms vitality and nutrition, as applied to enamel and as qualified vaguely with quotation marks, Dr. Bodecker makes this interesting admission of his purpose in this procedure (page 381):

"In the discussions on enamel and dentin we have persisted in using the terms 'vitality' and 'nutrition,' in order to emphasize our observations, which show that the *changes which occur in enamel and dentin are dependent on and affected by the degree of vitality of the dental pulp* for some years after the eruption of each tooth."

This is the same as stating the conclusion that the said changes in enamel and dentin are not due to vitality in these tissues but, instead, are contingent upon and result from vitality in the nearby pulp.

For the sake of brevity and directness, the remainder of this discussion will be restricted to vitality and nutrition in enamel of fully formed human teeth.

If such enamel contained living cells and nerves, and also some of the enzymes that normally occur in living tissues, it could utilize—in an active vital way instead of dependently—substances which, according to Dr. Bodecker's findings, pass to enamel, from the adjacent pulp, in what he calls dental lymph. But as enamel is devoid of these vital factors, and also is incapable of growth and unable by processes within itself to repair its structure when injured, all *semblances* of vitality in enamel are contingent upon vital conditions elsewhere—as are analogous semblances in the protruding portion of a fingernail, or in the peripheral part of a horse's hoof to which shoes are nailed. No one refers to the protruding portion of a fingernail, or to the peripheral part of a horse's hoof, as a vital tissue, yet each has been produced by vital cells, and shows contingent effects of vital reactions in nearby tissues, but does not itself

exhibit the conditions of vitality—despite the slight amounts of water (lymph?), and the incidental changes, within it.

The following statement is included among Dr. Bodecker's conclusions (page 388):

"Hardness tests [by Karlström] as well as clinical observations show that enamel of recently erupted teeth is less hard than that of mature teeth. What is the source of the mineral salts which cause this change in condition? Evidence has been presented which shows that the saliva cannot be instrumental in accomplishing this hardening. *The only other source* is the dental pulp. . . ." [Italic not in original.]

In this statement Dr. Bodecker assumes that the observed changes are due to added mineral salts from two possible sources, one of which he excluded. But are there not other possibilities? Thus, has he eliminated—by *experiment*—the possibility that the changes he attributes *entirely* to mineral salts in dental lymph from dental pulp are chiefly, or in part, reactions that occur *slowly and spontaneously* (by ordinary chemical processes) among some of the constituents that were present in the enamel when the tooth erupted? The statement that saliva cannot be a source of the mineral salts which participate in changes in enamel, and that these salts can come to the enamel "*only*" from the dental pulp, disregards important findings. Thus Armstrong—one of the most experienced workers on fluorine in the dental field—has found that "for the molar teeth of mature rats that received 20 parts per million of fluorine (as sodium fluoride), in water for sixty days, there was no change in the proportion of fluorine in the *dentin*; but in the *enamel* of the same teeth, there was an increase of 36 per cent. The extra fluorine in the enamel was evidently absorbed through the outer surface of the tooth, not *via* the *dentin*" [*Dental Caries*: second (1941) edition, page 39]. Possibly this result was due to reactions at the "outer surface" of the enamel that there increased the proportion of *fluorapatite*.

At the first general scientific meeting of the International Association for Dental Research, in 1922, I participated in a discussion of findings from which Dr. Bodecker had concluded that enamel of fully formed teeth contained an albuminous ("organic") matrix. I called attention to deficiencies in the evidence, including lack of

chemical *proof* that the material in question contained protein and was not an artifact. Later, in a study of preparations made by Dr. Bodecker at my suggestion for chemical tests, I found that the said matrix contained protein and was not an artifact. At that time, Dr. Bodecker was inclined to ascribe important nutritive (vital) influences to the organic matrix. Below is quoted a part of my ensuing comment, which continues to apply to Dr. Bodecker's assumptions of vitality and nutrition in enamel of fully formed human teeth:

"The following facts, among many, have a significant bearing on a solution of the problem of nutrition in enamel.

"1. The smaller the structure in which nutrition or metabolism occurs in a mammalian tissue, the larger the proportion of the selective cellular nuclei involved; but no cellular nuclei have yet been found in the enamel matrix.

"2. It has not been shown that the organic matrix itself is not densely mineralized *in situ* in the enamel. [This comment applies to assumptions of *vitality* and *nutrition* in enamel of fully formed teeth, not to *diffusion* therein.]

"3. Movement of water in the enamel [as in a lamp wick, then suggested by Dr. Bodecker] might occur wholly by capillarity or osmosis, and without any selective character.

"4. Movement of substances (in solution) by capillarity or osmosis may be beneficial, indifferent, or destructive, without being nutritional.

"5. Nutrition is a process of selective acquisition in the structure that is being nourished. It involves a tripartite procedure—assumption, transformation, and rejection of materials—resulting in renewal of mass and in removal of waste. It is not a one-way traffic, but a process of come and go.

"6. The enamel protein is stained deeply by trypan blue. Some years ago the present writer [Gies] demonstrated, in dogs, that *while enamel is being produced, trypan blue, after its injection into the circulation, is absorbed into the enamel*, and is permanently retained; but that after enamel has been formed, trypan blue does not pass into it from the circulation, although the pigment enters the dentin. Since injected trypan blue is removed from all stained parts of the living body except dental enamel (after its passage into enamel under the special conditions just stated), it is probable that the degree of true *nutritional* transformation, as distinguished from simple mechanical change, in enamel *after its production*, is very slight if not wholly negative.

"7. If the enamel matrix is entirely inert chemically and devoid of nutritive influence, it is possible nevertheless that physical (mechanical) transmission of ions and molecules on or in its framework, distinct from physio-

logical (selective) movement but inaugurated or controlled by conditions external to the matrix, might account for important effects on the enamel. Changes of this character appear to be the kind that Dr. Bodecker has projected but which he terms nutritional.

"Dr. Bodecker's very significant findings may lead to important discoveries, especially as to the origin and the prevention of dental caries. Such developments will be accelerated rather than retarded by searching scrutiny of all hypotheses regarding the function and dynamic relationships of the organic matrix." [Gies: *J. Den. Res.*, 6, 146; 1926, June.]

The following related statement occurs in Dr. Bodecker's discussion (page 386):

"Because dyes of large molecular size, such as trypan blue, form insoluble combinations with the organic matrix of the enamel during the formative stages of this structure, they are not removed."

In this allusion to the data in paragraph 6, in the preceding long quotation, Dr. Bodecker presented no evidence in support of his statement that trypan blue forms an "insoluble combination with the organic matrix of the enamel during the formative stages of this structure" and *on that account* remains there permanently. He has not shown that the size of the molecule of trypan blue is a factor in the phenomena under discussion. Trypan blue is strikingly non-toxic; after intra-peritoneal injections of large quantities, it enters nearly all tissues, and deeply stains them and all of their proteins; but, after such injections, is transformed in, or ejected from, all *living tissues in the approximate sequence of the degrees of their vital activities*, passing completely first from such very active tissues as the liver, and more gradually from relatively inactive tissues (including dentin, among the last), *but not from enamel after trypan blue has entered enamel during the formative period*. This evidence against the conception of vitality in enamel withstands the assertion that trypan blue forms an "insoluble combination with the organic matrix of the enamel during the formative stages of this structure." Why, if Dr. Bodecker's interpretation is correct, does the protein in the organic matrix of enamel behave differently from the proteins in the other tissues of the body? If the molecules of trypan blue, combined or uncombined, are not too large or "insoluble" to diffuse into and from such tissues as liver (with very

high proportions of many varieties of protein), and bone and dentin (with large contents of compactly deposited calco-phosphatic materials), what biological fact warrants the assumption that the protein in the organic matrix of enamel has greater chemical affinity for trypan blue than that shown by any other tissue protein? These questions can be answered only by experimental findings.

Among Dr. Bodecker's conclusions are the following statements (page 388):

"The question arises: *By what term shall these changes* [in enamel and dentin] *be designated?* Although the definition of 'vitality' does not make it completely applicable, evidence has been presented that the changes in the enamel and dentin are due to the presence of a *vital* pulp."

In this quotation Dr. Bodecker says that "the definition of 'vitality' does not make it completely applicable" [to the changes in enamel and dentin]. The related sentence would have been more accurate, I believe, if "completely" had been omitted. Would not the following restatement of Dr. Bodecker's comment in this relation be more nearly in harmony with what, throughout his paper, he seems to urge?: "These changes" in dentin and enamel result from the influence or action, within these tissues, of material *secreted* into them by vital dental pulp. This restatement would accord fully with Dr. Bodecker's remark on page 382 that his "investigations beginning early in this century present histological evidence that changes in dentin and enamel are the result of the activity of the dental pulp;" also with the evidence (page 384) that the "odontoblasts . . . are *secretory* cells;" with the "working hypothesis (page 384) that the fluid ['dental lymph'] was *secreted* by the odontoblasts;" and with the conclusion, from experiments with dyes (page 385), "that the pulp exercises a *vital control* over the calcified dental tissues." This interpretation—that the so-called "dental lymph" is a *pulpal secretion* (intermittent?), and *not lymph* (continuous?) containing pulpal waste products—would not conflict with the possibility that, under variable conditions, fluid (and substances dissolved in it) is physiologically directed by capillarity or otherwise from the pulp into the dentin and enamel, nor with the deduction that this pulpal secretion is biologically more significant than "dental lymph" *oozing* away from and returning to the pulp.

Two additional quotations from Dr. Bodecker's paper, bearing on his views of vitality in enamel, are discussed briefly in conclusion:

"The exact chemical composition of the dental lymph is still unknown. On the basis of histological observation of various types of specimens and their reaction to fixatives and other chemical reagents, it is believed normally to contain water, mineral salts and lipids." [Page 384.]

The three types of constituents named in the foregoing quotation are in no sense distinctive. Discovery of *secretory* substances that induce the effects ascribed to "dental lymph" would be highly significant. Thus, could any such secretory substances destroy bacteria, or neutralize bacterially produced acids, if, under responsive pulpal stimulation, these substances were delivered at any site of initial caries?

"After the injection of radioactive phosphorus into the blood stream or administering by means of a stomach tube . . . [and after placement of] crowns . . . on teeth *in an effort* to eliminate the saliva as a source of the radioactive phosphorus defined in the enamel . . . the result . . . showed *traces* of the isotope in the enamel and a greater quantity in the dentin. McCauley concludes that . . . the fully erupted *tooth* has a small but definite mineral metabolism" (*italic not in original*). [Page 386.]

McCauley's paper is a valuable and interesting review of the published experiments of others with radioactive isotopes, among them radioactive phosphorus. The conclusion quoted above is McCauley's opinion of some of the available data. The findings to which McCauley refers do not indicate that fully formed enamel is a *vital* tissue or that *nutrition* occurs in it, but only that "traces" of isotopes have *passed into it*. McCauley made this preliminary statement (page 1221):

"The use of artificial radioactive elements [such as that of phosphorus made radioactive by special means] in metabolic studies is founded on the *postulate* that stable and radioactive isotopes are *chemically alike and behave identically in the animal organism* except when the radiations are so intense as to produce chemical or physiologic tissue changes." (*Italic not in original.*)

A "postulate" is "a proposition for acceptance without proof; something taken for granted; an assumption." McCauley's review presents no evidence (*a*) that the assumed "metabolic" effects were either anabolic or catabolic or (*b*) were not artificial adsorptions or

depositions, or (c) that the *radioactivity* of the designated isotopes did not induce effects in enamel that simulated metabolic results. The following statements in McCauley's review appear to justify the foregoing deductions relative to the findings with isotopes:

"Radiophosphate administered to a 16-year-old human subject showed that *each tooth* took up about one three-hundred-thousandth of . . . the [radioactive phosphorus] in the dose. It was estimated that 250 days was necessary to replace 1 percent of the phosphorus in a *tooth* by *metabolic exchange*" (italic not in original). [Page 1223.]

"Enamel contained only traces of the isotope," in a dog after being "fed radiophosphate." [Page 1224.]

"Evidence of inorganic phosphate adsorption to the surface of hard tissue crystallites is important for several reasons: . . . 3. It provides an explanation for the exchange of inorganic phosphate which takes place between the [blood] plasma and the mineral phase of calcified tissues. 4. It accounts for the relatively high concentrations of . . . [radioactive phosphorus] in the surface layer of the enamel of experimental animals to which the isotope has been administered. [Page 1224.]

"Barnum and Armstrong . . . *demonstrated* that radiophosphate in saliva could reach the dentin through the enamel, but *postulated* that, *in vivo*, *more* phosphate reached the enamel through the circulation and the pulp than was *adsorbed* from the saliva" (italic not in original). [Page 1225.]

"Pedersen and Schmidt-Nielsen could demonstrate no significant concentration of . . . [radioactive phosphorus] in the cement-capped enamel surfaces of several teeth from two young girls who had been administered the isotope several days previous to extraction"—evidently none passed from dentin to enamel. [Pages 1225-26.]

"Wassermann . . . found that the pulpless teeth of a number of adult dogs took up . . . [radioactive phosphorus] at the same rate as comparable teeth with pulps injured by slight trauma and . . . that the radio element distributed itself *quickly throughout the dentin of nonvital teeth*. Isolating the enamel from the saliva seemed to have no significant effect on the relative *deposition* of the isotope in that tissue. The amount of phosphorus derived from the saliva by the enamel appeared negligible as compared with that picked up through the dentin, *either in normal or in pulpless teeth*" (italic not in original). [Page 1226.]

The known facts appear to justify this general conclusion: Enamel of fully formed human teeth is not a vital tissue, the processes therein being physical (diffusion) and chemical (adsorption, reaction), *not*

metabolic (neither cellular construction or repair, nor coordinated elimination of waste products).

I feel that, in the interest of scientific accuracy and of better understanding of the actual findings and the related conclusions pertaining to enamel of fully formed human teeth, the application of the terms vitality and nutrition should be discontinued until factual evidence shows that the observed changes are due to inherent vitality and are not dependent on, and contingent expressions of, vital reactions in the dental pulp. It should not be difficult, in a discussion of changes in enamel, to indicate their adventitious relation without disregard for any significant reality, and thus to prevent the confusions that occur from use of terms that convey specific imports that are not intended. Terminology closely in accord with the scientific facts would be not only desirably more accurate, but also directly more informative.

X. CONCLUDING REMARKS

Charles F. Bodecker. Much could be written in comment on Dr. Gies' able and thorough discussion of this article. One interpretation of observations on isotopes, however, requires some clarification. Dr. Gies mentions McCauley's quotation of Wassermann as follows (page 397): "The amount of phosphorus derived from the saliva by the enamel appeared negligible as compared with that picked up through the dentin, *either in normal or in pulpless teeth.*" This quotation implies that the dental pulp is not a necessary organ in the distribution of experimentally introduced phosphorus. Such a conclusion would be warranted were it not for the observations made on the differences in permeability in pulpless and in vital teeth mentioned in the above article. It was stated (page 385) that "the removal of the dental pulp resulted in an excessive increase of permeability of the enamel, dentin and cementum. . . . [After pulp removal, the experimentally introduced] dye not only saturates the entire tooth but passes out through the cementum into the surrounding alveolar bone." This observation suggests the manner in which radioactive phosphorus reaches the dentin and enamel in the experiments described by Wassermann et al. Under normal

conditions, as in teeth with *recently* extirpated pulps, the phosphorus passes from the blood in the periodontal membrane through the cementum into the dentin and enamel. In normally vital teeth, on the other hand, it follows the physiological route of pulp, dentin and enamel.

An important physiological activity of the pulp in its relation to the dentin and enamel has been demonstrated. The fact that this organ, with its profuse blood supply, transmits products to the dentin and enamel suggests a mechanism in addition to the saliva which may possibly reduce the activity of dental caries by an optimum diet including a sufficiency of vitamin D and calcium.

William J. Gies. In the initial discussion, Dr. Bodecker referred to McCauley's review of published reports of experiments with radioactive isotopes as presenting evidence of "metabolism" in enamel (page 386). As to this I wrote, in my dissenting response, in part as follows (page 396): "McCauley's review presents no evidence (a) that the assumed 'metabolic' effects were either anabolic or catabolic or (b) were not artificial adsorptions or depositions, or (c) that the *radioactivity* of the designated isotopes did not induce effects in enamel that simulated metabolic results." This was followed by a few quotations from McCauley's review that "appear to justify the foregoing deductions." One of these quotations stated findings by Wassermann, which Dr. Bodecker discussed from a different point of view.

It seems sufficient to add briefly that Dr. Bodecker's interpretation of the import of Wassermann's findings implies that enamel is not a vital tissue, the changes occurring in it when the pulp is vital being determined by the pulp; but when the pulp is nonvital or absent, there may be readjustments in the enamel with substances that pass into the enamel by diffusion or otherwise from more than one source. His interpretation—if it applies to the findings with *radioactive* isotopes—does not disagree with the view expressed in my preceding discussion; namely, that there is no evidence of vitality nor of nutrition in the enamel of fully formed human teeth.

DENTISTRY TAKES THE INITIATIVE

ALBERT L. MIDGLEY, D.M.D., Sc.D.

Providence, Rhode Island

With the creation of the American Council on Dental Health, by a merger of the National Health Program Committee with the Committee on Public Health and Education, the American Dental Association has taken an impressive forward step toward the solution of the complex problem of assuring dental and oral health for all inhabitants of the United States. Should the Council on Dental Health fully recognize their implied obligations and take accurate measure of their concurrent opportunities, American dentistry will enter upon a rôle of unprecedented significance in nation-wide planning and accomplishment.

The dental deficiencies revealed by the draft boards of the two World Wars have created astonishment and dismay in the public mind, and brought forth expressions from many quarters which were not at all consistent with the vaunted supremacy of American dentistry. Keenly sensitive to criticism which it had been powerless to foresee or to avoid, the dental profession now feels that something should be done, and done promptly, to place definitely in its own hands the means for preventing such deplorable conditions. The rank and file of the profession have looked hopefully to dental leadership for the sovereign cure. It has been generally agreed that our knowledge of the values of (1) early inspection and treatment; (2) diet and nutrition; (3) hygiene, and (4) dental health education, offers a solid foundation upon which to construct an effective dental health program. If the dental profession, through its national organization, had devised and put into operation a rational program based upon these four essentials, and had given this program the impetus of a unified and continuous effort, it is at least possible that a repetition of the conditions which were revealed in the former World War would not have occurred.

How came it that American dentistry could have been so blind,

or so oblivious? Deeply absorbed in the hunt for the *cause* of dental caries, we placed insufficient emphasis upon the very real and practical value of the means we were then using, and still use, to *control* decay and save the teeth before they are irreparably damaged. Such errors of judgment and deficiencies in practical leadership constitute an obvious and immediate challenge—first to dentistry, and then, if we fail, to the American public and leaders who are outside of our profession. Unless organized dentistry shows itself keenly interested in accepting this challenge and prompt in evolving a comprehensive plan to meet it, the initiative may at any time be taken away from us. In other words, instead of being asked what we propose to do about the problem, it is not unlikely that we shall be told what we *must* do about it.

The action taken by the dental profession in St. Louis is most encouraging, for it indicates plainly that we are becoming thoroughly aroused. When our mind is made up, when we are vigorously resolved to recognize and use to the utmost all our united knowledge and united power, as citizens and professional men, the sincerity and vigor of our effort will answer the challenge in no uncertain way. The gravity of the situation, the vital importance of our obligations, and the priceless value of our opportunities, are begetting an invincible determination to move forward—"To strive, to seek, to find, and not to yield."

One may assume that the first question which will engage the attention of the American Council on Dental Health is why the development of a dental and oral health program is essential to the public welfare; the next, What should it be? and then, How, when and where shall it function, and by whom shall it be operated? Fortunately for us all, the American Council on Dental Health has a personnel competent to draft correct and adequate answers to all these questions. The integrity, ability and professional standing of these men should draw into their deliberations sympathetic and capable advisers from the health-service professions and such other agencies as are related to the movement and interested in its success.

To perfect the program and refine its processes, the Council must

begin with the adoption of sound principles and end with the elaboration of appropriate details. The work will require a sharply-defined analysis of the fundamental problem, and the calm effort of patient and practical minds to envisage the means necessary for its satisfactory solution. Dentistry must use its best resources of knowledge, of experience, of leadership, and give unremitting attention to each detail of the plans and mechanisms which are proposed. It was clearly in recognition of this truth, and of the fact that intermittent attention and spasmodic effort cannot accomplish the ends in view, that the Board of Trustees, in their wisdom, appropriated funds for the services of a full-time secretary as soon as the resolution creating the Council was adopted.

The supremacy of American dentistry depends at this moment not only upon a workable plan for the present crisis, but on maintaining continuous action for the saving of teeth—by prevention, or control, or both: action which should begin now and continue until the cause and cure of caries and other dental infections are found. Obviously a complete program must cover the maintenance of dental and oral health from pre-natal life through old age. It might suitably include the following units: (1) Pre-natal care, (2) infancy and early childhood, (3) pre-school age through the 5th year, (4) school age—6th to 18th year, (5) youth—18th to 35th year, (6) middle age—35th to 60th year, (7) old age—60th year through the remainder of life. In the construction of such a comprehensive program, one of the first decisions to be made by the American Council on Dental Health will be whether we should set up the mechanism of one of these units and see how it works, or wait to complete all the mechanisms and put all the units in operation at the same time. Plain commonsense, together with the time element and the various economic, political, social and financial considerations involved, would seem to suggest that the operation of a well-considered program for a single unit—a program which commends itself as not only ideal in theory but definitely attainable in practice—would be advisable as an initial step. Thus the unforeseen weaknesses and deficiencies of the trial unit can be recognized and avoided in the

other attempts, and an effective schedule of services be gradually evolved. Like a jig-saw puzzle, the pattern is complex and intricate, but with the key picture assembled the others will sooner fall into place.

Our previous failures have resulted from lack of a thoroughly interested, intelligent, unified effort of national scope. With clearer vision, compelling motive and competent leadership, shall we now see this through? It is a colossal undertaking—a herculean task. Its aims are farther-reaching than anything that American dentistry in its century of remarkable progress has ever attempted. Yet the colossal is by no means the impossible, and the greatest whole is no more than the sum of its parts. The American public in its entirety presents the same dental phenomena as the single community. Any dentist worthy of the name, who has rendered periodic services to his youthful patients for the space of twenty years, can be sure—for he is daily seeing the convincing results—that none of the dental cripples listed by the selective service will be among his patients. Why, then, may not this type of service be the real key to an all-absorbing problem, and one of the very implements by which the supremacy of American dentistry can, in our present state of knowledge, be successfully maintained?

WON'T YOU WALK A LITTLE FASTER?

WILLARD C. FLEMING, D.D.S.

San Francisco, California

Occasionally the statement is made that, for the dental graduate, commencement exercises all too frequently mean finale so far as further effort by him in dental education is concerned. Like any generalization, this statement is open to argument, and it is a simple matter to cite examples to which it does not apply. However, there is, unfortunately, a considerable amount of evidence which justifies the claim that dentists as a group are reluctant to continue their education after graduation. This evidence may be divided into three parts: Hearsay, and circumstantial and statistical data.

Hearsay. In addition to the comments and generalizations by dental educators, regarding lack of interest in postgraduate dental instruction, there is the evidence presented by members of the book trades. Publishers and book salesmen have pointed out that dentists are extremely poor customers as purchasers of professional books.

Circumstantial evidence. One of the state boards of dental examiners has on occasion classified the technic and laboratory work of candidates into three groups. One group has been classed as the work of men who graduated twenty to thirty years previously; a second group, as the work of men in practice for ten or fifteen years; a third group, as the work of recent graduates. A check of the work and dates of graduation indicated the accuracy of this classification. The only conclusion that can be drawn is that the candidates were practicing methods which they had been taught during their undergraduate years.

Statistical evidence. In 1937 the California State Medical Association, together with the Federal Government (W.P.A., F.E.R.A.), published a statistical survey known as the California Medical-Economic Survey. Some of the figures dealt with the family budgets of physicians and dentists in California. Eight hun-

dred and twenty-five physicians, and five hundred and thirty-seven dentists, were involved in this particular compilation.¹ For purposes of the study, the two groups were segregated into smaller units according to net income: less than \$3,000 per annum; \$3,000 to \$5,000; and so on to incomes over \$9,000. While it is interesting to note the relative amounts each group spent for food, clothing, rent,

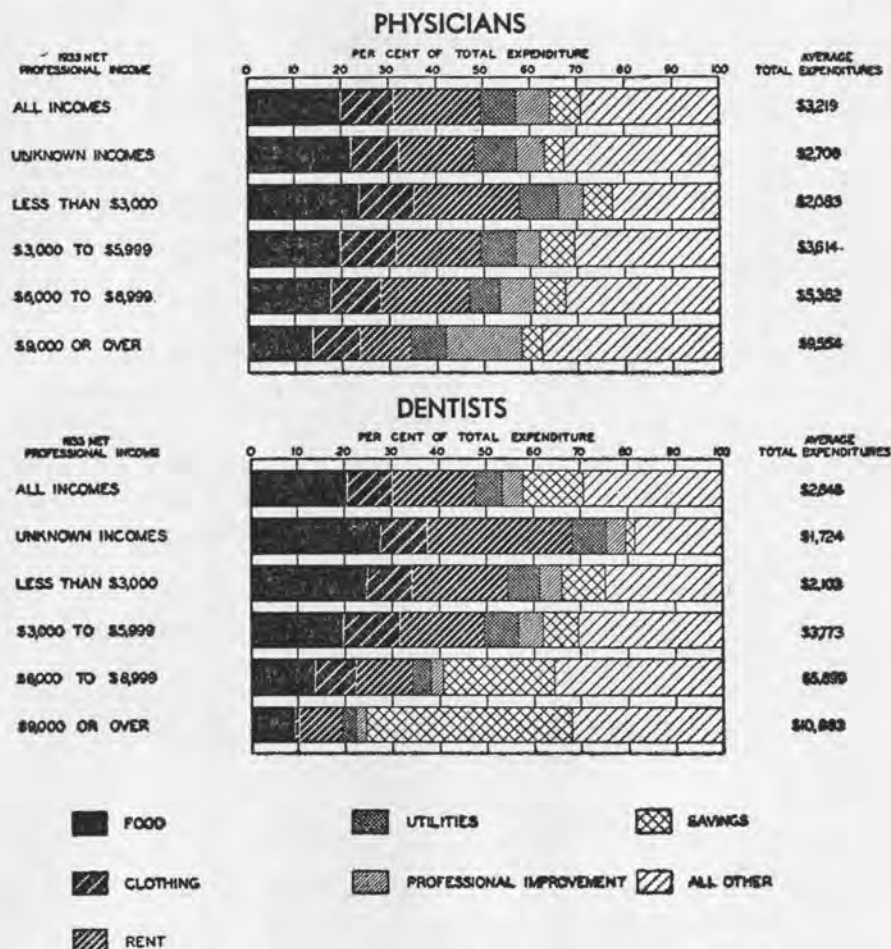


FIG. I. DATA ON THE BUDGETS OF CALIFORNIA PHYSICIANS (825) AND DENTISTS (537), IN 1933.

¹California Medical-Economic Survey: California Medical Association, 1937, p. 115.

etc., there are two items that are pertinent to this discussion. One has to do with savings, the other with professional improvement. The accompanying illustration shows these two items in relation to total income. It is evident therefrom that the medical man spends approximately as much for professional improvement as he puts aside for savings, and that as his income increases he spends proportionately more on professional improvement. The dentist not only spends less money on improvement but, as his income increases, this amount fades into insignificance when compared with his savings program.

The above evidence seems to indicate that there is justification for the claim that dentists are not inclined to continue to study after graduation. Further, it might imply that dentists are recruited from an economic level wherein the problems of financial security take precedence over educational progress, hence the unusual savings program.

Discussion. If one accepts the above evidence, the next step is to inquire as to the cause of the conditions noted. This is not a simple problem. There are a number of reasons which would have to be discussed fully to offer a complete explanation of the situation. However, the following two reasons are presented in partial explanation, having been selected not because of primary importance, but because they merit careful and thoughtful consideration by the profession.

The dental schools, the dental educational system, and dental faculties to some extent may be responsible. Until recently the dental diploma and state board license have been looked upon as symbols that, once attained, represented the goal of educational effort.

Another explanation that is purely speculative, but which offers substance for thought and discussion, is based upon the circumstances of dental practice. Dentists as a group carry on their work within the walls of their offices. Their practices are not open to the examination and criticism of their colleagues, nor do they have the opportunity to observe the changes in dental practice. Hence only the most self-critical and ambitious continue the time consuming

and expensive process of education. The physician, working in the clinic and hospital, is open to observation by other physicians. He operates in the presence of anesthetists, nurses and other physicians. His failure to keep in the front rank of his profession becomes apparent to those who are qualified to judge him. The lawyer is in open competition with other lawyers in our courts of law, and his failure to keep abreast of the times is readily apparent. The desire to have others think well of us is a strong driving force. Praise for performance well done is sought by all. The circumstances under which dentistry is practiced are such that it is not subject either to the criticism or praise of other dentists.

As mentioned above, these are only two of probably many reasons that explain the lack of interest of dentists in professional improvement. However, if one can agree with the evidence presented and approve the conclusions, one should also accept the thought that a greater degree of self-appraisal is necessary in dentistry than in the other professions. How can this attitude become a part of our professional life? There seem to be two possibilities: *First*, for dental schools to select only those who have the capacity to develop this attitude; *second*, to develop this frame of mind in students.

Educational psychologists will admit the difficulty of predetermining the aptitudes and capacities of students before admission to specialized curriculums, but progress is being made in this field. Teachers in our dental schools today would feel themselves in deep water attempting to develop such an abstract thing as a capacity for self-appraisal; but, again, we can see evidence of progress here.

It is apparent that we are not going to add this attribute to a dental student's equipment in the same way we might add a new subject such as the use of the "sulfa drugs" in dentistry. There is no course of "self-criticism in six easy lessons." The problem is part of the general philosophy of dental practice, which is changing and will continue to do so. During this time, it would seem highly desirable for the dental schools to select teachers and institute methods for the development of this attitude of self-appraisal.

The profession, also, has its part and should seek to stimulate a greater degree of interest among young people in the practice of dentistry. In this way dental schools will have a greater number of applicants and, as progress ensues, will have both the methods and personnel to identify and develop in the student the capacity for self-appraisal.

AMERICAN COLLEGE OF DENTISTS
PROCEEDINGS OF THE ST. LOUIS MEETING, AUG. 27-28, 1942
BOARD OF REGENTS AND COMMITTEE CHAIRMEN

REPORTS OF COMMITTEES

TO THE

BOARD OF REGENTS

(Continued from page 324)

CONTENTS

II. Education. Willard C. Fleming, D.D.S., <i>Chairman</i>	409
III. Necrology. John V. Conzett, D.D.S., <i>Chairman</i>	412
IV. Preventive Service. L. A. Cadarette, D.D.S., <i>Chairman</i>	416
(To be concluded)	

II. EDUCATION

WILLARD C. FLEMING, D.D.S., *Chairman*¹
San Francisco, California

A part of the report of last year's Committee on Education had to do with the stimulation of qualified young people to take up dentistry as a career. This subject met with a great deal of interest, and the question that immediately arose was: "What are these qualifications"? The major activity of the committee this year has had to do with this problem.

Each committee has a group of members of the American College of Dentists who are designated as consultants. These members have signified their interest in the committee's work and have great value as an advisory group. They were asked to assume that they were admission officers of a dental school and to designate the qualities they would consider desirable, and the qualities they would consider necessary, in a student seeking admission. Twenty-seven out of thirty-eight, answered this inquiry. Without exception, all of the answers show a great deal of thought and interest in the subject. As might be expected, if one were to compile all of the necessary and desirable qualifications reported by them, we would be admitting only

¹The other members of this Committee are (1941-42): C. W. Freeman, F. W. Hinds, Harry Lyons, J. T. O'Rourke, G. D. Timmons and L. M. Waugh.

"supermen" to the study of dentistry. However, it is possible to summarize and classify these reports as there was a good deal of duplication. The following summary covers, for the most part, the thoughts expressed:

<i>Necessary qualities and abilities</i>	<i>Desirable qualities and abilities</i>
Intellectual capacity	Good personality, capacity to deal with people
Good moral character, honesty, integrity	Capacity for leadership
Good health	Poise, good appearance, neatness
Emotional stability	Artistic ability
Interest in dentistry	Accuracy
Mechanical ability	Financial backing
	Industrious and studious

Most of us will agree that a group of young men and women possessing the above qualities and abilities would be welcomed in any professional school—law, medicine, nursing or dentistry. The one quality that would mark them for dentistry would be, "Interest in Dentistry."

This committee feels that the development of this *interest* in *qualified* young people is a task that should be undertaken by the whole dental profession and earnestly recommends that the American College of Dentists undertake a study of this problem and initiate action along that line throughout the profession.

The following are excerpts from a letter received from Dr. Kenneth R. Gibson, a consultant on this committee. His views are included in the report as they represent the attitude of a number of consultants reporting to the committee.

" . . . Frankly, if we were the Dean, faculty member, or admitting officer of a dental school, we would be more concerned with the problem of the present national over-all shortage of dentists, a shortage which promises to continue for some years, and ways and means to alleviate the condition.

"A shortage of dentists exists in Michigan and has existed for several years. Proof of this statement lies in this organization's inability to provide a full dental staff for its public health dental programs over the past five years,

even though we pay salaries which are in excess of the average net incomes of dentists generally, and have advertised nationally and locally.

"We are now in an all-out war. There have been and there will be growing demands made upon the dental manpower of this country to meet the needs of the armed services, demands made upon a profession whose numbers were too few even before the war.

"We appreciate that some effort has been made to stimulate a greater interest among young men and women in the profession of dentistry as a life calling. Such effort, however, has not been of sufficient duration or sufficiently well organized to make much headway in cutting the present national over-all shortage of dentists or the shortage in this state. If we were the Dean of a dental school, we would see that some members of our faculty and a selected number of the profession were trained to present the advantages of dentistry in an interesting and convincing manner. We would not wait for invitations to come to us. We would acquaint ourselves with the opportunities that exist to influence the kind of young men and women we want and need in the profession, and we would be prepared to send speakers and counselors for the purpose. It would be an aggressive, intelligently planned and executed program.

"If we were the Dean, we would study the costs of dental education, the curriculums, and the length of the program. We would view with some alarm the cost of dental education which places such opportunity far beyond the ability of even reasonably well situated parents financially, in view of the present and potential public and service need for dental practitioners; we would seek ways and means to accelerate the dental educational program, eliminate the non-pertinent and non-essential part of the curriculum; and reduce the over-all cost of dental education."

If dentists and dental education are generally agreed that the above qualities and abilities are desirable, the next step that might logically be taken is the consideration of means and methods of determining these qualities and abilities in the applicants seeking admission to dental schools.

Various recommendations have been submitted by the consultants and members of the committee. These include aptitude and personality testing, "shakedown" courses, probationary periods, interviews, etc. The committee is of the opinion that a study of this problem might well be one of the functions of this committee during the next year.

There is one other item which the committee wishes to mention

and that has to do with the courses on military dentistry, maxillo facial surgery, etc., that are being introduced into the undergraduate curriculum.

A study of the content of these courses indicates that instruction is being offered to undergraduates, beyond that which their background and experience would justify. Some of this instruction is better suited for the general or plastic surgeon.

The committee feels that this type of instruction should be of an informative nature only, and that emphasis should be placed on the fact that this type of surgery is beyond the qualifications and abilities of the recent dental graduate.

The committee recommends that courses in military dentistry, military courtesies and customs and oral and facial prosthesis be encouraged. They further recommend that greater emphasis be given the regular courses in oral surgery and exodontia whenever possible.

ADDENDUM

The committee suggests that the recommendations in this report regarding "stimulation of interest in qualified young people" be referred to the Dentistry in Action Committee.

Tentative plans for the committee's program next year will call for a continuation of the work regarding qualifications of dental students. This program is subject to approval by other members of the committee.

III. NECROLOGY

JOHN V. CONZETT, D.D.S., *Chairman*¹

Dubuque, Ia.

"We are not sure of sorrow,
And joy was never sure;
Today will die tomorrow;
Time stoops to no man's lure;"

No one has been able to define "life." The best that can be said is, "life consists of." And among the many facts and fancies of

¹The other members of this Committee are (1941-42): F. H. Cushman, P. V. McParland, R. H. Volland and M. L. Ward.

which life does consist, none is more truly fact than that of "uncertainty." We say: "I am," "I will," "I do," and yet there comes to every one of us the realization that uncertainty does exist.

This, however, should not deter one in the least, in fact, it should be a stimulus to do and to be. The biologist tells us that life consists of a series of cooperations and coordinations between external and internal conditions; the philosopher tells us that life consists of a series of satisfactions; and the Christ told us that life consists of living abundantly.

Tennyson in his poem "Ulysses" concludes with these lines:

"One equal temper of heroic hearts,
Made weak by time and fate, but strong in will
To strive, to seek, to find, and not to yield."

So during the year just closed, some of our Fellows have met with uncertainty in their striving and thus have been compelled to lay down their armaments. In so doing, however, they have encountered that final certainty which we call Death and have passed into the realms beyond. We shall miss them in our play and in our work. We mourn their loss. It is right that we should. But we shall gain from having known them and their good works will live on forever. It is ours to enroll them on our tablet of "eternal ones" and to commend their spirits to Him who is above all, and who is all.

WALTER F. BARRY

Newark, N. J.

1879-1942

Fellowship conferred in 1935

Graduated University of Pennsylvania Dental School, 1906. Past president New Jersey State Dental Society and Essex County Dental Society. Member American Society of Oral Surgeons and Exodontists; Clinical Club of the New Jersey State Dental Society; American Dental Association.

ROY EMMETT BLACK

Huntington, Pa.

1883-1942

Fellowship conferred in 1932

Graduated Philadelphia Dental College, 1904. Past president Central Pennsylvania Dental Society. Member Pennsylvania State Dental Association; Central Pennsylvania Dental Society; American Dental Association.

JOHN P. BUCKLEY

Hollywood, Calif.

1873-1942

Fellowship conferred in 1921

Graduated Chicago College of Dental Surgery, 1898. Past president Illinois State Dental Society, American Dental Association, and Odontological Society of Chicago. Member Chicago Dental Society; Los Angeles County Dental Society; Southern California Dental Association; Illinois State Dental Society; American Dental Association. One of the founders of the American College of Dentistry.

JAMES W. DEATON

Texarkana, Ark.

1886-1942

Fellowship conferred in 1938

Graduated St. Louis University School of Dentistry, 1914. Past president Arkansas State Dental Association. Member Arkansas State Dental Association; Southwest District Dental Society; Texarkana Dental Society; Omicron Kappa Upsilon Dental Fraternity; American Dental Association.

GEORGE EVANS

New York, N. Y.

1844-1942

Fellowship conferred in 1927

Studied dentistry with a Dr. Roberts as preceptor from 1857 to 1861. Author of "A Practical Treatise on Artificial Crown, Bridge, and Porcelain Work." Member National Dental Society; Dental Society of the State of New York; First District Dental Society of the State of New York; Odontological Society; American Academy of Dental Surgery; American Dental Association; and past president, New York Dental Club.

CARL J. GROVE

St. Paul, Minn.

1873-1942

Fellowship conferred in 1934

Graduated Chicago College of Dental Surgery, 1898. Member St. Paul District Dental Society; Minnesota State Dental Society; American Dental Association; Delta Sigma Delta and Omicron Epsilon Alpha Fraternities. He was a Mason and a member of the Mystic Shrine.

DUDLEY C. HUGHES

New York, N. Y.

1894-1942

Fellowship conferred in 1938

Graduated University of Pennsylvania School of Dentistry, 1915. Member First District Dental Society of New York; New York State Dental Society; American Dental Association; New York Academy of Dentistry; American Society of Oral Surgeons and Exodontists; American Stomatological Association; and Delta Sigma Delta Fraternity.

EUGENE BOND HOWLE

Raleigh, N. C.

1883-1942

Fellowship conferred in 1930

Graduated University of Maryland Dental School, 1908. University of Maryland School of Medicine, 1910. Past president Raleigh Dental Society and North Carolina Dental Society. Member American Dental Association.

GEORGE H. MEANS

Louisville, Ky.

1886-1941

Fellowship conferred in 1925

Graduated University of Louisville School of Dentistry, 1905. Past president Kentucky State Dental Association, and Louisville District Dental Society. Member Louisville District Dental Society; Blue Grass Dental Society and American Dental Association.

LELAND R. PACKWOOD

Fresno, Calif.

1885-1942

Fellowship conferred in 1938

Graduated College of Physicians and Surgeons, 1907. Member California State Dental Association; American Dental Association; Psi Omega, Tau Kappa Omega and O.K.U. Fraternities. Past president Alumni Association College of Physicians and Surgeons; and served on many committees of the California State Dental Association.

HENRY H. PIPER

West Medford, Mass.

1852-1942

Fellowship conferred in 1932

Graduated Boston Dental College, 1889. Past president Massachusetts Dental Society, and American Academy of Dental Science. Member Massachusetts Dental Society; American Academy of Dental Science, and American Dental Association.

CLYDE C. SHERWOOD

Toledo, Ohio

1876-1942

Fellowship conferred in 1931

Graduated Ohio State University Dental School, 1901. Past president American Academy of Periodontology. Member American Dental Association; Ohio State Dental Society; American Academy of Periodontology; Toledo Academy of Medicine, and Toledo Public Health Association.

IV. PREVENTIVE SERVICE

L. A. CADARETTE, D.D.S., *Chairman*¹*Detroit, Mich.*

This group was able to meet twice this year as a committee; once at the time of the A.D.A. meeting at Houston, and once during the mid-winter meeting in Chicago.

At the Houston meeting the committee agreed that we should determine the status of lay education regarding this subject. At the Chicago meeting, however, the committee felt that our activity would not be productive at this time, and that we should not attempt anything until conditions were more settled.

The consultants of the group were contacted by letter, told of the committee's action, and were asked to report anything of significance from their localities to the committee chairman. At the time of the last annual meeting, questionnaires which had been sent to the membership of the American Association of Schools and to the

¹The other members of this Committee are (1941-42): Hermann Becks, C. S. Foster, E. M. Jones and E. W. Swanson.

consultants to the committee were still coming in. The conclusions from the completed tabulations are:

1. There was a good percentage of replies from the Schools Association membership.
2. The percentage of replies from the consultants was not as great as had been expected.
3. Apparently the status of the teaching of the subject is satisfactory in that:
 - a. The subject is generally being presented in all phases of instruction,
 - b. There is a realization of the importance of the subject, and that
 - c. There is a realization of the necessity for continued investigation of the subject.
4. The consultants who replied feel that State Departments of Health and Dental Societies are interested in the subject, and desire to cooperate.
5. There is greater need of lay education.
6. The most significant point is that while the subject is taught in the schools, the application is not carried over into practice.

REPORT OF MEETING OF THE BOARD OF REGENTS, ST. LOUIS, MO.,
AUGUST 27, 28, 1942

O. W. BRANDHORST, *Secretary*

The Board of Regents of the American College of Dentists met in the Statler Hotel, St. Louis, Mo., on Thursday and Friday, August 27 and 28, 1942, to transact the business of the College, hear committee reports and discuss with representatives of Sections and States, the activities of the College.

THURSDAY MORNING SESSION

This session convened at 9:30 o'clock. The total attendance was thirty-four. Ten Regents were present, fourteen of the nineteen Sections were represented, seven unorganized areas had representatives and eight committee chairmen were present to give their reports in person. Two organizers and founders were also present, namely, J. V. Conzett and H. E. Friesell.

President's Address. After the meeting had been duly called to order, President-elect Black presided while President Meisel presented his address. Dr. Meisel called attention to the profession's responsibility in rendering dental services and urged that consideration be given now to problems of post-war dental practice, with its many ramifications. His address was published in the September issue of the *Journal of the American College of Dentists* (pages 285-90).

Past President Oliver (A.D.A.), speaks. Oren A. Oliver, immediate past president of the American Dental Association, spoke briefly on problems confronting the dental profession and offered numerous suggestions for guidance in our deliberations.

COMMITTEE REPORTS

The following committee reports were presented:

STANDING COMMITTEES

Certification of Specialists. (E. W. Swinehart, Chairman), presented by H. C. Fixott, a member of the committee.

The committee was commended for the excellence of its report. Besides covering the various aspects of the subject thoroughly, the chairman outlined the approach he had made to the committee assignments. Emphasis was placed on the fact that the personnel of the committee had been especially selected for the task and each member of the committee was given a special duty to perform.

This method did much to guide the Regents in their study of the committee structure of the College and their decision to alter previous plans for committee selection and appointments.

The report of the committee will be published as a symposium: "The Certification of Specialists."

Education. (W. C. Fleming, Chairman), presented by F. W. Hinds, a member of the Committee.

The report presented some interesting statements on desirable qualifications of dental students. Received as a progress report.

Endowment. Presented by Arthur H. Merritt, Chairman:

This was a progress report, the committee being ready to proceed with the raising of funds when it is thought appropriate to do so.

History. Presented by W. N. Hodgkin, Chairman:

The report indicated progress in the accumulation of important historical material pertaining principally to early history of the American College of Dentists.

Hospital Dental Service. Presented by W. Harry Archer, Jr., Chairman:

The chairman reported on the defeat of the proposed disfranchisement of the dental members of the International Anæsthesia Research Society. The report recommended (1) a national roster of hospital dentists; (2) the formation of the Association of Hospital Dentists; (3) a dental internship survey of hospitals, and (4) adoption of basic standards of Hospital Dental Service for *Class A* hospitals. These matters will be discussed further by the Committee and the Regents.

Journalism. Presented by J. Cannon Black, Chairman:

This report included a résumé of the unfortunate result of the sale and distribution of 50,000 copies of the December, 1941, *Jour-*

nal of Dental Research and the subsequent efforts by Procter and Gamble Company to commercialize on the matter. The report was published in the September, 1942, issue of the *Journal of the American College of Dentists* (pages 318-24).

Oral Surgery. (L. M. FitzGerald, Chairman), presented by Wm. J. Gies for the Chairman:

This was received as a progress report, with special emphasis on support for the *Journal of Oral Surgery* to be published shortly by the A.D.A.

Preventive Service. (L. A. Cadarette, Chairman), presented by O. W. Brandhorst for the Chairman:

This was received as a progress report.

Prosthetic Service. (Walter H. Wright, Chairman), presented by Wm. J. Gies for the Chairman:

The report directed attention to developments relating to the laboratory and technician problem. Received as a progress report.

Relations. (L. E. Kurth, Chairman), presented by O. W. Brandhorst for the Chairman:

This was received as a progress report. It indicated a wide approach by the committee to the many problems confronting the profession in its relation to other professions, the government and the public generally.

Research. Presented by A. L. Midgley, Chairman:

This was a résumé of the Fellowships and Grants-in-Aid which have been made to research workers by the College during the past several years.

Socio-Economics. (C. E. Rudolph, Chairman), presented by Wm. J. Gies for the Chairman:

The report indicated that the committee was devoting its time to the preparation for publication, of the material on the cost of dental services, a study made by the committee during the past several years.¹

¹This study has been financed by the American College of Dentists.

SPECIAL COMMITTEES

Protective Dentistry. This report was made by Peter J. Brekhus, Chairman of the Committee. It stressed the desirability of inaugurating a plan for dental care that would give adequate service to the youth of today as a practical approach to the dental health problem. The discussion centered chiefly on the best method of financing such a program.

Credentials. Presented by Wm. H. Crawford, Chairman: This committee had been appointed at the representatives' meeting in Chicago on February 22, 1942, at which time the question of nominating and electing to fellowship was being discussed. The committee made the following recommendations:

"(1) It is recommended that local sectional advisory committees be established to whom should be submitted the names of individuals recommended by the board of Censors and approved by the Regents. The purpose of this procedure is to obtain assurance that the Censors and the Regents have acted wisely and the committee should make a report in writing to the Regents through its Secretary. The method of appointment and number of members on this committee are left to the discretion of the Regents, but it is suggested that the Regents might take advantage of the method used by the American College of Surgeons in electing the governing board. This method has been mentioned previously in this report.

"(2) Since it has come to the attention of many that candidates for election are acquainted with the possibilities that they may become members of the College, and since in many cases this has proved to be extremely embarrassing, it is strongly recommended that the College emphasize to its membership the importance of secrecy regarding the nomination of new members. Information needed by the Board of Regents to complete the nominating forms should never be obtained from the nominee."

The Board of Regents later approved the recommendations but found that the adoption required a change in the By-laws. The By-laws Committee pointed out that the by-laws could only be amended at an annual meeting. Therefore, the By-laws Committee will prepare a suitable amendment to be presented at the first annual meeting to be held.

The Board of Regents agreed, however, to proceed at once with the adjustment of certain details such as Section boundaries, State

jurisdiction, etc., in preparation for carrying out the plan of a state committee when the by-laws have been amended.

Fellows taking part in the discussion were: E. P. Brady, J. E. Gurley, L. T. Hunt, H. O. Lineberger, A. L. Midgley, O. A. Oliver, C. H. Schuyler and W. O. Talbot.

The session closed with a luncheon and adjourned at 1:45 p. m.

THURSDAY AFTERNOON SESSION

The session convened at 2:00 o'clock with ten members of the Board of Regents present.

Minutes. The minutes of the Regents' meeting of February 21 and 23, 1942, were read and approved. Report on the minutes indicated all instructions carried out.

REPORTS OF OFFICERS

President. President Meisel's report to the Board of Regents, included among others, the following recommendations:

(1) That a committee be appointed to make an intensive study of the effectiveness of the College and to prepare an outline of a long-range program for the future;

(2) That we discontinue the practice of appointing members of committees for five-year periods; make all yearly appointments subject to reappointment, but remove inactive and disinterested committeemen. Chairmen of committees, especially experienced chairmen, could be of great help in selecting committee personnel;

(3) That we study the geographical distribution of the assigned territory of the Sections. Some unorganized areas certainly should support a Section;

(4) That the Regents should give some thought to the publication in the JOURNAL, of excerpts from the reports of the Secretary and possibly of the Treasurer. This would give members information of work being done and also how money is being spent;

(5) That each member should be expected to make an annual report of his activities as a College member. Many members feel that the advent of Fellowship is a personal honor, and that no sense of responsibility to the College is appended to it. A report would serve to remind him of his membership and of his obligations toward the College objectives;

(6) That an Ad-interim Committee, like that of the A.D.A. Trustees, be appointed. This might consist of the President, President-elect, Secretary, Treasurer and one additional Regent to make a committee of five. This committee will handle emergency business, subject to approval of Regents;

(7) And, finally, that a better financial reserve for the College be built.

Treasurer. Treasurer Smith reported that the cash on hand in the Continental Illinois National Bank and Trust Company of Chicago at the close of the fiscal year, June 30, 1942, was \$9,222.41, and as of August 17, 1942, \$8,872.31. He pointed out that in addition to this the College owned securities amounting to \$7,000.00 par value, including \$2,000.00 in Government War Bonds.

The report was supplemented with the report of James C. Thompson & Company, Certified Public Accountants.

In a supplementary statement, the Treasurer called attention to the need for thoughtful consideration of our finances and possible curtailment of certain activities for the duration.

Secretary: The Secretary reported on the Ad-interim activities of the Board, reviewing decisions made by mail ballot.

State of the College as of August 27, 1942:

Active members	1043
Honorary members	21

1064

Deaths since Houston meeting:

Walter F. Barry, Newark, N. J.....	July 5, 1942
Roy E. Black, Huntington, Pa.....	March 7, 1942
John P. Buckley, Hollywood, Calif.....	May 14, 1942
J. W. Deaton, Texarkana, Ark.....	July 14, 1942
Geo. Evans, New York, N. Y.....	Jan. 12, 1942
Carl J. Grove, St. Paul, Minn.....	July 5, 1942
Dudley C. Hughes, New York, N. Y.....	May 4, 1942
Eugene B. Howle, Raleigh, N. C.....	June 23, 1942
Geo. H. Means, Louisville, Ky.....	Nov. 9, 1941
Leland R. Packwood, Fresno, Calif.....	April 11, 1942
Henry H. Piper, West Medford, Mass.....	April 9, 1942
Clyde C. Sherwood, Toledo, Ohio.....	July 5, 1942

Fellowships to be conferred. The Secretary reported that eighty-one men had completed all the necessary requirements for fellowship and were eligible to have fellowship conferred at this time. Of this number seventy-six had signified their intention to present themselves at a Section meeting in accordance with instructions given them (the names of these persons will be found in a report on the Section meetings held the week of September 13, at the request of the Board of Regents, for the purpose of completing the conferring of fellowships for the Board. The report on these Section meetings is made a part of these minutes).

The Board of Regents voted to confer fellowship upon these persons as of *August 27, 1942*, with the request that the Sections, through their properly elected or appointed officers, give the pledge to the newly made fellows and invest them with cap and gown.

The Regents also voted to confer fellowship upon the following persons *in absentia*, subject to investiture with cap and gown at a subsequent meeting:

Horace Ryan Beachum	Dallas, Texas
John J. Berry	Deadwood, South Dakota
Herbert L. Bunker	Junction City, Kansas
Frederick J. Conboy	Toronto, Canada
Francis W. Lepeska	U. S. Navy—at sea

The Regents voted to confer Honorary Fellowship upon Dr. Harlan H. Horner of Chicago, Ill., Secretary of the Council on Education, in recognition of unusual services he has rendered.

Report of Tellers of election. The Secretary presented the report of James C. Thompson & Company, Certified Public Accountants, who had been appointed tellers of the election held by mail. Following this report, the President announced the result as follows:

President-elect	HENRY CLINE FIXOTT, Portland, Ore.
Vice-President	ERNEST A. CHARBONNEL, Providence, R. I.
Secretary	OTTO W. BRANDHORST, St. Louis, Mo.
Treasurer	HAROLD S. SMITH, Chicago, Ill.
Regent (5 years)	WALTER H. WRIGHT, Wilkinsburg, Pa.

Vote on temporary measures recommended by the Board of Regents as submitted for approval by mail ballot, 438; not voting, 21. Total votes cast, 459.

Report of Assistant Secretary. Assistant Secretary Gies reported on Section and Committee activities as well as progress with Socio-Economics report.

Report of Editor. Editor Gurley reported generally upon his activities as editor.

REPORTS OF SPECIAL COMMITTEES

Program Committee. John E. Gurley, Chairman of the Program Committee for the Boston meeting, reported on the program that had been arranged for that meeting. It was voted to record the program in the minutes. It was as follows:

CONVOCATION, AMERICAN COLLEGE OF DENTISTS, SUNDAY, AUGUST 23, 1942, BOSTON, MASS.

MORNING (9:00-12:00). *Group conferences:*

1. Certification of Specialists.....E. W. Swinehart, Leader
2. Journalism.....J. Cannon Black, "
3. Preventive Service.....L. A. Cadarette, "
4. Hospital Dental Service.....W. H. Archer, Jr., "
5. Oral Surgery.....L. M. FitzGerald, "
6. Socio-Economics.....C. E. Rudolph, "

LUNCHEON, 12:00 (*under auspices of the New England Section*):

Speaker: Mr. Chas. T. McGinnis, *Fellow of the American Institute of Architects*, Boston, Mass.

Subject: "The Architect Muses on Dentistry."

AFTERNOON:

Conferring of Fellowships.

President's Address.

Symposium on Prosthetic Service: W. H. Wright, Leader.

Business Session.

Election of Officers.

EVENING (6:30-7:30). Reception and dinner:

Speakers:

Brigadier General Robt. H. Mills, Washington, D. C.

Dr. Daniel P. Marsh, *President, Boston University*, Boston, Mass.

Installation of Officers.

Inaugural Address.

Music.

THURSDAY EVENING SESSION

The evening session was devoted principally to a consideration of the various committee reports and their recommendations.

FRIDAY MORNING SESSION

The Board convened at 8:45 a. m. with eleven members present. *Reference Committee on President's Report.* The Board gave special consideration to the report of the Committee on President's report with the following decisions:

(1) That a Planning Committee, to be called *Survey Committee*, be appointed to review past and present activities of the College; study the structure generally, including its finances; and suggest improvements as well as ways and means to be of greater service to the profession;

(2) That committees be appointed for a period of one year, with reappointment at the end of that time if desirable or agreeable and that the Chairman of the Committee be given a voice in the selection of the personnel of his committee;

(3) That more information be given the members relative to Regents' activities;

(4) That members be asked from time to time to report on their activities;

(5) That an Ad-interim Committee, consisting of the President, President-elect and Secretary be created as a Standing Committee to take care of Ad-interim needs. This committee is to report recommendations to the Board of Regents for approval;

(6) That steps be taken to build up a strong financial reserve.

Consideration of J.D.R.-Procter and Gamble Cooperation.

After extended discussion the following motion was approved: "That the Board of Regents regrets the unfortunate situation which has developed from the free distribution under the auspices of the Procter and Gamble Company, of a very large number of copies of the *Journal of Dental Research*, containing articles favorable to the commercial interests of the Company. The Board of Regents hopes

that the International Association for Dental Research will take effective action to prevent the recurrence of such an incident."

Installation of officers. At 11:00 o'clock, President Meisel installed the new officers as follows:

<i>President</i>	J. CANNON BLACK, Chicago, Ill.
<i>President-elect</i>	HENRY C. FIXOTT, Portland, Ore.
<i>Vice-President</i>	ERNEST A. CHARBONNEL, Providence, R. I.
<i>Secretary</i>	OTTO W. BRANDHORST, St. Louis, Mo.
<i>Treasurer</i>	HAROLD S. SMITH, Chicago, Ill.
<i>Regent (5 years)</i>	WALTER H. WRIGHT, Wilkinsburg, Pa.

New Board. The new Board immediately went into session, eleven members being present.

Elections. The following persons were elected to the respective offices:

<i>Editor</i>	JOHN E. GURLEY, San Francisco, Calif.
<i>Associate Editor</i>	GEO. W. WILSON, Milwaukee, Wis.
<i>Assistant Editor</i>	G. C. PAFFENBARGER, Brooklyn, N. Y.
<i>Chairman of Contributing Editors</i> ..	WM. J. GIES, New York, N. Y.
<i>Assistant Secretary</i>	WM. J. GIES, New York, N. Y.
<i>American College of Dentists representative for the A.A.A.S. meeting</i>	WM. J. GIES, New York, N. Y.

Report on New York Section. Wm. J. Gies reported for the New York Section. The report was received with interest.

Inaugural Address. After luncheon, President Black gave his inaugural address. He presented a graphic picture of post-war problems and urged the College to give attention and study to them now so that intelligent action can be taken when the opportunity comes.

Adjourned at 4:00 p. m.

REPORT ON SECTION MEETINGS, WEEK OF SEPTEMBER 13, 1942

(A supplement to the Minutes)

When it became apparent that it would be impossible to hold the annual Convocation of the College, the Board of Regents, whose responsibility it is to direct the conferring of all fellowships, directed each Section of the College to hold a meeting during the week of September 13, for the purpose of completing the conferring of fellowships for the Regents upon the persons presenting them-

selves before the various Sections, and who had been designated by the Regents, through the Secretary of the College, as having completed the necessary requirements for fellowship. The Regents, in session in St. Louis on August 27, 1942, had voted to confer fellowship upon these persons, subject to completion by the Sections.

Accordingly, the Sections held meetings at the time and place designated below and completed the conferring of fellowship for the Board of Regents upon the persons listed. Reports from all Sections pointed to enthusiastic and successful meetings.

The schedule of these Section meetings, with the names of the persons presenting before each Section follows:

KENTUCKY SECTION

Brown Hotel, Louisville

September 14, 1942, 6:00 p. m.

Fellowship conferred upon:

Roy Douglass Mitchell, Atlanta, Ga.

Attendance—14.

NORTHERN CALIFORNIA SECTION

Palace Hotel, San Francisco

September 17, 1942, 6:00 p. m.

Fellowships conferred upon:

Lyall O. Bishop, Berkeley, Calif.

Charles F. Gray, Sacramento, Calif.

Lou T. Smith, San Jose, Calif.

Attendance—33.

MARYLAND SECTION

Belvedere Hotel, Baltimore, Md.

September 18, 1942, 7:00 p. m.

Fellowships conferred upon:

Max Kentz Baklor, Baltimore, Md.

Demzell C. Blevins, Centreville, Md.

W. Buckey Clemson, Baltimore, Md.

Meyer Eggnatz, Baltimore, Md.

Karl Frederick Grempler, Baltimore, Md.

Geo. E. Hardy, Jr., Baltimore, Md.

Kyrle Wm. Preis, Baltimore, Md.

Frank A. Richison, U. S. Naval Hospital, Philadelphia, Pa.

Attendance—47.

NEW YORK SECTION (Combined with New Jersey Section)

Town Hall Club, New York, N. Y.

September 18, 1942, 6:30 p. m.

Fellowships conferred upon:

Henry U. Barber, Jr.	New York, N. Y.
LeRoy Eli Burr	Yonkers, N. Y.
Walter H. Ellis	Buffalo, N. Y.
John T. Flynn	Scarsdale, N. Y.
James F. Henegan	New York, N. Y.
Edward G. Murphy	New York, N. Y.
Glen H. Whitson	Brooklyn, N. Y.

Attendance—Good.

MINNESOTA SECTION

Minnesota Club, St. Paul

September 19, 1942, 7:00 p. m.

Fellowships conferred upon:

Carl H. Boyden	Mitchell, South Dakota
Chester H. Longley	Little Falls, Minn.
Earl A. Nelson	Minneapolis, Minn.

Attendance—31.

NEW ENGLAND SECTION

Copley-Plaza Hotel, Boston

September 17, 1942, 6:30 p. m.

Fellowships conferred upon:

Earle S. Arnold	West Hartford, Conn.
Joseph A. Bray	Hartford, Conn.
Wm. Edward Burke	Boston, Mass.
Duane H. Clarridge	Nashua, N. H.
Harold J. Cronin	Springfield, Mass.
Peter A. Dempsey	Dorchester, Mass.
Alton K. Fisher	Newport, R. I.
Thomas J. Giblin	Boston, Mass.
James Warren Holt	Fall River, Mass.
Harold H. Hookway	Boston, Mass.
Andrew J. Rafferty	Worcester, Mass.
Alfred P. Rogers	Boston, Mass.

Attendance—46.

WISCONSIN SECTION

University Club, Milwaukee

September 16, 1942, 6:30 p. m.

Fellowships conferred upon:

Abraham H. Bassman.....	Milwaukee, Wis.
Glen Bennett.....	Wisconsin Rapids, Wis.
Ernest H. Redeman.....	Marinette, Wis.

Attendance—22.

COLORADO SECTION

Cosmopolitan Club, Denver

September 14, 1942, 10:00 a. m.

Fellowships conferred upon:

Stanley T. Dohrman.....	Great Falls, Mont.
Earl W. Spencer.....	Pueblo, Colo.
Clarence H. Swanson.....	Columbus, Mont.

Attendance—16.

PITTSBURGH SECTION

University of Pittsburgh, School of Dentistry

September 16, 1942, 6:30 p. m.

Fellowships conferred upon:

Henry A. Anderson.....	Pittsburgh, Pa.
Guy P. Bannister.....	Cleveland, Ohio
Jacob Clifton Eselman.....	Pittsburgh, Pa.
James M. McNerney.....	Pittsburgh, Pa.
Chas. R. B. Walton.....	Pittsburgh, Pa.

Attendance—25.

IOWA SECTION

Farm of Dr. L. M. FitzGerald, Peosta, Ia.

September 20, 1942, 2:30 p. m.

Fellowship conferred upon:

John J. Foley.....	Fort Dodge, Ia.
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Attendance—Good.

ILLINOIS SECTION

Chicago Athletic Club, Chicago, Ill.

September 16, 1942, 6:30 p. m.

Fellowships conferred upon:

Reed O. Dingman.....	Ann Arbor, Mich.
Mort Henkin.....	Sioux City, Ia.
Howard M. Marjerison.....	Chicago, Ill.
William J. B. Mason.....	Saginaw, Mich.

Attendance—33.

ST. LOUIS SECTION

University Club, St. Louis

September 15, 1942, 6:30 p. m.

Fellowships conferred upon:

Oliver M. Jamieson.....	Memphis, Tenn.
Allen O. Gruebbel.....	Jefferson City, Mo.
Webb B. Gurley.....	St. Louis, Mo.
John M. Marré.....	St. Louis, Mo.

Attendance—23.

OREGON SECTION

Benson Hotel, Portland

September 18, 1942, 6:30 p. m.

Fellowships conferred upon:

Robt. Edw. Hampson.....	Seattle, Wash.
Rolland R. Jones.....	Portland, Ore.

Attendance—Good.

TEXAS SECTION

Gunter Hotel, San Antonio

September 19, 1942, 6:00 p. m.

Fellowships conferred upon:

Atlee B. Conly.....	Dallas, Tex.
Glover Johns.....	Fort Sam Houston, Tex.
Alvah Lucas Jones.....	Paris, Tex.
Thomas Hughes Kennedy.....	Dallas, Tex.
Roland Lynn.....	Dallas, Tex.
Glen Seay Morris.....	Fort Sam Houston, Tex.
John Lewis Preston.....	Wichita Falls, Tex.

Attendance—21.

FLORIDA SECTION

Seminole Hotel, Jacksonville

September 19, 1942, 12:30 p. m.

Fellowships conferred upon:

Rupert H. Gillespie.....	West Palm Beach, Fla.
Carrington J. Masters.....	Jacksonville, Fla.
Harold B. Pattishall.....	Jacksonville, Fla.
Ernest B. Penn.....	Miami, Fla.

Attendance—Very good.

INDIANA SECTION

Columbia Club, Indianapolis

September 17, 1942, 6:30 p. m.

Fellowships conferred upon:

Merritt E. Peck.....Jeffersonville, Ind.
Allen L. Voiers.....Jeffersonville, Ind.

Attendance—17.

WASHINGTON, D. C., SECTION

University Club, Washington, D. C.

September 17, 1942, 8:00 p. m.

Fellowships conferred upon:

Louis H. Renfrow.....St. Louis, Missouri
Francis Graeme Ulen.....Washington, D.C.

Attendance—16.

SOUTHWESTERN SECTION

University Club, Los Angeles

September 16, 1942, 6:30 p. m.

Fellowships conferred upon:

Herbert G. Childs.....Los Angeles, Calif.
Louis F. Snyder.....San Diego, Calif.

Attendance—17.

NEW JERSEY SECTION (combined with New York Section)

Town Hall Club, New York, N. Y.

September 18, 1942, 6:30 p. m.

Fellowships conferred upon:

Edward J. Jennings.....Trenton, N. J.
Maxwell Jacob Lentz.....Passaic, N. J.
Jacob M. Wisan.....Trenton, N. J.

Attendance—17.

AMERICAN COLLEGE OF DENTISTS
MEETING OF THE NEW YORK AND NEW JERSEY SECTIONS
Action Relative to the Journal of Dental Research

Report of the Committee appointed by the Chairman of the New York Section of the American College of Dentists—pursuant to preliminary discussion at a meeting on May 18, 1942—"to consider the situation created by the private arrangement between the *Journal of Dental Research* and the Procter and Gamble Company."

The *Journal of Dental Research* was born of a great ideal. This ideal had found expression in 1906 in a publication known as the *Journal of the Allied Dental Societies*, which in the words of its editor, Dr. William B. Dunning, had been founded "as a protest against supply-house dental literature, and for thirteen years has embodied, preached and maintained the principle that the publication of dental knowledge should be managed by the profession, and not by the manufacturers and vendors of dental merchandise."

It was out of this protest and as part of it, that the *Journal of Dental Research* came into being in 1919. In announcing its publication, the statement was made by the editor, Dr. William J. Gies, that "*it would be absolutely independent of all supply-house influences*. It will be conducted in full accord with the highest ideals of strictly professional journalism devoted to the advancement of research. . . . It will not be a supply-house dummy or a trade circular, but a strictly professional project."

In keeping with these ideals and to guard against any lowering of its standards, a small group of men in this city, set out to raise an endowment fund of \$50,000 to insure its financial stability and to make certain that these standards would be maintained. The response to the appeal made by the Committee has been nation-wide, proving that the ideals represented by the *Journal of Dental Research* have widespread approval by the profession. Great sacrifices have been and are being made to complete this Fund. In this city, where the Journal and its founder are best known, nearly \$10,000

has already been contributed by the members of the dental profession.

All this has been done to insure the continued existence of the Journal on the high plane it has always occupied and to which it was dedicated in 1919. Yet in spite of the sacrifices and effort that has gone into making it an example of all that is highest and best in professional journalism, its pages have recently been opened to commercial exploitation. In the December, 1941, issue of the Journal appeared two articles setting forth the superiority of liquid as against abrasive dentifrices. Approximately 50,000 copies of this issue were purchased by the makers of a liquid dentifrice and sent to the members of the American Dental Association. This was followed a few days later by a circular letter calling attention to the articles appearing in the *Journal of Dental Research* and extolling the virtues of a liquid dentifrice, of which the company sending the circular was the manufacturer. There could be no disguising the purpose for which these articles were published. It was clearly an attempt on the part of the manufacturers to promote the sales of a commercial product through the pages of the *Journal of Dental Research*.

Their publication was permitted by the Publication Committee of the Journal notwithstanding the fact that the product in question had been disapproved by the Council on Dental Therapeutics of the American Dental Association, and with the implication that the findings of the Council were unreliable. It was also done in violation of the action taken by the American Association of Dental Editors (of which the *Journal of Dental Research* is a journal-member) asking that its members "refuse the privileges of reprinting or circulating any material, to those who seek to profit from its distribution."

This degradation of the *Journal of Dental Research* should not be allowed to pass without a vigorous and widespread protest on the part of the dental profession. Energetic action should be taken to prevent similar occurrence in the future.

Therefore, be it *resolved* that the members of the New York Section of the American College of Dentists, at a meeting held in New York December 6, 1942, express their unqualified condemnation of the action taken by the Publication Committee of the Jour-

nal of Dental Research in permitting the publication in its pages of articles clearly of a commercial nature, in complete disregard of every principle for which the Journal was founded and which it has maintained inviolate for almost a quarter of a century.

WILLIAM B. DUNNING,
LEUMAN M. WAUGH,
ARTHUR H. MERRITT, *Chairman.*

After the applause that greeted this report had subsided a motion for adoption was amended to include the request that the report be published in the *Journal of the American College of Dentists*. The motion as thus amended was adopted unanimously.

LOWRIE J. PORTER, D.D.S.,
Secretary, New York Section.

JOURNAL OF DENTAL RESEARCH

WILLIAM J. GIES ENDOWMENT FUND

Consolidation of the Annual Financial Reports to the International Association for Dental Research for the Five Years Ending March 14, 1942¹

Compiled, for the Committee on Endowment, by

LEUMAN M. WAUGH, D.D.S., *Treasurer*

This Fund was created, on the initiative of the Committee on Endowment,² to insure the continuance of the *Journal of Dental Research* "in full accord with the highest ideals of strictly professional journalism devoted to the advancement of research," to which the *Journal* was dedicated at its establishment in 1919.

The five annual reports relating to this Fund, as published in the *Journal of Dental Research* in 1938 to 1942 inclusive, are presented below in a consolidated form, various errors and inaccuracies in the individual annual reports having been corrected. The names of the contributors have been arranged in alphabetic sequence, in groups, to facilitate location of any name. The annual report for 1943 will be presented at the annual meeting of the International Association for Dental Research in March, 1943, and published in an early issue of the *Journal of Dental Research*.

I. AMOUNTS RECEIVED FROM ORGANIZATIONS

Alpha Omega Fraternity.....	\$ 175.00
American Association for the Advancement of Oral Diagnosis ..	165.17
American College of Dentists.....	4,000.00
New England Section.....	100.00

¹This consolidation of financial reports includes the data in the annual statements published in the *Journal of Dental Research*, as follows: 1938, 17, 345-47; 1939, 18, 297-98; 1940, 19, 332-35; 1941, 20, 295-99; 1942, 21, 346-49. During 1937-38 contributions of \$10 or less—a total of \$395—were, in accord with a general announcement to prospective donors, presented to the *Journal of Dental Research* for current expenses and not added to the Fund. Thereafter all contributions were included in the Fund.

²The personnel of the Committee on Endowment: Arthur H. Merritt, *Chairman*; Theodor Blum, Frank C. Cole, S. Ellsworth Davenport, Jr., William B. Dunning, Joseph D. Eby, C. Fred GaNun, Gordon M. GaNun, Henry W. Gillett, Herman J. Kauffer, Joseph H. Kauffmann, Frederick C. Kemple (deceased), Alfred L. Kohn, Frederick C. McKay, Albert L. Midgley, Bissell B. Palmer, Richard B. Pomeroy, Theodor Rosebury, J. A. Salzmann, Martin C. Tracy, C. Raymond Wells, G. H. Whitson, Maurice William, Leuman M. Waugh, *Treasurer*. Address of the Treasurer: 931 Fifth Avenue, New York, N. Y.

Northern California Section.....	\$ 100.00
Pittsburgh Section	500.00 ⁸
Arizona State Dental Society.....	25.00
Arkansas State Dental Society.....	244.50
Association of Military Surgeons (Dental Section).....	200.00
Atlantic Orthodontic Society.....	20.00
California (see also American College of Dentists and University of Southern California):	
Sacramento District Dental Society.....	10.00
San Francisco Dental Association.....	100.00
State Dental Society.....	100.00
Chicago College of Dental Surgery, Foundation for Dental Research	100.00
Colorado State Dental Association.....	300.00
Connecticut State Dental Association.....	100.00
District of Columbia (see International Association for Dental Research and J. B. Mann Study Club)	
Florida:	
Central District Dental Society.....	25.00
Florida Dental Society.....	100.00
Northeast District Dental Society.....	25.00
West Coast District Dental Society.....	25.00
Georgia (see also Omicron Kappa Upsilon):	
Atlanta Dental Society.....	20.73
Eleventh District Dental Society.....	13.00
Seventh District Dental Society.....	5.00
Sixth District Dental Society.....	10.00
State Dental Society.....	194.35
Tenth District Dental Society.....	10.00
Illinois (see also Chicago College of Dental Surgery and International Association for Dental Research):	
Chicago Dental Society.....	1,500.00
State Dental Society.....	1,200.00
Indiana State Dental Society.....	200.00

⁸The contributions for the Pittsburgh Section were presented by Drs. W. H. Archer, J. S. Ashbrook, R. E. Black, C. O. Booth, T. W. Brand, H. K. Cooper, W. L. Fickes, J. C. G. FitzHugh, F. C. Friesell, H. E. Friesell, C. W. Hagan, C. S. Harkins, W. E. Lotz, T. F. McBride, W. A. McCready, P. V. McParland, E. G. Meisel, H. C. Metz, J. S. Oartel, B. P. Rial, W. F. Swanson, L. E. Van Kirk, A. I. Wise, W. H. Wright, A. C. Young, Robert Zugsmith.

International Association for Dental Research:	
Anonymous (Minneapolis)	\$ 25.00
Anonymous (Washington, D. C.)	11.00
Boston Section	25.00
Chicago Section	50.00
New York Section	125.00
International College of Dentists	200.00
Iowa:	
Fort Dodge District Dental Society	25.00
State Dental Society	100.00
Waterloo District Dental Society	50.00
Kansas:	
Fifth District Dental Society	5.00
First District Dental Society	25.00
Golden Belt Dental Society	25.00
Northwest Kansas District Dental Society	25.00
Seventh District Dental Society	88.00
Southern District Dental Society	25.00
J. B. Mann Study Club (Washington, D. C.)	100.00
Marquette University (see also Omicron Kappa Upsilon):	
Dental Alumni Association	25.00
Dental School Faculty	25.00
Massachusetts (see International Association for Dental Research)	
Michigan State Dental Society	250.00
Missouri (see also Omicron Kappa Upsilon):	
Springfield District Dental Society	25.00
Nebraska State Dental Association	50.00
Nevada State Dental Association	30.00
New Jersey:	
Atlantic County Dental Society	9.00
Bergen County Dental Society	50.00
Essex County Dental Society	44.50
Hudson County Dental Society	200.00
Monmouth County Dental Society	25.00
Passaic County Dental Society	65.00
Plainfield Dental Society	14.00
State Dental Association	170.00
Tri-County Dental Society	25.00
New York (see also International Association for Dental Research):	
First District Dental Society	500.00

Kings County Dental Society.....	\$ 25.00
Midtown Dental Society [now N. Y. County Dental Society]	25.00
New York Academy of Dentistry.....	5,000.00
Queens District Dental Society.....	100.00
State Dental Society.....	500.00
North Carolina Dental Society.....	200.00
North Dakota State Dental Association.....	130.00
Ohio:	
Cincinnati Dental Society.....	200.00
State Dental Society.....	60.00
Omicron Kappa Upsilon.....	1,000.00
Eta Eta Chapter (St. Louis University).....	25.00
Lambda Chapter (Atlanta Southern Dental College)....	100.00
Xi Chapter (Marquette University).....	25.00
Oregon State Dental Association.....	50.00
Pennsylvania (see also American College of Dentists):	
Hazelton Dental Society.....	15.00
Lackawanna County Dental Society.....	30.00
Lycoming Dental Society.....	14.00
Schuylkill County Dental Society.....	25.00
Third District Dental Society.....	25.00
University of Southern California.....	13.25
Texas State Dental Society.....	223.00
Vermont State Dental Society.....	100.00
Virginia:	
Richmond Dental Society.....	100.00
State Dental Society.....	250.00
West Virginia State Dental Society.....	100.00
Wisconsin (see also Marquette University):	
Calumet County Dental Society.....	25.00
Fond du Lac County Dental Society.....	25.00
Fox River Valley Dental Society.....	100.00
Milwaukee County Dental Society.....	25.00
Northwest District Dental Society.....	100.00
State Dental Society.....	393.00
Winnebago County Dental Society.....	25.00

II. AMOUNTS RECEIVED FROM INDIVIDUALS

\$1,700: A. H. Merritt.....	\$ 1,700.00
1,000: L. M. Waugh.....	1,000.00

\$800: <i>In memoriam</i> —John and Ophelia E. Gies, Reisterstown, Md., 1872 (John Gies, III; William J. Gies, II)	\$ 800.00
600: A. L. Midgley	600.00
276.10: W. H. G. Logan	276.10
260: Anonymous (Providence, R. I.)	260.00
150: W. A. Spring	150.00
134: O. W. Brandhorst	134.00
125: G. C. Paffenbarger	125.00
100: G. M. Babbitt, H. F. Bernstein, G. S. Callaway, F. C. Cole, S. E. Davenport (Jr.), W. B. Dunning, B. E. Erikson, H. D. Grubb, J. E. Gurley, Harry Kaplan, L. R. Kramer, H. W. Krogh, O. G. L. Lewis, A. W. Lindsay, B. E. Lischer, R. E. Olson, J. W. Richmond, M. C. Tracy, W. W. Wickham, L. J. Wyatt—20 @ \$100	2,000.00
50: A. W. Bryan, J. A. Graham, A. S. Litten, T. C. Purcell, C. H. Schott—5 @ \$50	250.00
45: G. W. Clapp	45.00
40: Jacob Schnee	40.00
35: A. J. Irving	35.00
25: <i>In memoriam</i> —William D. Tracy, New York, February 11, 1937 (Mrs. Tracy); M. S. Aisenberg, G. M. Anderson, J. P. Arnold, Adams Bailey, F. H. Brophy, Alex Chase, O. J. Chase, M. L. Collins, J. H. Ferguson, O. H. Gaver, A. F. Jackson, E. A. Johnson, Frances Krasnow, A. L. Nygard, R. E. Price, J. B. Robinson, G. J. Roth, J. C. Salvas, W. H. Scherer, E. B. Spalding, H. H. Streett, E. W. Swinehart, R. H. D. Swing, Alfred Walker, J. R. Walsh, C. R. Wells, J. H. Yearick—28 @ \$25	700.00
20: D. J. Aubertine, A. I. Hadley, A. R. McDowell—3 @ \$20	60.00
16: N. H. Slunghier	16.00
15: B. L. Brun, C. G. Fletcher, J. S. Hopkins, H. E. Latcham—4 @ \$15	60.00
11: R. E. L. Pattilo	11.00
10: F. O. Alford, A. J. Asch, Leland Barrett, R. L. Blake, C. F. Bödecker, G. B. Broadhurst, J. A. Brown, H. L. Bunker, J. E. Chace, A. R. Cooke, L. D. Coriell, M. M. DeVan, W. P. Eaton, S. S.	

Eisner, C. S. Foster, G. A. Grubb, G. F. Hale, T. J. Hill, B. B. Ide, Wilbert Jackson, M. J. Lentz, H. O. Lineberger, J. W. Lucas, A. B. Luckhardt, J. O. McCall, H. A. Mesjian, R. M. Olive, A. H. Paterson, G. F. Peachey, S. L. Pridgen, S. P. Rushing, Joseph Schroff, H. M. Seldin, W. W. Tracy, C. H. Tweed, J. S. Walker, J. P. Winthrop—37 @ \$10.....		\$	370.00
\$9: F. A. Richmond.....			9.00
8.75: Anonymous (Chicago)			8.75
8: T. A. Grant.....			8.00
6: V. H. Hilgemann.....			6.00
5: L. I. Abelson, A. R. Adams, Edmund Applebaum, E. A. Armbrrecht, L. W. Baker, Louise C. Ball, I. B. Bendes, F. B. Bostwick, A. J. Boydston, E. F. Briggs, D. W. Brock, A. C. Broussard, L. A. Cadarette, T. D. Casto, W. G. Chambers, W. T. Chambers, W. N. Cogan, F. G. Cooper, C. S. Copeland, A. R. Crane, J. C. Curry, J. B. David- son, G. P. Dey, E. D. Douglass, L. A. Fonner, T. P. Fox, V. H. Frank, V. H. Frederich, E. A. Gamard, F. J. Genre, R. B. Giffen, G. E. Groth, Albert Hallenberg, Raymond Hand, O. E. Hoff- man, A. D. Horowitz, C. L. Inman, Meyer Klatsky, S. D. Langer, Abraham Lees, N. J. Leidy, W. S. Leslie, W. P. Manning, J. A. McClung, S. G. Michlin, J. K. Miller, J. R. Mitchell, John Morgan, Edith Oblatt, J. B. Poindexter, S. E. Pond, L. J. Porter, J. E. Psayla, A. H. Puls, Harry Reisman, Muriel K. G. Robinson, W. J. Robinson, A. C. Rodgers, Simon Shapiro, Kannon Sheinman, R. C. Shurr, E. G. Sloman, C. C. Smith, P. E. Smith, E. R. Strayer, H. E. Sum- mers, G. L. Teall, Isidore Teich, J. E. Tyler, C. A. Wiethoff, P. W. Woods—71 @ \$5.....			355.00
4: Bertha Eastwood, P. V. Reid—2 @ \$4.....			
3: Carl Breitner, J. B. Carr, Bernard Cohen, J. M. Dun- ning, A. C. Eglin—5 @ \$3.....			15.00
2.50: James Nuckolls			2.50
2: S. B. Black, O. M. Davis, R. L. Dement, F. E. Downs, A. N. Drury, H. C. Fixott, M. A. Ful-			

ler, J. H. Gunter, T. C. Hansen, L. E. Hess, G. W. Kuhn, Barrett Malbin, A. R. Schmid, G. W. Thompson—14 @ \$2.....	\$ 28.00
\$1.50: H. J. Lee.....	1.50
1: J. V. Benton, E. C. Blaisdell, Zachary Blum, B. J. Boyle, E. A. Branch, A. J. Buff, R. R. Byrnes, F. C. Carothers, M. L. Christensen, Lowell Craw- ford, W. E. Cutler, W. H. Daniels, Lewis Davis, E. J. Durkee, L. M. Fleisch, Stanley Flickinger, O. J. Fusilier, R. E. Gill, H. C. Gilliland, D. H. Glew, Ferdinand Griess, LeRoy Hodge, V. P. Klapacs, Maurice Markowitz, H. E. McMillan, R. R. Miller, H. D. Mosier, J. A. O'Grady, M. A. Parrott, W. B. Power, W. R. Roland, C. A. Scrivener, J. B. Sherry, D. L. Smith, D. T. Smithwick, W. C. Webb, H. D. Wilson— 37 @ \$1.....	37.00

III. AMOUNTS RECEIVED FROM SPECIAL GROUPS OF INDIVIDUALS

Greater Philadelphia Dental Meeting (February 11, 1941)—Collected and transmitted by Dr. Louis I. Grossman:⁴

\$5: Veronite Dental Co.....	\$ 5.00
2: J. A. Crosier, H. M. Vernon—2 @ \$2.....	4.00
1: Anonymous (20, including 12 anonymous "commer- cial exhibitors"), A. R. Adams, Fred Adams, C. B. Addie, Karl Albert, Bruce Anderson, I. Barbell, Thos. Barratt, S. D. Baughan, D. W. Bell, H. R. Bell, I. B. Bender, Benj. Benedict, J. E. Bernstein, H. S. Bertel, H. C. Best, W. A. C. Bes- ter, G. Bizzozero, S. S. Bloom, U. Blum, B. M. Brickman, E. Briggs, B. Britton, I. N. Broomell, B. Broudo, D. H. Brown, L. L. Brown, C. C. Bruno, Lester Burket, John Cane, Theodore Casto, Robt. Chain, J. F. Chermol, Frank Chumar, A. J. Clark, N. Clar- vitz, Climax Dental Supply Co., Herbert Cohen, G. A. Coleman, E. R. Cornish, J. P. Courtman, J. W. Craig, S. E. Culler, J. P. Davidson, Geo. Davis, W. D. Day, G. F.	

⁴The names were recorded on a list of signatures of contributors; some were partly illegible.

DeLong, R. A. Denny, F. C. Denton, Edw. Derad, Thos. Dilworth, Dr. Doland, A. Dubroff, B. L. Eastwood, J. A. Eberly, J. Echternach, R. H. Ellis, B. E. Erikson, E. F. Everett, W. D. Everhard,

M. M. Fintz, J. Fogg, J. W. Forbes, Frank Fox, A. Frank, J. Freedman,

A. B. Gabel, Dick Gaber, C. S. Gaige, L. Galfand, A. L. Geisenhover, H. J. Ginns, J. H. Githens, M. M. Glasser, Ray J. Glezen, H. Godmilow, I. Golden, L. Grace, E. W. Greimer, P. P. Gross, F. M. Grosscup,

N. R. Haig, R. L. Hart, Hendrickson (S. S. White Co.), H. J. Henneka, R. U. Hennessey, W. Henry, G. Hinkson, J. E. Hirtle, F. H. Hoeffler, C. S. Holmes,

C. Ivory,

J. M. Jackson, S. Jaffe, J. K. Jennings,

E. L. Kanaga, Frank Kanter, S. Katz, H. C. Keane (S. S. White Co.), C. B. Keil, L. L. Keim, W. D. Kelly, R. M. Kerr (Jr.), J. Kitchenman, H. U. Kless, M. Krauser, P. Kuntz,

W. F. Lang, Vernon Lapp, Saml. Lavine, A. S. Lawson, Sanford Lawyer, B. Lebby, M. Leof, Frank Leonard, W. T. Levergood, S. Levin, V. H. Levitz, B. A. Lincoln, J. H. Lock, A. J. Long, H. J. Lord, B. A. Lowry, S. B. Luckie, J. W. Lynam, E. J. Lyons,

W. Magann, E. A. Manning, M. B. Markus, C. S. Martin, J. C. Mason, C. B. Masseth, B. Masuda, H. Mathews, C. J. Mattis (S. S. White Co.), R. C. Mears, B. M. Meiman, W. E. Mendel, Leon Metz, Earl Miller, F. D. Miller, R. E. V. Miller,

M. E. Nicholson, R. H. Nones (Jr.),

E. J. Ohn, D. B. Olmos, A. L. Orr,

Irving Parmet, Chas. Patton, O. C. Peters, Sara Pogost, Dr. Popkin, W. W. Powell, Edw. Pressman, A. Puls,

M. F. Quinn (Jr.), Michael Quinn,

Geo. Rankin, R. B. Rearick, L. C. Rees, W. A. Reese, Paul Reid, P. H. Richardson, S. W. Ridgeway, E. T. Ritsert, W. J. Robinson, Milton Rose, S. L. Rosenthal, J. T. Rothner, F. S. Rusca, John Sabritt, M. A. Salerno, B. Saturen, W. V. Scanlon, E. H. Schaeffer, Leon Schuck, Harry Schwartz, I. L. Schwartz, J. Schwartz, I. D. Scott, L. Serota, Simon Shapiro, H. D. Shields, W. R. Showacre, B. O. Silver, H. T. Silverman, J. Sindoni, S. B. Smith, S. F. Smolczynski, S. L. Snyder, E. L. Spellman, G. J. Stein, D. S. Stern, E. R. Strayer, R. H. Stuckland, Edw. Subin, G. W. Thompson, F. H. Travers, J. V. Tryon, D. C. Turkington, E. A. Ulrich, Wm. Updegrave, E. H. Velutini, A. L. Ventura, R. C. Walter, S. B. Wasserman, B. R. West, C. A. Whitcomb, H. E. Williams, R. W. Williams, J. E. Wittek, E. V. Wright, H. B. Wright, J. H. Yearick, H. Zelson, W. I. Zyner—236 @ \$1	\$ 236.00 ⁵
<i>Transmitted by Dr. R. R. Gillis (Indiana) for a group of members of the Indiana Dental Association</i>	34.00
<i>Transmitted by Dr. Charles N. Fiero (New York)—25 contributions of \$1 each by anonymous donors</i>	25.00
<i>Transmitted for the Veterans Administration by Dr. Fred Vater (Wisconsin)—20 contributions of \$1 each by dental officers: Drs. J. F. Amick, L. Y. Beers, J. Bleasdale, J. J. Burke, H. D. Daugherty, R. L. Denson, Mark Devine, F. L. Edele, H. H. Facticeau, W. C. Hauser, G. H. Jones, C. S. Kleinkert, W. W. Marr, W. W. McCrillis, V. S. Owen, E. W. Pellien, W. G. Skidmore, W. F. Taylor, A. J. Trainor, Fred Vater</i>	20.00
<i>Contribution by six anonymous members of the Michigan State Dental Society</i>	9.00
Total of contributions, 1938-42, inclusive	\$30,451.35
Total contributed by organizations	\$21,007.50
Total contributed by individuals	9,443.85
	<hr/> \$30,451.35

⁵This total includes four contributions of \$0.25 each by "friends"; calculated as one of \$1.00 in the Anonymous group of 20.

IV. SUMMARY OF ANNUALLY RECORDED ITEMS OF RECEIPTS AND EXPENDITURES

Year	Contributions (payments)	Earned interest	Expenses	Net receipts	Cumulative total of annual net receipts
1937-38	\$10,652.50	None	\$134.06	\$10,518.44
1938-39	4,748.17	None	None	4,748.17	\$15,266.61
1939-40	5,693.78	None	None	5,693.78	20,960.39
1940-41	5,190.55	\$206.78	3.53	5,393.80	26,354.19
1941-42	4,166.35	333.95	None	4,500.30	30,854.49
Total	\$30,451.35	\$540.73	\$137.59	\$30,854.49	

V. SUMMARY OF OPEN ACCOUNTS RELATING TO PLEDGES

1. Organizations

	Pledge	Paid	Balance
American College of Dentists (38)	\$5,000	\$4,000	\$1,000
Illinois State Dental Society (41)	1,500	1,200	300
International College of Dentists (39)	800 ⁶	200	600
Kansas: First District Dental Society (41)	100	25	75
J. B. Mann Study Club, Washington, D. C. (41)	1,000	100	900
Michigan State Dental Society (38)	500	250	250

2. Individuals

In Memoriam: John and Ophelia E. Gies, Reisterstown, Md., 1872 (40)			
	\$1,000	\$ 800	\$ 200
Harry Kaplan (41)	250	100	150
George C. Paffenbarger (38)	250	125	125
Fred A. Richmond (41)	36	9	27
Gordon L. Teall (41)	10	5	5
Total			\$3,632

VI. SUPPLEMENTARY STATEMENT REGARDING INVESTMENT

IN WAR BONDS

By authorization of the Trustees, and approval of the Sections, of the International Association for Dental Research, forty War Bonds of Series F ("12-year appreciation bonds") costing \$740 each were purchased from the funds in the treasury *as of March 14, 1942*. The serial numbers on the bonds are these:

⁶Annually \$200, beginning in 1939.

Purchased (10) March 30, 1942: M140400F to M140409F, inclusive.

Purchased (22) May 29, 1942: M197811F to M197832F, inclusive.

Purchased (8) July 29, 1942: M237558F to M237565F, inclusive.

The payee named on each bond is: "Committee on the William J. Gies Endowment Fund for the Journal of Dental Research (an unincorporated body)." These bonds are in the custody of the Treasurer of the Committee, in a safety deposit box, Empire Trust Company, 580 Fifth Avenue, New York City, in trust for the Committee.

Total amount expended for the said forty bonds.	\$29,600.00 ⁷
Corresponding balance of deposits with the Empire Trust Company, 580 Fifth Avenue, New York City, as of March 14, 1942.	1,254.49

Total amount of net receipts (including the value of the
War Bonds) in the Fund as of March 14, 1942. \$30,854.49⁸

⁷This is the total amount paid for the forty bonds, and does not include accrued interest. Their total maturity value (twelve years after purchase) will be \$40,000. Meanwhile, if and when higher interest-bearing investments should be desired in behalf of the Journal, some or all of these bonds may be sold to the United States Government at their value including corresponding accrued interest.

⁸The net addition to the Fund, *since March 14, 1942*, and to and including November 21, 1942, is \$482.26. The details of these additions, and of others that may be received meanwhile, will be included in the next annual report.

EDITORIALS

DENTAL LITERATURE

In a recent editorial¹ the editor of the *New Jersey State Dental Journal* quotes a criticism of our literature; "At home and abroad dentistry is still rated an undeveloped profession in every phase of its literature." The word "still" in this criticism is well chosen, for in that, admission is made that there has been some progress. This being a correct deduction, further analysis of our journalistic problem may reveal possibilities of further progress. Two facts stand out pre-eminently at the outset of any consideration of this question: present-day editors are but amateurs; and officers, trustees and councilmen have too much to do with the details of the editor's job.

Reasons often and easily drift into excuses and such may be the case just now. However, the fact is that only in recent years have we had much need of literature in teaching dental students. Dental practitioners showed dental students how to make our various appliances and how we might see where one was required. We learned solely from clinical experience, even waving off as theory, whatever may have been taught within the classroom.

Today teaching methods and interest have greatly changed. Literature is needed and much reading is required. Libraries have been and are being rapidly and well developed to meet the need. Our literature has been catalogued and indexed, noting some refinements yet to be made, so that in this progress is being made. Dental students are not only using and familiarizing themselves with our literature, but at the same time they are learning the value of good literature and how to produce it. The next group of editors, our successors, will make a longer stride forward. Incidentally, this is proper. One generation receives the culture of the preceding generation, raises it to a new level and passes it on to the next. This present generation has done a notable job and we have no cause for embarrassment.

¹*New Jersey State Dental Journal*, 14, 42; 1942, Nov.

Now as to the second of the two facts above stated, officers, trustees and councilmen do keep too close an eye over their society publications. Because of this editors are constrained to society or association policy. Probably one of the worst evils in this connection is the feeling of compulsion to publish whatever a member may have written. This is a flagrant wrong. Men do write, some well, others not so well. Perhaps provision should be made for all, but our leading journals should use care and discrimination in the selection of manuscript for publication. Present-day editors and even future editors should be able to distinguish between true and false, and if not, then authority should be sought. Many misleading and untrustworthy articles do get into our literature—written, no doubt, with honesty of purpose and by an enthusiast. But because of this and the further fact that he is a member of the association owning the publication, is not sufficient reason for accepting it. Yet under present conditions of relationship, there is constraint to do so.

The profession should own its literature, but there should be set up, Publication Boards, charged with responsibility, allocated a fixed sum of money and held accountable to the owner through its representatives, trustees, councilmen or delegates. Complete freedom in all details of journalism should be allowed this Board and only in case of extreme matters should any other authority intervene.

The dental profession is still in the position of a child with a new toy. When both have grown older, new and better conditions will obtain. At present our literary efforts are constrained to too great a degree in developing association, society or group consciousness—we must turn to professional or service consciousness, in which readers' demand will be for truth in written word.

INDIUM IN DENTISTRY

Occasionally one reads a "puff" about the great strides that dental therapy has made since indium was added to dental alloys and amalgam. The latest example comes from *Time Magazine* (15, 58; 1942, Nov. 16), which presents this gem of misinformation: "Dental alloys of gold and indium stand up well under molar pressure and the tarnishing action of acids."

It is true that in America indium is used in small amounts (usually a fraction of 1 per cent) in gold alloys by two manufacturers. It takes the place of zinc and its chief purpose appears to be "our gold is different," and thus to provide attractive advertisements; at least it would seem so for one manufacturer. To keep the record straight, it may be added that gold alloys containing indium do not "resist molar pressure" better than do appropriate gold alloys, for while it has been claimed that indium-containing gold alloys possess greater strength, ductility, and immunity from discoloration than do other dental alloys of similar type, these assertions have no basis in fact.

It was very surprising to read that "dental alloys of gold and indium stand up well under . . . the tarnishing action of acids." Since when have acids had a tarnishing action on gold alloys? Most dentists pickle gold alloys in strong mineral acids to remove tarnish. The gold alloys can withstand this rigorous treatment because they contain mostly gold and platinum—not because they contain indium which, even in dilute mineral acids like hydrochloric, nitric, and sulfuric, is soluble.

As another example of misinformation, note the following: "Indium and mercury form amalgams readily and these are extensively used as a dental amalgam base. The amalgam containing 5 per cent of indium combines with an amalgamating alloy giving a superior dental filling. In addition to its exceptional resistance to tarnish and its increased strength, it sets slowly enough to permit shaping. It polishes well and it is free from objectionable setting changes and granulation."¹

Indium is not used extensively in dental amalgams; in fact, can any one name a single dental amalgam alloy made in America that contains indium? Several manufacturers have been experimenting with indium-containing dental amalgams for a number of years, but so far the products have not reached the commercial market for the very obvious reason that these amalgams have not been proved to be superior in any way. Indium does not enhance the properties as

¹Hopkins, B. Smith: *The Chemistry of Less Familiar Elements*, pp. 17-18, Chapter 8, Gallium and Indium; published by Stipes Publishing Company, Champaign, Illinois.

claimed. Small amounts of indium do not make silver tarnish-proof. It takes large amounts of indium up to more than 40 per cent to produce silver-indium alloys that will not discolor in *sulfides*. Such alloys are hard and brittle and are not commercially feasible. Silver objects may be plated with indium and the plating sweated in, making a high content of indium-silver alloy on the surface. This coating is extremely tarnish resisting, but, of course, cannot be applied to amalgam fillings.

And so one wonders what is back of all of this publicity regarding the application of the metal, indium, in alloys for dental purposes?—G. C. P.

WAR, ACCIDENTS AND THE FUTURE

Sherman said, "War is Hell." There is no denying the charge. Casualties, both in killed and maimed, run into large numbers. All the viciousness of men is brought out in the effort to overcome the enemy. It is commonly known that increase in immorality accompanies war. Present conditions about our army camps are atrocious, as reported by those in a position to know. Constructive effort in all lines, save only war, ceases. Progress stops and we become negative to a great degree. All effort should and must be expanded to put an end to war—to find a better way of solving our problems.

And yet! While it is reported that 43,000 English civilians were killed in air raids since the beginning of the war, we killed by accidents, here in United States, 102,500, with 9,300,000 injured and of these 350,000 permanently injured. Automobiles killed 40,000 but accidents within the home were responsible for 31,500 deaths!¹

One need not go into the cost in money or time, or other loss involved—that is in reality the least worthwhile. Just comparing these two sets of figures, one may conclude that war merely does the same job in a shorter time so that war losses only seem greater. The financial cost of war is, of course, infinitely greater than that for accidents, but both are stupendous and might be avoided.

Again many developments come about as the result of a war—under that pressure, men are forced to improve, so gains can always

¹*Science News Letter*, Sept. 26, 1942, p. 206.

be counted. Man's confidence oftentimes is awakened and increased so that he may come to have real convictions about questions which theretofore had not found place in his mind. We in America are accused of having no convictions in any principles in particular.

Some things must go on and so again man's faith is bolstered up. Just to cite one instance, the following statement is taken from that of the Editors of *Stanford (University) Medical Bulletin*, recently reorganized and changed so as to become a new volume and a new number (Vol. I, No. 1):

"That these changes should be inaugurated in these difficult times is an outstanding gesture of faith—faith that our country will survive to preserve a place for such a publication; faith that the medical profession and our school will continue to be interested in, and contribute to, advances in medical knowledge; faith that in a world becoming increasingly dominated by governmental encroachments and control, there is still a place for a private university to stand as an oasis of freedom and a refuge from regimentation."

One can see in this a nucleus which might be easily expanded and out of it all may come an abundance of faith.

If then the human hazards of war differ from the hazards of normal life, partly in reduction of time, similar to the oxidation of iron in an atmosphere of pure oxygen as compared with long exposure to atmospheric elements, what is so terrible about it? Let's take a look.

1. It is acceptable, (for the time) if not legalized, murder.
2. It is destructive—destructive of human life, destructive of all the finer things and concepts which men have developed.
3. It is wasteful—wasteful of manpower, wasteful of wealth, wasteful of all our art and records of accumulated knowledge.
4. It teaches brutality and carelessness instead of a finer human relationship and thrift.
5. It takes from us our sense of things right and moral.
6. It really encourages unmorality and immorality.
7. If war encourages immorality and unmorality, it becomes then one of man's major problems and as we solve our problems, we rise to new heights, so that even in war man's cultural level may be raised. Some wars of the past have shown such results and perhaps this present war may be classed as such.

It does all these and no doubt more, but it does one thing basic to all—it kills morality. Yet this in a measure is denied by those whose first duty is that of cleaning up about our camps. They are cleaning up merely that our boys will be physically fit. No one will deny the need of this, but if there is a time when morality is needed, isn't it in time of war? Unless we have a moral concept—a thing of value to be accomplished—and keep clean in its accomplishment, we have no valid reason for going into war. But with a moral concept, and a real purpose to be accomplished, and we have in this, we can expect to win and we will.

With this as a shield, we'll win the war and win the peace, that out of a bad mess, good, or even better, may come. This is our *faith* and the future augurs well for mankind, no matter for the moment, about some of the details of adjustment. We'll have our food, our clothing and a place to sleep. We'll look to the preclusion of accidents and will have some luxuries. We will have made a step toward that more "abundant life."

All of this can come out of war if we so determine. The future always augurs well—it will be as we make it.

WORK—BUT NOT FOR PAY

This is the title of an admonition to wives and sweethearts in *Science News Letter*.¹ It is made as a suggestion to help them in helping themselves while their men folks are in the war. The experience of professional men and women should serve to confirm such admonition, for due to the united efforts of untold numbers in the professional fields, both in service to the public and professional development, great good has been accomplished. The public has benefitted both directly through individual service and indirectly, as advancements have been made. Men seem to work best when not paid for it.

¹*Science News Letter*, October 3, 1942, p. 214.

FOES WITHIN AND WITHOUT

We are in a war, we have a Foe without, and we must win—not just for the sake of winning, yet that is the sportsman's attitude, but because we believe in the thing which we have to give to the world—ours is the best way of life—we enjoy it, it is good for us, so we will take it to others. And yet, is it?

Among Foes within, may be mentioned that dread disease cancer. A heading,¹ "Worse Foe to Japan," recently attracted attention and from which the following is quoted: "Cancer of the stomach occurs two or three times as frequently in the Japanese as it does in the white races, . . ." But the cause as indicated by Dr. George T. Park,² may be cited as a Foe without: "The flagrancy of high pressure salesmanship through the radio and the press by manufacturers of proprietary drugs in order to induce the public to treat its own indigestion, is one of four causes for the high mortality from stomach cancer"

There is a familiar ring—it sounds like some of the tales within our own field. There is much concern at present about abrasion of teeth. We've always had it with us but it does appear to be endemic now. Researches have been and are being made.³ Liquid dentifrices are making a grand stand play, using the "scare" method.⁴ Shouldn't dentists blush with embarrassment then, when confronted with such an advertisement as appeared on page 53 in *Life* for November 16, 1942?

JOURNAL OF DENTAL RESEARCH: WILLIAM J. GIES
ENDOWMENT FUND

The Endowment Fund for the *Journal of Dental Research* was started about three years ago by a group of men in New York City. The personnel of this group has not been changed, although others have been brought into the activity. On another page in this issue of

¹*Science News Letter*, Oct. 3, 1942, p. 211.

²*Ibid.*

³See Tainter, M. L.: This issue, p. 353.

⁴See Report of Council on Dental Therapeutics; *J.A.D.A.*, 28, 1682; 1941, Oct.

the JOURNAL is published a report of the Treasurer. In a footnote at the bottom of that page can be found the names of the members of the original self-appointed committee.

The campaign has been carried on until we have arrived at a fair total, there still being some \$19,000 to go. The profession has been quite carefully organized and solicited, yet many parts of the country have not contributed as they might desire. Will you look over the Treasurer's report and then make yourself one of two thousand to contribute another \$10.00, that we might clear this up?

The campaign has not been conducted by the College, neither has it been conducted by any organization within the profession—we have only this voluntary group. We have opened the pages of the *College Journal* to the campaign and are so doing at this time in publishing their report, likewise in extending this solicitation. If the Fellows of each State would get busy within their States we could easily raise this balance. Let's do it within the next six months.

ERRATUM

On page 348 of the September issue of the JOURNAL, reference was made to pp. 324-30. This should have been pp. 318-24.

CORRESPONDENCE AND COMMENT

ADDITIONAL OPINIONS ON THE RECENT COMMERCIAL EXPLOITATION OF THE JOURNAL OF DENTAL RESEARCH¹

I. The issue of the JOURNAL OF THE AMERICAN COLLEGE OF DENTISTS for September, 1942, presented, on pages 347 and 348, resolutions adopted by the American Association of Dental Editors and the Regents of the American College of Dentists last August condemning the commercial exploitation to which the J.D.R. had recently been subjected. Resolutions to the same effect had previously been adopted unanimously by the Pittsburgh Section of the International Association for Dental Research, and by the Pittsburgh and Chicago Sections of the A.C.D. When the Pittsburgh Section of the A.C.D. contributed \$500 to the J.D.R. Endowment Fund, it was assumed that the J.D.R. would be helped by the Endowment Fund to avoid commercial degradation. It was believed also that the management of the J.D.R., in the service of the I.A.D.R., would not become irresponsible, and that the J.D.R.—continued as a journal for the promotion of dental science—would not be permitted to degenerate into a supply-house “stooge.” The judgment of the Pittsburgh Section of the A.C.D.—in the earnestness of the support which the contribution of \$500 to the J.D.R. Endowment Fund very definitely evidenced—was formally expressed in the following resolutions, which were adopted unanimously at a meeting of the Section on May 2, 1942:

“Whereas: Since its founding, the *Journal of Dental Research* has been the example of the very best in dental journalism, free from commercial influence of any kind; and

“Whereas: the *Journal of Dental Research* was presented to the International Association for Dental Research by its founder and original owners with the high hope that such a policy would be continued; and

¹Previous allusions to this situation, in this volume, were: Editorial, page 260 (June); annual report of the Committee on Journalism, page 320 (Sep.); “Collective Views,” page 347 (Sep.); report of action by the New York and New Jersey Sections, page 433 of this issue.

"Whereas: the Publication Committee, empowered by the International Association for Dental Research to edit, publish, and distribute the *Journal of Dental Research*, in cooperation with its Board of Editors, has entered into an agreement with the Procter and Gamble Company, without consulting the Board of Editors; and

"Whereas: this agreement is not only a change in the original policy of the *Journal of Dental Research*, but also is in direct opposition to the highest ideals of dental journalism as represented by the *Journal of Dental Research*; and

"Whereas: the Pittsburgh Section of the American College of Dentists has contributed to the Endowment Fund of the *Journal of Dental Research*, and the above mentioned irresponsible action of the Publication Committee may jeopardize the attainment of, as well as further increases in, the Endowment Fund; therefore be it

"Resolved: That the Pittsburgh Section of the American College of Dentists express to the officers and members of the International Association for Dental Research its profound disapproval of the action of the Publication Committee in consummating such an unprecedented agreement, and suggest that the Association take immediate action to see that those ideals of dental journalism traditionally exemplified by the *Journal of Dental Research* be protected from any further subversive action by any officer, committee, or agent of the Association."

Resolutions of similar import were adopted unanimously by the Pittsburgh Section of the I.A.D.R. on May 13; by the Chicago Section of the A.C.D. on May 25.—(12.)²

Comment. In response last June to the protests in the resolutions mentioned in the foregoing statement, and by individual members of the I.A.D.R., the Publication Committee of the J.D.R. stated to the Board of Editors that, in the transaction with the Procter and Gamble Company, the Committee had acted privately because they "did not consider the transaction a change of policy." Their statement also included the opinion that, in justification of their procedure, "there was the definite advantage to be considered in advertising value to the Journal and to dental research."

Earnest efforts have been made to induce the Publication Committee (a) to admit the very obvious fact that their private deal

²The terminal numerals in parenthesis are inserted for purposes of identification in the records of this JOURNAL.—[ED.]

with the Procter and Gamble Company involved a radical change of policy in the conduct of the J.D.R., and also (b) to give voluntary assurance that such a private departure from normal procedure—for a committee serving a Board of Editors of a non-proprietary journal devoted to the advancement of scientific dental research—would not be permitted again. Unfortunately these efforts have been unsuccessful. This situation presumably will be discussed, and appropriate action taken, at the annual meeting of the I.A.D.R. in Chicago, next March.—[C. Ed. (12)].

2. The resolutions adopted by the A.A.D.E. and the Regents of the A.C.D., and the related comment in the annual report of the Committee on Journalism—mentioned in footnote 1 on page 455—were published after the Publication Committee's inadequate defense discussed above had become well known. The appended report "on the recent lowering of the professional standards of the J.D.R."—adopted unanimously at the monthly meeting of the Board of Directors of the New York Academy of Dentistry on November 12, 1942—followed preliminary attention to this situation at their meeting in October:

"The New York Academy of Dentistry was founded to attain important objectives among which were these, as recorded in Article II of the Constitution:

"To encourage and develop professionally controlled dental journals for the publication of dental literature; to urge upon its [Academy's] fellows that they refuse to accept positions on editorial boards [of], or lend their influence to, proprietary dental journals by the preparation of articles for publication in such journals; . . . and [to] exert its [Academy's] influence toward placing the activities of the profession and its members upon the highest ethical and non-commercial plane."

"The Academy, in pursuance of these objectives, was among the dental societies that helped to make the *Journal of Dental Research* an exemplar of the very best in dental journalism and in the journalism of science. Believing that the transfer of ownership of the J.D.R. to the International Association for Dental Research in 1937 assured the Journal's continuance on 'the highest ethical and non-commercial plane,' the Academy in recent years contributed from its treasury a total of \$5,000 to the Endowment Fund of the J.D.R. to help the Association to maintain, for dentistry, this important

scientific journalistic service. Approximately \$4,500 in addition have been contributed to this Endowment Fund by members of the Academy, individually, in the same spirit.

"The Academy's respect and esteem for the J.D.R. having been manifested in these and other relationships, the Academy's members have learned with very deep regret the following well known conditions related to the issue of the J.D.R. for December 1941—conditions which, if allowed to be precedents, would help to convert the J.D.R. into the equivalent of a 'supply-house organ:'

"(1) The said issue contained two correlated papers that evidently were expected to indicate that Teel is a commendable dentifrice, and thus to weaken or nullify the previously published judgment of the American Dental Association's Council on Dental Therapeutics that Teel is not an 'acceptable' product. One of these two papers, presenting no new scientific principle or information, was a description of tests by an employee, and in the laboratory, of the supply-house whose claims for Teel had been rejected by the Council on Dental Therapeutics. This paper was obviously not a disinterested contribution to dental research.

"(2) Last April, approximately 50,000 copies of the issue of the J.D.R. containing these papers in support of Teel were distributed free of charge by the *management of the J.D.R.* to all members of the American Dental Association. These copies contained circular return-forms inviting subscriptions for the J.D.R., but there was no indication that the copies had been distributed at the expense of—and for—the Company whose claims for Teel had been rejected by the Council on Dental Therapeutics.

"(3) Soon after the free distribution of the 50,000 copies of the said issue of the J.D.R., the Company that markets Teel issued to all members of the A.D.A. a circular letter referring to the said papers in the J.D.R. as providing an adequate basis for approval by dentists of the general use of Teel as a dentifrice.

"(4) Various dental and lay publications currently present advertisements for Teel containing direct or indirect allusions to the said papers in the J.D.R. as a scientific basis for the sales promotion of Teel, and thus tend to encourage the belief that Teel has been recommended by the J.D.R.

"(5) The scientific findings which led the Council on Dental Therapeutics to decide that Teel is not 'acceptable' were published in the issue of the *Journal of the American Dental Association* for October 1941. The two papers in support of Teel in the issue of the J.D.R. for December 1941 were revised by the authors, respectively, on October 9 and 10, 1941—as stated in footnotes therein—thus enabling the authors to modify their papers in the light of the comment adverse to Teel that had been published earlier

by the Council on Dental Therapeutics. This situation raises the question as to whether the management of the J.D.R. gave the Council on Dental Therapeutics opportunity to comment simultaneously on the papers in support of Teel. To the foregoing well known facts we add the following information. A member of the Academy recently sent to an officer of the Council on Dental Therapeutics a related letter presenting this question:

"'Was the Council on Dental Therapeutics given an opportunity to publish in the December issue of the *Journal of Dental Research*, simultaneously with the two Procter and Gamble papers therein, any statement regarding the findings which led the Council on Dental Therapeutics to vote the judgment that Teel is not an acceptable product?' To this question the reply of the officer of the Council was: 'No.'

"(6) Responding to objections to some of the conditions summarized above, as expressed by members of the I.A.D.R., the Publication Committee (of three) of the J.D.R., in a formal statement last June to the Board of Editors, said that the arrangement with the manufacturers of Teel had been conducted privately and had not been made known to the Board of Editors of the J.D.R. nor to the Council of the I.A.D.R., and had not been reported at the annual meeting of the I.A.D.R. last March, despite the fact that the free copies were then about to be distributed. This statement last June by the Publication Committee also expressed the opinion that this private procedure, which had not been authorized by the Board of Editors, and grossly commercialized the J.D.R., was desirable and commendable because it was what they called 'a move to increase the circulation of the Journal and disseminate new knowledge of dental science.'

"The import of the degradation of the J.D.R., by the commercial exploitation outlined in the foregoing summary, was shown very clearly by one of the founders of the New York Academy of Dentistry, who was also one of the charter members of the I.A.D.R. and a member of the original staff of editors of the J.D.R., and is now Chairman of both the J.D.R. Endowment Fund Committee and of the Board of Trustees of the I.A.D.R.—Dr. Arthur H. Merritt—who, in an editorial entitled 'The exploitation of professional dental journalism,' wrote in the first three paragraphs as follows (*J. Periodontology*, 13, 100; 1942, July):

"'When in 1919 the *Journal of Dental Research* made its first appearance, it was frankly stated that it was, in effect, "an open break with the past in dental journalism and a move in the direction of complete professional ascendancy in dentistry;" that it would "be neither a supply-house dummy nor an advertising circular" and that it would "endeavor to equal in quality the best of the research journals in the medical and biological sciences."

"'For more than two decades it has kept faith with that pledge. During those years the *Journal of Dental Research* has been representative of all that is best in dental journalism. That it might continue to uphold the ideals to which it was dedicated, no

sacrifice was counted too great by those who appreciated its importance to professional progress. To guard against any lowering of these standards and to aid in its support, the dental profession has undertaken the creation of an endowment fund of \$50,000, more than one-half of which has already been paid in cash. It was the thought of the Committee charged with the raising of this Fund, that being able to point to a journal wholly free of commercial influences and to the willingness of the profession to sacrifice itself to provide such a fund, it could then appeal to philanthropic organizations for additional support.

"Because of these ideals and the sacrifices which have been made and are being made to maintain them, the opening of the pages of the *Journal of Dental Research* to commercial exploitation has come as a distinct shock to those who have the interest of professional journalism at heart and who have labored long and earnestly in its promotion. That this was done without due consideration as seems probable, does not, unfortunately, alter the situation, nor does it lessen the harm that has been done."

"In accord with the constructive spirit of Dr. Merritt's editorial, the New York Academy of Dentistry respectfully requests the International Association for Dental Research to take whatever action may be necessary to give the dental profession *public* assurance that hereafter the *Journal of Dental Research* will be conducted—in all relationships—in full accord with the highest ideals of non-commercial, professional, scientific journalism.

"To expedite attention to this appeal, copies of this statement will be sent to the active general officers, and to the secretaries, editors and councillors of the North American sections, of the International Association for Dental Research, and to the Secretary of the American Association of Dental Editors of which the J.D.R. is a member."—(13).

Comment. This statement, for the New York Academy of Dentistry—a leading dental organization in the city in which the J.D.R. was established and the I.A.D.R. was founded—indicates some of the objections which have been under active discussion where these two agencies for dental advancement originated. The New York Academy of Dentistry and its individual members certainly did not give nearly \$10,000 to an Endowment Fund for the *Journal of Dental Research* to help that Journal to publish propaganda by a supply-house employee to discredit the A.D.A. Council on Dental Therapeutics. Special attention should be given by the reader to the import of the paragraph preceding the quotation from Dr. Merritt's editorial, especially in relation to the pretense by the J.D.R. Publication Committee that their private deal with the Procter and Gamble Company was not a change in the policy of the J.D.R. Dr. Merritt, a past president of the A.D.A., was one of the founders

of the N.Y.A.D., "one of the charter members of the I.A.D.R. and a member of the original staff of editors of the J.D.R., and is now Chairman of both the J.D.R. Endowment Fund Committee and of the Board of Trustees of the I.A.D.R." If Dr. Merritt does not know intimately what the non-commercial policies of the J.D.R. have been, who does?—[C. Ed. (13)].

FURTHER COMMENT ON "ADMIRALCY IN THE
NAVY DENTAL CORPS"

Refer to page 339 of the issue of this JOURNAL for September, 1942, for a statement of prior events related to the proposed rear admiralty in the Dental Corps of the United States Navy. House of Representatives Bill 7234, to create such rank, was referred to the Navy Department, which rendered an adverse report. This situation has been reported, under the heading "Dental Corps Admiralty," in the *Army and Navy Register* (63, 1; 1942, Sep. 19):

"The Navy Department has recommended against enactment of a bill H. R. 7234, which would create the rank of rear admiral in the Dental Corps of the Navy.

"The Navy said that the creation of such a rank 'would serve no useful purpose,' and would mitigate against sound administrative practice. The bill referred to was introduced by Representative Carl Vinson, chairman of the House Naval Affairs Committee, at the request of several interested dental organizations. For some time there has been considerable agitation for the creation of the flag rank in the Dental Corps, and during hearings on the bill which suspended permanent promotions for the duration of the war, Dr. Sterling V. Mead, representing the American Dental Association, brought the matter before the House Naval Committee.

"The Navy Department's letter to the House Naval Affairs Committee, is as follows:

"The bill H. R. 7234 "To authorize the rank of rear admiral in the Dental Corps of the United States Navy," was referred to the Navy Department by your committee with request for report thereon.

"The purpose of the bill is stated in its title.

"The Dental Corps of the Navy is a part of the Medical Department. The affairs of the Dental Corps are under the general direction of the Chief of the Bureau of Medicine and Surgery who has as his principal assistant an officer of the Medical Corps of the rank of captain. Within the bureau, and reporting directly to the chief of the bureau through the assistant chief of bureau, is a dental officer in charge of the dental section. Obviously, sound administrative practice would not follow if the head of the Dental Corps were an officer of the rank of rear admiral.

"Enactment of the bill H. R. 7234 would result in an increased cost to the Government of approximately \$2,000 per annum.

"The Navy Department considers that the establishment of the rank of rear admiral in the Dental Corps of the Navy, as contemplated in the proposed legislation, would serve no useful purpose and, accordingly, recommends against its enactment.

"The Navy Department has been informed by the Bureau of the Budget that there would be no objection to the submission of this recommendation."

"During hearings on the bill that suspended the permanent promotion system in the Navy, Representative Vinson stated, 'It has been brought to my attention that in the generosity of the Congress and the Navy, during these war conditions when everybody wants to get something as well as win the war, they want to make some demands for the Dental Corps. The American Dental Association has a representative here, and he is sitting in the committee room now, and he wants to present the reasons why we should have an admiral in the Dental Corps as well as the Medical Corps.' Representative Magnuson, of Washington, interposed to say that 'A dentist could be an admiral.' Representative Vinson answered, 'No; the law prohibits a chaplain from becoming an admiral, and it prohibits a dentist from having any higher rank than that of captain. Now they have asked if we have the rank of general in the Dental Corps of the Army, why should not dentistry be recognized with the rank of admiral in the Navy? What is your answer to that?'

"Rear Admiral Randall Jacobs, Chief of Naval Personnel, who was on the witness stand, replied: 'The Dental Corps is a part of the Medical Department of the Navy. I have not consulted Admiral MacIntyre, who is head of the Medical Department of the Navy, about that.' Admiral Jacobs a little later stated 'That should be general legislation and should not be tied up with this special legislation.'

"Toward the close of the hearing, Representative Vinson told Dr. Mead, 'If you will have your organization prepare a bill establishing the rank of admiral in the Dental Corps, I will introduce it and refer it to the department, and get the Bureau of Medicine and Surgery's and the department's comment on it.'

"Dr. Mead then told the committee, 'The Bureau of Medicine and Surgery does approve of the amendment we offered.' The matter rested at this point, and a few days later Mr. Vinson introduced the bill which was returned to the committee with an unfavorable report. Whether or not the House Naval Affairs Committee will pursue the matter any further, in light of the department's attitude, must await the return to Washington of Mr. Vinson and a number of other members of the committee."—(14).

Comment. The argument that the creation of a rear admiralty in the Navy Dental Corps would not be sound administrative prac-

tice is the "sea-lawyer's" formal way of saying that if the head of the Dental Corps were a rear admiral and the assistant chief of the Bureau of Medicine and Surgery were a captain, an awkward situation would exist, because the dentist would outrank the physician. This argument is no longer valid because all assistants to bureaus have been given flag rank; that is to say, they were made rear admirals. One might also ask "for what useful purpose?" Perhaps their administrative duties are such that they are entitled to that rank, and the same reason holds for the appointment of a rear admiral as head of the Navy Dental Corps.

A study of these incidents leaves a confusing impression. The bill was referred to the Navy Department and of course was passed on down to the Bureau of Medicine and Surgery for comment, as suggested by the testimony. Did this Bureau give the unfavorable report, which was carried up through official channels; or did a higher authority in the Navy Department disapprove of the bill? Dr. Sterling V. Mead testified before the House Naval Committee: "The Bureau of Medicine and Surgery does approve of the amendment we offered."—[*C. Ed.* (14)].

NOTES

DENTAL RESEARCH AND COMMERCIAL ENTANGLEMENTS

The report of the Committee on Journalism, on pages 318-24 of the issue of the J.A.C.D. for September, 1942, should be read by every dentist in the United States. It expresses keen regret that "the *Journal of Dental Research* recently became an advertising accessory for the producer of an unacceptable dentifrice;" indicates some of the "commercial entanglements" that have degraded the *Journal of Dental Research* to that low level; emphasizes the fact that hitherto "for twenty-two years the *Journal of Dental Research* has been accepted as a scientific publication free from the taint of commercial influence;" and concludes with the appealing statement that "American dentistry looks to the International Association for Dental Research to continue to keep alive true professional ideals free from commercial interference and domination." In presenting details, the report states that the "taint of commercial influence" was based upon and evolved from the publication in the issue for December, 1941, of "two articles on 'abrasion of the teeth,'" of which (1) one referred to observations in the Dental Research Laboratory, under the direction of the Research Foundation, of Ohio State University, "with the aid of a grant from the Procter and Gamble Company;" (2) one was by an employee, in the laboratory of "the Chemical Division of the Procter and Gamble Company, Ivorydale, Ohio." This situation, and the widespread conviction that such efforts to promote commercial interests commonly result in betrayal of professional ideals and also in public detriment, raise many practical questions among which is this one: *Can scientific dental research, in a dental school or university, be based in whole or part financially upon funds provided from commercial sources—without disregarding the ideals of science or of the dental profession, and without any ensuing obligation to cooperate in promoting the commercial interests of the donor(s)?*

(A) The answer to this question is assuredly Yes, if the "funds provided from commercial sources" are presented to the dental

school or university, for research in a specified part of the dental field, with these definite mutual commitments:

(a) The accepted funds shall be expended to ascertain scientific truth on the problem(s) to be studied—and for no other purpose, stated or implied.

(b) The related research shall be conducted by the investigator(s) selected by, and responsible only to, the dental school or university holding the funds in trust.

(c) The findings of the research shall be revealed, *by the investigator(s)*, only to the (faculty, committee) dental school or university serving as trustee of the funds.

(d) The formal report, by the (faculty, committee) dental school or university to the commercial source of the funds, shall not be published, in whole or part, without official agreement with the institution in which the research was conducted—and then only in a form or forms, and under conditions, approved by that institution.

These commitments would indicate that the “commercial source of the funds” desired to ascertain truth, not to buy propaganda for sales promotion. The commercially funded research would be based on the public responsibility of the institution entrusted to conduct it. That institution would select, as the investigator(s), competent and trusted personnel who, in a confidential relationship to the institution, would be neither open nor secret agents of the “commercial source of the funds.” Any resultant publication would accord with the self-respect and the public responsibility of the institution in which the research was conducted. It is obvious that any honorable industrial group would regard these conditions as favorable rather than inimical to all commercial interests that would not conflict with public welfare. If these conditions had applied to the situation mentioned in the said report of the Committee on Journalism, it seems certain that Ohio State University would not have been used to promote the sale of Teel—a dentifrice found unacceptable by the A.D.A. Council on Dental Therapeutics.

(B) The answer to the above question may be No, if the research represents an arrangement between a “commercial source of funds” and an officer of a dental school or university who undertakes with

"the house" to "do the research personally." Under such conditions—dependent upon the readiness of this type of "independent investigator" to be (at his price) a commercial accomplice—the outcome of the "research" may be "just what the firm needed" for an effective "campaign of sales promotion." Whether research resulting from "personal deals" with commercial concerns may be conducted with complete fidelity to truth plainly depends upon the personal and scientific integrity of each payee, and his ability to withstand the temptations to adapt the findings to the indicated financial interests of his client.

Workers in dental research in dental schools or universities, confronted as they are by increasingly attractive financial inducements to be accommodating agents for industrial concerns, should resist the related temptations to "get easy money" and, instead, cooperate in commercial research *only* when it can be done in a creditable scientific way—under the direct auspices of, and in service for, the schools or universities of which they are officers.—[C. Ed. (18)].

PERSONALITIES AT A DENTAL MEETING

Specialist: pseudoexpert type. I don't have any trouble with dentures I make. My plates fit. I have perfected my technic of impression taking. My plates stick. Patients have trouble getting 'em out. I make 'em look natural too. They don't look artificial "a tall." I get good fees too. Last year I did twenty thousand gross. I'll be all set to retire at 55. I have a good time at the meetings. I come to relax, not to hear clinics or papers—they're a waste of time.

Specialist: genuine article. The more dentures I make the more I realize how little I really know about them. Everytime I come to a meeting I pick up some good points. This time I learned that the new acrylic denture materials expand when they get wet. I mean *expand*—as much as half a millimeter from tuberosity to tuberosity. I had been adjusting the occlusion on dentures that dried out several days in my cabinet—and then to have them grow like that when they were in the patient's mouth for a few days! Now all I shall have to do is keep them in water after polishing and until inserted. Simple, isn't it? I feel that this point alone was well worth my trip to the meeting.

Dental politician: junior grade. It's all over but the shouting, boys. Did we outfox 'em? They will never know what hit 'em because even before the meeting ever started we had New England, New York, Ohio and California in the bag. By promising to support the southern candidate next year, we scooped the solid south. Then we hinted to the eastern boys that the year after next would be their turn. The whole scheme worked like a charm. No wonder our gang wins the elections year after year. That other bunch hasn't any leadership. They don't know how to get about. No wonder they get nowhere fast.

Dental politician: different type. My creed is difficult to state for I am concerned primarily with the advancement of the dental health of the public, with the promotion and support of research in any form that will assist such a program, with dentistry's rôle in the social welfare of the people, and with the encouragement of young people to make a career of dentistry. I feel dentistry's obligation to the public because the public delegates to dentistry the right to practice and to determine who may practice dentistry. I feel, too, that the public is obligated to dentistry because of its discipline—its code of ethics. Recognition of these mutual obligations is essential not only from a professional but also from a social point of view, if we are to solve many of the problems that dentistry will face after the war. The social and economic life of this nation will be materially changed by the present worldwide struggle. To say that dentistry will not be affected, or to assume that it will not be, is stupid and dangerous because control of many dental affairs, under such conditions of indifference to dentistry's public obligations and opportunities, might be taken from the profession that is best equipped to promote them.—[C. Ed. (19)].

DOES YES MEAN NO?

The report of the A.C.D. Committee on Journalism in the last issue of the J.A.C.D. (pp. 318-24), and also the resolution adopted by the American Association of Dental Editors at the annual meeting on August 25 (pp. 347-8), present very instructive comment on the "throw away" distribution of an issue of the *Journal of Dental*

Research "under the auspices of a commercial concern; namely, the Procter and Gamble Company." Neither the report nor the resolution refers to the significant fact that the following constructive statements were included in a report presented to the American Association of Dental Editors in October, 1941, by the Committee on Reprints of which Dr. J. Ben Robinson, then President-elect of the American Dental Association, was Chairman—one of his two associates being a member of the J.D.R. Publication Committee that a few weeks later made, without the knowledge of the Board of Editors, the said arrangement with the Procter and Gamble Co. (*Transactions*, 1941, p. 45):

"5. While it is highly desirable to restrain directly those who design to exploit dental literature, it appears that the best defense against this *evil* may be achieved indirectly by the improvement or strengthening of the *ethical standards* of authors and editors who should faithfully refrain from writing or publishing what *purport to be scientific articles* in which statements are made that may be attractive and useful to the commercially minded. Both *author and editor* should in all cases refuse to deliver reprints and also refuse the privileges of reprinting or circulating any material to those who seek to profit [financially] from its distribution.

"6. A vigorous editorial on *unethical uses* of dental reprints should be drafted by this body [A.A.D.E.], to serve all dental editors as a definite and authoritative source of *policy-guidance* in an effective educational campaign to *awaken authors* to their *ethical responsibilities* in protecting their contributions against use other than for *bona fide educational or scientific purposes*." [Italic not in original.]

If these judgments apply to reprints—they certainly do—is it not preposterous to assume that they do not apply with equal pertinence to the free distribution for a supply house of 50,000 copies of an entire issue of a journal?—[*C. Ed.* (20)].

NEW INFORMATION ABOUT THE "HARVARD PLAN"

On pages 271-2 in the issue of the J.A.C.D. for June, 1942—in an allusion to a report of a committee of five "appointed to represent the Harvard Dental Alumni Association in any matter pertaining to the proposed change at the Dental School"—it was stated that "the prospective report will be considered at the meeting [of the Alumni Association] to be held on June 10, 1942." That report

was published in the November issue of the *Harvard Dental Alumni Bulletin* (pages 1-8). A few quotations are appended:

"Owing to circumstances beyond my control it has . . . developed into practically a one-man report"—by the chairman, Dr. W. Vernon Ryder, '05, four of the seven members (Drs. Bloom, Kent, Miner and Spinney) having resigned; two of the seven (Drs. Alden and Giblin) were inactive.

"The new school [Dental Medicine] had been established without any official consultation with the [Dental] Alumni Association and regardless of the protests of many individual alumni."

"Although the Dental School has always been under the Department of Medicine it was founded through the efforts of dental practitioners. The development and growth of the Dental School has been due to the effort of members of the dental profession. The alumni have given generously of their time toward its continuance and until recently the Medical School has taken very little interest."

"There are 34 items [in an official statement of the endowment funds of the Dental School] with a balance as of June 30, 1941, of \$2,333,314.81. . . . As I understand it, after the graduation of the last class from the Dental School in 1944 all the funds of that School will be transferred to the School of Medicine," which, with the grants obtained [from three foundations] for it, "will give the new School an endowment of something over \$3,700,000."

"The School of Dental Medicine is now in charge of a Committee on Instruction, of which Dean [of the Medical School] C. Sidney Burwell is the Acting Chairman. This Committee is responsible to the Faculty of Medicine."

"The curriculum of the new School is as yet not ready for publication. [The Committee on Curriculum, Dr. John W. Cooke, chairman, consists of ten members.] The success or failure of the new School hangs on this problem. . . . On May 12, 1942, Doctor Burwell said that they had recently run into some difficulties that would delay the catalogue at least until July. His feeling was that it would not be wise to go to print with something that might have to be changed."

"We should not go into causes leading up to the change [discontinuance of the Dental School, and substitution of the School of Dental Medicine]. . . . We should not at present discuss the merits or demerits of the new plan. . . . we should watchfully wait."

"We all know that the general attitude [of the dental profession] toward the School of Dental Medicine ranges all the way from hopeful expectation to downright skepticism with the preponderance of the feeling on the skeptical side."

"On May 20 I invited all of the members of the present Freshman Class

[of the School of Dental Medicine] to have dinner at the Harvard Club and spend an evening in discussing their problems and their attitude toward the new School. . . . They are all [a total of 7] enthusiastic about their first year [taken jointly and under conditions identical with those for the medical students], but this is to be expected because, we might say, they are all medically minded. Most of [them] . . . were more interested in research than in dentistry . . . [and] the majority . . . are very much in doubt whether they will want to go into medicine or into dentistry. It is true some of them think they will continue their interest in one of the dental specialties but I don't believe any of them have very much desire to become general practitioners of dentistry. They are also beginning to realize that after spending so much time in preparing themselves in medicine it would be folly not to avail themselves of the opportunity of registering with their own medical boards."

"Bewildered as I am, bewildered as you are, there is one thing certain. After 1944 the only connection you and I will have with Harvard University is through the School of Dental Medicine. It is therefore our duty, yes, privilege, regardless of what we may think of the experiment in its present form to stand behind it with all our strength."

There is no indication in the issue of the *Bulletin* of any action taken by the Alumni Association on Dr. Ryder's report. The *first* class (1941) has decreased from nine at the beginning to six at present. On page 12 of the same issue of the *Bulletin*, at the end of an anonymous note on the "*second* class admitted to the Harvard School of Dental Medicine"—a total of nine beginning July 1, 1942—the following statement is included:

"In *pioneer* ventures numbers alone are of little significance. Intelligence, courage, and vision are qualities that leaders must possess. These young men have these qualities and we look forward to their becoming leaders in the *development of dental medicine as a specialty of medicine*." [Italic not in original.]

Harvard University authorized, for publication in the newspapers on November 26, 1942, an announcement of these new conditions in the School of Dental Medicine: Dr. A. LeRoy Johnson, of New York City, has been appointed Professor of Clinical Dentistry. "In addition to his teaching duties [he] will serve as Executive Officer of a newly appointed Administrative Committee of the School which will be charged with general administrative responsibilities for the School." The members of this Committee, in addition to Dr. John-

son, are: Dr. C. Sidney Burwell, Dean of the Medical School and *chairman of the Committee*; also Drs. Percy R. Howe and Kurt H. Thoma.—[*C. Ed.* (21)].

ATTENDANCE AT THE U. S. DENTAL SCHOOLS

The appended summary extends the one published on page 101 of the issue of the J.A.C.D. for March, 1942, the data for 1942-43 having been taken from a preliminary announcement recently issued by the A.D.A. Council on Dental Education as of October 15, 1942:

NUMBER OF UNDERGRADUATES IN THE FOUR CLASSES

Year	Freshmen	Sophomores	Juniors	Seniors	Total
1940-41	2305	1973	1841	1601	7720
1941-42	2476	2072	1974	1833	8355
1942-43	2701	2160	2041	1946	8848
Gains					
1941-42	171	99	133	232	635
1942-43	225	88	67	113	493

ENROLLMENT OF UNDERGRADUATES IN THE 39 U. S. DENTAL SCHOOLS

	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43
Total	7184	7331	7407	7720	8355	8848
Average per school	184	188	190	198	214	227

Note the steady increase in total attendance since the adjustment to higher pre-professional requirements—1664 more undergraduates in the 39 schools this year than there were five years ago.—[*C. Ed.* (22)].

DECENCY PREVAILED

The last two issues of this JOURNAL contained protests against a "proposed degradation of dentists in a medico-dental society" (June, pages 275-79; Sep., pages 336-37). The appended quotation from an official notice dated December 2, 1942, from the headquarters of the International Anesthesia Research Society, presents the following related information:

"The Board of Governors at their regular meeting on November 15, 1942, unanimously passed the following motion:

" 'Inasmuch as the two-thirds vote for the new constitution was not attained, which was specified necessary under the old constitution, the new constitution is thereby not in force and henceforth the Society is working under the old constitution. According to the old constitution, the Board of Governors elected

during an annual Congress of Anesthetists will serve until the next annual Congress or until their successors have been elected. On this basis, the Board of Governors are continuing to serve until the next Congress can be held. The 1942 Congress was cancelled because of war conditions and another Congress will be held at the earliest possible moment feasible.'"

The facts in the foregoing quotation indicate that the designs of a few were not endorsed. The "official notice" also contained the assurance that "the International Anesthesia Research Society will function as usual and all members will be on equal footing as in the past."—[*C. Ed.* (23)]

BOOK ANNOUNCEMENTS

Year Book of Dentistry (1942): This book published annually by The Year Book Publishers, Inc., 304 S. Dearborn St., Chicago, is now available for the year just closing. Since this book does appear annually, it is familiar to all and will without doubt be received with interest. This issue is well printed, well selected, as to content, and well illustrated. Price \$3.00.

Ceramics in Dentistry, by Milton Cohen, D.D.S.; formerly Professor of Crown and Bridgework and Clinical Professor of Dental Ceramics and Ceramic Technology, New York University, College of Dentistry, New York City.

This text of 335 pages is well illustrated with 707 engravings on 696 figures, 26 in colors. Special binding, \$10.00, net. Published September, 1940. Lea & Febiger, Philadelphia.

NUTRITION REVIEWS

This is the name of a new magazine in the professional world. It is Vol. 1, No. 1, published by The Nutrition Foundation Inc., Chrysler Bldg., New York City. The editor is Frederick J. Stare, Ph.D., M.D., of Harvard University, who is assisted by a large staff of assistant editors.

The purpose as stated by the directors is that an "authoritative, unbiased and editorially interpreted review of the world's current research progress in the science of nutrition" may be available. It is just that—editorial comment—it should be helpful—subscription price, \$2.00 per year.

AMERICAN COLLEGE OF DENTISTS

REGISTER OF MEMBERSHIP

as of November 10, 1942

OTTO W. BRANDHORST, *Secretary*

St. Louis, Missouri

AMERICAN COLLEGE OF DENTISTS

I. REGISTER OF MEMBERSHIP

As of November 10, 1942

1. HONORARY FELLOWS¹

- Blair, Vilray P., '38, Metropolitan Building, St. Louis, Mo.
Blauch, Loyd E., '39, U. S. Office of Education, Washington, D. C.
Briggs, Lyman J., '40, National Bureau of Standards, Washington, D. C.
Carey, Eben James, '39, Marquette University, Milwaukee, Wis.
Cumming, Hugh S., '32, U. S. Public Health Service, Washington, D. C.
Hanzlik, Paul J., '33, Stanford University School of Medicine, San Francisco, Calif.
Heatwole, Timothy Oliver, '40, Walbert Apartments, 1800 N. Charles St., Baltimore, Md.
Horner, Harlan H., '42, 212 E. Superior St., Chicago, Ill.
Kraus, Edward H., '32, University of Michigan, Ann Arbor, Mich.
Leake, Chauncy D., '36, University of California, San Francisco, Calif.
Leary, Timothy, '31, 44 Burroughs St., Jamaica Plain, Mass.
Luckhardt, Arno B., '33, 5216 Greenwood Ave., Chicago, Ill.
McQuarrie, Irvine, '38, University of Minnesota, Minneapolis, Minn.
Miller, Sydney Robotham, '40, 1115 St. Paul St., Baltimore, Md.
Murphy, Francis Daniel, '39, Milwaukee County Hospital, Milwaukee, Wis.
Parran, Thomas, '40, U. S. Public Health Service, Washington, D. C.
Riggs, Charles E., '31, 3105-36th St., Washington, D. C.
Schwitalla, Fr. A. M., '38, St. Louis University, St. Louis, Mo.
Sinai, Nathan, '34, University of Michigan, Ann Arbor, Mich.
Souder, Wilmer, '30, National Bureau of Standards, Washington, D. C.
Thompson, Lewis R., '32, U. S. Public Health Service, Washington, D. C.
Waller, Clifford E., '33, 1103 W. Highland Drive, Woodside, Md.

Total, 22

2. ACTIVE FELLOWS¹

- Abbott, Rush P., '34, West Point, Miss.
Abbott, Thomas Richard, '38, 920 S. 37th St., Milwaukee, Wis.

¹Numerals following names indicate years of admission to membership.

*A founder.

**A founder and organizer.

- Adams, Philip Edwin, '37, 106 Marlborough St., Boston, Mass.
Addie, Charles B., Sr., '37, 1812 Spring Garden Rd., Philadelphia, Pa.
Aiguier, James E., '37, 1116 Medical Arts Bldg., Philadelphia, Pa.
Aisenberg, Myron S., '33, 42 S. Greene St., Baltimore, Md.
Alden, Harold W., '35, 160 Main St., Northampton, Mass.
Alexander, Howard, '33, 1305 E. 63rd St., Chicago, Ill.
Alford, Frank O., '39, First Natl. Bank Bldg., Charlotte, N. C.
Altfillisch, Henry J., '29, 722 Roshek Bldg., Dubuque, Ia.
Amies, Arthur, '38, care Australian College of Dentistry, 193 Spring St., Melbourne, Australia.
Anderson, Alvin B., '40, Hamilton Bank Bldg., Knoxville, Tenn.
Anderson, George M., '31, 831 Park Ave., Baltimore, Md.
Anderson, Henry A., '42, Medical Arts Bldg., Pittsburgh, Pa.
Applegate, Oliver C., '38, 2015 Woodside Rd., Ann Arbor, Mich.
Applegate, Stephen G., '39, 630 E. Jefferson Ave., Detroit, Mich.
Archer, W. Harry, Jr., '38, 804 Professional Bldg., Pittsburgh, Pa.
Armbrrecht, Edward C., '38, Wheeling, W. Va. (In Service—Navy)
Arnold, Earle S., '42, 37 Linnard Road, West Hartford, Conn.
Arnold, Edmond B., '38, 3306 Fannin St., Houston, Tex.
Arnold, Joseph P., '37, 1021 Esperson Bldg., Houston, Tex.
Arnott, Alwyn J., '32, care Dental Hospital, Chalmers St., Sydney, Australia.
Asch, Andrew J., '39, 8 West 40th St., New York, N. Y.
Ash, Percy A., '38, 137 Macquarie St., Sydney, Australia.
Ashbrook, John Stewart, '28, 310 Medical Arts Bldg., Pittsburgh, Pa.
Ashby, John L., '40, Box 728, Mount Airy, N. C.
Ashton, John T., '38, 108 N. Washington St., Alexandria, Va.
Atkins, A. Paul, '40, 3519 6th Ave., Des Moines, Ia.
Atkinson, Spencer Roane, '37, First Trust Bldg., Pasadena, Calif.
Austin, Louie T., '38, Mayo Clinic, Rochester, Minn.
Bach, Ernest N., '37, 305 Professional Bldg., Toledo, Ohio
Bailey, Adams, '39, 1 East 57th St., New York, N. Y.
Bailey, Elpha E., '36, 1124 Republic Bldg., Denver, Colo.
Baker, Charles Reeder, '28, 636 Church St., Evanston, Ill.
Baker, Chester A., '32, 1726 Eye St., N. W. Washington, D. C.
Baker, Frederick Cooper, '39, 5231 Hohman Ave., Hammond, Ind.
Baklor, Max Kentz, '42, 2201 Eutaw Place, Baltimore, Md.
Ball, Edward L., '31, 814 Doctors Bldg., Cincinnati, Ohio
Ballou, N. Talley, '37, State Dept. of Health, Richmond, Va.
Banks, Ernest Lee, '40, 805 Candler Bldg., Atlanta, Ga.
Bannister, Guy P., '42, 1036 Rose Bldg., Cleveland, Ohio

- *Banzhaf, Henry L., '21, 1217 W. Wisconsin Ave., Milwaukee, Wis.
Barber, Arthur D'Alanson, '33, 217 Eccles Bldg., Ogden, Utah
Barber, Henry U., Jr. '42, 5 East 57th St., New York, N. Y.
Barnard, Frank P., '35, 507 Main St., Worcester, Mass.
Barnwell, Charles M., '38, Medical Arts Bldg., Atlanta, Ga.
Barrett, Leland, '29, 133 W. 72nd St., New York, N. Y.
Barry, Aloysius L., '38, 144 Harrison St., E. Orange, N. J.
Bartlett, Avery Allen, '38, 525 David Whitney Bldg., Detroit, Mich.
Bassett, Charles Turk, '38, 1726 Eye St. N. W., Washington, D. C.
Bassman, Abraham H., '42, 411 E. Mason St., Milwaukee, Wis.
Baughman, Leo Melzer, '41, 232 Oxford Ave., Los Angeles, Calif.
Baumann, Charles J., '36, Milwaukee, Wis. (In service—Army)
Baus, Erwin Peter, '38, 4419 W. North Ave., Milwaukee, Wis.
Beachum, Horace Ryan, '42, 1209 Medical Arts Bldg., Dallas, Tex.
Bear, Harry, '29, 410 Professional Bldg., Richmond, Va.
Beckman, Arthur R., '40, 822 Medical Arts Bldg., Dallas, Tex.
Becks, Hermann, '35, 154 Yerba Buena Ave., San Francisco, Calif.
Bell, Dickson G., '38, 450 Sutter St., San Francisco, Calif.
Bell, Frank J., '39, Billings, Mont.
Benbrook, Charles M., '27, 707 Theatre Auditorium Bldg., Los Angeles
Calif.
Bennett, Glenn, '42, 262 W. Grand Ave., Wisconsin Rapids, Wis.
Bennett, Paul Hamilton, '38, 907 Valley Bank Bldg., Tucson, Ariz.
Benney, Clarence R., '39, Post Dental Clinic, Fort Sam Houston, Tex.
(Army—regular)
Benson, William J. H., '29, 536 Wisconsin Ave., Milwaukee, Wis.
Berger, Adolph, '29, 133 East 58th St., Grand Central, No., New York,
N. Y.
Bergstrom, Hyrum, '33, 229 Seventh Ave., Salt Lake City, Utah
Berkey, Hugh Thomas, '38, 408 Wayne Pharmacal Bldg., Fort Wayne,
Ind.
Berry, John J., '42, Deadwood, S. Dak.
Berthel, Russell W., '38, 903 Lowry Bldg., St. Paul, Minn.
Bertram, Irvin Roy, '38, 966 Metropolitan Bldg., Denver, Colo.
Best, J. V. Hall, '38, 135 Macquarie St., Sydney, Australia
Bettman, M. M., '36, 528 Medical Arts Bldg., Portland, Ore.
Birenbach, Samuel, '40, Whitehall Hotel, 100th St. and Broadway,
New York, N. Y.
Bishop, Lyall O., '42, Bank of America Bldg., Berkeley, Calif.
Black, J. Cannon, '29, 55 E. Washington St., Chicago, Ill.
Blackwell, Robert E., '29, 180 N. Michigan Ave., Chicago, Ill.
Blaisdell, Edwin C., '34, 5 Market St., Portsmouth, N. H.

- Blake, Reuben Lloyd, '36, Butler Bldg., San Francisco, Calif.
Blakeman, Robert I., '27, 603 Hume Mansur Bldg., Indianapolis, Ind.
Blakemore, J. Frank, '41, 613 1st Nat. Bank Bldg., Ft. Smith, Ark.
Blanquie, Raoul Henry, '36, Flood Bldg., San Francisco, Calif.
Blevins, Denzell C., '42, Chesterfield Ave., Centreville, Md.
Blue, James A., '26, 512 Merchants Bldg., Mobile, Ala.
Blum, Theodor, '23, 101 E. 79th St., New York, N. Y.
Blutau, Theodore C., '40, 89 East Ave., Rochester, N. Y.
Bock, Charles Adam, '41, Baltimore, Md. (In service—Army)
Bodecker, Charles Francis, '26, 630 W. 168th St., New York, N. Y.
Bolks, Harry Garrett, '41, 923 Badgerow Bldg., Sioux City, Ia.
Booth, Cecil O., '29, 405 Flannery Bldg., Pittsburgh, Pa.
Booth, John J., '33, Marion, Iowa
Boots, John L., '28, Severance Medical Union, Seoul, Korea
Bossert, Walter, A., '40, 1346 Taylor Ave., Bronx, N. Y.
Bostwick, Frank Brown, '26, 10 No. Main St., Woodstown, N. J.
Bowles, Shirley W., '28, 3875 Wilshire Blvd., Los Angeles, Calif.
Box, Harold Keith, '38, 86 Bloor St. West, Toronto, Canada
Boyd, Bert, '30, 610 S. Broadway, Los Angeles, Calif.
Boyden, Carl H., '42, 202 Medical Arts Bldg., Mitchell, S. Dak.
Boydston, Walter J., '37, 204 Masonic Temple, Fairmont, W. Va.
Boyko, G. Victor, '40, 64 Hamilton St., Paterson, N. J.
Brach, Louis, '34, 112 Monticello Ave., Jersey City, N. J.
Bradford, Harry, '37, Medical Arts Bldg., Birmingham, Ala.
Brady, Ewing P., '33, 7239 Northmoor Drive, St. Louis, Mo.
Branch, Ernest A., '38, State Board of Health, Raleigh, N. C.
Brand, Thurlow Weed, '29, 28 Oakwood Square, Pittsburgh, Pa.
Brandhorst, Otto W., '34, 4952 Maryland Ave., St. Louis, Mo.
Brandon, Gerald Ivanhoe, '38, 3203 Garrison Blvd., Baltimore, Md.
Brann, Clinton T., '40, Davenport, Ia. (In service—Army)
Brashear, Alton Dean, '41, Richmond, Va. (In service—Army)
Brauer, John C., '38, Iowa City, Ia. (In service—Army)
Bray, Joseph A., '42, 99 Pratt St., Hartford, Conn.
Brekhus, Peter J., '34, 1967 E. River Road, Minneapolis, Minn.
Bremner, M. D. K., '33, 55 E. Washington St., Chicago, Ill.
Brevig, Harold R. H., '33, 27 E. Monroe St., Chicago, Ill.
Bricker, Frederick A., '33, 3780 Wilshire Blvd., Los Angeles, Calif.
Briggs, E. Fred, '39, 116 Hammond Ave., Bangor, Maine
Broadbent, B. Holly, '33, 1400 Keith Bldg., Cleveland, Ohio
Broadhurst, Geo. B., '38, St. Louis, Mo. (In service—Army)
Brock, David W., '38, 4903 Delmar Blvd., St. Louis, Mo.
Brock, Sam H., '38, 1318 Medical Arts Bldg., Dallas, Tex.

- Brockington, Marion L., '33, Cherokee Road, Florence, S. C.
Bronner, Finn J., '37, 209 East 23rd St., New York, N. Y.
Brooks, Clarence G., '39, 302 State St., New London, Conn.
Broussard, A. Claude, '38, 1116 Maison Blanche, New Orleans, La.
Brown, Chas. Frederick, '38, 432 Mack Bldg., Denver, Colo.
Brown, George Cowles, '35, 332 Main St., Worcester, Mass.
Brown, Homer C., '23, 1816 Franklin Ave., Columbus, Ohio
Brown, James A., '38, Lister Bldg., St. Louis, Mo.
Brown, J. Draper, Jr., '39, Madison at 10th St., Wilmington, Del.
Brown, John H., '38, P. O. Box 104, Newton, Miss.
Brown, Little Berry, '38, Atlanta-Southern Dental College, Atlanta, Ga.
Brown, Robert Kennard, '32, Campus Bldg., Ann Arbor, Mich.
Brown, Wm. Wiley, '38, 508 Frisco Bldg., Joplin, Mo.
Browne, Wilbur F., '40, Town Bldg., Brunswick, Me.
Brownlie, Ira C., '30, 536 Metropolitan Bldg., Denver, Colo.
Bruening, Edward H., '22, The Ranch House of Los Ranchos Perkins, Tucson, Ariz.
Brun, B. Lucian, '29, 827 Park Ave., Baltimore, Md.
Bryan, Alvin Wesley, '28, Box 727, Iowa City, Ia.
Bryans, Walter J., '38, 76 Park St., Lee, Mass.
Budge, David Clare, '29, Logan, Utah.
Bull, Harry L., '37, 921 Bergen Ave., Jersey City, N. J.
Bunker, Herbert L., '42, 440 West 1st St., Junction City, Kans.
Bunting, Russell W., '22, University of Michigan, Ann Arbor, Mich.
Burkart, Howard Houston, '41, 106 Forrest Ave., N. E. Atlanta, Ga.
Burke, John Francis, '41, 921 Bergen Ave., Jersey City, N. J.
Burke, William Edw., '42, 220 Marlborough St., Boston, Mass.
Burket, George E., '30, Kingman, Kansas
*Burkhart, Harvey J., '21, Rochester Dental Dispensary, Rochester, N.Y.
Burkhart, Richard H., '40, 5 E. 53rd St., New York, N. Y.
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Rohde, Arthur C., '26, 324 E. Wisconsin Ave., Milwaukee, Wis.
Rohde, Frank G., '40, Columbus, Nebr.
Rollins, Fred Goldsmith, '32, Boston, Mass. (In service—Army)
Rudolph, Charles E., '31, 909 Metropolitan Bank Bldg., Minneapolis, Minn.
Rule, Robert W., Jr., '41, 450 Sutter Street, San Francisco, Calif.
Rusca, Felix St. Elmo, '34, 3943 Chestnut St., Philadelphia, Pa.
Rushing, Shade P., '37, 212 Armstrong Bldg., El Dorado, Ark.
Sager, Louis E., '39, 8 Belgrade Ave., Roslindale, Mass.
Samuel, James H., '40, Record Bldg., Morristown, N. J.
Sand, Russell Agern, '40, Fargo, N. Dak. (In service—Army)
Sapienza, Benedict Francis, '37, 712 Comer Bldg., Birmingham, Ala.
Sargeant, Walter S., '40, 806 Nicholas Bldg., Toledo, Ohio
Sauer, Raymond J., '38, 30 N. Michigan Ave., Chicago, Ill.
Sausser, Emerson R., '37, 269 S. 19th St., Philadelphia, Pa.
Sawyer, Carl Woodward, '40, 10th and Troost Sts., Kansas City, Mo.
Sayre, Loren Dana, '34, 30 N. Michigan Ave., Chicago, Ill.
Schaefer, Frederick W., '40, 721 Barker Bldg., Omaha, Nebr.
Schaefer, Joseph E., '33, Chicago, Ill. (In service—Army)
Schelpert, John W., Jr., '39, 125 Prospect Ave., Mt. Vernon, N. Y.
Scherer, Walter H., '34, 1620 Medical Arts Bldg., Houston, Tex.
Schlosser, Rudolph O., '32, 311 East Chicago Ave., Chicago, Ill.
Schmid, Adolph Robert, '38, 1033 Third Ave., Worthington, Minn.
Schneer, Jacob Bernard, '39, New York, N. Y. (In service—Army)
Schott, Carlos H., '31, 1004 Neave Bldg., Cincinnati, Ohio
Schultz, Louis Charter, '40, University of Michigan, Ann Arbor, Mich.
Schuyler, Clyde H., '32, 400 Madison Ave., New York, N. Y.
Schwartz, Philip L., '39, 49 Bayard St., New Brunswick, N. J.
Scott, Jay D., '38, 315 Alemada Road, Kansas City, Mo.
Scott, Saxon Bird, '29, 291 Geary St., San Francisco, Calif.
Scruggs, Anderson McLaren, '35, 11, The Prado, N. E. Apt. 1, Atlanta, Ga.
Selberg, Alver, '35, 344 Fourteenth St., San Francisco, Calif.
Selden, Joseph L., '29, 118 S. Perterson Ave., Louisville, Ky.
Selleck, George A., '35, 450 Sutter St., San Francisco, Calif.
Semans, Harry M., '22, Ohio State University, Columbus, Ohio
Shackelford, John H., '39, 1601 David Whitney Bldg., Detroit, Mich.
Shapiro, Benjamin, '39, 849 Eastern Parkway, Brooklyn, N. Y.
Shapiro, Jacob, '39, 766 Eastern Parkway, Brooklyn, N. Y.

- Shapiro, Simon, '38, 142 Joralemon St., Brooklyn, N. Y.
Shaw, James H., '40, 724 Power and Light Bldg., St. Petersburg, Fla.
Shaw, Wm. S., '39, 304 First Nat'l Bank Bldg., Fargo, N. D.
Shearer, William, '27, 619 City National Bank Bldg., Omaha, Nebr.
Sheffer, Will Gross, '36, Medico-Dental Bldg., San Jose, Calif.
Sheffield, L. Langdon, '40, 730 Toledo Medical Bldg., Toledo, Ohio
Sheffield, Neal, '41, 304 Dixie Building, Greensboro, N. C.
Shehan, Daniel Edward, '41, 619 Medical Arts Bldg., Baltimore, Md.
Shellman, Joseph F., '38, 903 Lowry Medical Arts Bldg., St. Paul, Minn.
Shuman, Harry B., '39, 29 Commonwealth Ave., Boston, Mass.
Shurr, Raymond Carter, '39, Valparaiso, Ind. (In service—Army)
Simkins, William Morris, '28, 412 Vanderbilt Road, Biltmore, N. C.
Simmons, Richard F., '37, 705 Medical Arts Bldg., Norfolk, Va.
Simpson, Richard Lee, '29, 301 East Franklin St., Richmond, Va.
Slater, William K., '38, 1005 Medical Arts Bldg., Knoxville, Tenn.
Slaughter, Nathaniel G., '31, Athens, Ga.
Sloman, Ernest G., '38, 344 Fourteenth St., San Francisco, Calif.
Small, Donald Meeds, '37, Kennebunk, Me.
Small, Herbert Bates, '38, 82 Church St., Burlington, Vt.
Smedley, Wm. P., '38, 1206 Republic Bldg., Denver, Colo.
Smith, A. Malcolm, '37, 416 Tampa St., Tampa, Fla.
Smith, Arthur G., '26, P. O. Box 665, Tryon, N. C.
Smith, C. Carroll, '38, 906 N. Sheridan Rd., Peoria, Ill.
Smith, Chas. M., '39, 727 Jefferson Bldg., Peoria, Ill.
Smith, Earle S., '30, University of Iowa, Iowa City, Ia.
Smith, Edbert A., '38, 985 Fullerton Ave., Montclair, N. J.
Smith, Edward Henry, '29, 216 West Cook Ave., Libertyville, Ill.
Smith, F. Noel, '38, 617 Medical Arts Bldg., Baltimore, Md.
Smith, Harold S., '24, 180 N. Michigan Ave., Chicago, Ill.
Smith, Harry L., '33, Charlottesville, Va.
Smith, Lou T., '42, American Trust Bldg., San Jose, Calif.
Smith, Prescott E., '36, 922 Canal Bank Bldg., New Orleans, La.
Smith, Ray Victor, '38, 504 Oakland Ave., Iowa City, Ia.
Smith, T. Sydney, '30, 85 Marcela Ave., San Francisco, Calif.
Smith, Wiley W., '40, 401 Professional Bldg., Baltimore, Md.
Snapp, Ralph B., '40, 201 Fairmont Ave., Winchester, Va.
Sniffen, David A., '35, 121 Westchester Ave., White Plains, N. Y.
Snyder, Dick Pearl, '38, 137 E. State St., Columbus, Ohio
Snyder, Louis Frederick, '42, Marine Corps Base, San Diego, Calif.
(Navy—regular)
Sommers, Hilmer F., '38, School of Dentistry, University of Pittsburgh, Pittsburgh, Pa.
Sommers, Roy Sherman, '38, 1115 Equitable Bldg., Des Moines, Ia.

- Sorensen, Hans W., '36, 450 Sutter St., San Francisco, Calif.
Spalding, Edward B., '26, 555 W. Maple Ave., Birmingham, Mich.
Spencer, Earl W., '42, 620 Thatcher Bldg., Pueblo, Colo.
Spencer, Guy Louis, '38, 906 Sharp Bldg., Lincoln, Nebr.
Spencer, James F., '41, 1521 Grand Rapids Nat'l Bank Bldg., Grand Rapids, Mich.
Spicer, Albert H., Jr., '35, Westerly, R. I.
Spinney, David F., '38, 1330 Beacon St., Boston, Mass.
Spotts, William B., '38, 522 University Club Bldg., St. Louis, Mo.
Sprau, Robert L., '27, 970 Baxter Ave., Louisville, Ky.
Springsted, James H., '38, Berea College, Berea, Ky.
Sprinkel, A. Hume, '39, Staunton, Va.
Spurgeon, John S., '32, Hillsboro, N. C.
Squires, Franklin A., '38, Medical Centre, White Plains, N. Y.
Squires, William A., '38, 115 Broadway, New York, N. Y.
Stafne, Edward C., '38, Mayo Clinic, Rochester, Minn.
Staples, George A., '33, 6 Concord St., Nashua, N. H.
Starr, Ernest Edwin, '40, 1935 S. E. 23rd St., Portland, Ore.
Starr, Frank C., '40, 150 E. Broad St., Columbus, Ohio
Stephan, John Franklin, '25, 1038 Keith Bldg., Cleveland, Ohio
Stern, Leo, '32, 745 Fifth Ave., New York, N. Y.
Stickney, Truman L., '37, Wallace Block, Crookston, Minn.
Stillman, Paul R., '23, Longwood, Fla.
Stillson, Wm. Chas., '35, 10208 Euclid Ave., Cleveland, Ohio
Stillwell, Edw. C., '38, Glen Ridge Arcade, Glen Ridge, N. J.
Stratton, George Allen, '27, Oshkosh, Wis.
Streett, H. Hayward, '32, 829 Park Ave., Baltimore, Md.
Stricker, Carl Henry, '38, 359 Doctors Bldg., Cincinnati, Ohio
Strosnider, Charles W., '37, 21 East State St., Columbus, Ohio
Sturdevant, Roger E., '41, 106 Forrest Ave., N. E. Atlanta, Ga.
Sturm, C. Ray, '38, 7 Park Drive, Fairmont, W. Va.
Sullivan, Joseph David, '38, 919 Toledo Medical Bldg., Toledo, Ohio
Sullivan, Robert Fulton, '39, Savannah, Ga. (In service—Army)
Summers, Howard E., '35, 1015 First Nat'l Bank Bldg., Huntington, W. Va.
Sundby, Elmer Julius, '38, 825 Medical Arts Bldg., Duluth, Minn.
Swanson, Clarence H., '42, Columbus, Mont.
Swanson, Edgar Walford, '40, 25 E. Washington St., Chicago, Ill.
Swanson, Henry A., '35, 1726 Eye St. N. W., Washington, D. C.
Swanson, William F., '32, 5326 Pocussett St., Pittsburgh, Pa.
Sweet, Charles A., '32, Summit Medical Bldg., Oakland, Calif.
Swift, Thomas C., '39, 132 Rich Ave., Mt. Vernon, N. Y.

- Swinehart, Earl W., '28, 717 Medical Arts Bldg., Baltimore, Md.
Taggart, Chas. Ives, '38, 139 Bank St., Burlington, Vt.
Talbot, William O., '28, 1508 Trinity Life Bldg., Fort Worth, Tex.
Tannebring, Wm. Chas., '38, 163 Cabot St., Beverly, Mass.
Tartre, Joseph Armand, '40, Naval Training Station, Great Lakes, Ill.
(Navy—regular)
Taylor, Cecil McDow, '41, 1018 Esperson Bldg., Houston, Tex.
Taylor, Edward, '41, 108 West 15th St., Austin, Tex.
Taylor, Elbert Woodson, '38, 906 Exchange Bldg., Memphis, Tenn.
Taylor, Richard P., '37, 414 St. James Bldg., Jacksonville, Fla.
Taylor, Walter Elliott, '39, 630 Fifth Ave., New York, N. Y.
Templeton, James W., '38, 4952 Maryland Ave., St. Louis, Mo.
Terrell, Wilfrid H., '38, 627 First Trust Bldg., Pasadena, Calif.
Teuscher, George William, '40, 55 E. Washington St., Chicago, Ill.
Thatcher, George A., '34, 101 Main St., Brockton, Mass.
Thielen, Benj. Franklin, '38, 604 First Nat'l Bank Bldg., Paris, Tex.
Thoen, Erling, '29, 1026 Kirkwood Ave., Iowa City, Ia.
Thom, Louis W., '38, 1546 Medical Arts Bldg., Minneapolis, Minn.
Thomas, Earle H., '28, 55 E. Washington St., Chicago, Ill.
Thomas, Elmer A., '32, 200 Gaston Bldg., Hastings, Nebr.
Thomas, Robert Palmore, '27, 720-22 Francis Bldg., Louisville, Ky.
Thomas, Thomas Heathcote, '39, 1747 Medical Arts Bldg., Minneapolis, Minn.
Thompson, Edward Lauck, '38, 326½ South Beach St., Daytona Beach, Fla.
Thompson, Emory C., '38, 333 Linwood Ave., Buffalo, N. Y.
Thompson, Walter S., '36, Roosevelt Bldg., Los Angeles, Calif.
Thomson, Harry S., '39, 312 Medical Arts Bldg., Toronto, Canada
Thorn, Doran S., '40, 1361 Hamilton St., N. W., Washington, D. C.
Thornton, Irl Jay, '41, Medical Arts Bldg., Dallas, Tex.
Thornton, M. H., '39, 180 N. Snelling Ave., St. Paul, Minn.
Tiblier, Sidney Louis, '40, 1141 Canal Bank Bldg., New Orleans, La.
Timmons, Gerald D., '36, Temple University, Philadelphia, Pa.
Tishler, Benjamin, '39, 358 Commonwealth Ave., Boston, Mass.
Tison, Gordon Beldon, '37, 505 W. University Ave., Gainesville, Fla.
Todd, Russell I., '40, Western Union Bldg., Richmond, Ky.
Tolan, Joseph James, '39, 208 E. Wisconsin Ave., Milwaukee, Wis.
Travis, John J., '37, 721 N. University Ave., Ann Arbor, Mich.
Traynor, Phillip A., '38, 807 Washington St., Wilmington, Del.
Trier, Jerome H., '38, 993 Park Ave., New York, N. Y.
True, Harry A., '30, 344 Fourteenth St., San Francisco, Calif.
Tucker, J. Ross, '41, 813 Candler Bldg., Atlanta, Ga.

- Tuckfield, William J., '24, Dallas Monomeath Ave., Canterbury, Victoria, Australia
- Turner, Lewis Chambers, '38, 926 Medical Arts Bldg., San Antonio, Tex.
- Turnquist, Herbert Ellis, '40, Minneapolis, Minn. (In service—Army)
- Tweed, Chas. Henry, Jr., '38, 805 Valley Bank Bldg., Tucson, Ariz.
- Tyler, John Edward, '38, 311 Main St., Worcester, Mass.
- Tylman, Stanley D., '29, 187 N. Wabash Ave., Chicago, Ill.
- Uebele, Harvey M., '34, 208 E. Wisconsin Ave., Milwaukee, Wis.
- Ulen, Francis Graeme, '42, 4000 Cathedral Ave., N. W. Washington, D. C. (Navy—regular)
- Underwood, Harry Mason, '40, 1003 Medical Arts Bldg., Knoxville, Tenn.
- Van Horn, Chris S., '32, 424 Iron St., Bloomsburg, Pa.
- Van Huysen, Grant, '40, 5736 N. New Jersey Ave., Indianapolis, Ind.
- Van Kirk, Lawrence Edw., '29, 6049 Jenkins Arcade, Pittsburgh, Pa.
- Van Natta, Howard, '40, Medical Arts Bldg., Baltimore, Md.
- Vann, Geo. S., '26, Gadsden Nat'l Bank Bldg., Gadsden, Ala.
- Van Valey, Edwin G., '39, 38 East 61st St., New York, N. Y.
- Varnado, Major Brooks, '40, 1239 Maison Blanche, New Orleans, La.
- Vaughan, Clarence B., '37, 363 Marlboro St., Boston, Mass.
- Vaughn, James J., '34, 1001 Medical Arts Bldg., Nashville, Tenn.
- Vedder, Francis B., '33, 711 N. University Ave., Ann Arbor, Mich.
- Vignes, C. Victor, '23, 922 Canal Bank Bldg., New Orleans, La.
- Viner, Frank J., '38, Creighton University, Omaha, Nebr.
- Vinsant, Robert Sherman, '31, 1728 Madison Ave., Memphis, Tenn.
- Vogan, John Wilbur, '41, Alvin, Texas
- Voiers, Allen L., '42, Jeffersonville, Ind.
- *Volland, Roscoe H., '21, First National Bank Bldg., Iowa City, Ia.
- Waddell, J. Clark, '34, 413 Murphy Bldg., E. St. Louis, Ill.
- Wagner, Ralph O., '39, 431 30th St., Oakland, Calif.
- Wahl, Leonard P., '38, 317½ Jackson St., Wausau, Wis.
- Wainwright, William Ward, '40, University of California, San Francisco, Calif.
- Wakefield, Bernard G., '40, 333 Linwood Ave., Buffalo, N. Y.
- Wald, S. S., '38, New York, N. Y. (In service—Navy)
- Waldron, Carl William, '28, 730 LaSalle Bldg., Minneapolis, Minn.
- Waldron, Ralph, '23, 549 High St., Newark, N. J.
- Walker, Alfred, '23, 501 Madison Ave., New York, N. Y.
- Wallace, J. Sim, '29, Park Bourne, Hampton Wick, London, England
- Walls, James Milton, '34, 828 Lowry Medical Arts Bldg., St. Paul, Minn.

- Walls, Milton G., '39, 828 Lowry Medical Arts Bldg., St. Paul, Minn.
Walsh, Arthur L., '38, McGill University, Montreal, Canada
Walsh, Joseph Richard, '38, 67 S. Clinton St., E. Orange, N. J.
Walsh, Leonard Theodore, '39, 442 Thatcher Bldg., Pueblo, Colo.
Waltmon, William Knight, '40, Marshall Bldg., Hearne, Texas.
Walton, Charles R. B., '42, 114 Arlington Apartments, Pittsburgh, Pa.
Walz, William F., '23, 1114 First Nat'l Bank Bldg., Lexington, Ky.
Warburton, Wm. Leslie, '40, 703 Medical Arts Bldg., Salt Lake City,
Utah
Ward, Marcus L., '23, 1308 Cambridge Road, Ann Arbor, Mich.
Wash, Atwood M., '38, Medical Arts Bldg., Richmond, Va.
Watkins, Joseph Conrad, '25, 503 Wachovia Bank Bldg., Winston-
Salem, N. C.
Watson, Alfred P., '34, 2939 Willamette Blvd., Portland, Ore.
Watts, Clarence V., '27, 315 K. of P. Block, Des Moines, Ia.
Waugh, Leuman M., '23, 931 Fifth Ave., New York, N. Y.
Way, T. Irving, '32, Vernon Manor, Cincinnati, Ohio
Weaver, Samuel Marshall, '38, 1632 Keith Bldg., Cleveland, Ohio
Webster, Frederick W., '38, 1016 Stuart Ave., Lincoln, Nebr.
Wekenman, Chas. William, '40, 525 Couch Ave., Kirkwood, Mo.
Welch, Harold W., '40, 25 E. Washington St., Chicago, Ill.
Welker, John J., '38, 1144 Edison Bldg., Toledo, Ohio
Weller, Roland Edward, '39, 29 Commonwealth Ave., Boston, Mass.
Wells, Amos S., '37, 700 Physicians & Surgeons Bldg., Minneapolis,
Minn.
Wennerberg, Gunnar N., '39, U. S. Naval Air Station, Pearl Harbor,
T. H. Box, 1394. (Navy—regular)
Werner, Jack, '35, 344 Fourteenth St., San Francisco, Calif.
West, Clyde C., '40, 1951 Irving Park Road, Chicago, Ill.
West, Frederick T., '29, 135 Stockton St., San Francisco, Calif.
West, John Bernard, '38, 306 W. Church St., Elmira, N. Y.
West, Sylvan Edmond, '37, 450 Sutter St., San Francisco, Calif.
Westfall, Beverly Kemper, '40, 1006 Hume Mansur Bldg., Indianapolis,
Ind.
Wheeler, Russell C., '38, Missouri Theatre Bldg., St. Louis, Mo.
Wherry, Arthur C., '31, 910 Deseret Bank Bldg., Salt Lake City, Utah.
Wherry, Styles W., '33, First National Bank Bldg., Ogden, Utah
Whinery, Frank B., '40, Iowa State Bank and Trust Bldg., Iowa City, Ia.
White, F. Denton, '30, 512 Physicians & Surgeons Bldg., Minneapolis,
Minn.
White, Oliver Wilson, '35, 213 David Whitney Bldg., Detroit, Mich.

- White, Paul Gardiner, '30, Navy Dispensary Yard, Philadelphia, Pa.
(Navy—regular)
- White, Wm. Wayne, '38, 722 Argyle Bldg., Kansas City, Mo.
- Whiteman, Joseph D., '32, Mercer, Pa.
- Whiteman, Wilbert J., '38, 1529 David Whitney Bldg., Detroit, Mich.
- Whitman, Alton B., '41, 108 E. Central, Orlando, Fla.
- Whitson, Glenn Haverly, '42, 80 Hanson Place, Brooklyn, N. Y.
- Whittaker, H. F., '28, 406 Tegler Bldg., Edmonton, Canada
- Wiethoff, Charles Albert, '37, 909 Medical Arts Bldg., Minneapolis, Minn.
- Willett, Raymond C., '36, 535 Jefferson Bldg., Peoria, Ill.
- William, Maurice, '34, 200 West 57th St., New York, N. Y.
- Williams, Albert P., '36, Starks Bldg., Louisville, Ky.
- Williams, Austin Thos., '40, 70 Washington St., Salem, Mass.
- Williams, Edward L., '29, 1316 Medical Arts Bldg., Houston, Tex.
- Williams, John Bell, '29, St. Luke's Hospital, Richmond, Va.
- Williams, Joseph H., '37, Beaumont Medical Bldg., St. Louis, Mo.
- Wilson, George William, '29, 604 N. Sixteenth St., Milwaukee, Wis.
- Wilson, John Lacy, '35, 940 N. Campbell Ave., Indianapolis, Ind.
- Wilson, Walter A., '39, 28 Duncan Ave., Jersey City, N. J.
- Winter, Leo, '40, 2 East 69th Street, New York, N. Y.
- Wintrup, John Paul, '38, Wilmington, Del. (In service—Army)
- Wisan, Jacob M., '42, New Jersey State Dept. of Health, Trenton, N. J.
- Wise, Albert Irwin, '32, 2004 Clark Bldg., Pittsburgh, Pa.
- Wittich, Harold C., '41, 490 Lowry Bldg., St. Paul, Minn.
- Wolfe, Allen Scott, '29, 1710 Rhode Island Ave., N. W., Washington, D. C.
- Wood, Harry T., '38, 1261 David Whitney Bldg., Detroit, Mich.
- Wood, William A., '38, 1004 Merchants Nat'l Bank Bldg., Mobile, Ala.
- *Woodbury, Charles E., '21, 604 Bennett Bldg., Council Bluffs, Ia.
- Woods, Fred Sumner, '38, 704 Congress St., Portland, Me.
- Woodworth, J. Galvin, '33, 40 North St., Buffalo, N. Y.
- Wright, Clarence John, '38, 701 American State Savings Bank Bldg., Lansing, Mich.
- Wright, Edgar Allan, '41, 70 Washington St., Salem, Mass.
- Wright, Walter H., '27, 1306 Penn Ave., Wilkesburg, Pa.
- Wright, W. R., '23, Jackson, Miss.
- Wyman, Eugene Barry, '39, 51 Brattle St., Cambridge, Mass.
- Yando, Arthur H., '40, U. S. Naval Dental School, National Medical Center, Bethesda, Md. (Navy—regular)
- Yost, Howard, '39, 402 First Nat'l Bank Bldg., Grand Island, Nebr.
- Young, Alfred Clyde, '29, 121 University Place, Pittsburgh, Pa.

Young, William Andrew, '37, 40 N. Main St., Concord, N. H.
 Zeisz, Robert C., '36, 490 Post St., San Francisco, Calif.
 Zemsky, James L., '38, 147 Fourth Ave., New York, N. Y.
 Ziegler, Samuel, '38, 405 Lowry Medical Arts Bldg., St. Paul, Minn.
 Zimmerman, Neal L., '36, 620 Medical Dental Bldg., Portland, Ore.
 Zugsmith, Robert, '23, 3401 Fifth Ave., Pittsburgh, Pa.

Total, 1118

3. GEOGRAPHIC DISTRIBUTION OF ACTIVE FELLOWS

1. United States

Alabama: Blue, Bradford, Chandler (C.), Hassell, Hopping, Matthews, Patton, Sapienza, Vann, Wood (W.)—10.

Arizona: Bennett (P.), Bruening, Johnson (W.), Tweed—4.

Arkansas: Blakemore, Gibbs, Gray (M.), Johnson (E. H.), Jordan (J.), Koch, Rushing—7.

California: Atkinson, Baughman, Becks, Bell (D.), Benbrook, Bishop, Blanquie, Blake, Bowles, Boyd, Bricker, Childs (H.), Christiansen, Coleman (B.), Davis (A.), Dillon (C.), Durst, Endelman, Engstrom, Fleming (W.), Fontaine, Ford (L.), Frisbie, Giffen, Gill, Goodman, Graham (J.), Gray (C.), Green (Roy A.), Grover, Gurley (J.), Hambly, Harrison (W.), Hasbrouck, Hayes (G.), Hogeboom, Hollenbeck, House, Hughes (G.), Humphreys, Hunt (V.), Inskipp, Johnson (C.), Johnson (E. L.), Jones (E.), Kibler, Kingsbury, Kirtland, Leggett (J.), Leggett (R.), Leslie, Locke, Loop, Lucas, Lufkin, Marshall (L.), Mauer, McCoy, Merriman, Milliken, Moose, Nesbitt, Nuckolls, Petray, Potter, Robinson (W.), Rule, Scott (S.), Selberg, Selleck, Sheffer, Sloman, Smith (L.), Smith (T.), Sorensen, Sweet, Terrell, Thompson (W.), True, Wagner, Wainwright, Werner, West (F.), West (S.), Zeisz—85.

Colorado: Bailey (E.), Bertram, Brown (C.), Brownlie, Carmody, Chambers, Cogswell, Devitt, Downs, Giesecke, Hoffman (H.), Kelly (A.), Monroe, Roberts (Z.), Rogers (E. A.), Smedley, Spencer (E.), Walsh (L.)—18.

Connecticut: Arnold (E. S.), Bray, Brooks, Conran, Cory, Hertz, McLaughlin, Peterson, Murlless—9.

Delaware: Brown (J. D.), Cannon, Combs, Jefferis, Price (R.), Traynor, Wintrup—7.

District of Columbia: Baker (C. A.), Bassett, Camalier, Cogan, (W.), Erikson, Glezen, Jordan (L.), Kaplan, Krogh, Lynch (D.), McCole, McGehee, Paffenbarger, Swanson (H.), Thorn, Wolfe—16.

Florida: Caraballo, Cartee, Davis (W. McL.), Gillespie, Johnson (E. A.), Masters, Pankey, Pattishall, Penn, Shaw (J.), Smith (A. M.), Stillman, Taylor (R.), Thompson (E.), Tison, Whitman—16.

Georgia: Banks, Barnwell, Brown (L.), Burkart, Byrnes, Childs (W.), Coleman (W.), Foster (S.), Garrett, Harpole, Holliday (P.), Huff, Hunter, Jaynes, Johnston (H.), Mason (R.), Mitchell (G.), Mitchell (J.), Mitchell (R. D.), Murphy (R.), Scruggs, Slaughter, Sturdevant, Sullivan (R.), Tucker—25.

Idaho: Colver—1.

Illinois: Alexander, Baker (C. R.), Black (J.), Blackwell, Bremner, Brevig, Cameron (D.), Cart, Clark (S.), Clendenen, Conklin, Coolidge, Dittmar, Edlund, Fisher (H. G.), Ford (J.), Freeman, Gallie (D. M.), Gallie (D. M., Jr.), Gethro, Haberle, Hayes (H.), Hewett, Hoeffel, Hoffman (A.), Jelinck, Johnson (L.), Knapp, Kremer, Kurth, Lee (H.), Logan, Lundquist, MacBoyle, McNulty, Marjerison, Marks, Miller (Howard), Molt, Morrey, Mueller, Noyes (F.), Noyes (H.), Olafsson, Partridge, Pendleton, Pinney, Sauer, Sayre, Schaefer (J.), Schlosser, Smith (C. C.), Smith (C. M.), Smith (E.), Smith (H.), Swanson (E.), Teuscher, Thomas (E. H.), Tylman, Waddell, Welch, West (C.), Willett—63.

Indiana: Baker (F.), Berkey, Blakeman, Carr (J.), Crawford (W.), Fonner, Gilchrist (E.), Gillis, Gregory (G.), Hale (J.), Haynes (E.), Hilgemann, Hughes (F.), Jackson (C.), Johnston (J.), Kelly (Wm.), Kennedy (R.), Kennedy (W.), LaRue, Leavell, Mitchell (E.), Peck, Pell, Shurr, Van Huysen, Voiers, Westfall, Wilson (J.)—28.

Iowa: Altfillisch, Atkins, Bolks, Booth (J.), Brann, Brauer, Bryan, Carl, Conzett, Feldman, Fenton (R.), FitzGerald (L.), Foley, Ford (E.), Foster (C.), Hemingway, Hemsworth, Henkin, Higley, Hildebrand, Hoffman (O.), Kennedy (C.), Klaffenbach, Lehman, Ostrem, Smith (E. S.), Smith (R.), Sommers (R.), Thoen, Volland, Watts, Whinery, Woodbury—33.

Kansas: Bunker, Burket, Parkinson, Richmond—4.

Kentucky: Childers, Ferguson (R.), Goepper, Hower, Hubbuch, Hume, Johnson (J. E.), Juett, Linville, McElrath, Myers (R.), O'Rourke, Owen (J.), Randall, Selden, Sprau, Springsted, Thomas (R.), Todd, Walz, Williams (A.)—21.

Louisiana: Broussard, Gamard, Genre, Havá, Jarrell, Leabo, Psayla, Smith (P.), Tiblier, Varnado, Vignes—11.

Maine: Briggs, Browne, Fitzgerald (E.), Grant (G.), Haskell, Kelley, MacKay, Maxfield (C.), Maxfield (F.), Small (D.), Woods—11.

Maryland: Aisenberg, Anderson (G.), Baklor, Blevins, Bock, Brandon, Brun, Clemson, Coriell, Dean (H.), Deems, Dixon, Dobbs, Dorsey, Eader, Eggatz, Ferguson (J.), Gaver, Golton, Grempler, Hardy, Heintz, Hicks (H.), Hopkins, Ide, Inman, Jersin, Karn, Kelsey, Leonard, Lovett, McCarthy, Oggesen, Parsons, Preis, Pyott, Robinson (J.), Shehan, Smith (F.), Smith (W.), Streett, Swinehart, Van Natta—43.

Massachusetts: Adams, Alden, Barnard, Brown (G.), Bryans, Burke (Wm. E.), Canavan, Carnes, Chase (C.), Cleaveland, Cogan (A.), Cronin, Cushman, Daley, Daniels, Dempsey, Desmond, Dort, Elliott (M.), Esterberg, FitzGibbon, Foss, Gibbons, Giblin, Grant (F.), Grant (W.), Griffin, Hadley, Hinds (M.), Holt, Hookway, Howe, Kazanjian, Keltie, Mallett, Maycock, McKenna, Miner (L.), Muzzey, O'Hearn, Perkins, Peters (M.), Rafferty, Rogers (A. P.), Rogers (F.), Rollins, Sager, Shuman, Spinney, Tannebring, Thatcher, Tishler, Tyler, Vaughan, Weller, Williams (A.), Wright (E.), Wyman—58.

Michigan: Applegate (O.), Applegate (S.), Bartlett, Brown (R.), Bunting, Cadarette, Conley (C.) Cook, Davis (W.), Dingman, Easlick, Elliott (W.), Gibson, Girardot, Goodsell, Hall (C.), Harris (S.), Honey, Jay, Jeserich, Kemper, Kingery, LeGro, Lewis (S.), Lowery, McBride (W.), Mason (W. J. B.), Moore (G.), Morris (E.), Northrup, Pilkington, Prince, Richards, Schultz, Shackelford, Spalding, Spencer (J.), Travis, Vedder, Ward, White (O.), Whiteman (W.), Wood (H.), Wright (C.)

—44.

Minnesota: Austin, Berthel, Brekhus, Carlson, Carson, Clark (H.), Cobb, Coulter, Damon, DeVries, Dickson, Epstein, Ernst (H.), Ernst (M.), Estes, Fenton (H.), Flagstad, Green (R. O.), Griffith, Gyllenborg, Hall (A.), Harker, Harris (H.), Hartzell, Henry, Hodgson, Hyde, Johnson (R.), Larson, Lasby, Lawton, Longley, Mentzer, Miner (C.), Nelson (Charles), Nelson (E. A.), Nelson (H.), Pattison, Pattridge, Rudolph, Schmid, Shellman, Stafne, Stickney, Sundby, Thom, Thomas (T.), Thornton (M.), Turnquist, Waldron (C.), Walls (J.), Walls (M.), Wells, White (F.), Wiethoff, Wittich, Ziegler—57.

Mississippi: Abbott (R.), Brown (J. H.), Chipps, Haynes (G.), Henderson, Leggett (T.), Wright (W. R.)—7.

Missouri: Brady, Brandhorst, Broadhurst, Brock (D.), Brown (J. A.), Brown (W.), Calmes, Coleman (C.), Coston, Davidson, Davis (T.), Dillon (E.), Edwards, Engel, Fisher (H. M.), Foerster, Frederick, Freitag, Gruebel, Gurley (W.), Hagemann, Haverstick, Hillias, Keys, Kornfeld, Lischer, Main, Marré, Mayer, McFarland, Miller (J.), Moore (N.), Northcutt, O'Brien, O'Hare, Owen (E.), Poe, Porter (C.), Purcell, Renfrow, Rinehart, Robb, Rodgers, Sawyer, Scott, (J.), Spotts, Templeton, Wekenman, Wheeler, White (W.), Williams (J. H.)—51.

Montana: Bell (F.), Dohrman, Rider, Swanson (C.)—4.

Nebraska: Colgan, Davis (C.), Drake, Hemphill, Hunt (L.), Ludwick, Merchant, Myers, (L.), Pierson, Prime (J.), Rohde (F.), Schaefer (F.), Shearer, Spencer (G.), Thomas (E. A.), Viner, Webster, Yost—18.

Nevada: None.

New Hampshire: Blaisdell, Clarridge, Copeland, Staples, Young (W.)—5.

New Jersey: Barry, Bostwick, Boyko, Brach, Bull, Burke (J.), Devlin, Faupel, Harper, Harrington, Houghton, Hutchinson, Jennings, Lentz, Lum, Pruden, Reock, Samuel, Schwartz, Smith (E. A.), Stillwell, Waldron (R.), Walsh (J.), Wilson (W.) Wisan—25.

New Mexico: Clarke, Lord, Moran—3.

New York: Asch, Bailey (A.), Barber (H.), Barrett, Berger, Birenbach, Blum, Blutau, Bodecker, Bossert, Bronner, Burkhart (H.), Burkhart (R.), Burr, Callaway, Carr (M.), Chapin, Chase (O.), Cleveland, Collins, Cooke, Cottrell (I.), Davenport, Douglass (G.), Dunn, Dunning (J.), Dunning (W.), Ellis, Ernst (H. H.), Flynn, GaNun (C.), GaNun (G.), Gies, Granger, Groh, Hayes (L.), Hellman, Hemley, Henegan, Hillyer (E.), Hillyer (N.), Holbrook, Holliday (H.), Irving, Ivory, Kany, Keller, Kennedy (E.), Kohn, Lewis (F.), McBeath, McCall (J.), Meisburger, Merritt, Metz (K.), Mimmack, Miller (S.), Murphy (E. G.), Mork, Nestler, Palmer, Pankow, Peters (J.), Pfeiffer, Phillips (P.), Porter (L.), Riesner, Schelpert, Schneer, Schuyler, Shapiro (B.), Shapiro (J.), Shapiro (S.), Sniffen, Squires (F.), Squires (W.), Stern, Swift, Taylor (W.), Thompson (E.), Trier, Van Valey, Wakefield, Wald, Walker, Waugh, West (J.), Whitson, William, Winter, Woodworth, Zemsky—92.

North Carolina: Alford, Ashby, Branch, Fleming (J.), Hale (G.), Jackson (W.), Johnson (J. N.), Jones (P.), Lineberger, McClung, Olive, Poindexter (C.), Pridgen, Sheffield (N.), Simkins, Smith (A. G.), Spurgeon, Watkins—18.

North Dakota: Gilbert, Hocking, Sand, Shaw (W.)—4.

Ohio: Bach, Ball, Bannister, Broadbent, Brown (H.), Burmeister, Bush, Cottrell (H.), Dressel, Graham (W.), Harkrader, Hebble, Hill, Jarvis, Kitchin, Loughry, MacMillan, Meisser, Mills (C.), Mills (E.), Postle, Price (W.), Pryor, Sargeant, Schott, Semans, Sheffield (L.), Snyder (D.), Starr (F.), Stephan, Stillson, Stricker, Strosnider, Sullivan (J.), Way, Weaver, Welker—37.

Oklahoma: Flesher, Reichmann—2.

Oregon: Bettman, Cooper (H. C.), Fixott, Gulick, Harris (M.), Hurd, Jones (R. R.), Miller (Herbert), Prime (F.), Starr (E.), Watson, Zimmerman—12.

Pennsylvania: Addie, Aiguier, Anderson (H.), Archer, Ashbrook, Booth (C.), Brand, Cameron (J.), Casto, Cooper (H. K.), Corcoran, Eselman, Essig, Everhard, Fickes, FitzHugh, Friesell (F.), Friesell (H.), Gregory (W.), Haas, Hagan, Harkins, Lotz, Luckie, McBride (T.), McCready, McNerney, McParland, Meisel, Mershon, Metz (H.), O'Leary, Oartel, Rial, Rusca, Sausser, Swanson (W.), Timmons, Van Horn, Van Kirk, Walton, Whiteman (J.), Wise, Wright (W. H.), Young (A.), Zugsmith—46.

Rhode Island: Charbonnel, Conley (P.), Lynch (A.), Massicotte, Midgley, Mullaney, Spicer—7.

South Carolina: Brockington, Dick, Hair, Higgins—4.

South Dakota: Berry, Boyden, Eggers—3.

Tennessee: Anderson (A.), Clotworthy, Cottrell (A.), Hoffer, Jamieson, Levy, Lundy, Meacham, Ogden, Oliver, Parks (A.), Phillips (J.), Powers, Slater, Taylor (E.), Underwood, Vaughn, Vinsant—18.

Texas: Arnold (E.), Arnold (J.), Beachum, Beckman, Brock (S.), Conly, Crabb, Duckworth, Ellington, Foster (W.), Fountain, Frew, Garrison, Gillean, Hall (J.), Hays, Hicks (C.), Hinds (F.), Holder, Jones (A. L.), Jones (B.), Kennedy (T. H.), Knutzen, Lacey, Lux, Lynn (C.), Lynn (R.), McCall (W.), McCarty, McRimmon, Morris (G.), Murphy (J.), Newton, Nygard, O'Farrell, Ogle, Outlaw, Parks (S.), Platt, Preston, Ranfranz, Ridley, Robertson, Rogers (R.), Scherer, Talbot, Taylor (C.), Taylor (Edw.), Thielen, Thornton (I.), Turner, Vogan, Waltmon, Williams (E.)—54.

Utah: Barber (A.), Bergstrom, Budge, Leigh, Warburton, Wherry (A.), Wherry (S.)—7.

Vermont: Johnson (E. E.), Pond, Small (H.), Taggart—4.

Virginia: Ashton, Ballou, Bear, Brashear, Chevalier, Harrison (G.), Hodgkin, John, Little, Lyons, Muir, Pilcher, Simmons, Simpson, Smith (H. L.), Snapp, Sprinkel, Wash, Williams (J. B.)—19.

Washington: Dean (O.), Ellsperman, Ferrier, Hampson, Martin, Randolph—6.

West Virginia: Armbrrecht, Boydston, Douglass (E.), Gallagher, Loper, Poindexter (J.), Sturm, Summers—8.

Wisconsin: Abbott (T.), Banzhaf, Bassman, Baumann, Baus, Bennett (G.), Benson, Christensen, Crawford (J.), Dippel, Donovan, Dresen, Droegkamp, Ender, Fee (A.), Fee (G.), Fisher (A.), Flancher, Hahn, Hardgrove, Hausmann, Hopkinson, Huegel, Johnson (M.), Justin, Kolter, Kraus, Macfarlane, McFarlane, Milliette, Moen, Morgan, Morton, Mortonson (J.), Mortonson (M.), Nachazel, Nelson (C. A.), Noetzel, Redeman, Rohde (A.), Stratton, Tolan, Uebele, Wahl, Wilson (G.)—45.

Wyoming: None.

Territories: *Hawaii:* Conner, Fraser, Pritchard—3.

Army: Benney, Hartley, Johns, Mills (R.)—4.

Navy: Chandler (A.), Delaney, Fladeland, Knox, Lepeska, Mack, Rault, Richison, Synder (L.), Tartre, Ulen, Wennerberg, White (P.), Yando—14.

2. *Countries other than the United States*

Australia: Amies, Arnott, Ash, Best, Charlton, Moxham, Tuckfield—7.

Canada: Box, Conboy, Dohan, Faulkner, French, Gilchrist (H.), Mason (A.), Moore (F.), Pallen, Thomson, Walsh (A.), Whittaker—12.

China: Lindsay, Mullett, Sommers (H.)—3.

England: Roberts (C.), McLean, Wallace—3.

India: Khambatta—1.

Korea: Boots—1.

4. CLASSIFICATION OF ACTIVE FELLOWS AS TO YEARS OF ADMISSION

1921: Banzhaf, Burkhart, Conzett, Endelman, Foster (S.), Friesell (H.), Hartzell, House, Howe, Johnson (E. A.), Logan, Midgley, Noyes (F.), Volland, Woodbury—15.

1922: Bruening, Bunting, Byrnes, Chambers, Coriell, Coston, Dittmar, Ford (L.), Gillis, Gurley (J.), Kelsey, McCoy, Milliken, Price (W.), Prime (J.), Semans—16.

1923: Blum, Brown (H.), Chandler (C.), Cooke, Fickes, Friesell (F.), Gies, Hassell, Hillyer (E.), Hocking, Kennedy (E.), Lucas, Merritt, Miller (Herbert), Peters (J.), Robinson (J.), Stillman, Vignes, Waldron (R.), Walker, Walz, Ward, Waugh, Wright (W. R.), Zugsmith—25.

1924: Gallie (D. M.), Hale (J.), Hardgrove, Hasbrouck, Hoffman (A.), Hume, Hutchinson (R.), Morton, Phillips (J.), Smith (H. S.), Tuckfield—11.

1925: Goepper, Huff, Jackson (C.), Lischer, Massicotte, Powers, Rinehart, Stephan, Watkins—9.

1926: Blue, Bodecker, Bostwick, Cameron (D.), Coolidge, DeVries, Fee (A.), Hoffer, Khambatta, LeGro, Mork, Mullaney, McCall (J.), Rohde (A.), Smith (A.), Spalding, Vann—17.

1927: Benbrook, Blakeman, Charbonnel, Crawford (J.), Dick, Elliott (W.), Fixott, Giffen, Hayes (G.), Hubbuch, Kennedy (W.), MacBoyle, MacMillan, Mortonson (J.), Mortonson (M.), Oliver, Shearer, Sprau, Stratton, Thomas (R.), Watts, Wright (W. H.)—22.

1928: Ashbrook, Baker (C. R.), Boots, Bowles, Bryan, Charlton, Cogan (W.), Cooper (H. C.), Dunning (W.), Fisher (H. G.), FitzGibbon, Frew, Graham (J.), Hildebrand, Hillias, Hopkinson, Kibler, Lasby, Lindsay, Lowery, Mitchell (J.), O'Rourke, Palmer, Partridge, Simkins, Swinehart, Talbot, Thomas (E. H.), Waldron (C.), Whittaker—30.

1929: Altfillisch, Barrett, Bear, Benson, Berger, Black (J.), Blackwell, Booth (C.), Brand, Brun, Budge, Camalier, Conklin, Fenton (R.), Fleming (J.), Freeman, Hellman, Hopkins, Hower, Hurd, Ide, Jelinek, Kazanjian, Kelley, Knapp, Lee (H.), Lundquist, Martin (A.), Maxfield (F.), McParland, Meisel, Metz (H.), Miller (Howard), Miner (L.), Mueller, Nelson (H.), Nestler, Olafsson, Randall, Scott (S.), Selden, Simpson, Smith (E. H.), Thoen, Tylman, Van Kirk, Wallace, West (F.), Williams (E. L.), Williams (J. B.), Wilson (G. W.), Wolfe, Young (A.)—53.

1930: Boyd, Brownlie, Burket, Carmody, Clendenen, Cogswell, Combs, Davis (A.), Engstrom, Giesecke, Graham (W.), Gulick, Hollenbeck, Johnson (J. N.), Locke, Noetzel, Roberts (C.), Robinson (W.), Smith (E. S.), Smith (T. S.), True, White (F.), White (P.)—23.

1931: Anderson, Ball, Bush, Caraballo, Carr (J.), Davis (W.), Faulkner, Goodman, Hadley, Hodgkin, Johnson (J. E.), Keltie, LaRue, Lineberger, Mason (A.), Mason (R.), McCready, McElrath, McLean, Mills (C.), Mills (E.), Pell, Richmond, Rudolph, Schott, Slaughter, Vinsant, Wherry (A.)—28.

1932: Arnott, Baker (C. A.), Brown (R.), Cottrell (H.), Cushman, Edlund, Ernst (M.), FitzHugh, Flagstad, French, Grant (W.), Harper, Hausmann, Hinds (F.), Keys, Kohn, Lotz, Lynch (A.), McClung, McCole, Molt, Moore (F.), Murphy (J.), Ogden, Pond, Rial, Rollins, Schlosser, Schuyler, Spurgeon, Stern, Streett, Swanson (W.), Sweet, Thomas (E. A.), Van Horn, Way, Whiteman (J.), Wise—39.

1933: Aisenberg, Alexander, Barber, Bergstrom, Booth (J.), Brady, Bremner, Brevig, Bricker, Broadbent, Brockington, Burmeister, Casto, Christensen, Christiansen, Clark (S.), Copeland, Cottrell (A.), Davenport, Ferguson (J.), Ferrier, FitzGerald (L.), Gill, Hall (J.), Harrison (G.), Hewett, Hill, Hoeffel, Huegel, Jones (B.), Macfarlane, McBride (W.), McGehee, Meacham, Morgan, Morrey, Pinney, Prince, Purcell, Schaefer (J.), Smith (H. L.), Staples, Vedder, Wherry (S.), Woodworth—45.

1934: Abbott (R.), Blaisdell, Brach, Brandhorst, Brekhus, Carr (M.), Chase (C.), Damon, Dresen, Edwards, Fraser, Hoffman (H.), Hunt (V.), Kirtland, Leigh, Luckie, Lyons, Mack, Moran, Nelson (C. A.), Owen (E.), Patton, Pruden, Rault, Rogers (E.), Rusca, Sayre, Scherer, Thatcher, Uebele, Vaughn, Waddell, Walls (J.), Watson, William—35.

1935: Alden, Barnard, Becks, Brown (G.), Cameron (J.), Chipps, Clarke, Desmond, Dohan, Ender, Faupel, Goodsell, Harkins, Harkrader, Irving, John, Maxfield (C.), Merriman, Moose, Nygard, Oartel, Owen (J.), Paffenbarger, Scruggs, Selberg, Selleck, Sniffen, Spicer, Stillson, Summers, Swanson (H.), Werner, White (O.), Wilson (J.)—34.

1936: Bailey (E.), Baumann, Bettman, Blake, Blanquie, Coleman (B.), Dean (O.), Fleming (W.), Fontaine, Frisbie, Green (R. A.), Haas, Harris (M.), Hogeboom, Johnson (L.), Johnson (R.), Kingsbury, Klaffenbach, Koch, Leggett (J.), Lum, Mauer, Moxham, Mullett, Murless, Nesbitt, Pankey, Parkinson, Sheffer, Smith (P.), Sorensen, Thompson (W.), Timmons, Willett, Williams (A.), Zeisz, Zimmerman—37.

1937: Adams, Addie, Aiguier, Arnold (J.), Atkinson, Bach, Ballou, Boydston, Bradford, Bronner, Bull, Cartee, Conley (C.), Cooper (H. K.), Dillon (C.), Dort, Engel, Erikson, Everhard, Frederich, Garrett, Girardot, Grant (G.), Griffin, Hagemann, Hale (G.), Harrington, Harris (H.), Hughes

(F.), Hyde, Jeserich, Juett, Kitchin, Lewis (S.), Loughry, Lynch (D.), Main, Maycock, Mentzer, Mitchell (E.), Nelson (Charles), O'Hare, Peters (M.), Porter (C.), Porter (L.), Psayla, Rushing, Sapienza, Sausser, Simmons, Small (D.), Smith (A. M.), Stickney, Strosnider, Taylor (R.), Tison, Travis, Vaughan, Wells, West (S.), Wiethoff, Williams (J. H.), Young (W.)—63.

1938: Abbott (T.), Amies, Applegate (O.), Archer, Armbrrecht, Arnold (E.), Ash, Ashton, Austin, Barnwell, Barry, Bartlett, Bassett, Baus, Bell (D.), Bennett (P.), Berkey, Berthel, Bertram, Best, Box, Branch, Brandon, Brauer, Broadhurst, Brock (D.), Brock (S.), Broussard, Brown (C.), Brown (J. A.), Brown (J. H.), Brown (L.), Brown (W.), Bryans, Cadarette, Callaway, Canavan, Carson, Chandler (A.), Chapin, Chase (O.), Clark (H.), Cobb, Coleman (C.), Colgan, Collins, Colver, Cook, Cory, Coulter, Crawford (W.), Daly, Daniels, Davis (T.), Dickson, Dillon (E.), Dixon Donovan, Downs, Dressell, Duckworth, Eader, Elliott (M.), Epstein, Ernst (H.), Essig, Fenton (H.), Fisher (H. M.), Fitzgerald (E.), Fladeland, Flesher, Foerster, Fonner, Ford (E.), Ford (J.), Foster (C.), Foster (W.), Fountain, Gamard, GaNun (G.), Gaver, Genre, Gibbs, Gibson, Gilchrist (H.), Golton, Grant (F.), Gray (M.), Green (R. O.), Griffith, Grover, Haberle, Hagan, Hahn, Hall (A.), Hall (C.), Harpole, Harris (S.), Harrison (W.), Haverstick, Hayes (H.), Hayes (L.), Hays, Hebble, Heintz, Hems-worth, Henderson, Henry, Higgins, Higley, Hilgemann, Holliday (H.), Honey, Hopping, Hughes (G.), Humphreys, Hunt (L.), Inskipp, Jackson (W.), Jarvis, Jay, Jersin, Johnson (E. E.), Johnson (E. H.), Johnson (M.), Johnston (H.), Johnston (J.), Jones (P.), Jordan (J.), Jordan (L.), Justin, Kaplan, Keller, Kingery, Kornfeld, Kraus, Kremer, Krogh, Kurth, Lacey, Lawton, Leabo, Leggett (R.), Leonard, Lewis (F.), Lord, Lovett, Lundy, Lux, MacKay, Marshall (L.), Mayer, McBride (T.), McCall (W.), McCarthy, McCarty, McFarland, McKenna, McLaughlin, McRimmon, Meis-ser, Merchant, Miller (Jesse), Miller (S.), Milliette, Miner (C.), Mitchell (G.), Monroe, Moore (N.), Morris (E.), Muir, Murphy (R.), Muzzey, Myers (L.), Myers (R.), Newton, Northcutt, Noyes (H.), O'Brien, Ogle, Olive, Ostrem, Pallen, Parks (A.), Parsons, Pattridge, Petray, Pierson, Pilcher, Poe, Poindexter (J.), Pridgen, Pryor, Reichmann, Rider, Ridley, Robb, Rodgers, Rogers (F.), Rogers (R.), Sauer, Schmid, Scott (J.), Shapiro (S.), Shellman, Slater, Sloman, Small (H.), Smedley, Smith (C. C.), Smith (E. A.), Smith (F.), Smith (R.), Snyder (D.), Sommers (H.), Sommers (R.), Spencer (G.), Spinney, Spotts, Springsted, Squires (F.), Squires (W.), Stafne, Stillwell, Stricker, Sturm, Sullivan (J.), Sundby, Taggart, Tanne-bring, Taylor (E.), Templeton, Terrell, Thielen, Thom, Thompson (E. L.), Thompson (E. C.), Traynor, Trier, Turner, Tweed, Tyler, Viner, Wahl, Wald, Walsh (A.), Walsh (J.), Wash, Weaver, Webster, Welkner, West

(J.), Wheeler, White (W.), Whiteman (W.), Wintrup, Wood (H.), Wood (W.), Woods, Wright (C.), Zemsky, Ziegler—262.

1939: Alford, Applegate (S.), Asch, Bailey (A.), Baker (F.), Bell (F.), Benney, Briggs (E.), Brooks, Brown (J. D.), Carlson, Cart, Chevalier, Childs (W.), Cleaveland, Coleman (W.), Conner, Davidson, Dean (H.), Delaney, Dippel, Douglass (E.), Douglass (G.), Drake, Droegkamp, Durst, Easlick, Eggers, Ellsperman, Fee (G.), Flancher, Gilbert, Granger, Hair, Hambly, Harker, Hartley, Haskell, Haynes (E.), Haynes (G.), Hemingway, Hillyer (N.), Hinds (M.), Hodgson, Hunter, Inman, Jarrell, Jefferis, Johnson (C.), Kemper, Kennedy (C.), Knutzen, Kolter, Larson, Leggett (T.), Lehman, Leslie, Little, Ludwick, Mallett, McBeath, McFarlane, Moore (G.), Parks (S.), Pattison, Perkins, Phillips (P.), Pilkington, Price (R.), Prime (F.), Pritchard, Randolph, Reock, Riesner, Sager, Schelpert, Schneer, Schwartz, Shackelford, Shapiro (B.), Shapiro (J.), Shaw (W.), Shuman, Shurr, Smith (C. M.), Sprinkel, Sullivan (R.), Swift, Taylor (W.), Thomas (T.), Thomson, Thornton (M.), Tishler, Tolan, Van Valey, Wagner, Walls (M.), Walsh (L.), Weller, Wennerberg, Wilson (W.), Wyman, Yost—103.

1940: Anderson (A.), Ashby, Atkins, Banks, Beckman, Birenbach, Blumtau, Bossert, Boyko, Brann, Browne, Burkhart (R.), Calmes, Cannon, Carl, Carnes, Cleveland, Clotworthy, Cogan (A.), Conley (P.), Conran, Cottrell (I.), Davis (C.), Devitt, Devlin, Dobbs, Dorsey, Dunn, Dunning (J.), Ellington, Ernst (H. H.), Esterberg, Estes, Feldman, Ferguson (R.), Freitag, Garrison, GaNun (C.), Gethro, Gibbons, Gilchrist (E.), Gillean, Glezen, Gregory (W.), Groh, Hemley, Hemphill, Hertz, Hicks (C.), Hoffman (O.), Holbrook, Holder, Holliday (P.), Ivory, Johnson (E.L.), Jones (E.), Kany, Karn, Kelly (A.), Kelly (W.), Knox, Leavell, Levy, Loop, Loper, Lufkin, Lynn (C.), Marks, Metz (K.), Meisburger, Mershon, Mills (R.), Mimmack, Moen, Nachazel, Nuckolls, O'Farrell, O'Hearn, O'Leary, Oggesen, Outlaw, Pankow, Peterson, Pfeffer, Platt, Postle, Richards, Roberts (Z.), Robertson, Rohde (F.), Samuel, Sand, Sargeant, Sawyer, Schaefer (F.), Schultz, Shaw (J.), Sheffield (L.), Smith (W.W.), Snapp, Starr (E.), Starr (F.), Swanson (E.), Tartre, Teuscher, Thorn, Tiblier, Todd, Turnquist, Underwood, Van Huysen, Van Natta, Varnado, Wainwright, Wakefield, Waltmon, Warburton, Wekenman, Welch, West (C.), Westfall, Winery, Williams (A.T.), Winter, Yando—125

1941: Baughman, Blakemore, Bock, Bolks, Brashear, Burkart, Burke (J.), Corcoran, Crabb, Childers, Davis (W. McL.), Deems, Foss, Gallagher, Gallie (D. M. Jr.), Gregory (G.), Gyllenborg, Havá, Hicks (H.), Houghton, Jaynes, Johnson (W.), Kennedy (R.), Linville, Matthews, McNulty, Northrup, Pendleton, Poindexter (C.), Potter, Pyott, Ranfranz, Rule, Sheffield (N.), Shehan, Spencer (J.), Sturdevant, Taylor (C.), Taylor

(Edw.), Thornton (I.), Tucker, Vogan, Whitman, Wittich, Wright (E.)
—45.

1942: Anderson (H.), Arnold (E. S.), Baklor, Bannister, Barber (H.), Bassman, Beachum, Bennett (G.), Berry, Bishop, Blevins, Boyden, Bray, Bunker, Burke (W. E.), Burr, Childs (H.), Clarridge, Clemson, Conboy, Conly, Cronin, Dempsey, Dingman, Dohrman, Eggnatz, Ellis, Eselman, Fisher (A.), Foley, Flynn, Giblin, Gillespie, Gray (C.), Grempler, Gruebel, Gurley (W.), Hampson, Hardy, Henegan, Henkin, Holt, Hookway, Jamieson, Jennings, Johns, Jones (A.), Jones (R.), Kennedy (T. H.), Lentz, Lepeska, Longley, Lynn (R.), McNerney, Marjerison, Marré, Mason (W. J. B.), Masters, Mitchell (R.), Morris (G.), Murphy (E. G.), Nelson (E. A.), Pattishall, Peck, Penn, Preis, Preston, Rafferty, Redeman, Renfrow, Richison, Rogers (A. P.), Smith (L.), Snyder (L.), Spencer (E.), Swanson (C.), Ulen, Voiers, Walton, Whitson, Wisan—81.

5. DECEASED FELLOWS¹

Charles L. Alexander, '28	Charlotte, N. C.	October 13, 1933
Charles C. Allen, '22	Kansas City, Mo.	July 16, 1930
Charles F. Ash, '22	New York, N. Y.	January 25, 1938
D. D. Atkinson, '22	Brunswick, Ga.	January 14, 1924
Chas. R. Baker, '22	Davenport, Ia.	March 7, 1940
John H. Baldwin, '23	Louisville, Ky.	January 20, 1929
Lafayette L. Barber, '23	Toledo, Ohio	November 23, 1929
Alexander E. Bard, '32	Tucson, Ariz.	August 19, 1941
Albert M. Barker, '33	San Jose, Calif.	December 22, 1938
Thomas J. Barrett, '21	Worcester, Mass.	December 29, 1930
Walter F. Barry, '35	Newark, N. J.	July 5, 1942
L. P. Bethel, '23	Columbus, Ohio	January 17, 1936
Theodore B. Beust, '28	Louisville, Ky.	November 24, 1937
*John F. Biddle, '21	Pittsburgh, Pa.	January 19, 1926
**Arthur D. Black, '21	Chicago, Ill.	December 7, 1937
Roy E. Black, '32	Huntington, Pa.	March 7, 1942
R. Boyd Bogle, '23	Nashville, Tenn.	May 25, 1941
George A. Bowers, '32	Nashua, N. H.	December 18, 1935
Charles A. Brackett, '22	Newport R. I.	March 20, 1927
Frank T. Breene, '26	Iowa City, Iowa	October 15, 1931
I. Norman Broomell, '34	Philadelphia, Pa.	March 23, 1941
Truman W. Brophy, '21	Chicago, Ill.	February 3, 1928
Elwyn R. Bryant, '37	New Haven, Conn.	October 2, 1942
*John P. Buckley, '21	No. Hollywood, Calif.	May 14, 1942
George K. Burgess, '30	Washington, D. C.	July 2, 1932

John H. Cadmus, '29	Chicago, Ill.	October 31, 1934
H. Wood Campbell, '25	Suffolk, Va.	March 31, 1931
Calvin S. Case, '23	Chicago, Ill.	April 16, 1923
J. E. Chace, '34	Ocala, Fla.	April 30, 1940
David T. Chase, '37	Portland, Ore.	October 23, 1936
James Francis Clark, '34	Pawtucket, R. I.	March 7, 1940
W. R. Clark, '23	Clear Lake, Iowa	August 1, 1932
Charles D. Cole, '35	Washington, D. C.	August 31, 1940
Albert W. Crosby, '36	New Haven, Conn.	November 11, 1938
Levitt E. Custer, '22	Dayton, Ohio	January 3, 1924
William D. Cutter, '37	Chicago, Ill.	January 22, 1942
W. L. Darnall, '33	Washington, D. C.	April 29, 1941
S. E. Davenport, Sr., '32	New York, N. Y.	June 7, 1934
W. S. Davenport, Sr., '26	Paris, France	February 26, 1938
DeForest Davis, '39	Cleveland, Ohio	August 8, 1940
Horace M. Davis, '24	Baltimore, Md.	February 8, 1935
Lyndall L. Davis, '27	Chicago, Ill.	February 25, 1937
Robert L. Davis, '38	Woonsocket, R. I.	March 22, 1941
Roscoe A. Day, '36	San Francisco, Calif.	June 28, 1939
Frank H. Dean, '24	Worcester, Mass.	September 10, 1934
James W. Deaton, '38	Texarkana, Ark.	July 14, 1942
W. H. DeFord, '32	Des Moines, Iowa	March 22, 1932
Frank A. Delabarre, '28	Boston, Mass.	April 15, 1938
Charles L. Drain, '34	Iowa City, Iowa	June 5, 1937
Forrest G. Eddy, '22	Buttonwoods, R. I.	May 17, 1939
Alfred Enloe, '38	Atlanta, Ga.	February 12, 1941
S. Eschelman, '23	Buffalo, N. Y.	September 26, 1932
George Evans, '27	New York, N. Y.	January 12, 1942
Walter Earle Fancher, '39	Yonkers, N. Y.	June 26, 1940
Edwin L. Farrington, '29	Lowell, Mass.	April 1, 1941
Luther A. Faught, '28	Philadelphia, Pa.	November 23, 1933
Josiah G. Fife, '33	Orange, Tex.	June 27, 1940
J. H. Fullenwider, '29	Louisville, Ky.	November 12, 1940
Oren Henry Gaver, '31	Baltimore, Md.	March 28, 1940
*William A. Giffin, '21	Detroit, Mich.	July 3, 1929
Steele F. Gilmore, '32	Princeton, Ind.	July 15, 1932
Hart J. Goslee, '23	Chicago, Ill.	May 31, 1930
Frank A. Gough, '26	Brooklyn, N. Y.	August 15, 1938
Horace P. Gould, '23	Brooklyn, N. Y.	April 4, 1928
Louis Graham, '22	San Francisco, Calif.	February 19, 1932
*Clarence J. Grieves, '21	Baltimore, Md.	November 4, 1927
T. L. Grisamore, '23	Chicago, Ill.	October 16, 1939

W. M. Griswold, '33	London, England	July 13, 1935
Carl J. Grove, '34	St. Paul, Minn.	July 5, 1942
Frederick T. Guild, '37	Providence, R. I.	May 1, 1941
Charles W. Hall, '23	Milwaukee, Wis.	June 10, 1936
Albert Hallenberg, '34	Fargo, N. Dak.	November 17, 1940
Frank A. Hamilton, '26	Indianapolis, Ind.	September 3, 1937
Charles A. Hawley, '27	Washington, D. C.	July 22, 1929
F. R. Henshaw, '22	Indianapolis, Ind.	May 27, 1938
Frank W. Hergert, '29	Seattle, Wash.	August 31, 1937
Frank O. Hetrick, '22	Ottumwa, Kansas	May 17, 1934
Finis Marlin Hight, '31	Houston, Tex.	August 6, 1939
DeLos L. Hill, '23	Atlanta, Ga.	May 7, 1931
*Thomas P. Hinman, '21	Atlanta, Ga.	March 19, 1931
A. Hugh Hipple, '21	Omaha, Neb.	July 29, 1933
N. S. Hoff, '22	Ann Arbor, Mich.	December 1, 1926
Thomas A. Hogan, '30	Pittsburgh, Pa.	July 17, 1930
J. A. C. Hoggan, '23	Richmond, Va.	February 28, 1928
William Hopkinson, '24	Milwaukee, Wis.	July 23, 1941
David A. House, '24	Indianapolis, Ind.	January 8, 1933
Edward J. Howard, '32	San Francisco, Calif.	November 16, 1931
Eugene Bond Howle, '30	Raleigh, N. C.	June 23, 1942
Claude N. Hughes, '38	Atlanta, Ga.	March 8, 1938
Dudley C. Hughes, '38	New York, N. Y.	May 4, 1942
Alfred O. Hunt, '27	Omaha, Nebr.	January 12, 1934
W. E. Hutchison, '38	Little Rock, Ark.	September 11, 1942
*Victor H. Jackson, '21	New York, N. Y.	January 26, 1929
Albert Wade Jarman, '31	Philadelphia, Pa.	May 20, 1933
*C. N. Johnson, '21	Chicago, Ill.	July 17, 1938
H. Herbert Johnson, '23	Crescent, Ga.	May 23, 1937
Ralph Bullock Jones, '38	Willimantic, Conn.	May 9, 1941
H. Leonidas Keith, '37	Wilmington, N. C.	July 29, 1938
*C. Edmund Kells, '21	New Orleans, La.	May 7, 1928
Oather A. Kelly, '37	St. Louis, Mo.	September 11, 1942
Frederick C. Kemple, '38	New York, N. Y.	May 21, 1938
Albert H. Ketcham, '30	Denver, Colo.	December 6, 1935
Charles S. Kramer, '30	Colorado Spgs., Colo.	July 30, 1941
Otto G. Krause, '27	Milwaukee, Wis.	January 31, 1940
Charles Lane, '26	Detroit, Mich.	April 28, 1938
A. C. LaTouche, '23	Los Angeles, Calif.	May 10, 1938
Harry E. Latcham, '33	Baltimore, Md.	August 20, 1941
Charles R. Lawrence, '33	Enid, Okla.	August 6, 1940
Alfred P. Lee, '23	Philadelphia, Pa.	April 8, 1940

Edward G. Link, '22	Rochester, N. Y.	July 12, 1933
Benjamin F. Luckey, '23	Paterson, N. J.	April 29, 1930
Chalmers J. Lyons, '22	Ann Arbor, Mich.	May 18, 1935
C. J. Marcinkiewicz, '38	Detroit, Mich.	April 23, 1940
J. A. Marshall, '22	San Francisco, Calif.	May 7, 1941
Herman A. Maves, '28	Minneapolis, Minn.	March 19, 1932
Charles J. McCarthy, '36	San Francisco, Calif.	January 23, 1940
Harris W. McClain, '29	Chicago, Ill.	July 16, 1934
Wm. H. McCracken, '38	Detroit, Mich.	September 12, 1939
Arthur R. McDowell, '27	San Francisco, Calif.	May 14, 1938
George H. Means, '25	Louisville, Ky.	November 9, 1942
Louis Meisburger, '22	Buffalo, N. Y.	August 10, 1927
George H. Mengel, '32	El Paso, Tex.	February 14, 1932
Clinton T. Messner, '29	Washington, D. C.	May 28, 1936
George E. Mitchell, '23	Haverhill, Mass.	August 23, 1934
J. N. C. Moffat, '31	Memphis, Tenn.	August 14, 1933
George S. Monson, '22	St. Paul, Minn.	May 27, 1933
Claude A. Moore, '38	Lexington, Miss.	October 11, 1941
W. D. M. Moore, '27	Chicago, Ill.	July 19, 1937
L. G. Noel, '23	Nashville, Tenn.	January 20, 1927
Edmund Noyes, '23	Chicago, Ill.	March 28, 1927
Robert Todd Oliver, '26	Washington, D. C.	July 11, 1937
Forrest H. Orton, '24	San Francisco, Calif.	March 1, 1933
Leland B. Packwood, '38	Fresno, Calif.	April 11, 1942
Alexander H. Paterson, '25	Baltimore, Md.	February 4, 1941
John D. Paterson, '27	Kansas City, Mo.	January 12, 1930
Henry H. Piper, '32	West Medford, Mass.	April 9, 1942
Frank L. Platte, '26	Berkeley, Calif.	June 27, 1927
William H. Potter, '26	Boston, Mass.	July 27, 1928
William B. Power, '29	Seattle, Wash.	March 29, 1940
Merle M. Printz, '25	Chicago, Ill.	February 10, 1934
James H. Prothero, '23	Chicago, Ill.	April 8, 1929
H. A. Pullen, '32	Buffalo, New York	February 17, 1935
G. A. Rawlings, '25	Bismarck, N. D.	April 16, 1933
Harry J. Ray, '34	Aiken, S. C.	June 27, 1936
Frank B. Rhobotham, '29	Chicago, Ill.	May 30, 1934
Charles E. Rice, '28	Los Angeles, Calif.	February 5, 1935
William Rice, '27	Boston, Mass.	November 23, 1932
Walter H. Richardson, '23	Worcester, Mass.	May 9, 1940
U. G. Rickert, '23	Ann Arbor, Mich.	October 21, 1938
W. M. Robey, '38	Charlotte, N. C.	July 10, 1938
F. E. Rodriguez, '33	Washington, D. C.	October 21, 1932

Albert R. Ross, '23	Lafayette, Ind.	May 13, 1938
Louis Rossman, '38	Baltimore, Md.	April 2, 1940
Arthur T. Rowe, '34	New York, N. Y.	December 12, 1935
Joseph Samuels, '32	Providence, R. I.	February 12, 1939
John Scholten, '32	Cedar Rapids, Iowa	March 8, 1938
Wallace Seccombe, '21	Toronto, Canada	January 16, 1936
Clyde C. Sherwood, '31	Toledo, Ohio	July 5, 1942
Samuel L. Silverman, '22	Atlanta, Ga.	October 7, 1934
Alfred R. Starr, '23	New York, N. Y.	October 27, 1924
Fred A. Stevenson, '27	Montreal, Canada	August 9, 1934
Edward F. Sullivan, '32	Boston, Mass.	March 26, 1938
Bert S. Sutherland, '28	Owosso, Mich.	October 23, 1931
Herbert S. Sutphen, '23	Sparta, N. J.	April 20, 1939
A. C. Thompson, '28	Detroit, Mich.	March 22, 1939
Walter G. Thompson, '30	Hamilton, Canada	January 9, 1939
George K. Thomson, '26	Halifax, N. S.	May 2, 1935
A. W. Thornton, '21	Montreal, Canada	February 11, 1931
H. W. Titus, '34	Eugene, Ore.	July 29, 1941
William D. Tracy, '23	New York, N. Y.	February 11, 1937
Frank T. Van Woert, '23	New York, N. Y.	September 9, 1927
Wm. W. Walker, '23	New York, N. Y.	June 14, 1925
Eugene R. Warner, '22	Denver, Colo.	March 28, 1936
F. H. Waters, '30	Ames, Iowa	July 6, 1937
Harry L. Watson, '32	Manchester, N. H.	March 1, 1936
A. E. Webster, '22	Toronto, Canada	November 6, 1936
E. K. Wedelstaedt, '22	St. Paul, Minn.	June 1, 1931
W. H. Weston, '22	Sydney, Australia	February 26, 1933
Herbert L. Wheeler, '22	New York, N. Y.	March 23, 1929
Jesse Duncan White, '23	St. Louis, Mo.	September 16, 1941
J. Leon Williams, '24	New York N. Y.	February 22, 1932
George H. Wilson, '21	Cleveland, Ohio	April 12, 1922
H. Reid Conley Wilson, '38	Cleveland, Ohio	July 9, 1941
George B. Winter, '23	St. Louis, Mo.	March 28, 1940
Craig M. Work, '32	Ottumwa, Ia.	March 29, 1940
Albert M. Wright, '23	Troy, N. Y.	November 8, 1926
J. Lowe Young, '29	New York, N. Y.	May 3, 1931
R. C. Young, '38	Anniston, Ala.	March 12, 1938
		Total, 188

II. REGISTER OF SECTIONS, AND CHIEF OFFICERS
ARRANGED IN SEQUENCE OF ORGANIZATION

	<i>Chairman</i>	<i>Secretary</i>
(1) Kentucky	Albert P. Williams, Starks Bldg., Louisville, Ky.	Raymond E. Myers, 129 E. Broadway, Louisville, Ky.
(2) Northern Calif.	E. G. Sloman, 344 Fourteenth St. San Francisco, Calif.	Saxon B. Scott, 291 Geary St., San Francisco, Calif.
(3) Maryland	Geo. M. Anderson, 831 Park Ave., Baltimore.	M. S. Aisenberg, 42 S. Greene St., Baltimore.
(4) New York	Clyde H. Schuyler, 400 Madison Ave., New York, N. Y.	L. J. Porter, 41 E. 57th St., New York, N. Y.
(5) Minnesota	M. G. Walls, 828 Lowry Medical Arts Bldg., St. Paul, Minn.	Harry C. Lawton, 704 Lowry Bldg., St. Paul, Minn.
(6) New England	W. Henry Grant, 406 Marlborough St., Boston, Mass.	James Keltie, 419 Boylston St., Boston, Mass.
(7) Wisconsin	C. J. Baumann, 408 W. Greenfield Ave., Milwaukee, Wis.	A. J. Noetzel, 536 West Wisconsin Ave., Milwaukee, Wis.
(8) Colorado	W. W. Cogswell, 612 Exchange Nat. Bank Bldg., Colorado Springs, Colo.	O. H. Devitt, 523 Republic Bldg., Denver, Colo.
(9) Pittsburgh	H. E. Friesell, University of Pittsburgh, School of Dentistry, Pittsburgh, Pa.	E. G. Meisel, 121 University Place, Pittsburgh, Pa.
(10) Iowa	J. V. Conzett, 116 West 13th St., Dubuque, Ia.	Leslie M. FitzGerald, 718 Roshek Bldg., Dubuque, Ia.
(11) Illinois	H. R. H. Brevig, 27 E. Monroe St., Chicago, Ill.	L. E. Kurth, 180 N. Michigan Ave., Chicago, Ill.
(12) St. Louis	W. B. Spotts, University Club Bldg., St. Louis, Mo.	E. P. Brady, 7239 Northmoor Drive, St. Louis, Mo.
(13) Oregon	Henry C. Fixott, 814 Medical Dental Bldg., Portland, Ore.	M. M. Bettman, 528 Medical Arts Bldg., Portland, Ore.

- | | | |
|------------------------|---|--|
| (14) Texas | W. H. Scherer, 1620 Medical Arts Bldg., Houston, Tex. | Konrad Lux, 1012 Medical Arts Bldg., Waco, Tex. |
| (15) Florida | R. P. Taylor, 414 St. James Bldg., Jacksonville, Fla. | E. L. Thompson, 326½ S. Beach St., Daytona Beach, Fla. |
| (16) Indiana | R. I. Blakeman, 603 Hume Mansur Bldg., Indianapolis, Ind. | G. Thaddeus Gregory, 505 Hume Mansur Bldg., Indianapolis. |
| (17) Washington, D. C. | Robt. H. Mills, War Dept., Office of Surgeon General, Washington, D. C. | Harold W. Krogh, 1835 Eye Street, N. W., Washington, D. C. |
| (18) Southwestern | M. M. House, 1001 Floral Ave., Whittier, Calif. | F. E. Hogeboom, 3780 Wilshire Blvd., Los Angeles, Calif. |
| (19) New Jersey | Joseph R. Walsh, 67 S. Clinton St., E. Orange, N. J. | G. Victor Boyko, 64 Hamilton St., Paterson, N. J. |

III. REGISTER OF PAST-PRESIDENTS

1921, 1922	J. V. Conzett	1934	B. B. Palmer
1923, 1924, 1925	H. E. Friesell	1935	J. B. Robinson
1926, 1927	C. N. Johnson	1936	W. R. Davis
1928, 1929	H. L. Banzhaf	1937	A. L. Midgley
1930	R. H. Volland	1938	C. E. Rudolph
1931	F. T. Breene	1939	A. H. Merritt
1932	U. G. Rickert	1940	A. W. Bryan
1933	J. E. Gurley	1941	G. W. Wilson
		1942	E. G. Meisel

IV. BOARD OF REGENTS: 1942-1943¹

I. OFFICERS

President, J. CANNON BLACK. *President-elect*, H. CLINE FIXOTT.
Vice-President, E. A. CHARBONNEL. *Treasurer*, HAROLD S. SMITH.
Secretary, OTTO W. BRANDHORST. *Editor*, JOHN E. GURLEY.
Assistant Secretary, WILLIAM J. GIES².

2. ELECTIVE REGENTS

WALTER H. WRIGHT (47), FRED W. HINDS (46), W. N. HODGKIN (45),
 W. F. LASBY (44), E. G. SLOMAN (43).

¹The Board of Regents consists of the officers and the elective Regents.

²Dr. Gies serves in the appointive office of Assistant Secretary.

SUPPLEMENT

It has been our custom to reprint in the Supplement in the terminal issue of each volume various matters of permanent interest on the covers of the successive issues in the volume.

AMERICAN COLLEGE OF DENTISTS

(A) Sections

Dates of meetings in College year of 1941-42 (between convocations):—(1) *Kentucky*: June 4, '42. (2) *Northern California*: Feb. 4, Mar. 4, Apr. 27, May 26, '42. (3) *Maryland*: May 18, '42. (4) *New York City*: Nov. 14, '41; Feb. 16, May 18, '42. (5) *Minnesota*: Mar. 5, May 4, '42. (6) *New England*: Nov. 26, '41. (7) *Wisconsin*: Mar. 22, '42. (8) *Colorado*: Jan. 26, June 19, '42. (9) *Pittsburgh*: Dec. 3, '41; Jan. 28, Feb. 18, Mar. 12, May 2, '42. (10) *Iowa*: May 5, '42. (11) *Illinois*: Dec. 8, '41; Feb. 9, 22, May 25, '42. (12) *St. Louis*: June 15, '42. (13) *Oregon*: Dec. 12, '41; Mar. 20, June 26, '42. (14) *Texas*: Apr. 26, '42. (15) *Florida*: Dec. 9, '41. (16) *Indiana*: Jan. 12, '42. (17) *Southwestern*: None. (18) *Washington (D.C.)*: Jan. 29, Mar. 10, '42. (19) *New Jersey*: Nov. 25, '41; Feb. 10, Apr. 28, '42.

(B) Standing Committees (1941-1942)

Certification of Specialists—E. W. Swinehart (45), *chairman*; Max Ernst (42), H. C. Fixott (44), W. E. Flesher (46), H. E. Kelsey (45), D. F. Lynch (46), J. O. McCall (43).

Education—W. C. Fleming (44), *chairman*; C. W. Freeman (46), F. W. Hinds (42), Harry Lyons (45), J. T. O'Rourke (43), G. D. Timmons (43), L. M. Waugh (42).

Endowment—A. H. Merritt (42), *chairman*; H. J. Burkhart (45), O. J. Chase (44), W. J. Gies (45), E. W. Morris (43), J. E. Psayla (46), C. R. Sturm (46).

History—W. N. Hodgkin (44), *chairman*; H. L. Banzhaf (46), E. E. Haverstik (42), A. W. Lufkin (45), J. Ben Robinson (43).

Hospital Dental Service—W. H. Archer, Jr. (46), *chairman*; R. W. Bunting (44), E. A. Charbonnel (45), H. C. Miller (43), Leo Stern (42).

Journalism—J. Cannon Black (45), *chairman*; J. M. Donovan (45), Walter Hyde (44), B. E. Lischer (43), E. B. Spalding (44), R. C. Willett (42).

Necrology—J. V. Conzett (46), *chairman*; F. H. Cushman (42), P. V. McParland (45), R. H. Volland (43), M. L. Ward (44).

Nominating—H. O. Lineberger (43), *chairman*; A. W. Bryan (46), G. M. Damon (44), W. R. Davis (42), H. E. Friesell (45).

Oral Surgery—L. M. FitzGerald (44), *chairman*; E. R. Bryant (42), M. W. Carr (46), W. I. Macfarlane (43), William Shearer (45).

Preventive Service—L. A. Cadarette (45), *chairman*; Hermann Becks (44), C. S. Foster (43), E. M. Jones (42), E. W. Swanson (46).

Prosthetic Service—W. H. Wright (43), *chairman*; W. H. Grant (46), C. A. Nelson (45), A. P. O'Hare (42), Jack Werner (44).

Relations—L. E. Kurth (46), *chairman*; J. O. Goodsell (43), H. F. Hoffman (45), T. E. Purcell (44), Nathan Sinai (45), Wilmer Souder (42), E. G. Van Valey (45).

Research—A. L. Midgley (42), *chairman*; L. E. Blauch (44), P. J. Brekhus (46), W. D. Cutter (43), J. E. Gurley (42), P. J. Hanzlik (45), P. C. Kitchin (43), A. B. Luckhardt (46), L. R. Main (44), Irvine McQuarrie (45), L. M. S. Miner (46), Fr. A. M. Schwitalla (44).

Socio-Economics—C. E. Rudolph (43), *chairman*; E. H. Bruening (44), W. H. Mork (43), B. B. Palmer (46), M. W. Prince (45), K. C. Pruden (46), Maurice William (44), G. W. Wilson (42).

INDEX

Volume 9: 1942

Special abbreviations; besides those of self-evident import.—*A. A. A. S.*: American Association for the Advancement of Science. *A. A. D. E.*: American Association of Dental Editors. *A. A. D. S.*: American Association of Dental Schools. *A. C. D.*: American College of Dentists. *A. D. A.*: *American Dental Association*. *A. M. A.*: American Medical Association. *A. P. H. A.*: American Public Health Association. *D.* or *d.*: dental or dentistry. *I. A. D. R.*: International Association for Dental Research. *I. A. R. S.*: International Anesthesia Research Society. *J. A. C. D.*: Journal of the American College of Dentists. *J. D. R.*: Journal of Dental Research.

- A**BRASION: by calcium carbonate, 371
 —: cementum and dentin compared with enamel, 376
 —: early studies by Miller, 357
 —: effect of tooth brush, 374
 —: measurement of, 366
 —: procedure for study of, 353
 —: variability of teeth, 362
 Acids: formed in the mouth, 36
 Acrylic Resin: *See* Methyl Methacrylate
 Addresses: cost of adequate d. care for adults, 137
 —: inaugural, Black, J. Canon, 291
 —: nutritional and dietary considerations in control of d. caries, 31
 —: pediatrician and orthodontist, 300
 —: President's, Meisel, E. G., 285
 —: prophylactic needs re environmental conditions of normal and carious teeth, 26
 —: salivary and bacteriological considerations in control of d. caries, 184
 Adenoids: cause of malocclusion, 303
 Air: *See* nitrous oxide analgesia
 Alloys: indium in (editorial), 448
 Amalgam: moisture spoils (editorial), 331
 —: palming (editorial), 83
 Amelogenesis: 107
 Ameloblasts: 113
 A. A. A. S.: Dallas meeting (1940); business session of the section; election of officers; abstracts of addresses; roster of dental members, 229-259
 —: relative to d. profession, 222
 A. A. D. E.: St. Louis meeting (editorial), 327
 —: resolutions on reprints, 347
 A. C. D.: Regents: ad interim meeting, 71; addresses; *See* addresses
 —: Proceedings of Houston Convocation, Oct. 26, 1941: reports of committees; certification of specialists, 44; education, 46; endowment, 52; hospital d. service, 56; journalism, 58; oral surgery, 66; preventive service, 69; prosthetic service, 191; relations, 217
 —: accomplishments, 289
 —: contribution of, 328
 —: proceedings of St. Louis meeting, Aug. 27-28, 1942; reports of committees; education, 409; journalism, 318; necrology, 412; preventive service, 416
 —: Board of Regents, 418
 —: sectional meetings, 427
 American Council on D. Health, 327, 401
 A. D. A.: St. Louis meeting (editorial), 326
 A. M. A.: 225
 Anesthetists: I. A. R. S.; d. members, 471
 Anesthesia: centenary (editorial), 329
 —: nitrous oxide, 1
 Anaesthetics(sia): sulphuric ether; first use in d., 309
 Analgesia: nitrous oxide and oxygen, 1
 —: factors in maintenance, 4
 —: increased sensitivity, 7
 —: instruments required, 7
 —: proper breathing, 6
 —: requirements for safety, 4
 —: tendency toward unconsciousness, 6
 Apparatus: for study of abrasion by dentifrices, 363
 ARMSTRONG, W. D.: fluorosis studies at University of Minnesota, 236
 Act: *See* Legislation
 Association: National Dental Hygiene, 16, 225. *See also* British Medical, Canadian Medical

- BACTERIOLOGY(ical)**: considerations in control of d. caries, 184
- BECKS, H.**: salivary and bacteriological considerations in control of d. caries, 184
- BERRY, H. A.**: removal of fluorine stains, 231
- BISHOP, R. G.**: National D. Hygiene Association, 16
- BLACK, J. CANNON**: inaugural address, 291
—: report of committee on journalism, 58, 318
- BLAUCH, L. E.**: editorial; d. teacher, 81
- Bleaching**: mottled enamel, 242
- BODECKER, C. F., and GIES, W. J.**: concerning the character of the age changes in enamel and dentin and their relation to the vital pulp and critical discussion, 380
- Books**: new, 104, 283, 349, 472
- BRANDHORST, O. W.**: reports of Board of Regents, 71, 418
- British Medical Association**: post-war plans, 295
- Bureau of Standards (U.S.A.)**: d. researches, 331
- CADARETTE, L. A.**: preventive service; report of committee, 69, 416
- Calcification**: before birth, 35
- Calcium Carbonate**: standard agent for study of abrasion, 371
- Calco-spherites**: 118
- Canadian Medical Association**: health proposals, 296
- Cancer**: dentist's responsibility, 247
- Caries**: d.; factors in immunity, 243
—: d. and fluorine, 234, 235
—: d. recommendations for control, 38
- CARR, M. W.**: oral surgery; report of committee, 66
- Chicago**: (editorial) midwinter meeting, 77
- Clinics**: Dental Health Service, Inc., 138
- Comments**: See Correspondence and Comment
- CONZETT, J. V.**: necrology committee; report of, 412
- Correspondence and Comment**: Admiralty in Navy Dental Corps, 339, 461
—: change needed now, 273
—: d. in public and military services, 95
—: Dentistry; an autonomous profession, 342
—: history of Army Dental Corps, 338
—: opinions on commercial exploitation of the *J. D. R.*, 455
—: proposed degradation of dentists in a medico-dental society; further comment, 275, 336
—: statement of action of Harvard alumni, corrected, 271
—: technical training for d. practice and post-graduate experience, 93
—: "Time," a misrepresentation, 272, 448
—: was John Harris "the founder of American d. education", 333
- COX, G. J.**: and **LEVIN, M. M.**: résumé, fluorine-carries relationship, 235
- Cyanosis**: congenital; oral conditions in, 246
- DAVIS, W. R.**: nutritional and dietary considerations in control of d. caries, 31
- DEAN, H. T.**: study of physiological effects by epidemiological methods, 245
- DEATHERAGE, C. F.**: mottled enamel from standpoint of public health dentist, 239
- Deaths**: 412, 423
- Dental Autonomy**: 8
—: care: compulsory for children, 287
—: caries: control, 26, 28, 31, 184
- Dental Health**: American council on, 327, 401
—: —; consideration of problems, 298
—: isolation, 8
—: laboratories; prohibited from advertising to public, 197
—: literature (editorial), 263, 447
—: schools: requirements for approval, 47
—: service: cost of adequate care for adults, 137
—: —; hospital, 56
—: teachers (editorial), 81
- Dentifrice(s)**: abrasive action dependent on size of particles, 356

Dentin: character of age changes in, 380

—: enamel membrane, 111

Dentistry: autonomy, 8

—: child development including fluorosis, 232

—: in Finland, 23

—(s): major problems, 299

—: military service, 95

—: and Poetry (editorial), 74

—: public opinion (editorial), 84

—: public service, 95

—: takes initiative, 400

Development: children free or relieved from pathological conditions, 233

Diet: balanced; value of, 305

—: balanced; in d. caries, 31

EDITORIALS: anesthesia centenary, 329

—: Chicago, 1942, 77

—: d. literature, 447

—: d. meetings, streamlined, 266

—: d. participation in advancement of science, 269

—: dental teacher, 81

—: dentistry and poetry, 74

—: dentistry and public opinion, 84

—: experience as a teacher, 89

—: foes within and without, 453

—: Gies, Wm. J., a birthday tribute, 72

—: indium in d., 448

—: is M.D. degree pre-requisite for research, 85

—: J. D. R.—Wm. J. Gies endowment fund, 453

—: Methyl Methacrylate, 267

—: moisture spoils amalgam, 331

—: noblesse oblige, 260

—: palming of amalgam, 83

—: politics and A. C. D., 91

—: problems in distribution of d. literature, 263

—: war, accidents, future, 450

—: what is the difference, 325

—: work, not for pay, 452

Education: d.; report of committee, 46, 409

—: d. health, 226

—: trends in, 101

—: Harvard Plan; new information, 468

—(al): approach in amalgams, 3

Enamel: calcification of matrix, 120

—: calso-spherites, 118

—: character of age changes in, 380

—: dentino; membrane, 111

—: epithelium, 110

—: hyaline rod, 116

—: matrix; structure of, 114, 117

—: mottled, 231, 238, 239. *See also*

Teeth: brown stain

—: —; bleaching of, 242

—: —; experimental production, 239

—: researches on, 107

—: terminal bar apparatus, 117

—: Tome's Processes, 117

Endowment(s): report of committee, 52

—: fund; J. D. R.; report of treasurer, 436

—: —; —; (editorial), 453

Epidemiology: study of physiological effects by, 245

EPSTEIN, SIDNEY, and TANTER, M. L.: standard procedure for determining abrasive action of dentifrices, 353

Ether: sulphuric; first use in d., 309

F. A. C. D.: meaning of, 345

Fellowship(s): conferred, 428

FERRARO, EDWARDS: a tribute, 100

FLEMING, W. C.: education; report of committee, 46, 409

—: won't you walk a little faster, 404

Fluorine: 237, 241

—: chemistry of, as related to fluorosis, 235

—: d. caries, 234, 240

—: removal of stains, 231

—: résumé of caries relationship, 235

Fluorosis: 232, 233, 235, 236, 245

Frenum Labium: cause of malocclusion, 304

FRISBIE, H. E.: NUCKOLLS, J., SAUNDERS, J. B. and C. M.; amelogenesis, 107

- GIES, WM. J.:** d. autonomy; policy of isolation, 8
 —: and BODECKER, C. F.: *See under* Bodecker
 —: (editorial) anesthesia centenary, 329; d. participation in advancement of science, 269; (editorial) d. and poetry, 74; is M.D. degree prerequisite for research in d., 85
- GINN, J. T.:** fluorine investigations at U. of Rochester, 237
- GOODSELL, J. O.:** relations; report of committee, 217
- GRANT, W. H.:** prosthetic service in the Navy; subcommittee report, 194
- Granules:** specific secretion in enamel formation, 116
- GURLEY, J. E.:** (editorials) Chicago, 1942, 77; d. literature, 447; endowment fund — *J. D. R.*, 453; experience as a teacher, 89; foes within and without, 453; noblesse oblige, 260; war, accidents, future, 450; what is the difference, 325; work, not for pay, 452.
- HARPER, C. F.:** problems in distribution of d. literature (editorial), 263
- Harvard Plan:** discussion, 13
 —: new information, 468
 —: statement of action of alumni corrected, 271
- HARMON, D. B.:** d. and child development, including fluorosis, 232
- Health:** d.; American council on, 401
 —: care of, 291
 —: program of state and local governments, 219
- HENEGAN, J. F.:** analgesia; nitrous oxide and oxygen, 1
- HILL, T. J.:** recommendations for control of d. caries, 38
- HINDS, F. W.:** brown stain of teeth, 241
- Hospital(s):** d. service; report of committee, 56
- HYDE, WALTER:** pediatrician and orthodontist, 300
- Hygiene:** national d. association, 16, 225
- I. A. R. S.:** d. membership, 471
 Immunity: d. caries; factors, in, 243
 Indium: use in d. (editorial), 448
- Isotopes:** fluorine, 237
 —: radio-active, 396
- JOURNAL(s) (ism):** classification of, 62
 —: commercial influence upon, 319
 —: commercial exploitation, views on, 347
 —: d. literature (editorial), 447
 —: interest of manufacturers in, 262
 —: problems in distribution (editorial), 263
 —: report of committee, 58, 318
 —: requirements in classification, 320
 —: D. Res.; endowment fund (editorial), 453
 —: —; —; report of treasurer, 436
 —: —; victim of commercial exploitation, 320; additional opinions, 455; resolutions concerning, 433
- JAY, PHILLIP:** fluorine and d. caries, 234
- KIONOBLASTS:** defined, 111
- KITCHIN, P. C.:** proceedings of d. subsection, A.A.A.S., 229
- KOCH, C. W.:** streamlined d. meetings (editorial), 266
- KOTANZI, E.:** clinical and histological picture of malignant tumors of oral cavity, etc., 247
- LABORATORIES:** d.; *See* d. laboratories
 Lactobacillus: studies of, 187. *See also* Bacteriology
- Legislation:** practice of prosthodontia, 204
- LEVIN, M. M.:** and COX, G. J.; résumé of fluorine-carries relationship, 235
- Literature:** d.; problems in distribution (editorial), 263
- LONG, C. W.:** first use of sulphuric ether in d., 309
 —: inhalation anaesthesia, 309

McKAY, F. S.: mottled enamel; survey of early history, 238

McCALL, J. O.: normal and carious teeth; prophylactic need, 26

Meetings: d.; streamlined (editorial), 266

MEISEL, E. G.: president's address, 285

Membership Roster: 474

MERRITT, A. H.: endowments, report of committee, 52

Methyl Methacrylate: (editorial), 267

MIDGLEY, A. L.: d. takes initiative, 400

Military Affairs: 218

MILLER, H. C.: hospital d. service; report of committee, 56

MILLER, W. D.: early studies in abrasive action of dentifrices, 357

MILLS, R. H., Brigadier General: new head of Army D. C., 345

MORTON, W. T. G.: inhalation anesthesia (reference), 330.

Mottled Enamel: *See* Enamel, Mottled

NASMYTH'S membrane: 119

National D. Hygiene Association: 16, 225

Necrology: report of committee, 412

NELSON, C. A.: prosthetic service in the Army; subcommittee report, 191

New Books: *See* Books, New

New Jersey and New York Sections: joint meeting, 433

—: —; resolution concerning J. Den. Res., 433

New York and New Jersey Sections: *See* New Jersey and New York Sections

NIRONEN, PEKKA: d. in Finland, 23

Nitrous Oxide: anesthesia and analgesia, 1

Noblesse Oblige: (editorial), 260

Notes: attendance at U. S. d. schools, 471; decency prevailed, 471; d. health care, 97; d. education, trends in, 101; d. research and commercial entanglements, 464; memory of dentist's public service,

100; d. definition and contrasts, 280; developments in education, 97; does Yes mean No?, 467; the five-year plan, 98; God Bless them, 345; Harvard snapshots, 97; military dentistry, civil war style, 281; new chief of Army D. C., 345; new information about Harvard Plan, 468; personalities at d. meetings, 466; teeth, those isolated-insulated organs, 346; views on commercial exploitation of the J. D. R., 347; what does F.A.C.D. mean?, 345; where is McFarland now?, 346

Nutrition: analysis of caries-free patients, 189

—: in control of d. caries, 31

NUCKOLLS, J.: SAUNDERS, J. D. DE C. M., and FRISBIE, H. E.: amelogenesis, 107

ORAL SURGERY: report of committee, 66

Orthodontia(ist): and pediatrician, 300

Organizations: concerned in health information, 16, 219, 225, 295, 296

PAFFENBARGER, G. C.: (editorials) d. and public opinion, 84; indium, 448; moisture spoils amalgam, 331; palming amalgam, 83; politics and the A. C. D., 91

Pediatrics(ian): and orthodontist, 300

Politics: and A. C. D. (editorial), 91

PORTER, L. J.: report of N. Y. and N. J. joint meeting of sections, 433

Prevention: d. takes initiative, 400

Preventive Service: report of committee, 69, 416

Procter and Gamble: deal with J. D. R., 455

Profession(al) men: 105

Prosthetic Service: report of committee, 191
—: in Army, 191

Prophylaxis: as taught by D. D. Smith, 28

PRYOR, W. J.: plastic methyl methacrylate: properties and utilities (editorial), 267

- RADIO:** d. public relations, 224
 Relations: medico-dental, 275
 —: report of committee, 217
 Reprints: resolutions concerning, 347
 Research: is M.D. degree pre-requisite (editorial), 85
 —: study of development, formation and calcification of enamel, 107
RUDOLPH, C. E.: cost of adequate d. care for adults, 137
- ST. LOUIS:** 1942 meeting; what is the difference, 325
 Saliva: consideration in control of d. caries, 184
SAUNDERS, J. B. DE C. M.: NUCKOLLS, J., and FRISBIE, H. E.: amelogenesis, 107
SCHOONOVER, I. C.: amalgam researches, 331
SCHOUR, ISAAC: experimental production of mottled enamel, 239
 —: reference, 35
SCIENCE: advancement; d. participation in, 269
SCRUGGS, A. M.: "a poetic star," 74
 Section(s): meetings of, 428, 433. *See also* Supplement
SMITH, H. V.: chemistry of fluorine as related to fluorosis, 235
SOUDER, W.: professional men, 105
 Specialists: certification of; report of committee, 44
 Students: enrollment in d. schools, 101, 471
 —: required qualities for d., 410
 Sugar: relation to caries, 34
 Sulphuric Ether: first use in d., 309
 Surgery: inhalation anesthesia; first use of sulphuric ether, 309
 —: oral; report of committee, 66
SWINEHART, E. W.: certification of specialists; report of committee, 44
- TAYLOR, EDW.:** factors on caries immunity, 243
TAINTER, M. L., and EPSTEIN, S.: standard procedures for determining abrasion by dentifrices, 353
 Teacher(s): d. (editorial), 81
 —: experience as (editorial), 89
 Teeth: brown stain, 241. *See also* mottled enamel
 —: caries control, 26, 31, 38, 184
 —: cleaning of; early history, 353
 —: malocclusion, 301
 —: normal, 26
 Technicians: d. 197, 204
 —: adjunct to d. profession, 211
 —: disapproved for use by undergraduates, by Pennsylvania Council and Examining Board, 211
 —: unionization, 206
THORNTON, I. J.: oral condition in congenital cyanosis, 246
 Tonsils: as cause of malocclusion, 303
 Tooth brushes: natural and synthetic bristles compared, 373, 378
 Tumors: malignant; of oral cavity, 247
- VITAMINS:** discussion of, 32-34
- WAUGH, L. M.:** endowment fund, *J. D. R.*; report of treasurers, 436
WELLS, HORACE: inhalation anesthesia; reference to as discoverer, 330
WILSON, G. W.: editorial tribute; Wm. J. Gies: seventy years of labor in public interest, 72
WRIGHT, W. H.: prosthetic service; report of committee, 191
- YOUNGER, H. B.:** bleaching of mottled enamel, 242

JOURNAL

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CONTENTS

NO. 1, MARCH

Nitrous Oxide and Oxygen Analgesia in the General Practice of Dentistry. <i>James F. Henegan, D.D.S.</i>	1
"Dental Autonomy: A Policy of Isolation." <i>William J. Gies, Ph.D.</i>	8
The National Dental Hygiene Association. <i>Randolph G. Bishop</i>	16
Dentistry in Finland. <i>Pekka Nironen, O.L.</i>	23
American College of Dentists:	
Proceedings of the Houston Convocation, Sunday, Oct. 26, 1941:	
Addresses:	
Prophylactic Needs in Regard to Environmental Conditions of Normal and Carious Teeth. <i>John Oppie McCall</i>	26
Nutritional and Dietary Considerations in the Control of Dental Caries. <i>Wm. R. Davis, D.D.S.</i>	31
Recommendations for the Control of Dental Caries. <i>Thomas J. Hill, D.D.S.</i>	38
Reports of Committees:	
Certification of Specialists. <i>E. W. Swinehart, D.D.S., Chairman</i>	44
Education. <i>Willard C. Fleming, D.D.S., Chairman</i>	46
Endowments. <i>Arthur H. Merritt, D.D.S., Chairman</i>	52
Hospital Dental Service. <i>Howard C. Miller, D.D.S., Chairman</i>	56
Journalism. <i>J. Cannon Black, D.D.S., Chairman</i>	58
Oral Surgery. <i>Malcolm W. Carr, D.D.S., Chairman</i>	66
Preventive Service. <i>L. A. Cadarette, D.D.S., Chairman</i>	69
Ad-Interim Meeting of the Board of Regents, Chicago, February 22-23, 1942. <i>Otto W. Brandhorst, D.D.S., Secretary</i>	71
Editorials:	
William John Gies: Seventy Years of Labor in the Public Interest.....	72
Dentistry and Poetry.....	74
Chicago, 1942.....	77
The Dental Teacher.....	81
Palming of Amalgam.....	83
Dentistry and Public Opinion.....	84
Is the M.D. Degree a Prerequisite for Effective Research in Dentistry.....	85
Experience as a Teacher.....	89
Politics and the A. C. D.....	91
Correspondence and Comment:	
Should Most of the Technical Training for Dental Practice Be "Left to Post-graduate Experience," as It Is for Medical Practice?.....	93
Dentistry in Public and Military Services.....	95

Notes:

Harvard Snap-Shots:

Stop, read and reflect.....	97
Unbounded Enthusiasm for Dental Health Care.....	97
Wonderful "Modern Development in Education".....	97
"Five-year Plan" has been extended to the equivalent of a six-year plan.....	98
"From Jest to Earnest".....	99
Navy Dentists in First-Aid Service.....	99
In Memory of a Dentist's Public Service.....	100
Trends in Dental Education.....	101
Help Your Country.....	103
Book Announcements.....	104

No. 2, JUNE

Professional Men. <i>Wilmer Souder</i> , Ph.D.....	105
Amelogenesis. <i>J. B. de C. M. Saunders</i> , M.B., Ch.B., F.R.C.S.; <i>James Nuckolls</i> , D.D.S.; and <i>Harry E. Frisbie</i> , D.D.S.....	107
American College of Dentists:	
Proceedings of the Houston Convocation, Sunday, Oct. 26, 1941:	
Addresses:	
The Cost of Adequate Dental Care for Adults. <i>Charles E. Rudolph</i> , D.D.S.....	137
Salivary and Bacteriological Considerations in the Control of Dental Caries. <i>Hermann Becks</i> , M.D., D.D.S.....	184
Reports of Committees:	
Prosthetic Service. <i>Walter H. Wright</i> , D.D.S., Ph.D.....	191
Relations. <i>J. O. Goodsell</i> , D.D.S.....	217
American Association for the Advancement of Science: Proceedings of the Sub-section on Dentistry; Seventh Annual Meeting, Dallas, Texas, Dec 29 and 30, 1941. <i>Paul C. Kitchin</i> , M.S., D.D.S., Secretary of Subsection.....	229
Editorials:	
Noblesse Oblige.....	260
Problems of Distribution in Periodical Dental Literature.....	263
Streamlined Dental Meetings.....	266
Plastic Methyl Methacrylate: Properties and Utilities.....	267
Dental Participation in the Advancement of Science.....	269
Correspondence and Comment:	
Statement of Action of Harvard Alumni Corrected and Confirmed.....	271
"Time" Magazine Again Misrepresents Dental News.....	272
The Change Is Needed Now.....	273
Proposed Degradation of Dentists in a Medico-Dental Society.....	275
Notes:	
Dentistry: General Definition and Contrasts.....	280
Military Dentistry: Civil War Style.....	281
Book Announcements.....	283

CONTENTS

v

NO. 3, SEPTEMBER

American College of Dentists:

President's Address. *E. G. Meisel, D.D.S.*..... 285

Inaugural Address. *J. Cannon Black, D.D.S.*..... 291

Pediatrician and Orthodontist. *Walter Hyde, D.D.S.*..... 300

An Account of First Use of Sulphuric Ether by Inhalation as an Anæsthetic in Surgical Operations. *C. W. Long, M.D.*..... 309

Proceedings of the St. Louis Meeting of the Board of Regents and Committee Chairmen, Aug. 27-28, 1942:

Reports of Committees:

I. Journalism. *J. Cannon Black, D.D.S., Chairman*..... 318

Editorials:

What Is the Difference?..... 325

Anesthesia Centenary..... 329

Moisture Spoils Amalgam..... 331

Correspondence and Comment:

Was John Harris "The Founder of American Dental Education?"..... 333

Further Comment on the "Proposed Degradation of Dentists in a Medico-Dental Society"..... 336

History of the Army Dental Corps..... 338

"Admiralty in the Navy Dental Corps"..... 339

Dentistry: An Autonomous Profession..... 342

Notes:

God Bless Them!..... 345

What Does F.A.C.D. Mean?..... 345

New Chief of the Army Dental Corps..... 345

Where Is McFarland Now?..... 346

Teeth: Those Isolated-Insulated Organs..... 346

Collective Views on the Commercial Exploitation of the *Journal of Dental Research*..... 347

New Books..... 349

NO. 4, DECEMBER

A Standard Procedure for Determining Abrasion by Dentifrices. *Maurice L. Tainter, M.D., and Sidney Epstein, D.D.S.*..... 353

Concerning the Character of the Age Changes in Enamel and Dentin and Their Relation to the Vital Dental Pulp. *Charles F. Bodecker, D.D.S.*..... 380

Critical Analysis of Dr. Bodecker's Paper. *Wm. J. Gies, Ph.D.*..... 390

Dentistry Takes the Initiative. *Albert L. Midgley, D.M.D., Sc.D.*..... 400

Won't You Walk a Little Faster? <i>Willard C. Fleming, D.D.S.</i>	404
American College of Dentists:	
Proceedings of St. Louis Meeting: Board of Regents and Committee Chairmen, Aug. 27-28, 1942:	
Reports of Committees:	
Education. <i>Willard C. Fleming, D.D.S., Chairman</i>	409
Necrology. <i>John V. Conzett, D.D.S., Chairman</i>	412
Preventive Service. <i>L. A. Cadarette, D.D.S., Chairman</i>	416
Report of the Board of Regents. (Including report on Sectional Meetings.) <i>Otto W. Brandhorst, D.D.S., Secretary</i>	418
Meeting of New York and New Jersey Sections: Action Relative to the <i>Journal</i> <i>of Dental Research</i> . <i>Lowrie J. Porter, D.D.S., Secretary</i>	433
<i>Journal of Dental Research</i> : William J. Gies Endowment Fund, Report of the Treasurer. <i>Leuman M. Waugh, D.D.S., Treasurer</i>	436
Editorials:	
Dental Literature	447
Indium in Dentistry.....	448
War, Accidents and the Future.....	450
Work But Not for Pay.....	452
Foes Within and Foes Without.....	453
<i>Journal of Dental Research</i> : William J. Gies Endowment Fund.....	453
Erratum	454
Correspondence and Comment:	
Additional Opinions on the Recent Commercial Exploitation of the <i>Journal of</i> <i>Dental Research</i>	455
Further Comment on "Admiralty in the Navy Dental Corps".....	461
Notes:	
Dental Research and Commercial Entanglements.....	464
Personalities at Dental Meetings.....	466
Does Yes Mean No?.....	467
New Information About the "Harvard Plan".....	468
Attendance at U. S. Dental Schools.....	471
Decency Prevailed	471
Book Announcements	472
Register of Membership.....	474
Supplement	519
Index	521
Title pages and contents: Volume 9.....	i-vi

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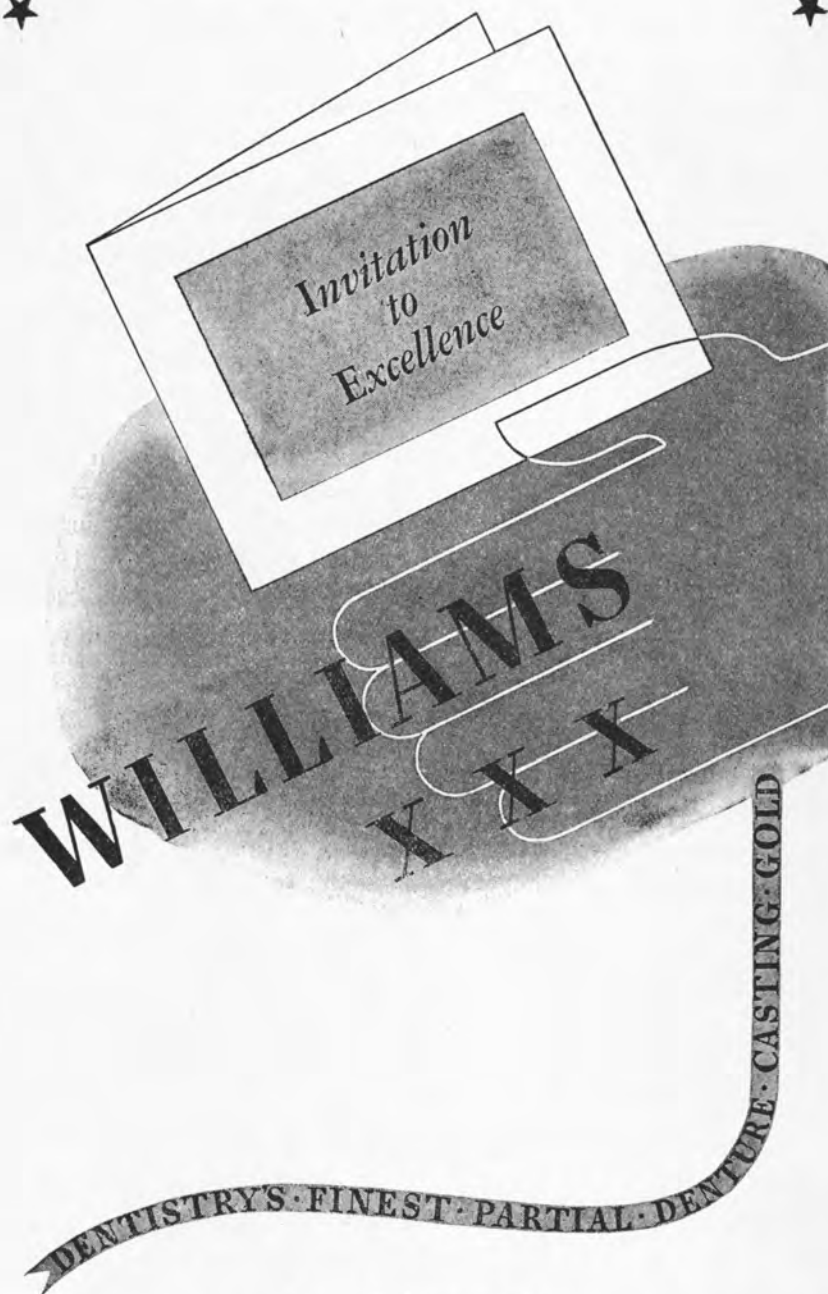
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Research—A. L. Midgley, *chairman*; L. E. Blauch, P. J. Brekhus, J. E. Gurley, P. J. Hanzlik, P. C. Kitchin, A. B. Luckhardt, L. R. Main, L. M. S. Miner, L. W. Morrey, Irvine McQuarrie, Fr. A. M. Schwitalla.

Socio-Economics—Geo. W. Wilson, *chairman*; E. H. Bruening, W. H. Mork, B. B. Palmer, K. C. Pruden, M. W. Prince, C. E. Rudolph, Maurice William.

Announcements

Next Meeting, Board of Regents: Chicago, Feb. 21, 1943.

Next Convocation to be announced.

Fellowships and awards in dental research. The American College of Dentists, at its annual meeting in 1937 [*J. Am. Col. Den.*, 4, 100; Sep. and 256, Dec., 1937] inaugurated plans to promote research in dentistry. These plans include grants of funds (The William John Gies Fellowships) to applicants, in support of projected investigations; and also the formal recognition, through annual awards (The William John Gies Awards), of distinguished achievement in dental research. A standing committee of the International Association for Dental Research will actively cooperate with the College in the furtherance of these plans. Applications for grants in aid of projected researches, and requests for information, may be sent to the Chairman of the Committee on Dental Research of the American College of Dentists, Dr. Albert L. Midgley, 1108 Union Trust Bldg., Providence, R. I. [See "The Gies Dental Research Fellowships and Awards for Achievement in Research," *J. Am. Col. Den.*, 5, 115; 1938, Sep.]

JOURNAL OF THE AMERICAN COLLEGE OF DENTISTS

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