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AMELOGENESIS

A FURTHER STUDY OF THE DEVELOPMENT OF TOMES' PROCESS AND THE ENAMEL ROD MATRIX IN THE MOLAR AND INCISOR TEETH OF THE RAT

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A histological study on Amelogenesis in the molar tooth of the rat was published a little more than a year ago, in which attention was drawn to the general lack of agreement on the cytology and functions of the ameloblast in the formation and elaboration of the enamel. It was fully realized that in such a controversial subject, the field had merely been reopened. The study, therefore, has been continued and extended with the employment of more exacting techniques. These further observations have clarified certain details which mean some modification and greater precision in definitions then employed.

The difficulties encountered in the histological examination and elucidation of the finer cytological details in the structure of cells of such great delicacy as the ameloblast cannot be over-emphasized. Not only, as in all histological technique, must the greatest attention be paid to the effects of various fixatives and the modifications which they produce in the appearances of the cellular constituents, but the

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histologist is faced with the problem of interpreting the effects of powerful decalcifying agents which have hitherto had to be employed in all cases where calcification is in active progress. In addition, as pointed out by Wellings\(^5\) in a recent critical review, there is always the danger, unless the thinnest of sections, carefully oriented, are employed, of confusing details of superimposed cells.

In the present communication, our observations are restricted for the most part to the adult ameloblast, Tomes’ process, the formation of the enamel rod, inter-rod substance, enamel matrix and their spatial relations. The closest attention has been paid to problems of fixation, and comparisons have been made on the effects of a variety of such agents on the appearances seen in both decalcified and undecalcified material. In addition the opportunity will be taken of discussing the critique of Orban, Sicher and Weinmann\(^4\) on our previous paper. We should like to acknowledge the kindness of these authors in giving us the opportunity of examining some of the material upon which their opinions were based.

**MATERIAL AND METHODS**

As in our previous investigations, the material was derived for the most part from young rats of the Evans-Long strain maintained on a full diet supplemented with cod liver oil. In addition to the first and second molar, the incisor was utilized more extensively but unfortunately owing to the precocity with which this tooth undergoes heavy calcification, it is not quite as convenient as the molar for the preparation of undecalcified sections and observations therefore could not be extended beyond the fourth day after gestation without the use of a decalcifying agent. Material from other species, such as the dog, cat, pig, monkey, man, etc., were also examined.

Previous experience and its general familiarity suggested the


adoption of 10 per cent neutral formol as the standard fixative on which to base the comparative examinations of the influences of other agents. In addition the appearances in the neutral formal fixation compare favorably with those provided by the Altmann-Gersh technique, and on examination of the living cell. In setting up such a standard the time factor and the pH of the solution were considerations. The tooth buds immediately after removal from their crypts were fixed in 10 per cent neutral formol of pH 8.9 and removed at hourly intervals up to 24 hours. The pH of the solution at the end of 24 hours was 8.8. The series of buds were then carried through a standardized technique of dehydration and embedding, and were sectioned without decalcification in the manner described in our previous communication. The material so obtained was stained with haematoxylin and eosin, Mallory-Azan, Masson’s trichrome methods, a modification of von Kossa’s silver nitrate technique, Koneff’s iron haematoxylin aniline blue, and a modified Mallory-Azan in which light green was substituted for the aniline blue.

Similar material, often from the same animal or as far as possible from litter mates, was fixed in a variety of solutions such as neutral alcohol, Zenker, Zenker-formol, Bouin’s fluid, etc., and carried through the same procedure and stained with the identical dyes. In series subjected to decalcification the agent in all instances was 5 per cent nitric acid in 80 per cent alcohol.

In the case of 10 per cent neutral formol (pH 8.9), it was found that fifteen hours fixation produced the optimal results with the least distortion and shrinkage. Up to twelve hours of fixation, the buds showed some degree of disintegration with vacuolization and artifact. The appearance of artifacts might be attributed to incomplete fixation of the cell cytoplasm, the distortion occurring during dehydration. With neutral 95 per cent alcohol the best results were obtained when fixation was extended beyond 15 hours. The material so treated proved particularly fruitful in the differentiation of the enamel rod elements and especially in establishing the relationship
of Tomes' process to the rod. Zenker's fluid with or without the addition of non-precipitating fixatives gives rise, as is well known, to such coarse changes in the cell as to offer serious difficulties in interpretation. Due to the acidity (pH 4.2) of the fluid, the potassium bichromate acts as a precipitant fixative and regularly gives rise to a segmentary appearance of the rod and even of the cytoplasm of the ameloblast.

In view of the importance of the differences in the histological picture presented by the various structures when the tissues are fixed by different agents, it seems permissible, although hazardous, to consider the possible effects that may be occasioned by each of the fixatives so employed.

The cells of the tissues fixed by formaldehyde in contrast to the material fixed by alcohol, uniformly show a clear delineation of the cell borders. This difference in behavior does not seem unreasonable when one considers that in all probability the surface of the cell consists, for the most part, of lipid material and protein. Immersion of such a surface into a solution of formaldehyde causes an immediate denaturation of the protein moiety. The lipid material remains intact. The tinctorial properties of this dual phase system are such as to give the appearance of a well defined cell wall. In general, we see no such clearly defined wall when the same material is fixed by the alcohol. Here one must consider the solvent properties of alcohol for lipids. It is quite probable that the slow fixation brought about by alcohol is accompanied by sufficient solution of the surface lipid material that the resulting coagulated surface has a less rigid structure and a more diffuse appearance. It may also be pointed out that the differences in the appearance of the pre-enamel process when fixed in Zenker formol and when fixed in formaldehyde are to be attributed to the difference in the properties of the agents. Formaldehyde fixation gives rise to pre-enamel processes of uniform appearance: Zenker formol fixation, on the other hand, yields an incomplete and distorted picture of many of the

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details. It appears quite probable that the differences may be attributed to the marked acidity (pH 4.2) of the Zenker preparation. The segmented appearance of the interior of Tomes' process and of the intrarod substance is no doubt due to the well known coagulating property of the chromate and mercuric chloride.

Observations

With the granulation of the cytoplasm and the changing polarity of the cell, the ameloblast approaches functional activity. Tomes' process is heralded by the appearance of a large terminal vacuole at the dentinal extremity of the cell, the existence of which is removed from the realm of the artifact by observation on the living cell. The content of the vacuole is clear, homogenous and slightly eosinophilic in reaction. Under the highest magnifications specific secretion granules, basophilic in reaction and somewhat refractile, can be observed in the homogenous material. The progenitor of Tomes' process is not always obvious in the continuous erupting incisor unless the development of that tooth is followed from the earliest stages. It is a mistake to imagine that every stage of amelogenesis is represented in the same preparation of a continuously erupting tooth, for the rate of functional activity is not necessarily paralleled by the developmental stages.

The terminal vacuole is never so large and obvious, once the enamel matrix has been laid down. With Zenker fixation the content of the vacuole is more coarsely granular. Almost simultaneously with the appearance of the terminal vacuole, the cell membrane juxtaposed to the dentino-enamel membrane undergoes thickening and becomes basophilic in reaction and hyaline in quality.

With the continued function of the cell, the lateral wall of the terminal vacuole presents a thickening which is also somewhat basophilic and of hyaline quality. The effect of these lateral thickenings is to give to the extremity of the cell a tapered appearance which is emphasized in sections cut somewhat obliquely. These tapered structures constitute the classical Tomes' processes and the hyalinized thickenings in the lateral wall are the structures which
we have termed the pre-enamel processes. (Figs. 1 & 2). As previously pointed out these processes are structures of great delicacy to be found only in sections which have not been exposed to any acid reagent, even for comparatively short periods of time. Therefore it is necessary to control the pH during fixation and dehydration, and decalcifying agents cannot be employed. In addition they are more or less destroyed by the more acid stains and are best revealed by progressive staining with haematoxylin and eosin. They are never found after the use of acid fixatives as Bouin, Zenker, Zenker-formol, unneutralized formol or after alcohol fixation.

The region of Tomes’ processes and the lateral thickenings termed the pre-enamel processes constitute the area undergoing functional transformation into the enamel matrix. This area of transformation can be more precisely defined with increasing development and after an appreciable amount of enamel matrix has been laid down. As the several elements participating in the formation of the enamel rod are best seen with the approach of their full functional development, it is to this stage that the greatest attention will be paid.

**The Ameloblast**

There is little to add to our previous description of the changes occurring within the ameloblast itself except to remark that its cytoplasm tends to exhibit a progressively more vacuolized appearance in which the minute refractile and mildly basophilic bodies, referred to as specific secretion granules, can often be observed particularly in those vacuoles lying towards the dentinal extremity of the cell. The cytoplasm of this, the distal end, appears with some stains to be more concentrated and its granular content coarser after Zenker fixation. It has been noticed that Zenker or Zenker-formol often precipitates the hyaline substance within the cell cytoplasm giving rise to the appearance of segmentation within the cell itself. The precipitated refractile basophilic and hyaline-like material is identical to that to be found in Tomes’ process and the matrix rod as will be described anon.
THE PRE-ENAMEL AND TOMES' PROCESSES

The distal extremity\(^a\) of the cell with its condensation of cytoplasm is succeeded by Tomes' process. The junction between cell and Tomes' process corresponds to the level of the so-called terminal bar apparatus in those preparations in which these structures appear. (Figs. 1-3-4). The distal limits of Tomes' process cannot be given with the same precision for lack of a convenient landmark and for other arbitrary reasons mentioned below.

The appearances in the region of Tomes' processes vary, depending upon the type of fixative employed and it is not possible to demonstrate the entire picture with any certainty by any one method of preservation. In addition, precisely oriented sections of the order of 3\(\mu\) in thickness are necessary to establish the continuous relationships between cell, Tomes' process and the maturing rod. Preparations fixed in neutral alcohol, sectioned without decalcification and subsequently stained with Masson's trichrome stain or Koneff's iron haematoxylin and aniline blue are of special value in following the transitional changes.

The proximal part of Tomes' process (Fig. 1), in direct succession to the cell, constitutes what is virtually a single vacuole filled with a clear homogenous material, acidophilic in reaction in which minute slightly basophilic, refractile bodies can be discerned. These appearances are similar to those described as the terminal vacuole in the provisional stages in the formation of the process. The highly acid fixatives such as Zenker's acid decalcifying agents change the picture somewhat. In such preparations, this portion of the cell is more coarsely granular and more closely resembles the structure of the cell itself. The vacuole of the process appears to arise by confluence of smaller vacuoles at the distal extremity of the cell.

The distal portion of Tomes' process (Fig. 1) is conical in shape and its apex projects for a variable distance into the core of the enamel rod. Its substance is more solidly hyalinized but as sug-

\(^a\)The terms basal and distal are used as in our previous paper with reference to the direction of functional activity.
gested by staining reactions, less mature than that of the rod itself. This is beautifully shown in preparations Masson stained after alcohol fixation where the substance of Tomes’ process takes the Ponceau-Fuchsin and the more mature matrix of the rod, the light green. As a rule, the relative stages of hyalinization of rod and distal portions of Tomes’ process respectively are fairly uniform. In certain rods of the same section and level, the apex of Tomes’ process is found extending into the rod for a considerable distance (Figs. 1 & 3). It is assumed that in these extreme examples, the entire rod is immature. Transitional types are often found in which small segregated areas of the acidophilic material of Tomes’ process lie isolated in the otherwise relatively mature matrix substance of the rod. (Fig. 1). As the zone is one of transition, due to some unknown histo-chemical change, the morphological extent of Tomes’ process can only be fixed arbitrarily.

This portion of Tomes’ process often exhibits the appearance of segmentation as described by Orban et al. (Fig. 5). We have found that this segmentation is characteristic of the precipitating fixatives such as Zenker-formol and the same appearance may extend to the proximal portion of Tomes’ process and to the cell itself.

The proximal portion of Tomes’ process is bounded laterally and on either side by the pre-enamel processes. (Figs. 1 & 2). These processes are somewhat more refractile than the body of Tomes’ process itself and are slightly basophilic in reaction. Slender structures, their apices terminate just short of the condensed cytoplasm of the distal end of the cell which corresponds to the level of the so-called “terminal bar” apparatus. Their bases blend with the lateral walls formed by the completely hyalinized rod cortex. The transition can only be detected by differences in intensity of staining reaction. They are destroyed in whole or in part by acid decalcifying agents and by acid stains and they cannot be shown after alcohol fixation. (Figs. 4 & 3). They have been found exclusively in preparations fixed with neutral formol or treated by the Altmann-Gersh technique and subsequently stained with haematoxylin and eosin. These processes represent the earliest stage of hyalinization which
we have been able to observe. As they mature, they thicken and ultimately give rise to the rod cortex. (Fig. 1). In those preparations treated with acid fixatives or decalcifying agents and in which the pre-enamel processes are consequently destroyed, the extremities of the cortex of the rod form series of projections. (Fig. 4). These projections must not be confused with the pre-enamel processes. The apices of these projections, even in undecalcified sections stained by acid stains, often appear rounded and globular and stain differentially. They form a system of dots very similar in staining reaction to the terminal bars but are not so discrete. We believe that this system is produced by coagulation and retraction of the substance of the pre-enamel processes in virtually the same manner as is the formation of the terminal bar apparatus itself.

THE ENAMEL MATRIX

We consider the matrix to consist of the hyalinizing rod and interprismatic substance, which, as evidenced by its tinctorial reactions, undergoes as a whole a process of maturation in a proximo-distal direction.

(a) The enamel rod: The developing enamel rod we regard as consisting of three portions, the rod cortex, the rod core and the rod membrane. (Figs. 1 & 6).

The cortex is the thickened lateral wall, homogenous, dense and strongly basophilic. (Fig. 1). It is formed as a continuation of the progressive change first observed in the pre-enamel processes. It is the first portion of the rod to undergo complete maturation and the first to undergo calcification. (Fig. 2).

The core, in contrast to the cortex, is the less completely hyalinized center of the rod. (Figs. 1 & 6). It seems to be formed by the continued hyalinization of Tomes' process. In undecalcified material fixed in neutral alcohol and neutral formal, Tomes' process and the core appear to be continuous and are marked by a progressive tinctorial change. After an appreciable length of rod has been established, the cortex and rod core undergo an almost equal degree of hyalinization. The substance of the core is not, however, quite as homogenous as the cortex, being more coarsely granular in appear-
ance. However, isolated rods from the same levels do not always show a corresponding degree of development. In some rods (Figs. 1 & 3) interrupted areas of incompletely hyalinized material, having the identical staining reaction as the distal portion of Tomes’ process, may be found deep within the core, surrounded by more mature matrix in which the tinctorial response has completely changed. In extreme examples, the entire rod is apparently immature and the distal part of Tomes’ process may extend in continuity almost to the end of the rod. Careful examination of transitional types indicates that the distal portion of Tomes’ process undergoes maturation from its periphery towards its center in the formation of the core.

The powerfully precipitant fixatives such as Zenker, as in Tomes’ process and within the ameloblast itself, characteristically produce the appearance of segmentation in the rod core. (Figs. 4 & 5). In light of the orderly, progressive and continuous fashion in which hyalinization proceeds, the segmentary appearance can be but a gross exaggeration of the true arrangement.

Surrounding the hyaline rod and therefore external to the cortex, a membrane can be selectively stained (Figs. 6 & 1); a modified Mallory-Azan proving most fruitful in differentiating the membrane and cortex from the hyalinizing core. Alcohol as a fixative produced no delineation of this membrane which was found only after neutral formol and in exaggerated form after Zenker fixation. (Figs. 4 & 5). It was less well defined in the region of Tomes’ process but could be traced in continuity to the cell wall. We assume that this membrane is therefore a thickened continuation of the cell membrane of the ameloblast.

(b) The interprismatic substance: The hyalinized rods appear to be connected together by an intercellular or interprismatic substance which possesses staining reactions which suggest that it consists of material similar to that of the enamel rod matrix. (Figs. 1, 3, 6). In the deepest and therefore the oldest level of the enamel matrix, maturation is almost complete so that the rods and the intervals between them can scarcely be distinguished. (Fig. 6). At these levels the matrix may therefore appear to be homogenous. As the
periphery is approached the tinctorial response of the interprismatic substance changes and resembles that of the basophilic pre-enamel processes and specific secretion granules. At the level of Tomes' processes the material becomes less refractile and more acidophilic. These maturation changes are, however, not quite so advanced when compared to relative levels of the rod. The origin of the interprismatic substance could not be determined but appearances suggest that it may have arisen in the region of the proximal portion of Tomes' process in association with the pre-enamel processes and in an essentially similar manner. The interprismatic substance is the last to calcify. (Fig. 2).

The Terminal Bar Apparatus

The authors previously reported that they believed the terminal bar apparatus to be an artifact. Further investigation supports this view. The terminal bars are found in the intercellular or interprismatic intervals at the level of the junction of the distal end of the ameloblast and the base of Tomes' process. (Figs. 1, 3, & 4). Comparison of the effects of several methods of fixation and staining indicate that the lateral walls of Tomes' process or the pre-enamel processes are peculiarly susceptible to erosion by the more acid fixatives and to a lesser extent to dehydrating agents and the more acid stains. Zenker's fluid in both decalcified and undecalcified material reveals these structures in the most exaggerated form and they appear as heavy discrete knots between the cells. (Fig. 4). In all such preparations the lateral walls of Tomes' processes are eroded in greater or less degree and the pre-enamel processes are absent. When erosion is great Tomes' processes are conical in shape and the terminal bars most evident. Examination of transitional forms suggests that the substance of the pre-enamel process and of the interprismatic intervals undergoes coagulation and shrinks back giving rise to these structures. This shrinkage not only occurs in the direction of the cell-body but to a lesser degree in the direction of the developing rod, thus producing a second system of similar bars which appear as differentially staining globules at the periphery of the rod.
Material fixed in neutral formol or by the Altmann-Gersh technique, sectioned without decalcification and stained with haematoxylin and eosin, show perfect pre-enamel processes but no terminal bar apparatus. However, in sections from the same blocks when treated with acids or stained with the more acid staining combinations, the pre-enamel processes disappear and the terminal bar apparatus becomes apparent, usually in a linear form. By these means it is entirely possible to reveal this system in any degree, depending upon the acidity of the solutions employed.

When alcohol is used as a fixative, the pre-enamel processes disappear, the interprismatic interval is exaggerated by the complete solution of its content and it is not possible to stain a terminal bar apparatus. (Fig. 3).

**DISCUSSION**

We shall limit the discussion to general aspects of our earlier findings and give more detailed consideration to recent observations in light of the views and criticisms of Urban, Sicher and Weinmann. We have therefore included for this purpose of schematic drawing which illustrates in composite fashion the various elements participating in amelogenesis and their morphological relationships. (Fig. 1).

The views expressed by Orban et al. in their criticisms of our earlier publication would appear to us to differ for the most part in terminology alone, due, we believe, to a failure to appreciate specific details. The general scheme is essentially the same but they impute to us opinions which we do not hold. In our schematic illustration we show an oblique relationship of cell to rod, a relationship which we agree with Orban et al., unquestionably occurs. However, this arrangement is by no means invariable. In the incisor, obliquity is common but depending upon the part of the section selected for examination, all forms of rod-cell arrangement from the straight line to the tangential may be found. On the other hand, in the

molar tooth the straight arrangement is the more usual, although oblique forms occur at certain levels.

We believe that the formation of the enamel matrix proceeds as a continuous and progressive process extending from the ameloblast through Tomes' process to the enamel rod. This process is, of course, associated at first with the progressive elongation and growth of the cell and ceases once the cell has attained its apogee. The period of growth is associated with the greatest functional activity of the cell which thereafter diminishes in size with further transformation. As the cell elongates the cytoplasm of the distal extremity becomes progressively more vacuolated. The content of these vacuoles is a clear, slightly acidophilic ground substance in which minute hyaline or specific secretion granules can be discerned. These appearances are altered by the precipitating fixatives. Confluence of the distal vacuoles, we believe, gives rise to Tomes' process.

With regard to the topographical relationship between the cell body and Tomes' process we believe now, as we did formerly, that Tomes' process has its inception at the level of the terminal bar apparatus, when these structures are present. We, therefore, agree in this particular with Orban et al., in spite of their tendentious statements to the contrary.

Tomes' process we regard as consisting of two portions. The proximal portion is, with philological reservations, essentially a vacuole whose content is similar to that of the distal extremity of the ameloblast, except that a slightly greater degree of hyalinization has proceeded in the form of a deposit in its lateral walls, constituting what we have called the pre-enamel processes. The precipitating fixatives do not yield these processes and the proximal portion of Tomes' process resembles more closely the coarsely granular cytoplasm of the distal end of the cell itself. In our previous publication we stated that Tomes' process arose initially by the formation of a terminal vacuole similar in all respects, except in size, to the structure of this portion of Tomes' process. This terminal vacuole we still regard as the progenitor of Tomes' process which is only seen in the earliest stages of enamel development prior to the formation
of the matrix. Its reality is established by observations on the living cell. Orban et al. deny the existence of this vacuole and illustrate in support of their contention a transparent artifact which corresponds neither in time nor position to the terminal vacuole. Their material is completely unsuited for a study of these changes in the initial phases.

The deposition of hyaline material in the lateral wall of the proximal portion of Tomes' process gives rise to the structure termed the pre-enamel processes. Their further consolidation and thickening, which is associated with alterations in tinctorial reactions, gives rise to the more homogenous cortex of the matrix rod. These processes are destroyed by the action of acids, acid fixatives and acid stains and when absent, the proximal extremities of the incompletely formed rod cortex may, on superficial examination, be mistaken for them. The pre-enamel processes are, however, much finer, differ in tinctorial reactions and are in proximal continuity with the rod cortex. We have been unable to find these processes in any of the preparations submitted by Orban, Weinmann and Sicher, which was not unexpected as they had been subjected to decalcifying agents. These authors, however, apparently assuming that the proximal ends of the rod cortex are the structures described by us as the pre-enamel processes, have consequently discussed our opinions on a totally erroneous basis. The term pre-enamel processes was chosen by us advisedly, as these structures, though related, do not form a part of the definitive matrix itself.

The distal portion of Tomes' process is that which has undergone hyalinization of some degree but whose tinctorial reactions are as yet dissimilar to those of the more mature part of the matrix. This portion of Tomes' process is surrounded on its periphery by the more completely formed cortical portion of the rod which is apparently derived from the earlier deposition constituting the pre-enamel processes. Hyalinization of this portion of Tomes' process would appear to proceed from its periphery towards its center and as pointed out

*Orban, et al., *J. Am. Col. Den.*, 10, 13-22; 1943, Mar., Fig. 12.*
may be incomplete. We assume that it has developed by precipitation or consolidation of the proximal portion of Tomes' process.

The distal part of Tomes' process and its lateral cortical boundaries are not acid soluble. In view of the tinctorial evidence of its immaturity, its failure to accept calcium, and in virtue of the fact that it constitutes the superficial layer of the definitive matrix, we would accept and adopt Orban et al.'s term, pre-enamel matrix, for this provisional zone. We, therefore, draw a distinction between the pre-enamel processes and the pre-enamel matrix, a distinction which is no more than arbitrary but which indicates the progressive formation and maturity of the hyaline material itself.

The pre-enamel matrix is succeeded by the more mature matrix. It is made up of the maturing rods and the interprismatic spaces. The rod we have described as consisting of core, cortex and membrane separated from one another by the interprismatic interval. The transition from the pre-enamel matrix to fully mature matrix is not abrupt but gradual. We judge from tinctorial reactions that the cortex precedes the core in maturation and is in turn followed by the interprismatic substance. When maturity is complete the whole matrix appears to be homogeneously welded together and distinctions in structure cannot be readily made, as also noted by Gottlieb.

In the maturing matrix calcification proceeds in inverse relationship to the maturity of the individual elements as revealed by tinctorial reactions. Calcification appears first in the cortex of the rod, is followed by the core, which in turn is succeeded by the interstitial substance in a disto-proximal direction. The changes occurring in the interstitial intervals closely resemble those of the rod except they are delayed. Although the function of the interprismatic spaces is not understood, it is possible that these intervals serve matrix maturation by providing a temporary channel for fluid exchange in the desiccation and consolidation of the matrix. It is interesting to note

that similar spaces exist in other keratin forming organs such as the skin and the nail.

The reality of the existence of a terminal bar apparatus remains highly questionable. The behavior of the material occupying the region in which they occur, to various fixatives and stains, strongly emphasizes their artificiality. We would take strong exception to the criticisms of Orban, Sicher and Weinmann on this ground. They imply that the methods of staining employed by us were unfavorable for the staining of these structures. This supposition we cannot accept, since in suitable material, the majority of stains employed yielded a terminal bar apparatus and we illustrated an excellent example of these appearances. (Fig. 13 of our previous paper). It is unfortunate that these authors should have selected for illustration a photomicrograph of one of our sections which although undecalcified had been treated with a highly acid stain. In this figure it will be noted that there is no sign of the pre-enamel processes. The terminal bar apparatus is present only when the pre-enamel processes are absent and they assume their most exaggerated form with the precipitating fixatives, such as employed by these authors.

We envisage the formation of enamel as capable of being divided into several stages which proceed either simultaneously, progressively, or successively:

1. The first is related to the development of the ameloblast followed by increasing cellular function and growth and succeeded by eventual cellular reduction on completion of the matrix.

2. The second process concerns the transformation of the ameloblast into the enamel matrix. This transition occurs at the regions of the distal end of the cell and Tomes' process. It consists fundamentally of the continuous elaboration of Tomes' process by confluence of cytoplasmic vacuoles, as the distal extremity of this process undergoes histo-chemical differentiation into a hyaline material. Although the body of our evidence supports the above view, the

\[^{10}\text{Orban, et al., } \text{ibid, Fig. 11-a.}\]
The question of successive formation of Tomes’ processes is not entirely ruled out. Although we favor the prior interpretation, the matter is, therefore, open to doubt.

3. The enamel matrix proper, after formation, undergoes further histo-chemical change and maturation. These changes together with those of transition resemble closely those occurring in the formation of keratin, an opinion based upon their tinctorial reactions and comparison of stratified squamous epithelium carried through identical procedures. It is fully recognized that tinctorial reactions are pseudochemical tests but we know of no strict histo-chemical methods, in the sense expressed by Lison in his classical “Histochemie Animale,”11 for keratin identification. There is, however, a reasonable amount of collateral evidence indicating the keratinous nature of the matrix (vide. Chase,12 Rosebury and Gies,13 Rosebury,14 Karshan15 and Pincus.16 In our previous publication the relationship of the formation of the matrix, to that of the skin and keratin was clearly expressed as “a parallelism” within the limitation of the methods employed. In suggesting such a parallelism as a working hypothesis for further investigation we made no claim of specific chemical identification as imputed to us by Orban et al.

4. The fourth phase is that of calcification which proceeds in the reverse direction of matrix maturation, a small portion of the definitive matrix remaining uncalcified for some time during amelogenesis. This zone we accept with Orban et al. as pre-enamel matrix, at the same time distinguishing the area of the proximal portion of Tomes’ process as the region of matrix transition.

5. The final phase, in which we have no observations to report,

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**Fig. 1.** A composite schematic drawing illustrating the continuity of cell, Tomes’ process and rod. This figure includes all phases we have observed concerned with the formation of Tomes’ process and its hyalinization to form the enamel matrix.

### A Ameloblast
- a Basal granules
- b Cytoplasmic vacuoles
- c Condensation of cell cytoplasm
- d Intercellular substance

### B Pre-enamel Matrix
- e Position of so-called terminal bars
- f Tomes’ process
- g Interprismatic matrix
- h Pre-enamel process
- i Secretion granules

### C Enamel Matrix
- **I Completely hyalinized rod**
  - k Rod membrane
  - l Rod cortex
  - m Hyalinized rod core
- **II Partially hyalinized rod**
  - n Extension of Tomes’ process into rod core
  - o Remnants of Tomes’ process in rod core
- **III Incomplete hyalinized rod**
  - p Delayed development of pre-enamel processes
  - q Delayed development of rod cortex
  - r Delayed development of rod core
Fig. 2. First molar, 3 day rat, coronal section, undecalcified, 5μ, neutral formol fixation. Modified Von Kossa silver nitrate counterstained haematoxylin and eosin. X 1900. Illustrating pre-enamel processes and formation of enamel rods. Note absence of terminal bars by this method of preparation.

A. Ameloblast.
B. Pre-enamel processes.
C. Calcifying enamel rod.
Fig. 3. Incisor, 3 day rat, undecalcified, alcohol fixation, 3µ. Masson trichrome ×2500. Illustrating continuity of cell, Tomes' processes, enamel rod and interprismatic matrix.

A. Ameloblast.
B. Position of so-called terminal bars.
C. Tomes' processes.
D. Interprismatic matrix.
E. Hyalinizing rods.
Fig. 4. Incisor, 3 day rat, undecalcified, Zenker formol fixation. Masson trichrome 3μ X 2500. Illustrating precipitation of intra-rod substance by fixation resulting in segmented appearance.

A. Ameloblast.
B. So-called terminal bars produced by fixation.
C. Area of Tomes' processes.
D. Rod membranes.
E. Segmented intra-rod matrix.
Fig. 5. Incisor, 3 day rat, undecalcified, Zenker formol fixation. Masson trichrome × 2500. Illustrating extreme segmentation produced by fixation. 3μ.

A. Ameloblast.
B. Segmented distal end of cell.
C. So-called terminal bars.
D. Segmented Tomes' processes.
E. Segmented rod.
Fig. 6. First molar, 3 day rat, coronal section, neutral formol fixation, undecalcified, 3µ. Modified Mallory-Azan. Illustrating cell membrane, intra-rod substance, and interprismatic matrix. ×1500.

A. Ameloblastic layer.
B. Interprismatic matrix.
C. Rod membrane.
D. Rod matrix.
is that described by Diamond and Weinmann, and Weinmann, Wessinger and Reed of secondary calcification or maturation of the enamel which, according to these authors, is associated with secondary calcification and further alteration in the enamel matrix. In the discussion of our previous article the relationship of our findings to those of Diamond and Weinmann was not clear and our criticisms were apparently misplaced.

Orban et al. described the process of rod formation as occurring by rhythmical transformation of Tomes' process, basing their opinion on the segmented appearance yielded by their preparations. This segmentation is characteristic of the precipitating fixatives. It may be produced not only in the rod and distal and proximal portions of Tomes' process, but also in the body of the cell itself well above the level of the so-called terminal bars. The later observation is of the greatest significance and we, therefore, believe that these appearances are false and cannot be accepted on face value. In our opinion these appearances are related to the effects of precipitating fixatives which grossly distort and exaggerate the normal process. They do not appear with the very precise Altmann-Gersh technique. These changes would seem to be due to coagulation or precipitation of the immature hyalin analogous to similar effects produced in the formation of the terminal bar apparatus.

The use of precipitating fixatives fail to reveal the underlying process of continued progressive hyalinization or maturation of the rod. As already pointed out the process extends within the rod from the periphery toward the center and therefore the effect of the precipitating fixatives in producing a segmented appearance is not unexpected.

As Baker and many others have pointed out, so great is the

The development of Tomes' process and the enamel matrix in the undecalcified first molar and incisor teeth of the rat has been followed in their early stages, from birth to three days. In making these observations the authors have given the closest attention to the problems of fixation and staining and comparisons have been made on the effects of a variety of agents in the appearances seen in both decalcified and undecalcified material, and the following observations made.

1. The initial development of Tomes' process is signalized by the appearance of a vacuole filled with a clear homogenous material in which minute refractile bodies may be discerned. This vacuole has been called the terminal vacuole.

2. With increasing maturity of the ameloblast, Tomes' process is now defined as consisting of two portions, proximal and distal.

3. The proximal portion of Tomes' process, lying in direct succession to the cell, constitutes what is virtually a single vacuole, the content of which is similar to that of early development of the terminal vacuole.

4. The vacuole of the process appears to arise by confluence of small vacuoles at the distal extremity of the cell.

5. The distal portion of Tomes' process is conical in shape, hyalin-
ized and its apex projects for a variable distance into the core of the enamel rod.

6. The proximal portion of Tomes’ process is bounded laterally by the pre-enamel processes. These processes are more refractile than the body of Tomes’ process and appear as slender structures, their apices terminating just short of the distal end of the cell. Their bases blend and are continuous with the lateral walls of the rod. As they mature they thicken and ultimately give rise to the rod cortex.

7. The developing rod, we regard as consisting of the rod cortex, the rod core and the rod membrane.

8. The rod cortex is the result of a continuation of the progressive change first observed in the pre-enamel processes and is the first portion of the rod to undergo complete maturation and the first to undergo calcification.

9. The core, in contrast to the cortex, is the less completely hyalinized center of the rod and seems to be formed by the continued hyalinization of Tomes’ process.

10. In some rods interrupted areas of incompletely hyalinized material, having identical staining reactions as the distal portion of Tomes’ process, may be found deep within the core.

11. In extreme examples, the entire rod is apparently immature and the distal part of Tomes’ process may extend in continuity almost to the end of the rod.

12. Surrounding the hyaline rod and therefore external to the cortex a membrane can be selectively stained. We assume this membrane is a thickened continuation of the cell membrane of the ameloblast.

13. The hyalinized rods appear to be connected together by an intercellular substance possessing staining reactions which suggest that it consists of a material similar to that of the enamel rod matrix.

14. The origin of the interprismatic substance could not be determined but appearances suggest that it may have arisen in the region of the proximal portion of Tomes’ and the pre-enamel processes.

15. The terminal bars when present are found in the intercellular
intervals at the level of the junction of the distal end of the ameloblast and the base of Tomes' process.

16. A second system of terminal bars may occur but to a lesser degree in the direction of the developing rod. These appear as differentially staining globules at the periphery of the rod.

17. We believe, as previously reported, that the terminal bar apparatus is an artifact. Further investigation shows that the terminal bars are revealed, but to a lesser extent, when the undecalcified material is subjected to acid stains and that these structures appear in their most exaggerated form as heavy discrete knots when the material has been subjected to the severe action of acids and precipitating fixatives.

18. The appearance of segmentation may be produced not only in the rod and distal hyalinizing portion of Tomes' process but also in Tomes' process itself and in the body of the cell well above the level of the so-called terminal bars. In our opinion these appearances are related to the effects of precipitating fixatives grossly distorting and exaggerating the normal process. We, therefore, believe these appearances are false and cannot be accepted on face value.

19. The various stages are illustrated in the composite drawing of Fig. 1.

We should like to express our thanks and indebtedness to Mrs. L. Philippe Kleinbeitz and Mrs. Capon for secretarial assistance, to Miss B. Killian for technical supervision, to Dr. John Eiler for his help in chemical procedures, to Mr. George Needham for the photomicrographs, and to Mr. Walter B. Schwarz for the schematic drawing.
As we come to the close of the year it is a privilege and an honor to address you again. With conditions as they are today it seems appropriate that attention be directed briefly to the worthwhile achievements of the past in order to stimulate our devotion to an unfinished task. The College, irrespective of critics, has followed a constant policy of studying social trends, making their findings available and urging the profession as a whole to view with concern the increasing needs and demands of our population for more dental health service. Through a Journal created in 1934 and offering an effective means to record and publicize the many activities of the College, editorials, papers, discussions and reports on social health problems have been continually presented to the profession. Also in the same year a standing committee on Socio-Economics was appointed.

That the College was interested in social problems before such a committee was created is evidenced by their financing, in 1930, a study of health insurance as in operation in European countries and the publication of the report.

In speaking later of this report, Dr. Nathan Sinai, one of its authors, mentions the work the College has done in the study of social problems and gives it credit for the role it has played:

"Of all the professional organizations in the United States, the College alone had the courage to recognize and squarely face the growing dissatisfaction inside and outside our system of medicine and dentistry. It was the only organization with the courage and foresight to first study health insurance. And, sad to relate, it is one of the few professional organizations that can lay claim to the quality of intellectual honesty in its attempts to seek a way out of the economic dilemma of physicians, dentists, and the public."
Since its inception the Socio-Economics Committee has faithfully called to the attention of the profession the need of an understanding knowledge of the many social obligations confronting it. One of these which must be solved before financial plans for aid can be perfected is the cost of providing and maintaining professional services to the individual. Many efforts have been made to justify estimated conclusions but there has been no scientific research until the Committee, with the assistance of expert statisticians, completed—after months of work—a survey of the records of Dental Health Service Incorporated of New York City. The findings obtained present not only the initial but the maintenance cost of clinic dental service to the individual. This report is now in the hands of the publisher and should soon be ready for distribution.

In my address last year I mentioned the increasing demand, not only in our own country but in others, that provisions be made for furnishing adequate health service to those who were financially unable to obtain it, and it seemed inevitable that post-war planning for such services would be undertaken in different countries. Since then reports and suggested plans have been offered by England, Canada, and the United States and are now available for study.

What is known as the Beveridge Report was prepared by Sir William Beveridge as chairman of the Inter-departmental Committee on Social Insurance and Allied Services which was appointed by the Minister without Portfolio of the British Government to “make a survey of the existing national schemes of social insurance and allied services, including workmen’s compensation, and make recommendations.” As the work of the committee progressed it was found that many questions were arising which made it inappropriate for civil servants to express an opinion. Therefore the Minister requested that members of the committee act only as advisers to the chairman, who alone would be held accountable for the report and also for the recommendations. The survey included a study of national social service projects during the last forty-five years, and presented an ever changing picture of the responsibility assumed by the British Government for its people. In suggesting principles of recommendation for future guidance it is pointed out:
“that social security must be achieved by cooperation between the State and the individual. The State should offer security for service and contribution. The State in organizing security should not stifle incentive, opportunity, responsibility; in establishing a national minimum it should leave room for encouragement for voluntary action by each individual to provide more than that minimum for himself and his family.”

In reporting the need for more comprehensive and rehabilitation service, admission is made that medical service has fallen seriously short of other social security benefits, but that dental service, under the present national health insurance plan, is steadily increasing. There is a growing demand that these benefits—which are paid for in part by compulsory contributions and a charge when treatment is rendered—be made available to all under health insurance in order to improve the health of the nation. The prophecy is made that free dental service will become as universal as free medical service.

The need for universal health and restoration services has received earnest consideration and is summarized in the following statements:

“This review of some of the problems involved in establishing a comprehensive medical service makes clear that no final detailed proposals, even as to the financial basis of this service, can be submitted in this report. It suggests the need for further immediate investigation, in which the finance and the organization of medical service can be considered together, in consultation with the professions concerned and with the public and voluntary organizations which have established hospitals and other institutions. From the standpoint of social security, a health service providing full preventive and curative treatment of every kind to every citizen without exceptions, without remuneration limit and without an economic barrier at any point to delay recourse to it, is the ideal plan. It is proposed accordingly that, in the contributions suggested as part of the plan for Social Security, there shall be included a payment in virtue of which every citizen will be able to obtain whatever treatment his case requires, at home or in an institution, medical, dental, or subsidiary, without a treatment charge. . . . But these proposals are provisional only, subject to review, in the light of the further inquiry suggested, in which organization and finance can be dealt with together. The primary interest of the Ministry of Social Security is not in the details of the national health service or in its financial arrangements. It is in finding a health service which will diminish disease by prevention and cure, and

“The Beveridge Report, p. 6, par. 9.
will ensure the careful certification needed to control payment of benefit at the rates proposed in this Report."

The Department of Pensions and National Health of the Canadian Government, recognizing dental service as a necessary factor in the conservation of public health, requested the Canadian Dental Association to present a plan whereby the profession could cooperate in a health insurance arrangement which might aid in solving the national health problem. Before endorsing any such plan the Association went on record as approving certain principles for dental health service which are, in substance: that the plan be national; that each Provincial Government be free to choose adoption of the plan, its method of application, and its financial administration; that the plan be administered through cooperation of the Provincial Government and the Dental Board; that in all cases possible the dentist practice in his own office; that a committee of five representatives—two from government and three from dentistry—be set up to proportion and administer funds; that every qualified dentist be free to refer a patient to a specialist if necessary; that preventive dentistry be given paramount consideration; that dental standards be kept intact; that dental research be encouraged; that any plan be made equally available to the indigent and those financially able to pay; and that the dental profession determine the need for dental service.

In May, 1943, representatives of the Canadian Dental Association met with a special government committee on Social Security and presented approved plans for the cooperation of the dental profession in the health insurance arrangement. While they did not advocate any definite health insurance plan without further study they did stress that any such plan must include essential preventive dental service which should necessarily begin with the child, although they realized that no plan would as yet eliminate all dental disease. However, they did not wish to go on record as assuming to care for all dental service for the whole population because of lack of personnel. They were willing, to the best of their ability, to undertake to carry out a plan for the children.

4The Beveridge Report, p. 162, par. 437.
The plan proposed that compulsory dental health service be instituted for all children up to the age of sixteen; that further service be advanced as deemed advisable from time to time according to the available personnel, financial support, and general considerations. This would make future dental service rendered only to those who had come up under the sixteen year plan, but it would eventually care for the whole population. The service rendered to those of sixteen years and under would be such as given under the usual procedure for children, and the fees for this service would be based upon a schedule recommended by a Provincial dental board. The profession would control the administration of dental service and dental personnel.

In presenting their proposal there is an expression of pride that, if accepted, the Dominion of Canada would be the first country to institute a plan for the control of public health as far as dentistry is concerned.6

With the Beveridge Report still holding the attention of those considering post-war possibilities, President Roosevelt released the findings of the National Resources Planning Board. Whereas the Beveridge Report dealt with social insurance and the allied services, the Planning Board’s study consisted of a comprehensive survey of national resources with suggestions for their use. Attention was called to the need of, and demand for, more health service but no specific plans were recommended. However, it was only a few months later that the Wagner-Murray-Dingell bill with proposals for broadening the social security program was offered in Congress. This bill is now pending in committees.

In 1935 Congress enacted the Social Security Act—which was amended in 1937—granting authority “to establish a Social Security Board, raise revenue; and for other purposes.” Since that time there has been a constant demand for an extension of the social security program. The present Senate Bill 1161 represents an effort to increase benefits, through the Social Security Board, to those now re-

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6 Special Committee on Social Security, Minutes of Proceedings and Evidence, No. 9, May 11, 1943; Department of Printing and Stationery, Ottawa, Canada.
ceiving them and to provide aid to other millions of our population.

The chief changes proposed in this expanded program have to do with the extension of service to others not now included in the Act, namely, unemployment benefits, old age benefits, permanent disability benefits, medical care, hospital care, demobilized service men, and the payroll tax.

When considering health care the National Resources Planning Board makes a different approach to the problem than does the Wagner-Murray-Dingell bill. The one, after a thorough study of existing health conditions, refers their findings to the professions for solution while the other provides for free medical, laboratory, and hospital aid for more than one hundred million people in the United States and places the administration of these benefits under the authority of the Social Security Board and the Surgeon General of the United States Public Health Service.

Health professions in other nations are recognizing social progress and are endeavoring to aid their governments in solving the new problems as they arise, while our professions may have public health plans forced upon them through governmental agencies. Did those who wrote this social security act feel it was necessary to exclude the professions and themselves assume the responsibility of changing the present social and economic methods of furnishing health care to the people?

Some state medical societies and a few groups of practitioners have endeavored to meet the growing demand for medical service through insurance plans or other methods, but to date organized medicine, which has the authority to speak for the profession, has shown a marked unwillingness to cooperate with the government in formulating plans for the extension of health service. However, the House of Delegates of the American Medical Association, during their June, 1943, meeting in Chicago, created a Council on Medical Service and Public Relations. One cannot but wonder if this action now taken is too late.

In commenting on the Wagner-Murray-Dingell bill the Journal of the American Medical Association is editorially concerned over
the fact that professional representation was lacking when the bill was prepared and states that the Association will give immediate consideration to having this corrected when the appropriate committees of both Senate and House take action. The editorial further points out that in its medical aspects it is a bill for compulsory insurance and an attempt to translate into a "technic of action" the proposals of the Social Security Board. Calling attention to this "technic of action" the writer analyzes the measure as an effort to avoid the difficulties of direct government control of medical service by placing the administrative responsibility on the Surgeon General of the Public Health Service, whoever he may be, and by so doing making this individual a virtual gauleiter of American medicine with powers not even surpassed by the Nazi gauleiter, Conti."

While this bill sets up basic principles under which medical service is to be provided, dentistry is informed, in section 912, that:

"the Surgeon General and the Social Security Board jointly shall have the duty of studying and making recommendations as to the most effective methods of providing dental, nursing, and other needed benefits not already provided under this title, and as to expected costs for such needed benefits and the desirable division of the costs between (1) the financial resources of the social insurance system and (2) payments to be required of beneficiaries receiving such benefits, and shall make reports with recommendations as to legislation on such benefits not later than two years after the effective date of this title."

There may be a ray of hope in the above statement. Could the provision that the Surgeon General and the Social Security Board have the duty of studying and making recommendations be construed as a bid for cooperation with organized dentistry? The administration is backing a broad expansion of the Social Security Act and the proposals made in this bill are popular with large groups and with organized labor.

Of vital concern to our profession today is this request for authority to study ways and means for a method of furnishing dental health care under a social security plan. Whether this authority will be granted no one can say or, if granted, will provi-

"J.A.M.A., 123, 600; 1943, June 26."
sions for dental health care be similar to those proposed for medical care now presented for legislative action?

Should centralized control of dental service for the people be placed under the administration of the Surgeon General and the Social Security Board much of our professional freedom will be restricted. Our present standards have been won through years of struggle. If these are lost or seriously impaired there can be little hope of progress. There must be no compromise on this issue for our profession cannot survive "half slave and half free."

In furnishing dental health care for the American population it is imperative that the profession be responsible for providing personnel, upholding standards, regulating fees, and controlling administrative services. The responsibility for securing funds for such services rests with the government.

Members of the dental profession occupy a dual position in our social order. Through the governing bodies of our nation we have been given the sole and exclusive right to administer dental health services to the people but we are also lay members of the body politic and as individuals must obtain for ourselves economic security.

There should be no misconception of the idea of relief in the minds of the American people. Our profession cannot finance the cost for services from their own resources. It must be secured through other means and be sufficient to assure at least the present economic status of the profession. Dental health care can never be obtained for the masses until there are funds to pay for it.

With the wide implications of present social changes the profession must form its policies not on hope or fear or wishful thinking but upon an intelligent analysis of its future place in our nation. The College cannot speak officially for the profession but it can continue its policy of initiating scientific studies and cooperate with those whose duty it is to plan a program whereby both the public health and professional prestige will be safeguarded. I therefore admonish all members of the College and those about to be received into its Fellowship to bear in mind that the time for this may be short and there is work to do.
In coming to you today as President of the American College of Dentists, I am deeply conscious of the responsibility that rests upon my shoulders, and I face the future with no mistaken idea of my ability to meet the situation single-handed, and to direct the affairs of the College successfully during the coming year. I am, however, encouraged and strengthened by the expression of confidence placed in me by the membership in electing me to this high office, and I realize that that action is most surely accompanied by a pledge to stand back of your vote with your thought and active cooperation. And this means the thought and active help of the best minds in the dental profession. I accept the office humbly and with sincere appreciation of your confidence. I pledge myself to work for and with you for the strengthening of the College and for the future welfare of our profession.

These are trying times with the world stumbling from one crisis to another. Our civilization is on trial. It will not be without benefit if it arouses the individual from apathy, the most dangerous foe we have to combat. Men in all walks of life must pause and ask themselves, What can we do? That thought comes to my mind now as I think of the plans and work of the College. What can we, as members of the American College of Dentists, do—more than we have always done? Perhaps not a great deal. But straight thinking and constructive action are needed now as never before.

Three things seem to me essential.

First, we must reaffirm our belief in the ideals and purposes of the College as outlined in the statement of its objectives—not all men live up to the highest ideals—we are only human, but we have ideals, which mean much, and they can be realized, which means more.

1Presented before the Joint Session of the Board of Regents and the Representatives of Sections, American College of Dentists, Cincinnati, Ohio, October 14, 1943.
Second, we must not allow the changes that are taking place in the world today to warp our viewpoint—let us remember the words of the venerable Bede, “That was o'erpassed, so shall this also be”.

Third, we must rededicate ourselves to active, enthusiastic participation in some phase of College activity. Enthusiasm is one of those qualities which, without diminishing itself, makes hard tasks easy and impossible results possible. Emerson says, “Nothing great was ever achieved without enthusiasm.”

Let us then approach the problems of this year with enthusiasm, holding fast to our ideals, and setting our goal of achievement high. The program of the College will be advanced and the College revitalized if each organized section gives special attention during the year to the problems that confront the dental profession, and if each Fellow gives something of his time, his thoughts and his deeds to some phase of College activity. Ample opportunity is afforded all of us in the outline of study and research as presented by the officers and committees of the past year. Many more opportunities are bound to develop because of unsettled conditions in the world today. The post-war period offers problems that we must be prepared to meet. We must realize that the future welfare of our profession is at stake. Plans for the socialization of medicine and dentistry, while they may and do have many good features will, unless properly guided and controlled, be of no value for the purpose desired.

It would seem that now, if ever, is the time for all good professional men to come to the aid of American dentistry and with deeds rather than words. The times challenge us to action. Let us hold ourselves in readiness to accept that challenge.

Not long ago we celebrated the one-hundredth anniversary of the founding of dentistry as a profession. This was accomplished by a group who at that early date wanted to get away from certain restrictions, who wanted liberty of action and freedom for professional development. This group was willing to make personal sacrifices to establish a profession in which the worth of the individual would be in the ascendency, as long as he willingly cooperated with his pro-
fessional confreres and his fellow men. It was to be a profession where there would be equality of opportunity for each to develop in accordance with his individual ability. As a result, dentistry as a profession has developed and dentists as individuals have had their chance and have been given independence of action and opportunity for success and honor through service.

When we claim that dentistry's mission is of the highest and noblest kind, not only in curing disease but in educating people in the laws of health, we are not boasting. The record of the last hundred years shows that dentistry has advanced as far and has been as helpful in its practical results as any other profession.

We cannot study the progress of dentistry without giving thought to the magnificent heritage given us by the Founders of the American College of Dentists. They by their vision and unselfish thought created this organization, whose sole purpose is to work unceasingly for the ideals, welfare and advancement of the dental profession both in teaching and practice. The story of the many outstanding contributions to dental progress made by the College and its membership in the past is indeed inspiring. They have built well, and each year has added to the worthwhile work done by and through the College.

Under the able leadership of President J. Cannon Black during the year just ending, attention has been focused on the post-war period and a list of post-war problems has been presented for consideration at this meeting in Cincinnati. In my opinion, the forty headings under which these problems are presented directly and indirectly include every avenue of approach, give ample opportunity to choose the most vital issues, and point the way for the work of the College for the ensuing year.

We must not lose sight of the splendid work that is being done by our several standing and special committees. When committee reports are received, they should be made a matter of prompt consideration and discussion and when approved should be brought to the attention of the entire membership, passed on to each section of the College for their information and consideration, to be backed
by prompt action, when such a course is indicated. It is my hope
that each section of the College will hold regular meetings, giving
consideration to the study of the recommendations that will come
out of the deliberations of the representatives and Regents in Cin-
cinnati, and that every member of the College will cooperate and
will endeavor to get other dental groups to study the same problems.

Not long ago I listened to a message on "Streamlining Our Pro-
nouns" by Philip Lovejoy, Secretary of Rotary International. The
method he adopted to emphasize personal responsibility by the use
of the pronouns, *they*, *you*, *we*, *I*, etc., appealed to me so strongly
that I secured his permission to use it in my talk to you today.

It is true that when a person in our group makes mistakes, we
sort of excuse it, we regret it, and then we forget it. However,
when one of the other’s group makes mistakes, *he* typifies the whole,
and *they*, all of them, are remembered by what *he* did. Therefore,
it seems to me that each of us must be careful to make our group,
which is a *they* group to others, an essential cooperative element in
dentistry and in the entire democratic set-up.

It is natural that when we consider the problems we are facing,
we are prone to forget our personal responsibility and to think and
talk about what *they* ought to do. We say *they* ought to emphasize
the importance of radiodontia and oral diagnosis; *they* ought to plan
for the licensing and certification of orthodontists; *they* ought to plan
for more thorough training and preparation of prosthodontists
and oral surgeons; *they* ought to plan for a better understanding
of the value of preventive dentistry and for a more adequate defini-
tion of the term, etc., etc.

In my opinion, the *they* theory will not result in constructive
thought or action, nor will it do much to advance the interests of
the dental profession. However, having concluded that *they* ought
to do these things, we must determine who *they* are.

Well, by *they*, we probably mean the American Dental Associa-
tion and its component state and local societies, the American Col-
lege of Dentists, the various sections of the College, the various
organizations of specialists, the officers and committees of these or
of any other group or organization studying dental problems.

How will they accomplish their objectives?

By and through the efforts of the committees appointed to study and report.

Who are these committees?

These committees are made up of members of the organization such as you and me.

How do the committees function?

The success of committee activity depends upon the interest of the chairman and members of each committee and the amount of consideration they give to the problem.

It is plain, then, that in order that they, the organizations, may plan intelligently it will be necessary for the standing and special committees to go into action, and if they, the committees, are to function adequately, it will be necessary for you and me to recognize our responsibility and do our part unselfishly and thoroughly.

We must not think only of those who laid the foundation of our profession a hundred years ago. We must not think only of the work done by the founders and past officers and committees of the American College of Dentists. We must not think only of what the present members of the College can do. We must view the American College of Dentists as a we group of which you and I are responsible parts and think only of how we can cooperate to make our job of building dentistry a success. Unity promotes concord. Community of interest, the same aims, the same objectives, give, if anything can, a feeling of comradeship, and the active cooperation of many men, while it favors friction, lessens the chance of misunderstanding and ill will.

In the final analysis it is not for me to say what you should do or what you should not do.

Realizing that “the word of action is stronger than the word of speech,” I carry the problem directly to me. I cut my pronouns down to I. What can I do?

I can read and study the various plans being put forward for the guidance of the profession today and tomorrow.
I can take an active part in the discussion of these plans in order to understand better the problems of the future.

I can, when through study, discussion, and thoughtful consideration I have reached a conclusion that seems worthwhile, bring that conclusion to the attention of the profession and others interested by presenting my thoughts to organized groups endeavoring to solve these problems.

I can, when given a committee appointment, devote the same time and effort to the committee assignment as I would give to the question if I were the one most interested.

I can endeavor to interest other members of the profession in the value of regular attendance at meetings, conscientious study of the problems that confront us, and constructive criticism of those problems. This last I can do most effectively by example and invitation.

I can, through association with you, help form a work unit or team, a we group that can give force and value to the efforts of all.

Someone has said, “There is no limit to the good a man can do if he doesn’t care who gets the credit.” Believing this, I can do my part unselfishly with no thought of personal gain.

So I am beginning this year of work in the American College of Dentists with the firm resolve that I am going to give prompt attention to the work at hand, that I am going to do my full part, and I am challenging you to put your shoulder to the wheel and to say with me, I can, I will accept my full share of responsibility. I will work for and with you so that we may help build for our profession a foundation that will enable it to gain and to hold its rightful place in the health professions and to make its full contribution to the welfare of mankind.

In my humble opinion, the program of the College will be a success, our dreams of the future progress of the dental profession will be realized, the post-war problems that confront our profession will be met and solved only in direct proportion to the emphasis we place on individual thought and action, the power of which is fittingly portrayed in the following poem by Berton Braley.
THE THINKER

"Back of the beating hammer
   By which the steel is wrought,
Back of the workshop's clamour
   The seeker may find the Thought,
The Thought that is ever master
   Of iron and steam and steel,
That rises above disaster
   And tramples it under heel!

"The drudge may fret and tinker
   Or labor with lusty blows,
But back of him stands the Thinker,
   The clear-eyed man who knows:
For into each plough or sabre,
   Each piece and part and whole,
Must go the brains of Labor
   Which gives the work a soul!

"Back of the motors humming,
   Back of the belts that sing,
Back of the hammers drumming,
   Back of the cranes that swing,
There is the eye which scans them,
   Watching through stress and strain,
There is the Mind which plans them—
   Back of the brawn, the Brain!

"Might of the roaring boiler,
   Force of the engine's thrust,
Strength of the sweating toiler—
   Greatly in these we trust,
But back of them stands the Schemer,
   The Thinker who drives them through;
Back of the job the Dreamer
   Who's making the dream come true!"

Yes, we are all dreamers; we love to look into the future and plan plans that appeal to our imagination, our innate love of adventure and accomplishment and success, and there is a thrill that comes to one who dreams dreams and then goes into action to make those dreams come true.
THURSDAY MORNING SESSION

The first session convened at 9:30 a.m., being a joint meeting with representatives of Sections. Fourteen of the nineteen Sections were represented. The following program was submitted:

President’s Address—J. Cannon Black, D.D.S. (page 269).

Reports of standing committees were received and filed; some of these will be published shortly, while others are still undergoing finishing touches.

The remainder of the morning was given over to a general discussion of post-war problems. This is a principal item of consideration by all groups at the present moment, and is of no less importance to the dental profession. A long list of questions was submitted to a large number of Fellows, after a preview at the Regents’ meeting last winter. These replies and this discussion constitute matter of no small importance, and will be submitted through the Journal in some part.

The President of the American Dental Association, Capt. C. Raymond Wells, brought greetings and delivered a short address.

Adjournment, 12:50 p.m.

THURSDAY AFTERNOON SESSION

The Board of Regents convened at 2:25 o'clock, with nine members present. The minutes of the last meeting were approved.

REPORTS OF OFFICERS

TREASURER: Treasurer Smith reported balance on hand in Continental Illinois Bank and Trust Company of Chicago, as of October 1, 1943, $12,070.64, in addition to securities valued at $3,000 (par value). This was accompanied by the report of James C. Thompson & Co., Certified Public Accountants.

SECRETARY: The Secretary reported on ballots taken by mail on
Ad-interim matters. He also reported a total membership as of October 14, 1943, of 1,124 members. He reported the following deaths since the Chicago meeting in February:

- W. N. Cogan, Washington, D. C. (March 13, 1943)
- Thos. J. Davis, St. Louis, Mo. (September 18, 1943)
- Hugo G. Fisher, Merion Station, Pa. (formerly of Chicago, Ill.) (October 3, 1943)
- Royal B. Giffen, Sacramento, Calif. (September 3, 1943)
- Ellison Hillyer, Brooklyn, N. Y. (May 3, 1943)
- William Hausmann, West Bend, Wis. (October 8, 1943)
- Frederick W. Hinds, Dallas, Tex. (June 4, 1943)
- W. H. G. Logan, Chicago, Ill. (April 7, 1943)
- John M. Murphy, Temple, Tex. (June 7, 1943)
- Guy L. Spencer, Lincoln, Neb. (July 15, 1943)
- Clarence V. Watts, Des Moines, Ia.

The Secretary reported that a number of Sections found it impossible to hold a meeting for conferring of fellowships on November 19, 1943. It was therefore voted that Sections be given a leeway of ten days before or after that date.

The Secretary presented the report of James C. Thompson & Co., tellers of the election carried out by mail. Following this report, the President announced the result:

- President-elect: Robert P. Thomas, Louisville, Ky.
- Vice-President: C. Willard Camalier, Washington, D. C.
- Secretary: Otto W. Brandhorst, St. Louis, Mo.
- Treasurer: Harold S. Smith, Chicago, Ill.
- Regent (5 years): Willard C. Fleming, Oakland, Calif.
- Regent (3 years): Walter H. Scherer, Houston, Tex.

Assistant Secretary: Assistant Secretary Gies reported on the I.A.D.R. meeting and also the publication of the report of the Socio-Economics Committee, “Dental Care for Adults,” about to be mailed.

Editor: Editor Gurley reported that four numbers of the Journal had been issued during the year.

Adjournment, 6:00 p.m.

Thursday Evening Session

The Board of Regents convened again at 8:00 p.m., with eight members present. The evening was devoted to a consideration and
discussion of the reports of standing committees including their recommendations, as presented at the morning session.

**Report of Committee on Protective Dentistry.** This report was reviewed by the Reference Committee. Publication was approved, after certain changes, of an explanatory nature.

Adjournment, 10:30 p.m.

**Friday Morning Session**

The Board of Regents convened at 8:45 o'clock with eight members present. The main business being consideration of the report of the By-laws Committee, W. N. Hodgkin, Chairman, consisting of the following proposed amendments.

Amend Section A, Article 1, which now reads:

1. **Nomination and election.** Any member of the College may nominate candidates for membership. Nominations must be presented, on copies of the official nomination form, to the Secretary at least 90 days before the date of the annual meeting at which action on the nominations may be desired, to enable the Secretary to forward them to the Board of Censors in accord with the rules of the Regents. Knowledge of nominations shall be kept inviolate by the nominators, and by the Secretary, Censors and Regents, until action is formally announced.

To read as follows:

Section A. Members.

1. **Nomination and election.** Any member of the College may nominate candidates for membership. Nominations must be presented, on copies of the official nomination form, to the Secretary at least four months before the date of the annual meeting at which action on the nominations may be desired, to enable the Secretary to forward them to the Board of Censors in accord with the rules of the Regents. The Board of Regents shall develop plans for safeguarding the interests of the College whereby, after a nomination has been received, such name shall be submitted by the Secretary to selected Fellows in the State, division or area in which nominee resides, that they may interpose possible valid objections or furnish desired information, before action by the Board of Censors and final action by the Board of Regents. Knowledge of the nomination shall be kept inviolate by the nominators, the Secretary, the Board of Censors and the Board of Regents, as well as the local committees, until action is formally announced.

To amend Section C, Article 1, which now reads:

1. **Officers.** The Board of Editors of the Journal shall elect an Editor,
an Associate Editor, and an Assistant Editor; and a maximum of ten Contributing Editors for terms not to exceed five years. No one shall be eligible to serve in the same position for a term or terms exceeding a total of five years.

To read as follows:

Section C. Board of Editors.

The Board of Regents shall elect an Editor and such assistants and business manager, as they deem necessary, as well as a maximum of ten Contributing Editors. No one shall be eligible to serve in the same position for a term or terms exceeding a total of five years, save by unanimous vote of the Board of Regents in instances and under conditions wherein the services of any such person for an additional period may be deemed desirable for the continued conduct of the Journal. The persons so elected plus the Board of Regents shall constitute the Board of Editors.

The Regents approved the proposed amendments, feeling that the amendment of Section A, Article 1, is desirable as an enabling act through which the Regents can develop plans to give the membership more voice in the selection of members, as recommended by the Section representatives about a year ago.

The Regents also felt that the amendment of Section C, Article 1, of the By-laws, was desirable to enable them to revise the functions of the Board of Editors.

The Regents voted to submit these amendments to the membership for temporary approval by mail vote, with the understanding that they would be submitted for final approval at the first regular convocation of the College. This was suggested because technically, amendments can only be voted at annual meetings of the College.

Election: The following were elected to the several positions:

Editor ......................... JOHN E. GURLEY, San Francisco, Calif.
Assistant Editor ................. E. G. MEISEL, Pittsburgh, Pa.
Contributing Editors:

J. V. H. BEST, Sydney, Australia (3 years)
KENNETH A. EASLICK, Ann Arbor, Mich. (5 years)
ARTHUR L. WALSH, Montreal, Can. (5 years)

Conferring of Fellowships: The Regents voted to confer fellowships, through the Sections, upon those who had qualified. A complete list will be published in the next issue of the JOURNAL.
Installation of Officers: President Black installed the following officers:

- **President**: H. Cline Fixott, Portland, Ore.
- **President-elect**: Robert P. Thomas, Louisville, Ky.
- **Vice-President**: C. Willard Camalier, Washington, D.C.
- **Secretary**: Otto W. Brandhorst, St. Louis, Mo.
- **Treasurer**: Harold S. Smith, Chicago, Ill.
- **Regent (5 years)**: Willard C. Fleming, Oakland, Calif.
- **Regent (3 years)**: Walter H. Scherer, Houston, Tex.

Retiring President Black presided while President Fixott gave his inaugural address, in which he urged members to cooperate with him in keeping the wheels of progress turning. (See page 277, this issue.)

Adjournment, 11:30 a.m.

**Friday Morning Session (cont.)**

(First meeting of New Board)

The new Board of Regents convened at 11:30 a.m. Present, 8.

The following announcements were made:

- **A.A.A.S. Representation**: Paul C. Kitchin was re-appointed A.A.A.S. representative.
- **Twenty-fifth Anniversary**: It was decided to appoint a special committee to give attention to the possibility of celebrating the Twenty-fifth Anniversary of the American College of Dentists in 1945. (See later announcement.)
- **Open Reference File**: The Secretary was instructed to set up an open reference file on post-war problems, urging members to contribute to same.
- **Horace G. Wells Centennial**: It was voted to cooperate in the Horace G. Wells Centennial Celebration in 1944.
- **Section Communications**: Communications from Sections were presented by the Secretary and discussed at length. It was voted to allow each Section up to $25 for necessary expenses in conferring fellowships.
- **President Fixott's suggestions for committee appointments for the following year were approved.**

Adjournment, 12:45 p.m.
The American Public Health Association, which was organized in 1872, has had a continuous growth, until today it is a large organization with many different sections representing various groups engaged or interested in public-health promotion. Dentistry, which came into the public-health picture only recently, was not represented in the early years. Fifteen or twenty years ago a few dentists became members of the Association, but dental topics were a rarity on the programs at annual meetings.

In 1937 an effort was made to increase the representation of dental-health workers, and an informal luncheon for those attending the annual meeting in New York City was held to consider the desirability of requesting the creation of a dental section. After thorough discussion the majority sentiment was against asking for a separate section until more dental-health workers were members or fellows of the Association. Consequently it was voted to proceed informally as the “Oral Health Group,” with a chairman and secretary; that an effort be made to get more of those interested in dental public health to join the Association, as members of existing sections or unaffiliated; and that meanwhile the “Oral Health Group” use its influence to have dental topics presented appropriately in meetings of existing sections. That arrangement has continued until the present year, with increasing interest in the ultimate formation of a dental section. At the annual meeting at Atlantic City, in 1941, a motion was passed by the “Oral Health Group” asking that a committee be appointed to explore again the desirability of seeking the creation of a dental section.

In 1942, in St. Louis, this committee reported that there was still some division of opinion and put the matter before the group for thorough discussion. A large majority of those present believed that the time had arrived to ask for the creation of a section, which would give dentistry equal recognition with other sections as an
important branch of public-health promotion and also aid in arranging joint meetings with other sections. A motion was passed almost unanimously that a committee be appointed to present a petition to the Governing Council of the Association for a dental section. The petition was presented to the Council at an ensuing meeting and, receiving a very cordial reception, was referred to the Executive Committee for a report and action in 1943.

At the annual meeting of the A.P.H.A. in New York City, the matter came before the Governing Council on October 13 for final action. Considerable promotional work had been done previously by members of the “Oral Health Group” to acquaint the Council with the desirability of favorable action. The Executive Committee’s report recommended the formation of a Dental Health Section. Several members of the Council spoke favorably and none against. A motion to approve was passed without a dissenting vote.

Following this action members of the “Oral Health Group” in attendance elected the following officers of the new section for the ensuing year:

Chairman—K. A. Easlick, D.D.S., Michigan;
Vice-chairman—J. M. Wisan, D.D.S., New Jersey;

The creation of the Dental Section gives dentistry representation in the Governing Council of the A.P.H.A., since the chairmen, vice-chairmen, and secretaries of sections automatically become members of the Council. Thus dentistry passes another historic milestone of recognition as a necessary and important health service.
"KAISER WAKES THE DOCTORS"

A Book Review

GEORGE H. KRESS, M.D., San Francisco, California
Editor California and Western Medicine

Foreword: The editorial, 2 "An Author, de Kruif, Finds in California the Solution of Future Medical Practice," states that excerpts from the book "Kaiser Wakes the Doctors," a copy of which has been sent to California and Western Medicine for review, would appear elsewhere in this issue.

The excerpts referred to are here used as the basis for a review of Author Paul de Kruif's book. This seems to be as good a method as any for bringing to the attention of readers the nature and scope of Author de Kruif's views.

The excerpts appear in quotations in each instance, followed by the reviewer's comments. No doubt, other answers will also occur to readers. If space were available, additional comment could be made.—The Author.

Book Review: Excerpts and Comments

"This book had its initial spark in a little story, 'Tomorrow's Health Plan—Today!,' published in the May, 1943, issue of The Reader's Digest."

Comment: At a luncheon at one of the clubs in San Francisco at which some twenty or more guests were present, Mr. de Kruif told the story of the above article—how it had been rewritten and rejected a dozen or so times before acceptance. The thought flits into the mind that his book may contain some of the ideas he incorporated in his initial drafts. The May, 1943, article referred to was an interesting statement.

"The banging, clanging, rhythmic flow of men and steel into a Liberty ship, complete from keel to launching within five days, is not the most epochal event at Henry Kaiser's shipyards."

Comment: Citizens, everywhere, share in the admiration for the splendid organization procedures Mr. Kaiser and associates have brought into being in their shipbuilding and other wartime industries. When de Kruif begins Chapter I of his book with the above sentence, he overlooked the man-hours, covering many days, needed in the building of a ship. Newspapers have told that story.

"So, under Henry Kaiser's guidance, it is the workers themselves who are building the model of a Mayo Clinic for the common man. Here where there

2This book review published in California and Western Medicine (59, 244; 1943) and by its editor, is presented herewith for your information as well as possible entertainment. It is entertaining but it also discusses in serious aspect one possible approach to the question ahead of us.—Ed.
3California and Western Medicine, 59, 207; 1943.
is no money consideration between the sick man and his physician, you see a blueprint for group medical practice for the common man, for the powerful preventive medicine of our doctors for tomorrow."

Comment: If deducting fifty cents per week from the pay of each worker, to cover sickness insurance supplied by the attending physicians, is not a "money consideration," what is it?

“What have I [de Kruif] done to fight for the medical underdogs, the medical have-nots? Their numbers are far greater than those who in the great depression were ill-clothed, ill-housed, ill-fed.”

Comment: Social welfare workers would probably take issue with de Kruif on the above, and would be tempted to call attention to the fact that poverty, which causes people to be "ill-clothed, ill-housed, ill-fed" is an important causative factor in many illnesses; and that there are many more poverty-stricken persons than there are of the group of human fellows, to whom the author refers to as "medical underdogs."

“Like any other form of insurance, these prepaid medical care plans have spread the risk, so that sick people’s unbearable financial burden might be shared by those who are well. But here was the catch: these prepaid medical care plans were medically not popular: it was the organization of the doctors themselves who opposed them.”

Comment: The large number of “prepaid medical plans” which are in operation throughout the United States, with full cooperation of physicians, is the best answer to the above.

“About medical care he [Mr. Kaiser] was fanatic.”

Comment: Did Author de Kruif look up the meaning of the word “fanatic”? The Oxford English Dictionary states: “Fanatic . . . affected by mistaken enthusiasm . . . an unreasoning enthusiast.”

Did de Kruif wish to give such a meaning to Mr. Kaiser’s labors?

“Then he [Mr. Kaiser] uncovered one of the secret weapons that he was sure would bring us victory in America’s coming fight for nation-wide health. ‘We won’t need Government handouts,’ he explained, with fire in his eyes and a slow smile. ‘Our medical chief, Doctor Garfield, has proved at Coulee Dam, and is proving now at Richmond shipyards, that if you properly organize and distribute the burden of payment for the best kind of hospital and medical care, the hospitals will quickly amortize themselves; they’ll pay themselves off!’ ”

Comment: With the type of set-up in operation in specialized fields of industrial endeavor, with a particular group of what might be called selected risks, with money cost deducted from pay envelopes without acquisition expenses, etc., and with additional income from state compensation funds to the amount of 40 per cent for industrial injuries, it may be possible for “hospitals to quickly amortize themselves.”
Not so, however, when both sexes and all ages are cared for under altogether different conditions. A study of the history of hundreds of hospitals, from one end of the United States to the other, will emphasize this.

"Even if the manufacturers would go for his plan [Mr. Kaiser's], seeing as how good medical care would lower their man-hours, vastly raise their production—even so, could Kaiser convince the doctors? The physicians whose voices are most powerful in organized medicine are specialists who make good livings on fees, not from the common but from the uncommon man. 'These specialists largely guide the medical rank and file. Will they be interested?' I asked."

*Comment*: The statement concerning "physicians whose voices are most powerful in organized medicine" is not in accord with the facts. The biographical files of the American Medical Association in Chicago contain abundant proof to the contrary.

"He [Kaiser] had it clear that, under the individualism of private practice, all was not too secure with the bread and butter of scores of thousands of little doctors."

*Comment*: Who and where are these "scores of thousands of little doctors" whose "bread and butter . . . is not too secure"?

If they exist by the "scores of thousands," it should not be difficult for de Kruif and company to point some of them out.

"'Remember [Author de Kruif speaking of himself] that your life is justly said to be a series of enthusiasms.'"

*Comment*: After perusal of the de Kruif book, one is much tempted to concur in the author's diagnosis of his own condition.

"The tough part of it would not be convincing the industrialists: they didn't mind stronger manpower. The tough job wasn't convincing the bankers: they would love financing hospitals and health centers if these were a sound investment. And the people—no, 135,000,000 American people would not mind prepaid medical care, for which they all would equitably pay, which would relieve them of their pain, sickness, misery, and needless death."

*Comment*: The reason bankers have been reluctant to finance hospitals has been due to their actuarial and other knowledge which proved to them that many hospitals are not "sound investments."

And de Kruif is very much in error when he states "135,000,000 American people would not mind prepaid medical care." The experience of California Physicians' Service with some 7,000,000 inhabitants of that State bears testimony on this point. Healthy people are not yet enamored of prepaid medical care, and without the cooperation of this group, the excessive proportion of poor risks will always endanger the actuarial soundness of voluntary sickness insurance plans.
“And the people? Alas, they were not organized, they were inarticulate. The voice of the common man could not reach the doctors.”

Comment: What a lack of understanding concerning the lives of physicians!

If there is one group whose members do hear the “voice of the common man,” it is the doctors. Let de Kruif read Robert Louis Stevenson’s tribute to physicians.

“He [Kaiser] believed that what he had begun for more than 100,000 shipbuilders could be done, too, for smaller industries, for communities rural as well as industrial.”

Comment: This is a statement of very broad scope not in harmony with past experience. As stated in the editorial comments in the current issue, logical conclusions are dependent on sound premises.

“Garfield—with a vision of the new death-fighting possibilities of group medical teamwork—had begun his experiments in modern medical care as a lone wolf in the southern California desert. He had graduated from the excellent University of Iowa Medical School and then had migrated to the modern Los Angeles County Hospital, where the lucky poor people of the region get medical science better, on the average, than that of the middle or even the upper economic brackets. Here Garfield, during his years of service as an intern and a surgical resident, had it burned into him why the treatment of the poor man, the ‘medically indigent,’ is so superior.”

Comment: The writer had the privilege of serving on the attending staff of the Los Angeles County Hospital for more than twenty-five years during all of which time he was also a member of its medical executive board. Therefore, he should know somewhat about the institution. Good as the ward and other service rendered by that hospital may be, it is not in accord with facts that in its wards “the lucky poor people of the region get medical science better, on the average, than that of the middle or even the upper economic brackets,” who are under the care of the Los Angeles physicians who are in private practice. These same physicians give their services without cost to the County Hospital patients. How absurd it would be for them, since they earn their living in private practice, to give the latter group a lesser quality of service. The author’s statement refutes itself.

“What it boiled down to for the men was that they felt they owned this health plan; they’d all helped pay for it. What it meant for the doctors was that, when there was no money consideration between them and their patients, there was the chance for simple Christianity to come in. Exit dollars—enter God.”

Comment: Rather interesting. The author would seem to imply that physicians in private practice do not carry on their work in accord with the principles of “simple Christianity.”
And from whence and how did he receive the message, "Exit dollars—enter God."

"That day he [Henry Kaiser's son] had taken his noon meal at the best hotel in Richmond, California, close by the Kaiser shipyards. 'There were a lot of shipyard workers eating in that dining room; and you should have seen the right-hand side of the menu card—prices like the Waldorf in New York,' said Edgar. [Mr. Kaiser's son] 'The men were ordering pheasant. They were liking it. Believe me, they're not going to forget they once earned money enough to order pheasant,' said Edgar, laughing, and in his laugh there was the ring of high approval. If a manager thinks pheasant is okay for the workmen, he is not likely to let them down on their medical care."

Comment: Some out of the ordinary premises for a peculiar conclusion.

"There is no trouble getting modestly paid men to spend the equivalent of half a pack of cigarettes a day when they know that this will guarantee them the best unlimited medical attention."

Comment: The statement is not in harmony with experience in medical service plans. California Physicians' Service gave unlimited service and found it could not be successfully carried through. The author had access to the California Physicians' Service reports and yet makes the above statement.

"The family prepaid health plan was advertised and announced at union meetings. It was an unexpected flop. Within three months' time, only some 10 per cent of the workmen's wives and children had signed up for it. What actually happened was what has defeated the bookkeeping of more than one voluntary health insurance plan. The wives and children were not signed up for it, most of them, until they took sick. You can see how this threatened to wreck Garfield's set-up."

Comment: The above presents interesting contrast to the statement quoted from a preceding page.

If persons to be covered do not sign up "until they took sick," it is easy to understand why a prepayment plan will break on financial rocks.

"'The most amazing part of the whole thing,' said Garfield, 'was that when we had the plan started and well along in operation, people stopped dying."

"'That sounds funny, but actually what it meant was that people came to us; the reason they stopped dying was the fact that they came to us with their early symptoms.'"

Comment: It is granted that, in a limited number of cases, lives are saved by early treatment. Prepayment plans help to this end, but not to the extent that "people stopped dying."
"If we free their hands, if we let them use all their science, our doctors can do more than merely mend bone and brain and muscle. They can build faith and courage in the common man."

Comment: Physicians have been building "faith and courage in the common man" from the beginning of recorded history and their hands have been "free" always.

"Kaiser's keymen, his two sons, Edgar and Henry Jr., included, were driven to the limit of their strength, and then beyond it, yet kept on working. Henry Kaiser himself enjoyed it. To supercharge his natural super energy, the giant [Mr. Kaiser] demanded more and better vitamins. New pills of these powerful chemicals were recommended to him..."

Comment: What were these wonderful vitamins? And are they prescribed for all the shipyard workers? In connection therewith, reference may be made to a newspaper dispatch of a few days ago, in which it was stated that in a new concentrated food packet for shipwrecked soldiers and sailors, a few vitamin pills were placed to fill vacant space in the packages, because, owing to wide press publicity concerning vitamins, the pills helped in the sustaining of morale.

"Then he [Doctor Garfield] explained that the whole project would pay itself off reasonably quickly from the money rolling in from the weekly 50-cent pieces voluntarily prepaid by 30,000 workers, plus fees from their industrial compensation insurance."

Comment: If the above is applied to, say, 100,000 workers in the Kaiser shipyards, the following calculation concerning income may be made: The daily nickels on the basis of fifty cents per week, or two dollars per month, in twelve months, say for 100,000 workers, would mean an income of $2,400,000. Add to that 40 per cent more for the income received through state compensation payments, a sum then in excess of $3,000,000.

When the income is received by the central plant, with acquisition and administrative costs held down to a minimum, in a group of selected risks of sufficient size or mass spread, it is quite easy to understand how "the whole project would pay itself off reasonably quickly."

"By the time Kaiser had returned West, Garfield was ready with a smart idea, really a wonderful idea, put into his head by his medical friend, Dr. Ray Kay. 'You and Mrs. Kaiser can make it a Foundation,' Garfield said. 'A Foundation not for profit. Then when our health plan has paid this one off, with all the money coming in we can do great scientific things; we can build new hospitals, more hospitals...'

Comment: Concerning the Permanente Foundation, brief comment was made thereon in California and Western Medicine (December, 1942, on page 344). The Foundation was established by a loan from Mr. and Mrs. Henry Kaiser.
"So the Permanente Foundation was founded by Henry and his wife, Bess Kaiser. This young Doctor Garfield might have all the figures to prove this was a wonderful investment, but the bankers were very pleased with Henry Kaiser's signature on the $250,000 loan."

*Comment:* Reference has been made in a previous excerpt to the attitude of the bankers. Here it is shown that the banking fraternity were taking no chances in relation to the establishment of the Permanente Foundation. They protected themselves by having Mr. Kaiser sign on the dotted line. This is no reflection on the bankers. They are custodians of the money of citizens and are obligated to show proper caution in protecting the interests of their clients.

"This immunity of doctors from really effective mass indignation was undoubted. And, during the past twenty years, their remarkable advances—for which we must thank the doctors—made medicine too costly for the common man. So it was inevitable, since the individual sick man must pay his doctor, that doctors will go where sick folks have the dough. This had brought about a maldistribution of medical care that stank to high heaven."

*Comment:* Some readers may hold that the verb used in the past tense in the last sentence of the above could be used with even more justice to the author's comments as given in his last two sentences.

"So the spread of these groups had remained feeble. Their number had remained small in proportion to the millions of our medical have-nots. And for a reason. From Chicago, headquarters of the American Medical Association, down through every state and county medical society from coast to coast, there reached an invisible but powerful hand. This hand was ready to give the works to any physician who'd go off the reservation by daring to serve a medical cooperative on a full-time salary.

"How, then, faced with the necessity of the medical care of 30,000 workers where the medical societies were powerful, would Garfield recruit a staff of good surgeons and physicians?"

*Comment:* Whose is this "invisible but powerful hand" that de Kruif talks about as existing in the American Medical Association headquarters at Chicago?

In a long experience in organized medicine, the writer has yet to have his first experience with such an "invisible but powerful hand." The total number of licensed physicians in the United States is about 176,000. Component county medical societies are the sole judges of the conduct of their members and in such matters are independent of their respective state associations and also of the national organization.

The "invisible but powerful hand" myth is a figment of imagination held by persons not familiar with the facts.
For information concerning the second paragraph in the above excerpt, reference may be made to the article by the California Procurement and Assignment Service which appeared in California and Western Medicine for January, 1943, on pages 23-26.

"Shall the people have a say in how to pay their doctors? Or shall organized medicine dictate how physicians shall be paid? Or else, no doctor—even if you're going to die?"

Comment: Do citizens dictate to merchants how they will decide to pay for goods purchased, or do merchants lay down the conditions of payment for their goods?

And the follow-up sentence in the excerpt, isn't it far-fetched.

"In the American Medical Association there are powerful constituent bodies, like the California Medical Association and the Michigan State Medical Society, that are actually fighting to bring about prepaid medicine."

Comment: For these kind words, thanks.

"So with the national organization of our physicians. It is run by a few men in the little smoke-filled room. Of this fact the medical rank and file are not aware or to it they are indifferent. With this fact many of our most competent doctors are disgusted."

Comment: The governing body of the American Medical Association is its House of Delegates. California is represented by eight delegates, who are elected by their California colleagues on the basis of the reputations for service which they have established. So also in other states. If "many of our most competent doctors are disgusted" with this plan of democratic organization, a better procedure will be welcomed.

"This was what haunted Garfield: the invisible hand from Chicago."

Comment: Again, "the invisible hand from Chicago," Who, and What, and Why?

"Yet, if Garfield manned his Permanente Hospital with medical stumble-bums—always available a dime a dozen—his health plan was sure to fail. The hospital would jam up with sick people who would not get well. The workman would reject the health plan. Its income would dwindle. Kaiser would be left with that $250,000 note to which he had signed his name. And Garfield? He would be ruined."

Comment: Author de Kruif here uses language not in keeping with dignified thinking or discussion. To apply the term "medical stumble-bums" to physicians whose services Doctor Garfield would reject, is out of place.

De Kruif insists that the physician in private practice is to have no money relations with patients, but financial considerations seem to be in order when the financial interests of Mr. Kaiser or Doctor Garfield are involved.

Referring to the California Procurement and Assignment Service report
on the Permanente Foundation in *California and Western Medicine* for January, 1943, the following paragraph is quoted from page 24:

“Doctor Garfield, according to these statements, is employed under an agreement which allows him to draw up to $25,000 annually in salary. To date, he states, he has drawn no salary from the funds of the Foundation, but has actually put into current operating funds some $10,500 of his own money. When and if the profit period of the Foundation is realized, it is anticipated that Doctor Garfield will draw his $25,000 annual salary, will be repaid his $10,500 advance and will have no further share in any profits accruing from the plan.”

“Yet now, in spite of these sinister possibilities, Sidney Garfield began hiring highly trained young surgeons and physicians. He was quiet, but he was strangely persuasive.”

*Comment:* Concerning the hiring, the Procurement and Assignment Service report previously referred to stated:

“Early in its existence in California, Procurement and Assignment Service became aware of the building up by Mr. Kaiser and Doctor Garfield of a staff of physicians for both the industrial and nonindustrial medical care of Kaiser employees. The Kaiser staff of some thirty physicians (early in 1942) represented a group of young men, all but two of whom were definitely of military age.

“A review of the Kaiser medical staff showed that practically every one of the thirty physicians should be declared ‘available for military service’ because of his age; at the same time, Procurement and Assignment Service had no intention or desire to break up an established staff which was caring for an important segment of the industrial population. . . .

“At the same time, Procurement and Assignment Service put Doctor Garfield on notice that his staff members were vulnerable to induction into the Army by Selective Service because of their low average age. This warning was given for the protection of the staff, to obviate the disruption that might occur if a large part of the staff was classified 1-A by local draft boards and forced into military service. . . .

“This question of rooms versus wards during the terrific expansion of enrollment of workers on the health plan was a point of hot debate between Doctor Garfield and Henry Kaiser. The seventy-bed Permanente Hospital had no sooner opened in late August, 1942, than it was deluged beyond its capacity by the Kaiser army swarming up from its original 25, to 50, 70, 90,000 shipbuilders. Sidney Garfield—it was his duty as a doctor—wanted to take care of them all, rooms or no rooms. Henry Kaiser—fanatical believer in a medical golden rule—maintained that if he himself should have a private room, then so should every worker, down to the humblest laborer or shipyard sweeper.”
Comment: Hospital executives will find much of interest in the above.

“He [Henry Kaiser] got the $300,000 [more] without his signature [to an additional note]. It encouraged the bankers that, three months after the opening of Garfield’s health plan, the original $250,000 loan was paying itself off at the rate of $25,000 a month!”

Comment: Why it is possible to pay off a loan at that rate is easily understood when the income received in the Richmond shipyards and previously discussed is taken into consideration.

“Garfield offered his doctors salaries that ranged from $450 to $1,000 a month—not bad for a young physician or surgeon just out of hospital residency and facing the cold world of medical competition in individual practice. So between August, 1942, and March, 1943, Garfield’s staff at the shipyard first-aid station, the Field and Permanente Hospitals had grown to a group of sixty well-trained physicians and surgeons.”

Comment: The Procurement and Assignment Service report previously quoted reflects interesting sidelights on the above.

“They [the doctors who were hired by Doctor Garfield] rubbed their eyes in amazement at Doctor Garfield’s new medical economics. His organization’s total income came, 40 per cent of it, from payment by industrial insurance companies for workmen’s compensation insurance medical care. The remaining 60 per cent came from the individual 50 cents a week from the prepaid health plan voluntarily subscribed to by the Kaiser workers.

“Under this plan what could the doctors give the sick workers for their seven cents a day?”

Comment: The above is given to emphasize the source of the Permanente Foundation’s massive income of hundreds of thousands of dollars. With money received in such great amounts, it is not to be wondered at that Doctor Garfield is able to hire physicians on individual salaries running up as high as $1,000 per month.

“Of course their excellent salaries, with no overhead, are a good reason for the notably high enthusiasm and morale of Garfield’s staff of doctors. But there is a deeper cause for their spirit that you remark about them on their rounds of medical mercy to the great army of the industrially wounded and the sick. On a vast scale it confirms Sidney Garfield’s discovery made in the desert. There and at Grand Coulee he had begun to be thrilled by what happened to his doctors when the cruel barrier of money was lifted from between them and their patients. Exit dollars—enter God.”

Comment: When Author de Kruif refers to Doctor Garfield in the above, ending again with the sentence, “Exit dollars—enter God,” how does he explain the “$25,000 annual salary” or more received by Doctor Garfield, referred to in the Procurement and Assignment Service report?
"On this vast scale Garfield and his staff were demonstrating a revolutionary new medical economy. In the five months following the health plan's opening, the workers had paid $500,000 into the health plan; for this they had received the equivalent of more than $1,500,000 worth of treatment, when you estimate it on the fee-for-service system by which the individual pays his individual doctor."

Comment: Along the same line of reasoning, and with the same fee-schedule estimations used in the Permanente computations above, it would be of interest to have the contrasting grand total of many millions of dollars that represent the value of the professional services gratuitously and unostentatiously given by California physicians in the county and other charitable hospitals of the State.

"This weapon was the possibility of putting doctors who were stepping off the reservation of medical 'ethics'—into the Army. The Federal Procurement and Assignment Service had the duty to gather physicians for our armed forces. Now the officials of Federal Procurement and Assignment, and its state and local boards were—most of them—also high in political power in the American Medical Association and its constituent state and local societies. Of course, you see that fact's significance."

Comment: The implication in the above might be called "nasty." The splendid group of physicians who as Medical Procurement and Assignment Service officers have given gratuitous service to our country deserve fullest commendation. That is the significant fact, not what de Kruif states.

"The scientific medical teamwork, the swift mending of smashed skulls and broken bodies, the rapid diagnosis and cure of early pneumonia, the expert healing of burned eyes, the modern management of diabetes, high blood pressure, and wrecked hearts, the surgery of appendicitis, perforating stomach ulcers, and the scientific treatment of cancer—all this could not be done with men whose only qualification was a plain 'M.D.' Garfield's health plan was modern group medicine or it was nothing."

Comment: What is modern hospital care if, in one sense, it is not "modern group medicine," where attending staff members confer with and utilize one another's knowledge and facilities in the treatment of seriously ill patients?

"Now the physicians of California came to the rescue. Their leaders had smashed a cruel taboo by going out of their way publicly to approve Kaiser's prepaid medical care. Now in this emergency where illness, and even death itself, threatened hundreds of thousands of women and children, the California doctors awoke. Through their California Physicians' Service they believed they could undertake the care of this vast cohort of the medically forlorn."
Comment: De Kruif gives to his book the title "Kaiser Wakes the Doctors." In the above he states "the California doctors awoke." California Physicians' Service was established several years before the Kaiser shipyards came into existence, and the California Medical Association contemplated the formation of California Physicians' Service even several years before that.

The California doctors, therefore, even according to de Kruif, evidently awakened themselves. The awakening did not come through Mr. Kaiser.

"Now the California Physicians' Service was ready to go into death-fighting action. Before Pearl Harbor, its organization by California medical leaders had got the California Medical Association into the doghouse with the invisible hand that ran the American Medical Association."

Comment: Again, the question is asked, To whom did this "invisible hand that ran the American Medical Association" belong that "got the California Medical Association in the doghouse"?

Members of the California Medical Association would be pleased to have this information, because they, themselves, know of no such power.

"The workers—by their voluntary weekly fifty-cent pieces—not only paid for their care, but built those facilities themselves. That was the big news. It ought to thrill you doctors. You don’t have to get your facilities by begging them from the rich; you don’t have to get them by Government handout.

"Who'd handle the bookkeeping of this prepaid medical care? Industry, not the doctors, who don’t pretend to be businessmen and admit it. Kaiser dealt his cards, face up, across the table."

Comment: Wherein lies this difference in bookkeeping? Physicians have kept their own bookkeeping accounts for years. What bookkeeping magic is this which only "Industry, not the doctors," is able to manage?

"Now in March, 1943, only six months after the Permanente Hospital had opened, came evidence of the mighty economic power of Garfield's prepaid group medicine. The sum accumulating from the individual seven cents a day from 60,000 Kaiser workers had not only paid for the upkeep and the lavish equipment of those hospitals. But together with income from compensation insurance mandatory under California law, it was paying off the original sum advanced by Henry Kaiser for the building of the Permanente Hospital at a rate of $50,000 monthly. Within two years of that institution's opening, the $550,000 needed to build and to equip it would be paid off in full.

"This super-speedy self-liquidation was new in medical history. It dazed ordinary doctors, accustomed as they were to practice in hospitals that were tax-supported, or wallowing, because of their high overhead, in a morass of debt. It drew indignant bellows of disbelief even from certain eminent experts in prepaid medical care. Their incredulity was based not on any
examination of the Kaiser health plan's bookkeeping. It came from a weakness common to all experts."

Comment: In a previous page, de Kruif was making the payments to the bankers at the rate of $25,000 each month. Now it is up to $50,000 monthly. Would that de Kruif had also given information concerning salary lists and the reserves. A comparison of the administration expenses and "high overhead" would also be of interest.

"Practicing individually, each doctor has to sell himself. This is obvious if he is to be successful. It results in the super-bedside manner, which has no relation to real medical ability. In the group the organization is the selling point. For instance, Mayo Clinic sells each doctor in the organization by its reputation. The doctor doesn't fritter away his time kidding John Smith by his bedside manner. He can devote his efforts to good medicine.

"Individual practice doesn't permit ready consultation. The waste of the patient's time in going from one medical building to another for each specialty is enormous."

Comment: Not what one would call an excellent example of coherent thinking.

"Henry Kaiser believes that we can begin right now to build these Mayo clinics for the common man wherever there are industries. Even where the industrial units are small, their managers and their men can pool their efforts to build health-center hospitals that can be used in common. He is a great believer in good, not cut-throat, competition, and thinks the new prepaid group medicine will be stronger if its units are kept small."

Comment: For other comment concerning the above, see in this issue the press item quoted in the editorial department.

"Garfield has calculated that community groups of 2,500 people can build, support, and pay off their hospital facilities.

"Then there are other 'experts' who wail that this may be all right in cities, but that it will be no go in rural regions where farmers notoriously have not got the ready money. Again Kaiser has the answer. The economic power of health plans of industrial regions is a tremendous one. When the hospitals there are paid off, then they will make formidable sums of money. . . And this money can then overflow—with urban and rural citizens cooperating—to build small hospital health centers in rural regions."

Comment: It is to be hoped that Mr. Kaiser, Doctor Garfield and those who hold to the above will put their plan into execution in two or three dozen places in California and other states.

"His [Kaiser's] heroes in tomorrow's new fight for life are the doctors. He looks forward to the return of a vast commando force of young physicians from the Army. They are no longer enthralled or misled by the reactionary double talk of organized medicine's invisible hand. They have practiced
group medicine, good medicine, upon the soldiers and they know its benefi-
cent power. Already they are laughing at the horse-and-buggy individual-
istic medicine of yesterday.

"The new hospital health centers will be the workshops where the power
of the science of these young men will begin to work a fantastic transfor-
mation upon our nation now living, so large a part of it, half alive. The great
economic power of the new prepaid medicine practiced in these health centers
will give a new lease on life to our older doctors, too. Joining these health
plans as the California physicians are now joining Kaiser's, there will be the
wherewithal for them to become reeducated, to become teamworkers, happy
that they, too, can join in the group medicine of our new fight for life."

Comment: More will be known about all the above when colleagues now
in military service return to take up work in civil practice.

The "invisible hand" evidently frets Author de Kruif because here it is,
bobbing up again.

"It [new hospital health centers and workshops] can abolish the misery
and the insanity of women's change of life. By the skilled use of the new
powerful hormones it can extend the sexual activity and lengthen the vigor-
ous prime of life of men, so that we will no longer say that we grow old too
quickly and wise too late."

Comment: Here Author de Kruif almost transposes himself into the rôle
of an optimistic therapeutist.

"Large industries, groups of small ones, groups of doctors today left at
home, the labor unions, the farmers' organizations—all should band together
now to demand the Government Medical Loan Agency. This would guar-
antee to the local bankers 50 per cent of any losses which might come as a
result of the banks' willingness to finance these new Mayo clinics for the
common man.

"Then for tomorrow Kaiser sees a still brighter promise. 'How shall we
reward the scores of thousands of young doctors who've risked their lives at
the fighting fronts in the war?' he asks. 'Death has awakened these doctors.

" 'We should urge that the Government provide them with an extra com-
pensation, and special encouragement for the health centers that they will
be ready and anxious to organize. The Government might well guarantee
these returning doctors not 50, but 80 per cent of the cost of building their
needed facilities.'"

Comment: Author de Kruif evidently holds that the Government will be
generous with doctors. How does he reconcile with his above sentiments the
thirty-five-dollar fee table established by the Federal Children's Bureau
which has been discussed in this and previous issues.

Here endeth the book review.
JOURNAL OF DENTAL RESEARCH

WILLIAM J. GIES ENDOWMENT FUND

Financial Statement as of March 12, 1943

Compiled by L. M. WAUGH, D.D.S., Treasurer

This Fund was created, on the initiative of the voluntary Committee on Endowment—organized in New York City in 1937—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.

I. AMOUNTS RECEIVED FROM ORGANIZATIONS
(March 14, 1942 to March 12, 1943)

Alpha Omega Fraternity (continuing annual payment) . $ 50.00
American College of Dentists: New York Section ..... 100.00
Illinois State Dental Society (completing pledge of $1,500) .............................................. 300.00
International Association for Dental Research: Boston Section .............................................. 25.00
Michigan State Dental Society (completing pledge of $500) .............................................. 250.00
Ohio State Dental Society (including annual payment of $60) .............................................. 160.00
Pierre Fauchard Academy .............................................. 25.00
Virginia State Dental Association ...................... 50.56

$ 960.56

II. AMOUNTS RECEIVED FROM INDIVIDUALS
(March 14, 1942 to March 12, 1943)

$110: G. C. Paffenbarger (part of pledged total) . . $110.00
100: Oren A. Oliver .............................................. 100.00
50: C. H. Schott .............................................. 50.00
20: A. R. Cooke .............................................. 20.00

$960.56

In 1937, Fred A. Richmond contributed a first mortgage bond for $100 on the Bethany Methodist Hospital, Kansas City, Mo., bearing interest at 4.5 per cent, payable semi-annually. Heretofore, only the interest was credited. In 1939, Don J. Aubertine contributed a number of shares of common stock in the Farnsworth Television and Radio Corporation, incorporated under the laws of the State of Delaware. These were not listed as an asset because they then had no cash value. The original certificate has been exchanged for a 46-share temporary certificate which we now hold. On March 11, 1943, our accountant found that the market value was $7.00 a share; they are now listed as having a current value of $322. The temporary certificate, #TL818, is recorded to the credit of the Journal of Dental Research Endowment Fund.

Total

IV. INTEREST INCOME AND EXPENSES (CURRENT YEAR)

Earned interest on cash balances $112.19
Expenses: none recorded

Balance added to the Fund $112.19

*The total amount of interest already received on Dr. Richmond's contribution of the bond, including the $6.75 recorded in Section II above, is $15.75. Thus his contribution to date is $115.75. The bond matures on May 1, 1947.

*This brings the total amount of Dr. Aubertine's contribution to the Fund to $342; in a previous report, receipt of $20 had been acknowledged.
V. SUMMARY OF TOTAL RECEIPTS (ASSETS): 1937-43

Total receipts for the Fund as of March 14, 1942 $30,854.49
Paid for forty War Bonds $29,600.00
Balance on deposit 1,254.49

Receipts in 1942-43:
- From organizations (Sec. I) 960.56
- From individuals (Sec. II) 383.75
- Mortgage Bond ($100), Bethany Methodist Hospital (Sec. III) 100.00
- Farnsworth Television and Radio stock (Sec. III) 322.00
- Interest on bank deposits (Sec. IV) 112.19

Total receipts in 1942-43 $32,732.99
Payments for forty-two War Bonds (Sec. VII) $31,080.00
Balance on deposit 1,230.99
Bond and shares 422.00

VI. CUMULATIVE SUMMARY OF ANNUALLY RECORDED ITEMS
OF RECEIPTS AND EXPENDITURES

<table>
<thead>
<tr>
<th>Year</th>
<th>Contributions (Payments)</th>
<th>Earned Interest</th>
<th>Expenses</th>
<th>Net Receipts</th>
<th>Net Receipts</th>
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<tbody>
<tr>
<td>1937-1938</td>
<td>$10,652.50</td>
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<td>$134.06</td>
<td>$10,518.44</td>
<td>$10,518.44</td>
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<td>1938-1939</td>
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<td>None</td>
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<td>15,266.61</td>
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<td>1939-1940</td>
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<td>None</td>
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<tr>
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<td>3.53</td>
<td>5,393.80</td>
<td>26,354.19</td>
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<tr>
<td>1941-1942</td>
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<td>None</td>
<td>4,500.30</td>
<td>30,854.49</td>
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<tr>
<td>1942-1943</td>
<td>1,766.31 112.19</td>
<td>None</td>
<td>None</td>
<td>1,878.50</td>
<td>32,732.99</td>
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</table>

Total $32,217.66 $652.92 $137.59 $32,732.99

VII. STATEMENT REGARDING INVESTMENT IN WAR BONDS

By authorization of the Trustees of the Association, forty-two War Bonds of Series F (12 year appreciation bonds) costing $740 each, have been purchased from the funds in the Endowment Committee’s treasury, as of the following dates and serial numbers:

4This total includes $422—the total current values of the bond and stock mentioned in Section III.
Purchased (10) Mar. 30, 1942: M140400F to M140409F, incl... $ 7,400
Purchased (22) May 29, 1942: M197811F to M197832F, incl... 16,280
Purchased (8) July 29, 1942: M237558F to M237565F, incl... 5,920
Purchased (2) Dec. 21, 1942: M423990F and M423991F ... 1,480

$31,080

The payee named on each bond is “Committee on the William J. Gies Endowment Fund for the Journal of Dental Research (an unincorporated body).” All of these bonds (and the Bethany Methodist Hospital bond and Farnsworth Television and Radio Corporation stock, indicated in Section III) are in the custody of the Treasurer of the Committee, in a safety deposit box, Empire Trust Company, 580 Fifth Ave., New York City, in trust for the Committee.6

VIII. SUMMARY OF OPEN ACCOUNTS RELATING TO PLEDGES

1. Organizations

<table>
<thead>
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<th>Organization</th>
<th>Pledge</th>
<th>Paid</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>American College of Dentists</td>
<td>$5,000</td>
<td>$4,000</td>
<td>$1,000</td>
</tr>
<tr>
<td>International College of Dentists</td>
<td>800</td>
<td>200</td>
<td>600</td>
</tr>
<tr>
<td>Kansas: First District Dental Society</td>
<td>100</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>J. B. Mann Study Club, Washington, D.C.</td>
<td>1,000</td>
<td>100</td>
<td>900</td>
</tr>
</tbody>
</table>

2. Individuals

In Memoriam: John and Ophelia E.
Gies, Reisterstown, Maryland, 1872
(John Gies III, William J. Gies II) 1,000 800 200
Harry Kaplan                                 250 100 150
George C. Paffenbarger                     250 235 15
Gordon L. Teall                             10   5   5   370

$2,945

IX. CORRECTION OF ANNUAL REPORT FOR 1941
(as published in the J. Den. Res.)

AND OF THE CONSOLIDATED REPORTS (1938-42)
(as published in the J. Am. Col. Den.; 1942, Dec.)

The accreditation of $34 to the “India Dental Association” should have been to the Indiana Section of the American College of Dentists. To that amount should have been added $19 contributed, as members of that Section, by Drs. J. B. Carr, F. V. Hilgemann, L. A. Fonner and R. C. Shurr—a total of $53 for that Section.

On March 25, one additional $1,000 War Bond—Series F, M204356F, was purchased, from the balance on deposit, at the terms and on the conditions of those previously obtained, as outlined in this section (VII).
EDITORIAL

Distance, Direction, Destiny

The race of life is being run; distance has been covered by so many people that we find more older people in the world at the present time than ever before. We have almost made the distance by the shortest possible route. This has been possible because of improvements in so many ways. A better knowledge of the inanimate sciences, physics and chemistry, has produced a technology, which in turn has produced so many labor saving devices, that our physical bodies are protected from the wear and tear of preceding generations. Our food is better and our bodies are better developed. Our educational facilities have improved, and with this has come a better understanding, increased appreciation and desire for better things. The public has thus charted for itself a better course and with the improvement in medical and dental science and art, the public is again greatly benefited. All of this and more have made for greater need and concomitantly, greater wealth. At the same time, as longevity has been extended, competition between age groups has developed. There is infinitely greater wealth in toto and many more individuals have greater wealth than at any time in history. Yet there is a feeling of insecurity. We are quite secure so long as our ability to do, keeps up but with increasing numbers and more older people still capable, fear comes upon us. This has been going on for many years with the development of the various "isms," but which have not fulfilled their promises.

Democracy has easily proven itself to be the best way. The individual must play his part in the game of life thus covering his own distance, in the only direction, straight ahead, resulting finally, in the determining of his own destiny.

Now, as a group or as a nation we may help out a little in making life more secure in later years, but how? The last ten to fifteen years have been rife with discussions both pro and con. Every nation in the world has made some contribution to this maelstrom of planning. While all are included within the general term, Social Security, most of our concern is with the purely material and we
may call it Economic Security. From our standpoint as one of the health professions, we are concerned with that phase and to that will address our thinking for the moment.

The American College of Dentists is an unknown yet integral group in American life but has done its part in an effort to solve this question. We have financed and made several studies, thus providing data upon which something may be built, or from which something may be deduced. Even the pages of this issue of the Journal carry much that may be of value.

At the outset, there are a few facts that must not be overlooked. Every man must make his own. Long ago he was charged to earn his bread by the sweat of his brow. There are too many today who want jobs without responsibility, which indicates a desire to go along in the easiest way possible. Any one with an ounce of gumption knows that he must spend less than he earns. But here again, it seems sometimes that he doesn’t want to do it. A very small per cent of the people make provision in one way or another for a very large per cent. This will always be so, but it is probable that more care might be exercised in the distribution of the national wealth than obtains at the present. The national income should provide sufficiently for all the people. Here is where Social Security steps in and it may do the job.

Now from our standpoint, this may be called compulsory insurance. A survey of income producers will reveal the fact that those whose incomes are within the higher brackets carry plenty of insurance, while the lower income group carry little if any, and in too many instances condemn it. Why is it that those who earn most know best how to protect it? A national insurance in which all earners are involved appears to be the answer.

Dentistry or dental service is preventive medicine and to children it is preventive dentistry, too—it is prevention in its broadest sense. A better knowledge of the science of nutrition may mean prevention to a still greater degree.

The job incumbent upon us as dentists is first, to be willing to assist all groups in our American life, to a better life. That is the broad goal spread out before us. Life must be better for each generation and it is ours now to assist the on-coming generation. Then
secondly, as dentists, we can contribute directly through our professional service.

Life is ever individualistic—every man must eat for himself, learn for himself, breathe for himself, in short, he must care for himself including his spiritual relationships as well. Yet we can see ahead of us some modification of past practices. Business has gone "big"—there are more jobs and more employees are needed. More and more, young men are fitted to go out in pursuit of a job or a position rather than to exploit virgin fields. There are more and more jobs requiring only a minimum of responsibility at the most. Therefore people think in terms of the group. Many other practices of men will need be turned from the individual to the group. This means the health professions as well. More and more of our young graduates want to go into positions prepared for them, rather than go out for themselves. Whether this is best or not is beside the point, they are doing it. They would rather have a check of a stated amount once or twice a month, than take their chance on more or less on their own initiative. One thing it does do and that is, it changes competition for profit to intellectual competition. It does away with the profit motive, but we of the out-going generation will feel that it produces lethargy and complacency.

The American way of life was established some years ago—long enough to be traditional—we should not attempt too great a change but rather manifest a willingness to co-operate more fully. Life is individualistic—it was made so from the beginning. American Democracy has been that agency by which or through which, man has been able to find himself and to live his life. Paraphrasing Mr. Churchill, let us not as Americans, preside over the liquidation of the American way of life.

Every man must cover his own distance; he can choose his own direction, at least in part; but his destiny will be largely what he makes it.
BOOK REVIEW


This book fulfills its purpose of being an “applied” anatomy for students and practitioners of dentistry. Its nine chapters present the anatomy of the head and neck in a comprehensive and discursive manner with numerous references to clinical problems and applications. Much of the factual detail, the importance of which is stressed repeatedly in the text, is obtainable only from a study of the numerous drawings and roentgenographs, for the author presents many of the subjects such as the vessels and salivary glands more as an essay on the need for anatomical knowledge rather than as an exposition of this very knowledge. This book, in consequence, offers a valuable synthesis of information obtained by the student from other, more factual sources, but it should not be considered as a practical anatomical manual or text.

The presentation of the embryology of the face, the anatomy and mechanics of the temporo-mandibular articulation, the facial musculature and innervation are particularly well handled and are sufficiently factual to answer the usual practical questions of a dental surgeon. Some of the clinical discussions, such as the author’s lengthy defense of radiography in dental diagnosis, or his evaluation of the anatomical considerations in the etiology of malocclusion will meet with less general approval, because in the former instance his position is now generally accepted without question and in the latter instance, he is discussing a still controversial subject as if the question was settled.—Ellis B. Jump, D.M.D., Assistant Professor of Anatomy, University of California College of Dentistry, San Francisco, Calif.
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.

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Next Meeting, Board of Regents: Chicago, Ill., Feb. 20, 1944.

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.]

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