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Contents for June, 1961

Dentistry in Israel

KURT A. ROSENZWEIG, D.M.D., M.P.H.

Introduction

The State of Israel was founded in 1948 in a part of the territory and as the successor of Palestine, a country which had been under British Mandatory rule since 1919. Up to that year Palestine had been a province of the Ottoman Empire. The Mandate given by the League of Nations after World War I contained the "Balfour Declaration" according to which the mandatory power was under obligation to facilitate immigration of Jews with the aim to establish a Jewish National Home in Palestine.

A Jewish minority had always lived among the Arab population of Palestine, especially in the larger cities for more than 100 years. Immigration of some size began in the eighties of the previous century as a result of intolerable persecutions. The immigrants came predominantly from Russia and they founded agricultural settlements in marginal areas of the country. The influx of newcomers grew after World War I mostly from Eastern and Central Europe. The ascendance of Hitler and his conquest of Europe drove those few who could escape the Nazi crematoria to seek asylum in Palestine. With the partition of Palestine and the establishment of the new state, the greater part of the Arab population fled, and a mass immigration of Jews from many countries soon turned the former minority into a majority. These general historical features are reflected in the development of dentistry in Israel since each wave of immigration brought dentists with it.

Legislation

In 1919, the British Administration found no regulations concerning the medical and dental professions. A few dozen persons, many of them women, were practicing dentistry, a great proportion without formal training. The newly established Department of Health set about bringing order to this field.

The first ordinance to regulate the practice of dentistry was issued

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in 1926, and in order to be granted a license the applicant had to prove his qualification by having studied dentistry ". . . for a period of at least three academic years in a dental or medical school recognized by the Director (of the Department) and has obtained a diploma in dentistry."[1] To those persons in the country who could not satisfy these requirements, the Director was entitled to grant ". . . upon application made within 12 months from the date at which this ordinance comes into force, if he thinks fit, a permit to practice dentistry to any person who was engaged in dental practice in Palestine on his own behalf for a period of five years at least during the seven years preceding the date of this Ordinance."[1] This permit did not entitle its holder to use the titles of Dentist or Dental Surgeon as the licensed dentist could. He was called a "Dental Practitioner." His activities were also subjected to some restrictions mainly in the prescription of narcotics. The practice of dentistry by licensed medical practitioners and the performance of "minor dental work by any attendant employed by a person authorized to practice dentistry under his personal supervision" was abolished in 1945, when the Ordinance was amended to make admission of more dental practitioners possible. A second amendment, an extension of the former, was introduced in 1947.

The Dental Ordinance of 1926 is still the basic law regulating the practice of dentistry in Israel. It was amended a third time in 1951 and recently in 1958 by the Knesseth (Parliament), essentially for the benefit of prospective dental practitioners among new immigrants. Thus there exist two types of practicing personnel within the dental profession in Israel: academically educated Dentists; and job trained Dental Practitioners, the latter a perpetuation of a need which was outmoded when the Dental School was founded, but which still remains "on the books."

Specialties are not recognized officially in Israel, although a number of well qualified dentists have limited their practice to orthodontics or oral surgery. Dental hygienists and dental nurses (in the sense of New Zealand) are non-existent in Israel. Treatment by such ancillaries would require special legislation.

Dental Manpower

As was mentioned before, dentists immigrated to Israel predominantly in waves, the most important of which were: 1923-6 from Russia, 1933-6 from Germany and Austria, 1937-9 from Poland. The

second world holocaust almost completely interrupted all immigration to Israel until 1946, when immigration again started from Poland, Hungary, and Rumania. In 1948-50 there was a wave of immigrants from Bulgaria, Yugoslavia, and Czechoslovakia, and the years 1955-7 again saw a renewed influx from Poland.

It is evident from the foregoing that the standards of the dentists, arriving from more than fifty different countries over a long period of time are most heterogeneous and reflect the standards prevailing in their countries of origin. The lack, until recently, of a School of Dentistry which would serve as a moderator of these discrepancies, by postgraduate education, was felt severely. Even more important, until the establishment of the Dental School, the country was entirely dependent upon immigration for its supply of dental manpower. It is therefore understandable why most dentists are well above middle age (Fig. 1).[2, 3]

The mean age of dentists in Israel is rather high—48 years (it is 44 in the U. S. A.[4]), and did not change significantly during the last nine years, whereas the median age rose (Table 1). These figures illustrate the aging of the established dentist population, together with the fact that most of the immigrants are in their late forties and early fifties.

Another remarkable feature of the dental manpower of Israel is

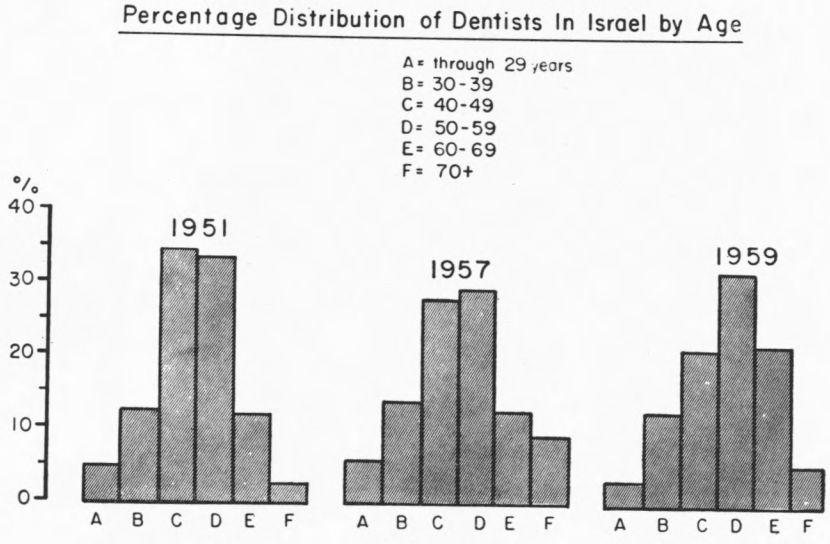

FIGURE 1

the fact that dentists are composed to a large extent (45 per cent) of women (Table 2).[3]

There are at present 518 dental practitioners licensed to practice in Israel, about 50 per cent of the number of dentists. Owing to legal restrictions (the minimum age required is 35 years) their mean age is 56.3 and the median age is 53.9. Only 6.2 per cent in this category are women, reflecting the fact that the greater majority had been dental mechanics previously. Permits to dental practitioners are granted at present at a high rate—124 having been admitted during 1959, thus increasing their number by almost 25 per cent. The num-

TABLE 1

AVERAGE AGE OF DENTISTS IN ISRAEL

Year	*Number Registered*	*Mean Age*	*Median Age*
1951	852	48.67	39.67
1957	989	50.15	39.88
1959	1074	48.06	42.67

TABLE 2

SEX DISTRIBUTION OF DENTISTS IN ISRAEL

Year	*Per Cent Male*	*Per Cent Female*
1951	60.4	39.6
1957	55.4	44.6
1959	55.2	44.8

TABLE 3

DENTISTS ADMITTED TO ISRAEL IN 1959

Origin	*Number*
Eastern Europe (Russia, Poland, Rumania)	27
Western Europe (France, Belgium, Germany)	6
South America	6
United States	2
Israel	10
Total	51

ber of dentists who were licensed in the same year was 51 (Table 3). Table 3 also shows the wide variety of countries from which these 51 came.

Dentist Population Rate and Geographic Distribution

The dentist population ratio is quite favorable at present (1:2,000, without the dental practitioners). It was 1:1,850 in 1951 and 1:1,900 in 1957.[5] During this period the total population increased by 25.3 per cent whereas the number of dentists rose only by 16.2 per cent. Figure 1 shows that the number of dentists between 30 and 59 years (the productive years) are slowly decreasing while the number over 60 years (retirement age) are rapidly rising. A study of Figure 1 is interesting if one follows the course of those under 30 years of age (who work the greatest number of hours), those between 30 and 39 (who have the greatest number of working weeks during the year), and those between 40 to 49 years (who see the greatest number of patients).[4] These are decreasing while those in partial retirement (after 60 years) are increasing.

It should also be pointed out that the work load of female dentists is much less and their professional life time much shorter than that of males. All these factors together indicate that the population of Israel is far less assured of an adequate dental manpower than would appear from the figures alone (1:2,000).

As in other countries, dentists in Israel prefer to live in urban communities. Thus the rural population, and especially the ethical minorities, are left without sufficient treatment facilities, with the exception of the "Kibbutzim" (communal settlements). The latter are visited weekly by dentists from the cities at the expense of the settlement. Figure 2 shows the geographic distribution of dentists as it was in 1951.[3] There is no reason to believe that this pattern has changed significantly since then.

Organization and Institutions

Dentists and dental practitioners have their separate professional organizations. There exists also an orthodontic society, and a society of dentistry for children has been founded recently.

The Ministry of Health does not have a dental division. A "dental adviser" is employed in the fields of licensing, both of personnel and import of supplies, and of dental public health. About 60 per cent of grade school children benefit from a dental school service, which

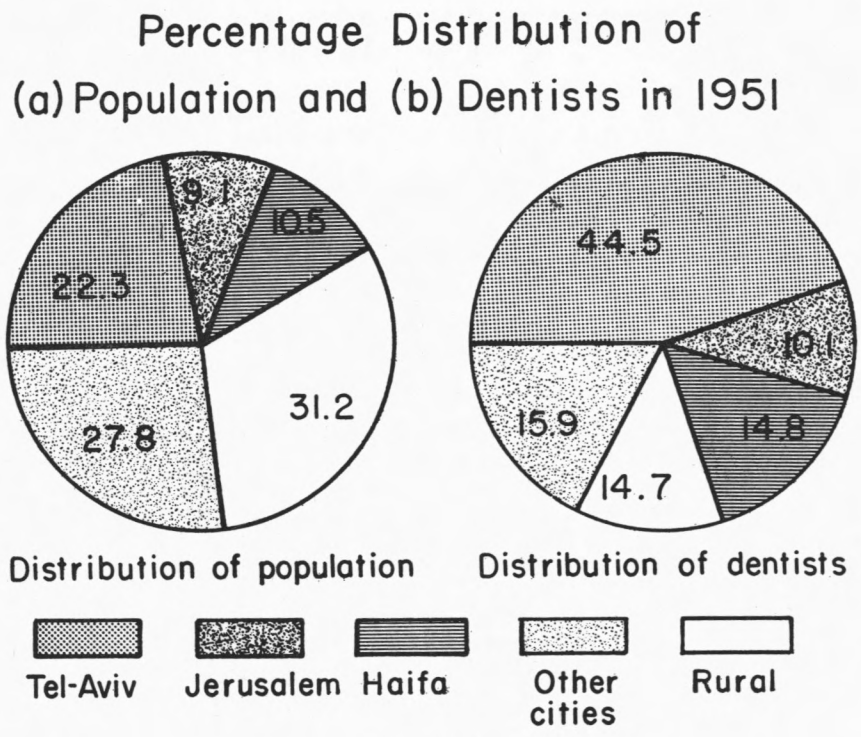

FIGURE 2

is supplied by the municipalities and financed by a small per capita fee.[6] At 18 years of age all able-bodied youths (boys and girls) join the Army which has its own dental corps.

There exist several cooperative non-profit organizations of health insurance. The largest, the General Workers' Sick Fund, operates a number of dental clinics staffed by salaried dentists. Treatment is given on a fee for service basis. Other organizations make the services of a closed panel of private dentists available to their members at a reduced rate.

The nonselective immigration to Israel brought a great number of handicapped individuals to the country, whose social and medical rehabilitation is the task of "Malben," a philanthropic organization whose funds are provided by Jewish organizations in North and South America. The agency has its own dental department where the chronically ill, the aged, retarded and blind children, and other handicapped people are treated.

Approximately 30 per cent of Israel's dental manpower works on a part-time or full-time basis in the above mentioned institutions.

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Predictions for the Next Fifty Years of Aviation

CAPTAIN EDWARD V. RICKENBACKER

To those whose memories go back to both World Wars, the name of Captain Eddie Rickenbacker is only too familiar. Captain Rickenbacker, famed U. S. aviator and aviation executive, is Chairman of the Board, Eastern Air Lines, Inc.

This paper was presented at the December 4, 1960, meeting of the New York Section of the American College of Dentists in the Hotel Statler-Hilton, New York City. The officers of the Section in charge of the arrangements were: Dr. Gerard L. Courtade, Chairman; Dr. Ormonde J. McCormack, Vice Chairman; and Dr. John J. Dolce, Secretary-Treasurer.

Any attempt to visualize, within 50 per cent of reality, what will be accomplished in the next fifty years of aviation would, in the eyes of his friends, qualify one as a fit subject for an insane asylum. I can speak from experience because, just thirty years ago, I ventured to predict such a glimpse of what we might expect in the next twenty-five years. Despite the fact that several of my predictions fell far short of what actually has taken place, my description of multi-engined transports; of trans-oceanic air service; of wide-ranging, high-flying military aircraft; and yes, of helicopters, sounded to many like the outpourings of an unbalanced mind. Yet, with this popular penalty vividly in mind, I will make the following predictions for aviation, within fifty years from now.

Long before the year 2010 is reached, military aircraft—both fighters and heavy bombers—will progress from turbo-jet engines at the speed of sound, to the more powerful ram-jet and rocket engines with supersonic speeds up to 2,500 to 3,000 miles per hour. These will be the forerunners of nuclear powered fighters and bombers, cruising 50 to 250 miles above the earth, with sufficient range to circle the globe without refueling, and will form a perpetual peace patrol. Even these will be but stepping stones to rocket-driven guided missiles, which are making obsolete our present con-

ceptions of fighters and bombers. Carrying a much further developed and devastating atomic bomb, these war machines will be controlled electronically and will require the help of human beings only at point of take-off. Speeds of these nuclear-powered guided missiles will increase progressively from 2,500 miles an hour to 25,000 miles an hour, and they will locate their targets with acoustical devices as yet unperfected.

This, I admit, is an ugly picture, but as man develops his ability to engineer these deadly instruments the need for them will diminish proportionately. In this fact lies mankind's greatest hope since the beginning of time.

Spectacular as are the developments ahead for military aircraft, the advance of aviation as the world's primary means of travel, over any appreciable distance, will be equally fantastic. Jet-powered transport planes will progressively graduate from today's giant aircraft, with speeds of 600 miles per hour, to veritable air liners, which will be cruising high above the weather with silent, vibrationless comfort, at speeds up to 2,500 miles. With these, we will be able to cross the continent in scarcely more than an hour—span the Atlantic in less than two hours—cross the Pacific in scarcely four hours—and circle the globe in scarcely ten hours.

The application of atomic power to transport aircraft will bring to reality aviation's inherent potential of being man's most economic as well as safest means of travel. Because of the limited weight of nuclear engine fuel, by comparison with the weight of tens of thousands of gallons of fuel now required for propulsion, the atomic engine will make possible tremendously increased payloads and ranges. This will mean far more efficient aircraft and, consequently, relatively lower and lower costs for the traveling public, and the shipper.

While these nuclear powered air liners will link all major cities over the continent and across the world, helicopters for inter-city short haul travel will progress from today's reciprocating engines—first to jet power, and then to atomic propulsion, increasing in size, and carrying from 50 to 100 passengers. To utilize this advanced means of transportation, all cities of any size will zone building heights in their downtown areas, and bridge the streets to make heliports of adequate size—an ideal convenience for the greatest number of people. The development of electronic devices and control, will make the operation of aircraft independent of the weather.

The conscious acceptance by the passengers, of the individual's role in promoting friendship and preserving peace, will be evidenced in a universal passport used for identification only, and airborne cargo will move freely in response only to the demands of commerce.

Finally, in the span of this next half century of aviation, space ships will become commonplace for inter-planetary travel. With luxurious accommodations for 150 to 200 passengers, they will use power derived from nuclear energy to develop speeds up to 25,000 miles per hour or better, and will have a practically unlimited range. In fact, space ships, in the year 2010, will be semi-self-sustaining planets in themselves.

What lies ahead for aviation? Our progress will be limited only by the limits of human imagination. To make these things, and even far greater wonders, man already has the God-given intelligence and the capacity for the knowledge they will require. Yet unless we can anchor our knowledge to moral principles, science may turn out to be, not the guide, but the betrayer of humanity. With aviation's development in the hands of men of good will, we have, for the first time in the long history of man, the one instrument which can forever eliminate the barriers of time and distance, of ignorance and misunderstanding, which since time began have set men apart and against each other. In terms of human relationships, these advances in aviation mean that the world will grow progressively smaller.

Then people of all nationalities will have, within their own hands, the means of meeting and understanding all people, and for eliminating the petty hates and jealousies which breed wars. For, in the years ahead, every community on the face of the earth will be a port of entry and departure for every other city, town, and hamlet, on the vast ocean of air, on whose shores every man lives. Then, instead of being the most deadly weapon God ever let man create, the airplane will truly become the Angel of Peace that He intended it to be.

Let me repeat, this is but a glimpse of the future I can see ahead, of just one facet of our surging economy. Science is increasing the productivity of man continuously, magically adding to his ability to produce more and more of the things which will aid and benefit more and more people everywhere. Opportunities? They are stored in abundance wherever you look. They are there waiting to be tapped by anyone with imagination—imagination backed by the faith in our freedom of enterprise and fortified by the courage to try.

In the field of electronics, visualize if you will, the promise of se-

lective registration of signatures—world wide—by television. Think of how the ability to register authentic signatures instantaneously in any part of the world, can improve the earning power of dollars, now held captive and idle in transit. Think of what it will mean when every bank in the world will have a television set, and where the exchange of credit, on signature, will make it unnecessary to keep billions of dollars in transit around the world—dollars which must now remain idle with no earning power. Think of the saving this will mean in interest charges alone; interest charges which benefit no one because of the much higher cost of allowing funds to remain idle. Through the universal adoption of selective signature registration by television, we can overnight contribute untold millions to the working capital of the world, and put these millions into productive use where they are needed most, and in a fraction of the time now required to transfer them.

Consider another promise of the application of atomic power. Visualize the tremendous productivity promised by the use of nuclear power to distill fresh water from the sea. This distilled fresh water, in volumes of billions of barrels annually, can be piped directly from the oceans to arid sections just as we now pipe oil and gas across the land. Reclamation of millions of idle acres will multiply the productivity of our own food supply, making it capable of feeding a population of 500 million without difficulty. And think beyond our own shores, of what this could mean to the rest of the world. For one thing, it would mean that no man should ever again lack food to eat. Apply this to human relations, to the cause of peace in the world, when mankind never again could be driven nor inveigled into aggressive acts by tyrants because he was hungry.

Visualize what anti-collision lights on automobiles could do to prevent accidents and the loss in our productive manpower that such unnecessary tragedies represent. We have the promise of the successful development of such electronic mechanisms for use on our aircraft—anti-collision devices, we call them—which will be able to add this further element of safety to our airliners that are already traveling nearly as fast as sound itself. It would be far less of an engineering feat to design such devices for automobiles, to tie them into the controls, so that under certain circumstances, they would automatically apply brakes, reduce horsepower and divert direction, saving untold thousands of lives every year.

From the aircraft industry, also, could come another tremendously

important contribution to more effective and more productive automotive power. On aircraft engines today, there is a turbine unit which, by utilizing the exhaust gases formerly wasted, now recovers from these gases approximately 20 per cent of the power produced by the original engine: production of additional power without an added drop of fuel. Applied to the automotive engine, this could mean a 20 per cent reduction in fuel requirement for a given mileage, or a 20 per cent increase in lifting and pulling power. Also important, however, is the beneficial effect this harnessing of exhaust gas could have on the elimination of smog and air pollution, which are becoming increasingly burdensome problems for every industrial and urban area in the country today.

There can be no question but what the world will continue to be more, instead of less, dependent on automotive transport. The provision of highway facilities today is one of the great problems faced by every community, every county, and every state in the Union. To provide adequate highway rights-of-way, we are spending billions of dollars building thousands of miles of arterial thruways by condemning land right and left, tearing down, and erasing residential and valuable industrial areas. Instead of spending billions for new surface highways, how much more could we accomplish with the same amount of money by elevating these automotive highways over the made-to-order beeline thruways which our railroad lines already have established. And the leasing of these overhead highway rights-of-way would provide a tremendous source of needed additional capital for our railroads, without detracting in any way from their own transportation business. What better, more direct line of communication could we have than these?

These are but a few of the tremendous opportunities that lie ahead of us. Who, then, can seriously question if there is any future in this great land of ours? No one with any knowledge of our country's past history, with any appreciation of the potential of a truly free and independent people, can fail to be optimistic. Our problem, then, is how well can we keep our nation on the right highway.

Our survival as a free people, and the freedom of generations to come, depends upon our ability to re-establish the eternal truth and principles upon which our beloved country was founded, and upon our willingness to demonstrate them in our personal and political life, and in our relations with other nations. To give the world the leadership it needs, by example, to lead the world out of the current

chaos of confusion, America does not need any world-shaking new discovery in political science. We need follow only one course—and it is so clearly marked, that our failure to recognize it is frightening. To create harmony among nations and to restore dignity to man, we need only to rediscover for ourselves the true principles of the American Way of Life, which have been tried and proved through some 180 tumultuous years. Rediscover them first, practice them at home, and then preach them to all our friends and associates throughout the world.

We have the greatest opportunity afforded mankind—to *sell* this concept of freedom to the world. I am convinced that, if each one of us would only renew our faith in the principles of our freedom, and use our highly developed talent for selling our principles, as well as our own products, our beloved country would remain strong spiritually as well as physically—so strong, that no power for evil could ever prevail against us, and freedom once more will be the hope, instead of the despair of mankind.

And it is you—the leaders of the dental profession and the thousands of men like you—whose highly developed talents have made possible the sharing of the ever-increasing national benefits of our free enterprise system, who also must be the leaders in this new selling order. You must be the missionaries, not of a new order, but of the age-old cause of freedom, upon which the welfare of America and the survival of freedom on this earth depend. If each one of us accepts such an assignment, if earnestly we devote our talents to its achievement, we cannot help but make some small individual contribution and, collectively, the results will be great.

But even more important, by so living today, we will inspire in the younger generation of tomorrow, a greater appreciation of the benefits and blessings which a gracious God has bestowed upon us as Americans. By teaching them these eternal truths, they can then keep this land of ours strong and free and, one day, lead the world from the darkness of bondage and despair into the holy light of hope and freedom, which is the mission entrusted to America. Then, when the candle of life is burning low, we can look back and say, "Thank God, I have contributed my best to the land that contributed so much to me."

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Dentist Needs for the Future

SHAILER PETERSON, Ph.D.

Dr. Peterson is Secretary of the Council on Dental Education of the American Dental Association and Assistant Secretary of the Association for Educational Affairs. Recently he was appointed dean of the University of Tennessee College of Dentistry.

This paper was presented at a symposium on "Career Opportunities in Medicine and Dentistry," New York City, December 29, 1960, at the annual meeting of Section Nd (Dentistry), American Association for the Advancement of Science.

The symposium was co-sponsored by Alpha Epsilon Delta, national premedical honor society. Dr. Peterson's paper appeared in the Alpha Epsilon Delta publication, Scalpel, *Winter, 1961 (Vol. 31; pp. 47-51).*

The subjects of this morning's session are representative of the kinds of discussion that have been held by many agencies over the past several years. It is gratifying and significant that Alpha Epsilon Delta is sponsoring this conference as a part of the Annual Meeting of the American Association for the Advancement of Science. All of the professions are becoming very cognizant of the need to study the problem of providing sufficient personnel to meet the demands of the future. This awareness of the problem has been prompted by two major factors—namely, the increased competition from new career areas, and the second, the reduction in the number of applicants which all of the established professions seem to have experienced in the last few years. While this last mentioned decline was actually expected, due to recognized reductions in the birth rate some twenty years ago, this decrease has been watched by admissions officers with a great deal of concern.

It has been interesting, in the case of dentistry, to note that the entire profession seems to be interested in this "manpower" situation and to note that a great many of the profession's agencies have gone on record officially expressing their concern. Moreover, many of these agencies have established special committees and have allocated

large sums of money for a study of the question. This has had the beneficial effect of impressing the profession with its responsibility for seeing to it that there would be an adequate supply of competent personnel to provide dental care to all who seek dental treatment, and also to try to find better ways and means of providing dental care for those who need treatment, even though they have not sought it. The profession realizes that by making the public more dental conscious, it will encourage more persons to seek dental care and that this care must be provided by a group of personnel whose numbers are not keeping pace with the rapidly expanding national population. In spite of this, the profession recognizes not only its responsibility for the dental health of the entire nation, but also a very real responsibility for providing the personnel who can meet this challenge and this need.

At the outset of studying this situation, most of the emphasis seemed to be directed at the educational institutions, for some persons would consider this to be purely an educational problem. The schools accepted their part of the responsibility, but it is interesting to note that it was not long before many other groups found that they had an important role to play in studying this question.

We now find that the public's dental needs of the future are being attacked from several different directions. Research is being accelerated in order to discover improved methods of reducing dental disease and hence, reducing the demands and the needs of the public for dental care. Attention is being given to improving the efficiency of dental practice by those who are expert in the field of practice administration, by the manufacturers of dental instruments, by research workers, by the dental schools, and by the practitioners.

As has been stressed thus far in this paper, at no other time has the attention of so many different groups in dentistry been focused upon one single, major problem—namely, the *needs of the future,* and with each group or agency wisely attacking the crux of the problem from its own point of view and utilizing its own facilities.

In the past two years, nearly all of the various societies and associations that are related to dentistry have taken some action announcing their interest in having programs developed which would attract an increased number of qualified persons for the profession of dentistry and also for an increased number of auxiliary dental personnel, including the dental hygienist, the dental assistant, and the dental laboratory technician. Also, there has been increased ac-

tivity in producing many brochures and pamphlets that describe the opportunities in dentistry. These have been widely circulated to counselors and advisors in the universities and colleges and to dentists who pass them on to patients. An increased amount of attention is also being given to the recruitment of potential dentists from the high school classes; but thus far, these programs have been left largely to the professional men in the community who are called upon by their service organizations and by the schools themselves.

The question is often asked: "How many dentists will be needed in the future?" Many statisticians have ground out figures to provide us with estimates of this need, but the true answer cannot be given by merely juggling numbers, nor can it be given accurately by anyone who is merely handy with a slide-rule. The usual method of calculating the number of dentists who are needed for the future is to estimate the number that will be needed in order to maintain the ratio of dentists to population which we have today, or to improve this ratio if possible. However, if we look at ratios, they become a bit discouraging, for we had a ratio of one dentist to 1,728 persons in 1930; one dentist to 1,865 persons in 1940; one dentist to 2,009 persons in 1950; and today, we have a ratio of one dentist to 2,150 persons. Incidentally, one reads many figures and they do not all agree. It should be mentioned that these were computed by the Association's Bureau of Economic Research and Statistics, and these figures intentionally exclude all teachers and all dentists employed by the federal services. Estimating the new schools that realistically may get under way in the next fifteen years, there is likely to be one dentist to about 2,450 persons by 1975. This means that we shall be short about 5,000 dentists in 1975 to meet the ratios that we have today, or short about 40,000 to recall the same ratios that we had thirty years ago. We could hold our own with our present ratios with one new school each year that would graduate a class of about 75, recognizing that the first new school started this year would not graduate its first class until four years from now. However, an average of one new school a year for the next fifteen years does not appear to be possible, although we are assured that there will be a number of new schools in that time.

This is certainly not to say that we have had losses in the number of dental students or in the number of dental schools, for they have increased; but it does mean that we are not able to keep up with the huge increases in national population. The number of

schools increased from 38 to 39 from 1930 to 1940; then to 42 in 1950; and we now have 47 in 1960, with another to be opened next year, or an increase of 20 per cent in twenty years. The number of graduates went from 1,561 in 1930 to 1,757 in 1940; and in 1960 to 3,253, an increase of 108 per cent in thirty years and an increase of 86 per cent in the last twenty years.

Similarly, the growth in dental hygiene schools has been remarkable, for in less than a ten year period the schools have grown from 16 to 37, with two more definitely scheduled to begin next year; or a gain of 144 per cent in schools and with nearly a 100 per cent gain in the number of graduates. This gain is even more remarkable in view of the fact that just about ten years ago, the curriculum of the dental hygiene program was changed from a one to a two year course. The growth in dental laboratory technician programs has not been as spectacular, but the increase in various kinds of programs for the dental assistants is also increasing rapidly and this increase is expected to continue since the profession has now approved a specific set of standards for such courses.

It is not my intention to present a paper that is pessimistic in tone. Also, I do not want anyone to interpret these figures to mean that there will be any lack of dental service in the future. While the figures certainly show that we cannot possibly have the same number of dentists to serve each group of 10,000 persons as we have had in the past, we must also realize that dentistry in the future is not likely to be practiced in exactly the same way that it has been in the past.

The practice of dentistry seems to be in an evolutionary period. During this period of time, the young student who is selecting a career will certainly choose wisely if he wishes to enter a field in which his professional services will be in great demand, and a field in which he himself will find it possible to make a contribution to both his profession and to the public. Surveys show us that many students select dentistry not only because of the service that they can render in the health field, but also so that they may be self-employed and engaged in a field of work which has high prestige value and one which also enables them to receive a satisfactory income.

The students who select dentistry will also find that growth in this profession will enable them to choose between a career of office practice and many other facets of dentistry. They may enter a field of research, which has the unique advantage of being practically a brand

new area of investigation, and they will find that their interest in research can include either the clinical areas, the related basic sciences, the areas of practice methods or public health, to name just a few.

Many dentists find that they can combine their interests and divide their time between teaching, research, and practice, and still have time to make a contribution to their own local communities.

Dentistry, by historical standards, can be considered an old or ancient art, judging by the time when dental appliances were first constructed. However, as a profession and as a career in which high educational standards have been required, dentistry is a relatively young profession.

Dentistry of the future will not be attractive for the young student who dislikes a routine-like existence or one who abhors complacency. Dentistry of the future will be attractive and satisfying only to those who are interested in a real challenge for a type of work that is continually changing and one that is continuing to offer new opportunities. Dentistry will be attractive to the student who wants to enter a field in which he can be sure that not everything has been done and where he can be sure that he can be a part of the evolution and the building. Dentistry will also be attractive to the student who has aspirations for being a part of a profession that has high ethical standards to give him his major guidance in his self-employed position, as opposed to a position that is solely regimented by legislation and directives.

Dentistry of the future will continue to attract primarily the highly qualified student who is endowed with intelligence, an ability to think for himself, and one who does not shirk hard work and responsibility. The standards in the dental schools continue to be high, even when it means leaving spaces open in the entering class. Last year, 141 places were unfilled in the capacity freshman class of 3,748 in the 47 dental schools because the admissions committees in half of these schools were not quite satisfied with the remaining pool of applicants. This year, the schools expanded their classes by 64, but again, there were unfilled positions. While more students were accepted than last year, there were still 164 places which could not be filled with the quality of students that are now being demanded by many of the schools. The vacancies in the entering classes of 28 schools this year give some cause for concern because there are some well-qualified applicants who do not get into dental school. How-

ever, most of those who are highly qualified and are not admitted create this situation for themselves by applying only to one or two schools which are already receiving a very large number of applications from qualified students.

Less than twenty years ago, dental schools and some of the other professional schools were having a difficult time filling their classes. Following World War II, there was a big influx of applicants that fell to about a two-to-one ratio, but this has now fallen to about 1.5 applicants for each place in all of the dental schools. During these years, the schools have been receiving an excellent group of applicants and therefore, have been able to raise their admissions standards as well as their graduation standards. The schools also have adopted the policy that they want to accept only those students whom they are reasonably sure can meet the demands and the standards of the school. Fifteen years ago, some schools would fail as many as 50 per cent of their first year class. Now, there are schools in which all students meet the standards, but the average academic failure for the first year is only 2 or 3 per cent, which proves that the schools take pride in the quality of their admissions programs. Also, it shows that the counselors should advise only the capable students to consider dentistry as a career. Percentages alone do not show the difference in the mortality or attrition rates in the last fifteen years, for one must realize that the higher standards make it impossible for students to remain in school even though they might have been permitted to remain under the lesser standards that some schools readily admit they had fifteen years ago.

Many agencies are studying ways and means of attracting a greater number of highly qualified students so that all of the dental schools can operate at full capacity and hence, help produce the dentists who are going to be needed in the future. Studies we have made show that the counselors in the universities and colleges are rather ineffective in advising students to study dentistry—just as they have been reported to be ineffective in some of the other fields. It is understandable that only 8 per cent of the dental freshmen indicate that the college predental adviser had anything to do with their seeking dentistry as a career and only 5 per cent indicate that the high school adviser influenced them in this direction. Most dental students feel that the decision was primarily their own, but 48 per cent indicate that their own dentist had a great influence and a third indicate that their parents were effective influences. Data such

as these are causing a number of the agencies in dentistry to try to get career information into the hands of the dentist so that he can talk to his young patients, although of course, work is continuing toward making material on dentistry available to the university and high school counselors, even though we realize that most of them are loaded heavily with other administrative and teaching duties and that they also must try to be experts in a very large number of career areas.

The question is often asked as to what becomes of the seemingly qualified student who is not accepted by a dental school in the year that he takes his aptitude tests. We have made a study of these students, but there are so many factors involved that it is difficult to draw many conclusions. A few students who take the aptitude test never complete their application to any school. Schools reject some applicants who have done well on the aptitude tests because these students have not demonstrated a similar ability in their college courses; and others are rejected on first application but eventually are admitted one or two years later after taking more college work. Out of those applying to dental school, about 10 per cent appeared to be highly qualified and yet, they were not accepted during that year. About 100 of these were given acceptance by at least one dental school, but of those about two-thirds entered another profession and the remaining one-third had to give up a professional career for lack of funds or for some other reason. These figures are interesting too, for the reports also show that one-third of those entering another health profession from this qualified group had been rejected by the dental schools, so there are certainly many factors involved in the selection of qualified students.

In summary and in conclusion, I should like to refer again to the main topic of this paper—namely, dentist needs of the future, and what the future may hold for the dentist. We have described the trend in dental school enrollment, which shows that in spite of increased numbers of schools and expanded enrollments, we shall undoubtedly not be able to retain the same ratio of dentists to population as we have at the present time. Also, we may continue to see this ratio become even more critical. Ratios, in themselves however, may be very misleading. There are many sections of the nation where there are acceptable ratios, for such states as New York, Connecticut, Massachusetts, Oregon and Minnesota have ratios of one dentist to less than 1,400 persons; but on the other hand, South

Carolina has a ratio of one dentist to 4,824. The availability of dental service varies so greatly between the states that a large part of the question is distribution of the dentists.

Many regions are attempting to correct the inequities in their own area by finding ways of recruiting more practicing dentists. This type of program is probably even more important than the recruitment of more dental students or encouraging the expansion of dental schools and the creation of new ones.

In the past ten years, dentists have proven that the average dentist can increase his productivity of service by 29 per cent. Other figures indicate that the combination of increased population and increased demand for dental care just about absorb this increase in efficiency. This means that thus far, the members of the dental profession have been able to adjust their efficiency and their work loads in such a way that they have been able to keep abreast of the demands, even though the ratios of dentist to population have become less favorable and in spite of the greater dental consciousness on the part of the public. A survey by the Association's Bureau of Economic Research and Statistics also shows that today, 40 per cent of the dentists report that they have somewhat more demand for service than they can render; about 45 per cent indicate that there is a good balance between their ability to provide service and the demand for it; and the remaining 15 per cent indicate they could take care of more patients. The career seeking student and the counselors should be interested in these figures, for they predict the demand that the professional man may expect for his services and his talents.

While dental education is somewhat appalled at the challenge of the future for more service, the dental educators are adamant that they will continue to raise standards and that they will continue to graduate an increasingly capable group of students with each graduating class. There is certainly no thought of lowering the standards of the curriculum or the length of the program merely to produce a greater number of graduates. The whole philosophy of the dental profession is that the public must continue to have the services of the most highly qualified professional men that it is possible to produce.

Dental service of the future will be conducted by a greatly expanded personnel, for the dental profession will be able to increase the number graduating from dental hygiene schools, dental laboratory technology schools and dental assisting schools. These aux-

iliary dental personnel will be called upon to render a larger proportion of the dental service, and they must, of course, be supervised by the dentist. The Association is now on record to encourage dental schools to institute research programs designed to study the functions of the dental hygienist and the dental assistant with the thought that the dental team can be made to operate more efficiently, and hence, be able to meet whatever demands are made of it in the years to come. This is another example of the point made earlier in this paper, that dentistry is in the early stages of an evolution during which time the methods of dental care and the allocation of duties for rendering this dental care are about to be changed. This is all the more reason why the dentist himself must have the very best education and experience that it is possible for the dental school to provide. He must be well prepared scholastically and be endowed with a desire to make a real contribution, both to the health of the public and to his own profession, through his highly ethical standards of professional conduct.

Those who enter dentistry today must also be particularly adaptable in order to cope with the changes that will take place in the treatment of dental disease, in the wider utilization of auxiliary dental personnel, and in the various methods of improving both private and group practices. The dentist of the future will need to be research oriented, for even though he himself may not be involved in the conduct of research, he will need to read more widely and attend more refresher courses; and this will mean that he must be prepared to decide for himself as to whether certain newly developed methods are sound and worthy of his attention and use. Also, the dentist of the future must take the time to become active with his own professional colleagues in the activities and programs of organized dentistry. With the changes that are likely to take place in dental practice, he will want to take an active part in formulating the policies of his own Association, both at the local and national levels; and similarly, he will want the assistance of these agencies to assist him in his own growth. Probably never before has it been so important for the professional man to understand all of the objectives of his own profession and for him to seek the methods by which he may be able to be most effective in planning for the future. As he becomes active in his profession, he will gain first-hand knowledge of the accurate image that dentistry should portray to the public as well as to himself. Portraying the proper image of dentistry to

the public, as well as to the prospective dental student, will do much toward finding the solutions to the problems of the future. It will do much in guaranteeing to the public that the dental profession will be able to meet all of the demands that will be made on it. Furthermore, the proper image will do much in guaranteeing to the dental profession that there will continue to be an increasing number of well-qualified applicants for the study of dentistry and the auxiliary dental fields.

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Dental History and the Smithsonian Institution

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This paper was originally presented at the meeting of the American Academy of the History of Dentistry, Miami, November 1, 1957. The author, who was unable to be present, is indebted to Dr. George B. Denton, Chicago, who kindly offered to read it. It has been revised for the present publication.

On June 6, 1786, at the age of 74, died "The most high puissant & most noble Prince, Hugh Percy, Duke & Earle of Northumberland, Earl Percy, Baron Warkworth & Lovaine . . . Lord Lieutenant . . . of Middlesex & Northumberland . . . Vice Admiral . . . of all America, one of the Lords of his Majesty's most Honorable Privy Council, & Knight of the most noble Order of the Garter." Lord Hugh was obviously a man of parts—but what was probably the most important event of his life is not recorded on his tombstone: this was begetting out of wedlock a son who is known to history as James Smithson. In later years Smithson wrote, "on my father's side I am a Northumberland, on my mother's I am related to Kings, but this avails me not. My name shall live in the memory of man when the titles of the Northumberlands and the Percys are extinct and forgotten."* The titles of the Northumberlands and the Percys are by no means forgotten as yet, but the name Smithsonian is known to the ends of the earth.

* Quoted in Paul H. Oehser, *Sons of Science: The Story of the Smithsonian Institution and Its Leaders.* (New York: Schuman, 1949), pp. 2-3.

The Smithsonian Institution is now an extensive complex of scientific research laboratories and collections, art galleries, and museums. It comprehends such diversified activities as those of the Astrophysical Observatory, the Canal Zone Biological Area, the Freer Gallery of Art, the Bureau of American Ethnology, and the United States National Museum. Its scientific publications are read throughout the world, and its collections are seen by millions of people annually.

It had a most unusual beginning. For reasons that have never been fully explained, James Smithson, the son of an English duke, left his substantial fortune "to the United States of America, to found at Washington, under the name of the Smithsonian Institution, an Establishment for the increase & diffusion of knowledge among men." After much debate Congress accepted the bequest and in 1846 established the Smithsonian Institution. It was particularly fortunate that the Board of Regents at an early meeting elected Joseph Henry as the first Secretary and adopted his plan of operation: to increase knowledge by stimulating and supporting original research and to diffuse knowledge through a program of publication. In setting it up, Congress also provided that the nation's collections in natural history be transferred to the Institution. These collections had been accumulating since the Lewis and Clark expedition of 1803, but most of the specimens, for lack of a proper government repository, had gone to the American Philosophical Society in Philadelphia. In 1850 Spencer Fullerton Baird was appointed Assistant Secretary to take charge of the museum, and by 1866 the collections constituted the world's "largest and best series of minerals, fossils, rocks, animals, and plants of the entire continent of North America." In 1878, Henry died in his 81st year, and Baird became Secretary; far more interested in the collections than Henry had ever been, Baird is entitled to stand as the father of the United States National Museum. Baird, moreover, looked upon the Museum not as a collection of curiosities but as a place where a visitor might gain a knowledge of the fauna and flora of the country and also as a center of serious research. Collection, preservation, exhibition and education, and research: these were the functions of the Museum as Baird organized it, and they have continued to be so to the present day.

Baird was a naturalist and primarily interested in the natural historical collections, but the Museum quickly extended to other fields. One of the most important single additions came from the Centen-

nial Exposition in Philadelphia in 1876. At its close many of the exhibits were donated to the Smithsonian and in 1879 a new "temporary" museum building was erected to house this new material. Like so many government temporaries, this one, which has the distinction of being the cheapest building per cubic foot ever erected by the government in Washington, is still standing. Now known as the Arts and Industries building, it contains, along with Lindbergh's *Spirit of St. Louis,* the First Ladies' gowns, and a host of other historic and scientific objects, the collections and exhibits in the health sciences.

It was the collections received from Philadelphia that led in 1881 to the formation in the Department of Anthropology of a Section of Materia Medica headed by Dr. James N. Flint, Assistant Surgeon, U. S. N. At the end of the first year Flint reported that the collection consisted of 3,163 specimens, of which 2,150 were "arranged in cases and open to public inspection." Over the years the collection of materia medica has expanded greatly, so that it now contains approximately 15,000 specimens. But the Division has also extended its interests into other fields related to the health professions. The first curator, Dr. Flint, became particularly interested in developing collections dealing with primitive medicine, magic, and superstition, and in recognition of these enlarged interests the Section's name was changed to Division of Medicine in 1898. In 1912, following the retirement of Dr. Flint, Dr. Charles Whitebread, a pharmacist, became curator. Under his administration the activities of the Division were oriented increasingly toward history, and Dr. Whitebread developed an active program especially in the history of pharmacy, acquiring a significant collection of the equipment used in the manufacture and sale of pharmaceuticals. Among these may be noted especially the Old World Apothecary Shop, deposited in the Smithsonian Institution by the American Pharmaceutical Association in 1945, which comprises the finest collection of European pharmaceutical antiques in this country. It was also during his curatorship, in 1924, that the Division first opened its Public Health Gallery, a series of exhibits devoted to public health education, including dental hygiene. At this time the name of the Division was changed to Division of Medicine and Public Health.

Over the years the Division also acquired a number of historical objects relating to medicine and dentistry. The collection of original

patent office models especially, which was transferred to the Museum in 1926, contained a large number of dental items. Other accessions included a collection of early X-ray tubes, and memorabilia of W. T. G. Morton, Crawford Long, and William Gorgas. The exhibits, however, still related primarily to materia medica, and were, it must be admitted, rather stodgy.

In 1948 Dr. Whitebread retired, and in 1952 Mr. George B. Griffenhagen, also a pharmacist, was appointed in his place. Since then a concerted effort has been made to develop the collections still further, and with increasing emphasis on medicine and dentistry. With limited facilities, Mr. Griffenhagen renovated the exhibits in these fields, enhancing their appearance with color, light, and new labels. The exhibits in dental history which he prepared included a case on dental instruments; one on the manufacture of dentures; one, the gift of the American Dental Association, a group of prints showing some dentists and their patients; and one which displays the dental office equipment of G. V. Black. He also created other exhibits showing historical developments in various branches of medicine and pharmacy. In addition there is also a new Hall of Health, which opened November 2, 1957, exhibiting for the layman modern anatomical and physiological knowledge of the body in health. This Hall of course includes an exhibit on teeth, entirely distinct from our exhibit in the history of dentistry.

From this exposition you may understand how the Division of Medical Sciences, as it is now called, has grown from a collection of materia medica to a museum section devoted in large part to the history of the health sciences and professions. At the same time you will also no doubt understand why the pharmacy collection was relatively strong and the dentistry section relatively weak. This situation has been remedied in recent years with the active aid of the American Academy of the History of Dentistry. Much of the stimulus for this activity has come from the opportunity to portray the history of dentistry to the American public which our current program of expansion and renovation offers.

Congress has provided the money for a new $36,000,000 Museum of History and Technology, which is now under construction on the Mall in Washington. This will allow for much needed expansion in both the exhibit and storage space in the medical-historical fields. At the same time it is providing a great opportunity to recreate the

exhibits. In order to help us do the best possible job, the American Academy of the History of Dentistry set up a special committee under the chairmanship of Dr. C. Willard Camalier. This committee has rendered valuable advice on our exhibits, for which we are grateful indeed. It has also been instrumental in helping us to obtain a number of valuable additions to the collections, notably a substantial proportion of the dental-historical material formerly at the University of Pennsylvania. This donation and others, from individuals, institutions, and companies, have provided the chief basis for three new exhibits on the history of dentistry which have just been completed. These will be moved to the new Museum when it is ready to open, there to join other dental exhibits now in the planning state.

As Curator, I look forward to the continued help of the American Academy of the History of Dentistry and ask you to give them your support. There are still gaps in our collection of historical dental instruments. The exhibits of the historical development of the profession are always subject to future improvement. We also need additional instruments for our reference collection, so that members of this Academy and others interested in the history of dentistry will be able to study here various stages of the development of dental instruments. I would therefore like to ask those of you who may have old instruments of historic value, whether your collection is large or small, to think of the Smithsonian Institution should you ever wish to dispose of them. And I also ask you, if you know of other dentists, or perhaps schools of dentistry or other institutions related to dentistry, who have old equipment of historical value, to think of the Smithsonian. This does not mean that I want you all to pack up everything you cannot use any more and send it off to me. There are limitations on what we can accept, if only because our storage space is not large enough to allow extensive duplication of material we may already have. Rather, please write, telling me what you have, and I will be only too happy to let you know whether or not we would be able to add it to our collections. Finally, I should like to remind you that our collections are part of the *National* Museum, which even now is visited annually by nearly two million people, and that the new Museum of History and Technology will be the largest museum of the history of science in the country. We want our exhibits to be educational and historically accurate, and we want them

to show the significant steps in the development of dentistry. With your help they can do so. This is a unique opportunity not only for us but also for you to explain to the American people something of the history of dentistry and to present to them an exhibit worthy of your profession.

Smithsonian Institution
United States National Museum
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Consideration of the Possible Etiological Role of Viruses in Cancer

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Following graduation he served one year as in instructor at the University of Iowa leaving to conduct research at The Rockefeller Institute from 1925 to 1949. He was associate director at the Merck Institute, 1945 to 1952. He is now at The Rockefeller Institute.

Cancer is a biological phenomenon occurring in many and perhaps all species of animals and it may be assumed that mammalian, and probably most avian, tumors are broadly comparable to those in man. The pattern of tumors and the relative incidence of certain types of cancer, however, vary with species. Thus, though relatively common in man, mammary cancer is rare in cattle; prostatic and uterine cancer are rare in dogs; and gastric and lung cancer are rare in all species except man. Lymphosarcoma and leukemias, on the other hand, are common to most species of animals including man. It seems clear that man is probably just as special a case as any of the species of domestic animals in the pattern of incidence of his common tumors.

Despite the similarity of cancer in animals and man, the matter of directly determining its cause has been limited to a study of those tumors occurring in birds and animals aside from man. The reason for this is that, by and large, each cancer is specific for the host in which it naturally occurs and can be transmitted or transplanted only to other members of the same species. In the cases of tumors of rab-

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bits, mice or chickens, for instance, this restriction does not limit the studies of the cancer investigator and direct tests for the presence of a causative agent can be made by the inoculation of tumor material into normal individuals of the same species. In cancer in man, however, this direct approach to determine a causative agent cannot be applied because of the risk to the life and well being of the human beings upon whom attempts to transmit cancer experimentally would have to be made. Determination of the nature of the causative agents or factors of human cancer must therefore be made by more indirect approaches and by applying the findings with animal cancer to man where they seem to have a possible bearing. It is because of the greater facility with which animal tumors can be studied that our knowledge concerning the possible role of viruses in cancer is largely limited to findings with animal and bird tumors.

Before going further I shall define several terms that will be used extensively in this discussion. The term "tumor" will be used in referring to any proliferative new growth, either malignant or benign. The term "cancer" will be used in its broader sense to refer to malignant neoplasms of any cell type. The term "virus" will be used in its ordinary sense to indicate an ultramicroscopic, extrinsic infectious agent. Since I want to emphasize proven etiological relationships, I shall limit the examples used in this discussion to tumors of animals exclusive of man.

Historically, the view that viruses may be important causes of certain types of malignant disease goes a fair way back into medical history. In 1896, Sanarelli observed an outbreak of illness among the rabbits in his laboratory in Uruguay. The disease was characterized by the development of multiple tumors over the skin of the body and about the eyelids and nose. It was eventually named infectious or rabbit myxomatosis. Affected rabbits died in from 8 to 14 days and on microscopical section the tumors appeared to be myxosarcomas. Two years later Sanarelli[1] proved that a filterable virus caused this disease. Actually its rapid and regularly fatal course labeled it more as an acute infection than as a neoplastic process, even though the tumors considered individually did give the impression of being cancerous. Infectious myxomatosis is not considered today as an example of a virus-induced tumor, but it did serve the useful purpose of indicating, for the first time, that a virus could cause a proliferative process resembling a tumor. In 1908, Ellerman and Bang,[2] working in Denmark, demonstrated a virus as the

cause of leukemia in chickens. This observation did not attract the attention it probably deserved from the standpoint of cancer research because of the fact that at the time leukemia was not generally thought of as a cancerous process. It remained for Rous in 1911[3] to demonstrate the first virus-caused cancer. This was a sarcoma of chickens. The agent responsible for inducing these growths had all of the characteristics of a filterable virus and the growths themselves were true malignant tumors which metastasized and eventually killed their hosts. This discovery by Rous is generally designated as the event which introduced the era of viral tumors. Unfortunately the Rous discovery stirred terrific controversy among oncologists, and the controversy continues to some extent even today. While no one could deny that the fowl sarcoma was a true neoplasm, some contended that because it was a tumor of a bird, it was in quite another category than would be a mammalian tumor and hence was meaningless from the standpoint of cancer. Also it was argued that the very fact that an extrinsic causative agent could be demonstrated served as indication that the growths produced in chickens could not be true tumors and that, even though they looked and acted like cancers, they had to be considered as something different and apart from them. Dr. Rous has told me of the visit of a distinguished British oncologist to his laboratory in the early days. This man, when shown a fine example of the chicken tumor, is supposed to have said, "But my dear fellow, this cannot be cancer because you know its cause."

Despite the objections of some to the interpretation of Rous' discovery, it had a very profound effect and set investigators to looking for other examples of virus-caused new growths in all sorts of animals. The list of those found has now grown to contain about 20 different tumors in nine species of animals. The list of these tumors is given in Table 1.

While a number of the animal tumors included in the table are benign growths and do not progress to kill their hosts, some of them are malignant or have malignant potentialities. The rabbit papilloma,[4] for instance, which starts out as an entirely benign growth, eventually becomes malignant and in most cases ends up as a frank cancer[5, 6] sometimes causing the death of the animal. The mouse mammary cancer[7] and the frog kidney cancer[8] are frankly malignant from the outset and, of course, mouse leukemia, both that of Gross[9] and that of Friend,[10] are malignant killing processes.

TABLE 1

1898	Rabbit myxomatosis (Sanarelli)
1908	Fowl leukemia (Ellerman & Bang)
1911	Fowl sarcoma (Rous)
1920	Bovine papilloma (Magalhaes)
1932	Canine oral papilloma (DeMonbreun & Goodpasture)
1932	Rabbit fibroma (Shope)
1933	Rabbit papilloma (Shope)
1933	Fowl lymphomatosis (Furth)
1934	Canine lymphosarcoma (DeMonbreun & Goodpasture)
1936	Rabbit oral papilloma (Parsons & Kidd)
1936	Mouse mammary carcinoma (Bittner)
1938	Frog kidney carcinoma (Lucke)
1946	Fowl lymphoid tumors (Burmester et al.)
1951	Equine cutaneous papilloma (Cook & Olson)
1951	Mouse leukemia (Gross)
1953	Mouse parotid tumor (Gross)
1953	Squirrel fibroma (Kilham, Herman & Fisher)
1955	Deer fibroma (Shope, Mangold, MacNamara & Dumbell)
1957	Mouse leukemia (Friend)
1957	Polyoma (Stewart & Eddy)

It is the demonstrated existence of the group of viral animal and bird tumors I have just outlined which is responsible for the growing belief during the past few years that viruses may also play a causative role in at least some human cancers. A question which has been raised in the minds of many is whether there is any logical or philosophical reason for considering man a species apart from other animals as regards the causation of his tumors. If viruses can serve as the cause of cancer in chickens, rabbits, mice, and frogs, for instance, there seems to be no reason for believing that they might not act similarly in man. After all, a number of the proven viral tumors of animals imitate the behavior of human tumors of unknown etiology in their cellular make-up, in their patterns of metastasis, in the manner in which they regress or kill, and some of them, at least, in the comparative ages at which they tend to appear. We have reached the point, it would seem, where it is somewhat unrealistic to contend that human cells are something apart from the cells of other species of animals in their capacity to react to cancer-causing viruses. Man is no stranger to the filterable viruses, and these small infectious agents are the cause of many of his both serious and minor illnesses just as they are the cause of many of the diseases suffered by other animals and birds. Cancer as we know it today is of two types as regards

causation; it is either cancer of "known etiology" and has a virus as its cause, or it is cancer of "unknown etiology." It would be strange indeed if an etiological line of distinction should exist between tumors of animals, many of which fall into the "known etiology" group, and those of man, all of which are at the moment in the "unknown etiology" group.

It has been intimated earlier in this discussion that evidence for a viral causation of animal cancer is relatively easy to obtain merely by the administration of filtrates of animal or bird tumors to hosts of the same species. With certain of the animal tumors, however, various indirect procedures have had to be resorted to in order to demonstrate their viral causation. The mouse mammary cancer, for instance, is caused by a virus present in the milk of certain strains of mice.[7] The offspring of such strains of mice, or other baby mice foster-nursed by females of this line, acquire virus from the mouse mother's milk by nursing. However, they do not promptly come down with breast cancer—instead they remain apparently completely normal until they have reached middle age before they show outward manifestations of cancer. Thus, in this situation, the development of cancer is dependent not only upon infection with a virus but also upon the coincidental presence of some age-associated factor or factors. There is good evidence that hormonal changes with age as well as genetic features constitute the factors which determine the time of development of breast cancer by mice infected with the specific virus.[11, 12] The virus acquired in the milk is seemingly not directly carcinogenic since for a year or longer it exists as a harmless latent infection within the infected mouse. Only with advancing age does some physiological or hormonal change occur which either induces the latent virus to become carcinogenic or the host sensitive to its carcinogenic effect. Here then in the case of mammary cancer of mice, one has a tumor that originally had all of the earmarks of being a spontaneous tumor of unknown etiology, although in reality it was eventually proven to have a virus as its inciting cause.

In like manner, the mouse leukemia described by Gross is transmitted from mother to offspring either by way of the egg or very soon after birth and it too, like the mouse mammary cancer, does not become evident until the affected mouse reaches a certain age and probably a certain specific hormonal situation.[13, 14] Thus in these two highly fatal neoplastic diseases of mice, the causation of

the actual cancer is a complicated process in which the virus plays only part of the role. Because of the complicated nature of their causation, both the mouse mammary cancer and mouse leukemia were worked with for years as malignancies of unknown etiology. It required investigators with imagination, originality, and astuteness to unravel finally the causes of these two diseases and to demonstrate in each the primary role of a filterable virus. Literally hundreds of thousands of mice were used in the work and the wonder is that the correct answer was finally arrived at.

There are certain animal tumors that we know to be caused by viruses in which the virus cannot be detected by any of the usual direct techniques that can be applied. The papilloma in domestic rabbits is an example of such a tumor. In papillomas of the wild cottontail rabbit, in which papillomatosis occurs as a natural disease, virus infective for either cottontail or domestic rabbits can be quite regularly demonstrated.[4] Such virus applied to the scarified skin of either type rabbit results in the appearance of beginning growths along the scarification lines after incubation periods ranging from 10 days to 3 weeks or longer. These growths gradually increase in size, eventually becoming 2 to 3 cm. in height and diameter. They are ordinarily fleshy at their bases and keratinized above the fleshy base. In some rabbits, after persistence for 6 to 9 months or longer, certain of the papillomas undergo malignant change and become cancers.[5, 15, 16] These metastasize and may eventually kill their hosts. An interesting feature of these growths in domestic rabbits, both the papillomas and the cancers, is that virus cannot be detected in them by any direct techniques that can be applied.[4, 17] Such growths ground up and suspended in saline in the usual manner of preparing virus suspensions yield preparations that are completely noninfectious for other rabbits to which they are administered. So far as one can tell by direct infectivity tests, the tumors contain no virus and are completely innocuous. However, these are tumors that were originally initiated by infection with known papilloma virus from the wild cottontail rabbit and in cottontails this virus does induce papillomas from which active virus can be extracted. It would thus appear that although virus of wild rabbit origin can infect domestic rabbits and cause in them papillomas that progress to cancer, the virus, in a form that we can recognize by infectivity tests, early disappears from them. However, it can be determined indirectly by using wild rabbit virus and various immunological tests [18, 19, 20]

that virus is still present in the growths though no longer in a form capable of infecting other rabbits, either wild or domestic ones. It is present there in what has been termed a "masked" form.[19] No one yet knows for certain the mechanism involved in the masking of rabbit papilloma virus. However, the virus in its masked state is not capable of infecting new hosts though it evidently maintains its ability to exert an antigenic effect upon the host in which it resides.

We thus, in the case of the domestic rabbit papilloma and carcinoma, have a situation in which tumors known to be of viral origin are to all outward appearances tumors of unknown etiology. By this I mean that if a domestic rabbit with either the benign papilloma or a malignant cancer arising from a papilloma were given to an investigator for study, he would have no way of determining that they were virus tumors. Deprived of a history as to the method by which the tumors had been initiated and forced to use only currently standard techniques for virus detection, he would have to conclude that these tumors in the domestic rabbits were of unknown etiology and I doubt that he would even suspect them of containing a virus in masked form.

My reason for spending this much time in discussing the Bittner mouse mammary cancer, the Gross mouse leukemia, and the papilloma and carcinoma in domestic rabbits is to indicate to you that the role of viruses even in some animal cancers is a sly and elusive one. These three cancer viruses have been extremely coy in concealing their natures and identities from the prying investigations of tumor workers. Two of them, the mammary cancer agent and the leukemia agent, have for long protected themselves from detection by the length of time they lie innocently latent in a host before inducing manifest cancer. Infecting their hosts at a very young age and not causing visible cancer until, in some cases, as long as a year or more later, the relationship between cause (virus infection) and effect (cancer) was not readily recognized. The third virus, that of the domestic rabbit papilloma, has protected itself even more thoroughly from detection by assuming a masked form in which its presence in a tumor is rendered completely occult so far as any direct test for it is concerned. I shall refer to these three viruses again when I consider the difficulties that may be anticipated in any later efforts to establish a viral etiology in human cancer.

Certain chemical substances such as methylcholanthrene, benzpyrene, tars, and some other substances are known to be carcinogenic

and to produce cancer in animals and probably in man when administered by appropriate techniques and for adequate periods of time. How the action of these chemical carcinogens in producing malignancy fits in with the view that viruses are etiologically essential in carcinogenesis is a little difficult to rationalize. However, there is evidence from animal work that certain of these chemical carcinogens enhance the malignant potentialities of some of the tumor viruses. Thus Ahlström and Andrewes[21] found that rabbits that had received a previous injection of tar reacted to fibroma virus in a most unusual manner. When the virus was injected into the skin, it produced tumors at each site of inoculation which, instead of regressing, as they do in the case of normal rabbits, persisted as malignant-appearing new growths for unusually long periods of time. When the virus was given into the blood stream of rabbits that had received tar, it produced a generalized and widespread growth of tumors which sometimes killed the animals. Normally the fibroma virus is completely without any grossly observable effect when given into the blood stream.[22] The administration of tar to a rabbit thus converts it from an animal which reacts not at all to fibroma virus given by way of the blood stream to one in which the virus induces a spreading, multiple, and sometimes fatal tumor disease.

Tar also alters the reactivity of rabbits to the papilloma virus. Thus Rous and Kidd[6, 23] observed that when rabbits, to whose ears tar had been applied, were injected into the blood stream with papilloma virus, cancers appeared promptly over the areas of skin to which the tar had been applied. It should be pointed out that normal rabbits injected with papilloma virus by way of the blood stream usually develop no tumors of any sort,[4] either benign or malignant, and the tar, as applied in the experiments of Rous and Kidd, was not of itself carcinogenic. In these experiments, therefore, it was shown that animals receiving a combination of tar and the papilloma virus developed malignant cancer forthwith. Ordinarily papilloma virus applied to the skin of rabbits induces, initially at least, benign papillomas, and the malignant change to cancer does not take place until some 8 to 12 months later[4, 5] It is apparent, therefore, from the experiments of both Ahlström and Andrewes, and Rous and Kidd, that the presence of tar in an animal materially alters the animal's reactivity to at least two tumor viruses and that this alteration is in the direction of enhancing the malignant properties of the tumors the viruses cause.

Duran-Reynals has similarly demonstrated the effects of chemical substances in altering the reactivity of animals to viruses. Duran-Reynals used viruses that are not ordinarily thought of as tumor-producing agents. In one set of experiments, he observed that methylcholanthrene applied to the skin of chickens that had recovered from fowl pox virus infection caused first the recurrence of the fowl pox lesions and later the development of frank cancers on the treated areas of skin.[24] In like manner, in another set of experiments, he observed that mice recovered from infection with vaccinia virus later developed cancers at the sites of the vaccinia scars when the animals were given cortisone and painted with methylcholanthrene.[25] These experiments, carried out with two different viruses, indicate that, under certain conditions sometimes involving hormonal stimulation, latent viruses can be activated by a chemical substance and that cancer can result seemingly from the combined action of the chemical substance and the virus on the cells of the host.[26] It is noteworthy, in the case of Duran-Reynals' experiments, that neither the fowl pox nor the vaccinia virus are ordinarily considered to be cancer-producing agents.

Stanley has speculated[27] that while chemical carcinogens and physical agents, such as ultraviolet and x-irradiation, supposedly cause cancer by a direct effect upon the genetic apparatus of the cell, it might be just as reasonable to assume that they act instead on viruses latently present in cells and that these activated viruses then serve as the cancer-producing entities. This speculation is not out of line with Duran-Reynals' findings. Also it furnishes a rationalization which brings into accord the seemingly divergent views concerning the possible roles of chemical and physical agents and viruses in carcinogenesis.

This concludes my description and discussion of a group of animal tumors for which there exists good experimental evidence that filterable viruses play etiological roles. What good is this mass of information going to be to us in determining whether or not human cancer may also be of viral origin? In studying animal tumors, as I have indicated, proof of a virus cause is relatively simply arrived at and usually entails merely the injection of animals of the same species with cell-free material from the tumor. Since this procedure cannot be followed in the case of human cancer, experimental oncologists are at once deprived of the use of the very tool which was successfully exploited in elucidating the role of viruses in animal cancer. And

even if human volunteers could be used in cancer research to determine the etiology of human malignancies, one wonders whether much might be achieved if it should turn out that the causative agents were like those causing mouse mammary cancer or mouse leukemia, for instance, where the virus must be administered soon after birth and does not exert its carcinogenic effect until middle age. This would mean, translating mouse age to human age, that an investigator would have to wait from 35 to 50 years to learn whether his experiment was successful or not. I believe that the necessity for such a long waiting period would discourage most workers in the cancer research field if human volunteers were to be the only method of determining whether or not viruses played a causative role in human cancer.

And even a more discouraging thought in connection with identifying a virus as the cause of human cancer is the possibility that it might be in a masked form as is the papilloma virus in the tumors it causes in domestic rabbits. If this were to prove to be the case, I doubt that the cause of human cancer would ever be determined—at least not with the tools for viral detection that we now possess.

But there are leads furnished by our knowledge of viral animal cancer that may prove helpful in determining whether or not viruses also play a role in human cancer. These are of an indirect character and are dependent upon the use of animal viral cancers as model systems through which information possibly applicable to human cancer may be obtained. At the moment the information to be derived from the study of animal cancers as model systems is limited and much more work will be required to make them of maximum value for use in the study of cancer in man. Some progress has, however, already been made and I should like briefly to discuss this with you next.

One of the new tools by which tumor investigators can recognize viruses within cancer cells is the electron microscope. In a number of the known viral animal tumors, tiny bodies of distinctive appearance have been seen.[28-36] By appropriate biological tests in susceptible animals, these bodies have been identified as cancer virus particles.

The identification of virus bodies of this type in known viral tumors has led investigators to search assiduously for similar characteristic bodies in human tumors. In a number of instances, particles visible by means of the electron microscope have been found in

human cancer material.[29, 32, 33, 37-41] However, proof that these bodies actually represent the causative agents of the cancers in which they are found is completely lacking due to the fact that biological tests of their cancer-producing activities cannot be conducted. These bodies have, therefore, been referred to as "virus-like" and further work will be required to tell us whether or not they actually play any role in the causation of the cancers in which they are observed.

Numerous attempts have been made to establish hypothetical human cancer viruses in experimental animals or in tissue culture but in no case has success been achieved. In like manner, serological tests or work involving the use of immune responses, has not succeeded in establishing that a causative virus is present in any human cancer. Thus, aside from the information supplied by the electron microscope that "virus-like" bodies may be present in human cancer cells, there is yet no concrete evidence that viruses play a role in human cancer as they are known to do in certain animal cancers. It has, of course, been established for years that viruses cause two benign tumors of man; one of these is the common wart[42] and the other is a tumor-like condition known as molluscum contagiosum.[43] "Virus-like" bodies, visible by means of the electron microscope, have been observed in both of these tumors.[44]

There are other approaches, suggested from work with viral animal tumors, that have not yet been fully exploited in work with human cancer. Among the leads suggested by model systems with viral animal tumors are the use of human cells from various tissues grown in tissue culture. It seems possible that, if an exhaustive enough trial of human cells of enough different types is made, some tangible evidence of causative viruses in human malignancies may be revealed. Another possible approach to the problem of determining the importance of viruses in human cancer is through the use of Toolan's hamster pouch method of maintaining human tissue[45] and the attempted infection of these normal tissue implants with filtered human cancer material. Still another approach not yet tried so far as I am aware is the use of fluorescent antibody prepared from the serum of advanced cancer patients to test for the presence of virus within the cancers of such patients, using the procedure developed by Noyes and Mellors,[46] to detect the distribution of papilloma virus in the growths of wild cottontail rabbits. A very promising possible approach is suggested by Greene's experiments of several years ago.[47, 48] In these he found that various types of embryonic

skin exposed to wild rabbit papilloma virus developed tumors of characteristic papilloma morphology when implanted into the brains of rabbits or other experimental animals. It requires little imagination to grasp the tremendous possibilities presented by this technique for demonstrating the presence of viruses in human cancers should they exist there in an infective, non-masked form. Greene has reported[49] exploiting the method on a limited scale with human tumors. He succeeded in demonstrating the presence of viruses only in molluscum contagiosum and the Straus-Bunting wart, two tumors already known to be of viral etiology. It is apparent from Greene's findings, preliminary though they are, that his method deserves thorough and extensive study as a means of demonstrating the possible presence of viruses in human cancer.

These are just a few of the approaches suggested by model systems of known animal viral tumors that might be used in demonstrating the presence of causative viruses in human cancer without recourse to the human subject as a test animal. Doubtless many other approaches will be devised in the future as new techniques are developed and new ideas evolved. The matter of proving the presence of causative viruses in human cancer, should they exist, may not therefore be as futile a task as it seems at first sight.

A possible limiting feature to the application of the approaches suggested above has been touched upon earlier. If some of the hypothetical human cancer viruses should prove to be masked as is the papilloma virus in domestic rabbits, or hormone or age dependent as are the mammary cancer and the leukemia viruses of mice, then the approaches suggested above would probably not apply to them and new ones would have to be devised.

Many of you will no doubt wonder why it makes any difference at all whether human malignancies are or are not caused by viruses and may consider the discussion that I have indulged in rather academic. Actually it is not academic at all because the proven demonstration that viruses are etiologically essential in human cancer would quite alter the flavor of work designed to control cancer. It would open the tumor field to that vast array of procedures that we now use in successfully controlling our infectious diseases and would enable us to take advantage of such things as chemotherapy, antibiotics, vaccines, and antibodies against an extrinsic infectious agent, instead of having to deal with the more hopeless situation of the autonomous growth of cells. No one, of course, at this point can say whether or

not any of these procedures would pay dividends, but it would at least be refreshing to have a new biological approach to cancer prophylaxis and treatment that might have some prospect for success.

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Unsolved Problems of Dental Care

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The opportunities that lie before the student of dental care are as endless as they are in any other activity which deals with illness. This statement is all the more true because dentistry has moved forward with great strides in the last few decades. The dentist who is satisfied with the status quo will slip down the hill which he has only just climbed, and his position will be more noticeable in view of the momentum with which he has been moving forward. Dentistry, having occupied a position far to the rear, has been catching up but, while solving problems successfully along the way, it still has a distance to go on the road to the millenium. So too has the practice of medicine and surgery, with which dentistry is now inseparably joined. My part in this symposuim* under the general heading of "The Opportunities of Dentistry in Hospitals," is a discussion of general principles; these are readily outlined by reference to a logical as well as historical examination of the possibilities which might be expressed as unsolved problems of dental care.

Here are some leads which might help the planner as he moves forward to better dentistry in hospitals; they are found under the various classifications of hospital service and can be invoked in the consideration of specific problems under the following headings. Hospitals are concerned with (1) Construction and reconstruction; (2) Equipment (movable and stationary; heavy and light); (3) Organization; and (4) Administration.

Under *construction* we have the unsolved problem of space allocation for the best dental service. We have "sold" the idea of dental care in hospitals in comparatively few instances, as one can see by looking at the record. There has accumulated much literature on this subject in recent years but, while there is frequent agreement "in principle" as a result, what do we find in actual practice? Has the dentist reached the point where his voice will be equally respected at the planning table with that of his colleagues on the medical staff when such matters are being considered? And, if a mistake was

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made in the beginning, when the creative opportunity was at its best, what can be done by reconstruction and remodeling of existing structure in order to get a better balance of medical-dental service? If the dawn came only after the hospital was built, what principles should guide us in the matter of rearrangement to bring matters up to date? For lack of time and space I must leave details such as location, orientation, absolute and relative space, space relationships, accessibility, and lighting, to your imagination. You will get the answer to these questions if you will follow the general principles of balanced construction and reconstruction for all branches of diagnostic and therapeutic service. Whether you will be succesful in applying them to your particular situation is another matter and that is why I consider this one of the remaining unsolved problems.

Let us consider *equipment.* In this respect you have done well, but can any dentist consider this problem solved while the mechanical, electrical, and chemical laboratories are still producing new and better inventions? What about the pharmacological laboratories, and the special laboratories which improve our prosthetic devices? Are we satisfied with the materials at hand for dental remodeling or reconstruction? The matter of expense will never disappear from the consideration of such items in the budget as equipment, but the obligation to solve this problem cannot be reduced by pessimism so long as there remains room for improvement.

Concerning *organization,* we are in a somewhat happier position. Having borrowed a leaf from the staff physician's book we try to follow his example, stratifying our dental staff correspondingly and, I hope, with equal dignity. The same holds for attendance and for discipline, for rewards and for punishments. Perhaps because the dentist earns his living by "piece-work," but for whatever reason, we are seeing a wholesome tendency to establish dental service on a full-time, or at least part-time, basis. Since this is all to the good so far as the patient is concerned, the extent of its spread is still among the unsolved problems of organization. We have not yet solved the problem of centralization or decentralization of dental effort—such things as library, laboratory and the like—so this too must remain on our minds for the time being, whether or not you look upon dentistry as a specialty of medicine. The central library and the laboratory have long ago solved this problem.

Under organization, we must also consider the position of the dental hygienist in the group; the place of the dental surgeon in the

general operating rooms of the hospital; the relation of the dental surgeon to the division, or department, of general (or special) surgery; and the place of the dentist in the councils of the hospital as, for example, in the Medical Board.*

In the matter of *administration* we find the least of our unsolved problems, though unsolved it remains. To appoint or not to appoint, to promote or not to promote, to limit or not to limit the term of appointment, to obtain equal rights in budgeting, recording, reporting, and obtaining recognition commensurate with the service—these require perfecting, if dentistry is to emerge completely from its cocoon and take its place among all other specialties in the hospital. Dentistry too must overcome such obstacles as negativism, inertia, vested interests, loyalties, shortages of all things and the like. There are many leads in the policies, rules and regulations, and attitudes which prevail for your colleagues on the medical staff as well as for you. Administratively you must not ask for less, and the more you get the sooner will the hospital confer dignity as well as authority and responsibility on you. Far more than for construction, and perhaps for equipment and organization, you will be judged by your administrative talents as well as by your clinical talents. I find it difficult to deny myself the pleasure of recording, at this point, my personal good fortune in dealing with the dental leadership, as well as the rank and file, of those hospitals with which I have been associated over the years.

We can also pursue our classification of unsolved dental problems by considering the aims of hospital service generally. These are prevention, diagnosis, cure, rehabilitation, teaching, and research. Prevention in dentistry as a day-to-day necessity is proved by all of the other aims here enumerated. Thus far, in the incomplete status of the effort, there is no evidence to show that any physician or dentist has been put out of business, so to speak, by any advance in preventive medicine or dentistry; the effort remains noble. The problem of prevention is far from being solved, though great strides in this direction already have been made and are continuing.

In diagnosis we stand high in dentistry, if only because we deal here with more tangible and more obvious pathologic phenomena. However, we still depend too much on the patient for the stimulus to diagnose, treat, and investigate. As a psychosomatic unit, the pa-

* It is interesting to record that Dr. David Tanchester, chief of the Dental Department, Montefiore Hospital, New York City, is now president of its Medical Board.

tient is still the most reliable diagnostic tool, and particularly so in cases where the lesion is concealed. The dental X-ray has been under attack of late, or at least under scrutiny, for possible pervasiveness, and this is a warning to us that a problem which we considered completely solved may, after all, be in need of further work in the physics laboratory. Under diagnosis one cannot omit such items as medical-dental relationships, and all those team-work relationships which contribute to, and support, a diagnosis. There is no department of the hospital which does not have something to offer at times in this respect, and the department of nutrition is not the least among them.

What I say here about diagnosis is equally true of therapy. The element of applied pain in the course of therapy is still in the minds of patients, if not in the minds of those who serve them. How to deal with, in order to prevent, deformities of the jaw by the application of conservative preventive and therapeutic methods still remains a problem to be solved. If we are in a position to choose between the lesser of evils, how much more can we minimize it? Pharmacology still has much to offer us in the way of prevention and treatment. We still have to come to terms with the so-called head-and-neck and plastic surgeons in order to give the best to our dental patients. In the matter of rehabilitation we have advanced far, and will undoubtedly add to our laurels in this area, but when we speak of unsolved problems let us not forget that our services are still limited to those who can afford to pay for them. The others are an unsolved problem to us.

Teaching, and particularly research, can never be finite while problems under any heading remain. But here too we can take a leaf from the scientist's book and do all we can to share knowledge and improve on it. The problem is to place a certain emphasis by qualified men on those by-products of dental care which make for steady progress and scientific continuity. Classrooms and laboratories are involved in such activities, and where do we find enough of them with talented staff available? When we speak of unsolved problems of any kind we naturally look to the laboratories, and to the pioneering spirits gifted with creative power who work in them, for salvation. Herein lies another problem—where to find such men and, finding them, how to obtain the wherewithal to support their work.

But this does not exhaust the list of opportunities. The unsolved problem of dental economics in relation to hospital economics, and

to medical economics generally, is ever before us and it is particularly urgent in view of the "non-urgent" character of the work of the dentist in comparison with other hospital work. Prepaid health insurance which will include dental insurance remains very much a problem. Volunteer service and its limitations still handicap our efforts somewhat, valuable though it seems to be. We do not have enough dentists to perform the full job required of us. But recent dental history leaves plenty of room for optimism. Dentistry has performed well in its search, its eternal search, for progress. The increased span of modern life will undoubtedly add to the requirements of a more difficult geriatric type of dental problem and, though we shall lean heavily on our preventive teachings, we shall continue to seek improved ways of bringing relief to those in whom prevention has failed. Public education is not the least of our partially-solved problems but we have reason to look forward here too for better methods and better results.

Formidable as these many problems seem at times, when viewed in the mass, we will somehow manage to overcome them if we can win enough time, patience, money, facilities, energy, talent, and creativeness for our researches. The momentum of recent dental effort will help because it is as convincing as it has been successful, and it augurs well for the future. So long as we have an awareness of the unsolved, the incomplete, and the unsatisfactory, we will do our duty in helping to make this dental world a better place to live in.

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The American Association for the Advancement of Science

Proceedings of Section Nd (Dentistry)

REIDAR F. SOGNNAES, D.M.D.

In keeping with the general program scheme of recent years, Section Nd again chose to organize a multi-disciplinary symposium on a topic basic to oral biology, namely *Fundamentals of Keratinization.*

The two session symposium held in the Biltmore Hotel, New York City, December 30, 1960, was organized under the direction of Dr. Earl O. Butcher, New York University School of Dentistry, and with co-sponsorship by Section N (Medicine); the International Association for Dental Research, North American Division; the American Dental Association; and the American College of Dentists. This was the 127th meeting of the AAAS.

During the morning session (moderated by Dr. Butcher, Program Chairman, Section Nd) keratinization was discussed with respect to (1) sequential mechanisms involved (A. G. Matoltsy, University of Miami); (2) distribution of SH and SS reactions in various vertebrate keratins (R. J. Barrnett, Yale University, R. F. Sognnaes, UCLA, and G. Pettengill, Harvard); (3) tissue culture keratinization (G. Szabo, Harvard); (4) ultrastructure of keratinizing tissues (J. A. Rhodin and E. J. Reith, N. Y. University); and (5) two presentations on the effects of Vitamin A on keratinizing tissues (H. A. Bern and D. J. Lawrence, University of California, Berkeley; and J. P. Parnell and B. Sherman, State University of N. Y.).

The afternoon session (moderated by Dr. Sognnaes) began with (1) a discussion of physical properties of cornified epithelium (I. H. Blank, Mass. Gen. Hosp.) and dealt with structural and chemical aspects of oral epithelial derivatives, namely (2) keratinization of the oral mucosa (J. Meyer and H. Madak, University of Illinois); (3) keratin formation in dental cysts (J. J. Pindborg, Royal Dental

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It has been the custom that abbreviated proceedings of the annual meeting of the AAAS be published in the JOURNAL. Dr. Sognnaes, secretary of Section Nd and Dean of UCLA School of Dentistry, compiled the report.

College, Copenhagen); (4) environmental and genetic effects on oral cornification (C. J. Witkof, Jr., Natl. Inst. Dent. Res., Bethesda, Md.); (5) ultra-structural demonstration of the extracellular deposition of enamel (M. L. Watson, University of Rochester); and (6) the microchemical constituents of the enamel protein (K. A. Piez, Natl. Inst. Dent. Res.).

The symposium was well attended, at times filling to capacity the Biltmore Suite (150) and resulting in considerable audience participation. During the morning session discussion concerned the definition of keratinization versus cornification, and the appropriateness of the classical terms of "hard" and "soft" keratin. On the basis of the distribution of SH and SS reactions a classification by site and origin was suggested as most appropriate by one discusser (Dr. Barrnett, Yale). During the afternoon session the discussion of the enamel protein resulted in the rejection of this curious epithelial product as either a typical keratin or collagen. It arises extracellularly, unlike typical keratins, and it contains no hydroxyproline, unlike collagen. One discusser (Dr. Pautard, Leeds University of England) even suggested that the enamel matrix may resemble a silk protein in structure. This may have important implications regarding concepts of calcification.

In addition to its own program, Section Nd co-sponsored a meeting on "Career Opportunities in Medicine and Dentistry" arranged by Alpha Epsilon Delta and attracted a large audience on the morning of December 29 in the Music Room of the Biltmore Hotel. Following introductory remarks (C. V. Reichart, Providence College), two comprehensive reports were presented on the future needs for physicians (W. H. Stewart, U. S. Dept. Health, Education and Welfare) and for dentists (Shailer Peterson, Council on Dental Education, American Dental Association). [Dr. Peterson's paper appears in this issue of the JOURNAL.]

The remainder of the morning was devoted to two panel discussions on future challenges in store for physicians and dentists. The panel dealing with career opportunities in dentistry was moderated by Dean Raymond Nagle, N.Y.U., College of Dentistry, with discussers from several Eastern dental schools: J. A. Cuttita (Columbia), M. M. Maxwell (Seton Hall), W. A. Wilson (Fairleigh Dickinson), J. N. Oaks (Harvard), L. W. Burket (Pennsylvania), and L. Herman, (Temple University).

Following a group luncheon, which was addressed by Vice Presi-

dent I. S. Ravdin, University of Pennsylvania, there was arranged opportunity for individual conferences with college admission officials and visits to local professional schools.

To succeed Dr. Joseph L. T. Appleton as Vice President and Chairman of Section Nd (for 1961), Dr. Harold J. Noyes, Dean, University of Oregon Dental School, was elected; and for new Committeeman-at-Large (1961-64), Dr. Albert A. Dahlberg, Zoller Memorial Dental Clinic and Department of Anthropology, University of Chicago, was elected to succeed Dr. Joseph C. Muhler who has completed his four year term of office.

The Secretary took official notice of the great loss to the organization by the untimely death of two very distinguished members of Section Nd, Drs. Balint Orban and Joseph P. Weinmann, both of the School of Dentistry, University of Illinois, and both active researchers in the area covered by the symposium on keratinization.

CALENDAR OF MEETINGS

CONVOCATIONS

October 15, 1961, Philadelphia

October 28, 1962, Miami Beach

October 13, 1963, Atlantic City

November 8, 1964, San Francisco

November 7, 1965, Las Vegas

MINUTES OF THE MEETING OF THE BOARD OF REGENTS

February 5, 1961, Chicago

The Board of Regents of the American College of Dentists met in the Conrad Hilton Hotel, Chicago, on Sunday, February 5, 1961. Ten members were present; President Edgar W. Swanson presided. Minutes of the meetings of October 14, 15, 18, 1960, at Los Angeles, were approved as submitted by mail. The Treasurer reported a bank balance and bonds totalling $61,672.76.

It was voted to publish Historian John E. Gurley's treatise, *The Evolution of Professional Ethics in Dentistry,* and to use these as memorial books. The Secretary reported the death of nineteen Fellows since the Los Angeles meeting. The plan for the rental of caps and gowns was further discussed and approved.

It was reported that the plan for the distribution of dental periodicals in other countries, under the direction of Colonel Norman O. Harris and his committee was proceeding satisfactorily. The Board recessed to attend the Illinois Section luncheon and convened again at 2:00 o'clock.

Chairman H. A. Swanson presented a detailed report on the areas in dentistry considered in the recommendations of the Commission on the Survey of Dentistry. While the report is to be given further attention at the meeting of the Board in Philadelphia, the following recommendations were approved:

1. That the committees of the College review and re-evaluate their objectives, as outlined in 1956, and the recommendations made since then, in relation to the recommendations of the Survey of Dentistry.
2. That when a committee submits recommendations for activation of a problem, it outlines the procedure for such activation so that the next year's committee can proceed if it is approved by the Board.
3. That the Board give consideration to the many subjects covered by our committees, and that a study be made by a Committee of the Board of this problem in relation to the recommendations of the Survey.
4. That the Board highly commend the Commission on the Survey of Dentistry for its conscientious and devoted service to the profession of dentistry and that a resolution to that effect be prepared and sent to the American Council on Education, to the W. K. Kellogg Foundation, to the American Dental Association, to the Rockefeller Brothers Fund, to the Louis W. and Maud Hill

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These minutes, have been compiled and condensed by the Secretary, O. W. Brandhorst. The detailed minutes are on file in the Central Office.

Family Foundation, to the staff members of the Commission, and to each of the members of the Commission.

5. That this Board be prepared to cooperate to the best of its ability with any and all groups who are affected by the recommendations of the Survey.

6. That, if it is permissible and within protocol, the College recommend to the proper bodies that workshops be held within each of the areas, *Dental Public Health, Dental Practice, Dental Education,* and *Dental Research* for the express purpose of devising ways and means for the implementation of the recommendations of the Survey.

Dr. Blackerby, Chairman of the Committee on Dentistry's Social Characteristics, presented a preliminary report, indicating the many facets of the study. This report is to be discussed further at Philadelphia.

The secretary reported on correspondence regarding the ACD Lectureship and suggested a review of the objectives and accomplishments. This will be given attention at Philadelphia.

The Board approved the suggested changes in the bylaws of the Pittsburgh Section.

It was agreed that a panel type of program should be developed for the Philadelphia meeting, stressing the points made in the recommendations of the Commission on the Survey of Dentistry.

Adjournment at 6:45 p.m.

Correspondence and Comment

Criteria for membersip in the American College of Dentists. O. F. FREITAG, D.D.S., St. Louis, Missouri.—Probably most dentists aspire to become members of the American College of Dentists whether they are engaged in private practice, are members of a branch of the Armed Services, are teachers, or research workers. They have learned of the purposes of the College during their undergraduate days, probably know some of the members, and consider the College members the epitome of perfection. This is a noble ambition and encourages dentists with this aspiration to provide the best treatment, and to become professional men in the full meaning of the word.

Membership in the College must have been earned, as attested by two endorsees and study by the Board of Censors who employ every possible ethical

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A department under this heading was initiated in Volume 1 (1934) of the JOURNAL by William J. Gies, then the editor. It will be continued occasionally from now on as circumstances permit.

All members of the American College of Dentists are invited to submit discussions for publication. Owing to present limitations of space, contributions for this department should be brief and direct.

method to ascertain the qualifications of prospective members. To be a member imposes a responsibility not only to live up to the qualifications for which he was chosen, but an alertness to broaden his knowledge continuously in every field of human welfare as a worthwile contribution to dentistry and the College.

An analysis of members of our local Section makes me feel proud to know that I have the pleasure of being associated with a group of men, each recognized as outstanding, but for different qualities important to dentistry:

1. As being skillful operators in the oral cavity; 2. For having rendered valuable service to organized dentistry in an official capacity; 3. For attaining national prominence in a branch of government service; 4. For unusual proficiency as a contributor to the literature; 5. For having given clinics and presented papers; 6. As a teacher; and 7. As a research worker.

Few members, or prospective members, possess all of the qualities listed above, otherwise the membership in the College would be small. I realize that much thought is given and much time devoted to the selection of members, and that personal feelings, dislikes, personality clashes, or differences of opinion, are never factors in the rejection of a proposed member.

The Good Lord in His Infinite Wisdom has not created men with the same qualities, virtues, personalities and characteristics, and yet the possession of these qualities are basic in the selection of men for College membership. Neatness, honesty, high moral principles, and professional demeanor also are basic attributes. Which one of the seven qualities I have enumerated, if any, carries the most weight is difficult to determine; the Board of Censors has a hard task and a thankless job to perform.

I am acquainted with dentists of unusual operative skill, some of whom have been so completely dedicated and devoted to patient care that their spare time is even limited with members of their own family, and they have no opportunity to serve otherwise or to write for publication. These men, in direct service to the public, have the respect of their patients and are doing a great and important service to humanity, in addition to promoting good will and bringing prestige to dentistry.

When I enjoy the privilege of speaking to these men, usually at a dental meeting, my conscience inquires why are they not members of the College; certainly the ability to perform skillfully in the oral cavity is of paramount importance. To be capable of providing specialized surgical treatment in the mouth, to plan treatment according to the best interests of the patient, to restore teeth with the nearest approach to nature, and in instances of abnormalcy to approach the normal in restorations, calls for a knowledge and intelligence unmatched in any area of dentistry or in any other profession.

I cannot expect the College or even our local Section to be influenced by my feelings, but perhaps I can plant a seed for thoughtful consideration.

An approach to dental recruitment at the local level. JAMES P. VERNETTI, D.D.S., Coronado, Calif.—The need for recruitment of more young men into the dental profession is acute according to the recent "Survey of Dentistry" report. Where is this pool of young men? They are now in the high schools of America waiting for help and guidance.

The Boy Scouts of America, based on information developed in a nationwide survey by the Institute for Social Research of the University of Michigan, spent three years developing a program to satisfy the desires and needs of young men of this age. As a result, the new Exploring Program was developed. It co-

ordinates their school curricula, their social activities and their moral guidance in one package of activity. The Explorer Post is patterned after a junior service club. The elected officers follow the pattern of President, Vice President, etc., and the adult leaders are known as Advisors and Assistant Advisors. Each Post can set up monthly, specialty activity programs, usually on a three meeting basis. Dentistry should take advantage of this programming. Outlined herewith is a sample three meeting program.

First meeting—75 minutes

1. Show a film or have an interesting speaker on dentistry as a profession, telling of college requirements, economics, teaching and research possibilities, etc. (Obtain material from ADA.)
2. Any film to be used should be previewed. The one titled "Pattern of a Profession" leaves much to be desired for this type of showing.
3. Tell briefly about dental caries and diseases of the mouth. Illustrate with slides if possible.

Second meeting—90 minutes

1. This meeting should be conducted in a dental office.
2. In the reception room or a suitable large room, explain to the entire group with models, charts or slides, the surfaces of the teeth and types of filling materials. (20 minutes)
3. Assuming there are 15 boys to a Post (average), divide the boys into three groups of five. Take each group to an operating room. Have dentist for each room.
4. In Room No. 1 have extracted lower molars in good condition, one for each youngster. From model, demonstrate the appearance of an occlusal amalgam preparation, have each boy prepare same on his extracted tooth, using first conventional drill, next the high speed or air turbine. Then have the boys mix the amalgam, condense into cavity and when set, carve.
5. In Room No. 2 have two prepared teeth to receive a two-surface inlay. Allow boys to melt wax into cavities, carve and withdraw with sprue to see internal impression.

Have three boys examine each other's mouth with a mouth mirror; one to be the patient, one representing the dentist, and one charting the fillings on a record chart as they are called to him. (*Example:* One, two or three surface restorations, etc.) Then have each alternate.

6. In Room No. 3 (or laboratory) have dentist demonstrate the mixing of impression materials, then allow youngsters to take alginate impressions of their own fingers and pour with stone.
7. Rotate from one room to another at 20 minute intervals.
8. Have 10 minute question and answer period for entire group at end.

Third meeting—90 minutes

1. Explain to the entire group the planned program for the evening. On a blackboard seek the names of the teeth by group participation, and draw (roughly) the entire arch. Explain briefly the extraction of a tooth and the need for replacement of one tooth with a permanent bridge and the loss of many with partial or full dentures. (15 minutes)
2. Again divide into small groups in dental office.

3. In one room, explain the entire casting process of a gold inlay or crown step by step. Have the inlay at all stages so that the boys can follow the procedure. Also explain about bridges and porcelain crowns and show samples. (20 minutes)

4. In second room show the process of making a partial denture (showing wax-up on a model) and a full denture (have finished samples of each). Have for display, mold and shade guides and explain each. (20 minutes)

5. In the laboratory, have two full denture set-ups on articulators. Have teeth set up articulated on one-half arch only. Then have one Explorer set the matching 3 upper anteriors, another the lower anteriors, divide the posteriors among the other boys. Remove the newly set teeth and repeat process with each group. Also make 3 gold castings and as each group visits, make an actual casting for them. (20 minutes)

6. Have 10 minute question and answer period.

Suggestions

1. Prepare in advance each step of program *carefully*.

2. Do not allow inactivity. Keep evening confined to no more than 90 minutes.

3. Allow youngsters to do as many procedures as possible with their own hands, unless too time consuming.

4. Keep groups in each office small for more personal observation. Do not permit boys to wander or mingle with other groups.

5. When speaking is necessary, do or have done, in an enthusiastic and well prepared manner.

6. Have the *entire program* planned before any Explorer Post is contacted.

Reaction

1. The enthusiasm for dentistry thus developed will be heartwarming and worth the effort.

2. This favorable impression will interest many outstanding young men in dentistry as a career.

3. Others not interested in college may become laboratory technicians.

Source of contact

Boy Scouts of America Council or district office or officers.

1. Council Committee Exploring Chairman.

2. District Committee Exploring Chairman or District Chairman.

Book Reviews

THE EVOLUTION OF DENTAL EDUCATION. By John E. Gurley, D.D.S. 276 pp. American College of Dentists, 1960. The Ovid Bell Press, Inc., Fulton, Mo.

This book of eight informative chapters recites the progress of dental education from its roots to its accomplishments and status in 1959. Including a chronological history of The Dental Education Council of America and The Dental Faculties Association of American Universities it brings to date the aims, organizational framework, scope, and attainments of dental professional training.

The author presents the history of the three great steps that elevated the profession from its composition; i.e., the Dental College, Journal and Society. The development of curricula, standards, teachers, equipment and research is portrayed in extensively documented form.

Dr. Gurley comments ably on dentistry's responsibility technically, culturally, scientifically, and philosophically. Likenesses of many of the early contributors to dental education, and paragraphs indicating the nature and the results of their efforts, add much to reader interest. The objectives and the means employed in classifying and inspecting dental colleges are stated in the official "Report of the Secretary of The Dental Educational Council of America." Resolutions of that important body show both the broad and the specific policies which, through their adoption and implementation, created the sound structure that has brought dental education to its present state of efficiency.

The concluding paragraph of the book contains the significant observation that the future of dentistry and of dental education lies in the hands of the dental practitioners.

The thoroughness with which this work was prepared is attested by 755 bibliographic references. It is a valuable addition to dental literature in both text and composition.

Neal A. Harper, Columbus, Ohio

PRINCIPLES OF CLEFT PALATE PROSTHESIS. By Cloyd S. Harkins, D.D.S. With the collaboration of Wm. R. Harkins, D.D.S., and John F. Harkins, D.D.S. 219 pp. New York: Columbia Univ. Press, 1960. $12.00.

Since there exists various specialized fields within the profession of dentistry, this book would not be of *primary* interest to all; however, all allied segments of the profession could learn much from it by a study of related phases.

This reviewer has thoroughly covered the contents. The author has paid great attention to detail; the illustrations are large and clear; the materials recommended are of such a type that appliances can be fully fabricated within the office of the dentist in charge. Procedures are so well described that it is not mandatory for any dentist interested in doing cleft palate rehabilitation to be a specialist in prosthodontics. Further, there is a complete index and a bibliography of well over 150 references to augment the author's own material. The book is well bound and has an easy-to-read format.

Dr. Harkins has selected an excellent sequence for the presenting of his

subject matter, starting with diagnosis and study casts of simple problems and progressing to the more complex variations of abnormalities and their treatment. He includes a consideration of such related factors as the construction of gold crowns necessary for abutment retainers, and corrective surgical procedures to assist the well-functioning of the appliance.

Finally, a whole chapter is devoted to a program of speech therapy for cleft palate patients who are wearing a corrective prosthesis—A consideration as important in this work as the actual closure of the cleft.

Since this is the only book currently in print concerned with this particular field and since it contains so much more information, in relation to other aspects of dentistry, than its title would indicate, it should be one of the proud possessions of all dentists.

Victor L. Steffel, Columbus, Ohio

THEORY AND PRACTICE OF CROWN AND BRIDGE PROSTHODONTICS. By Stanley D. Tylman, A.B., D.D.S., M.S. and Stanley G. Tylman, D.S., D.D.S. 4th Edition, 1063 pp. St. Louis: C. V. Mosby Co. 1960. $17.50.

This is the 4th edition of Dr. Tylman's widely used book on crown and bridge prosthodontics. It has been considered a standard work since the early 1940's.

In the preface, Dr. Tylman states ". . . the purpose of the book is twofold—to serve as a text for the student and as a reference book for the practitioner."

The format and content of this edition are essentially the same as the 2nd and 3rd editions. There are new chapters on the evolution and technics of high-speed tooth cutting methods and equipment; the use of the mercaptan and silicone base impression materials; and a discussion and technic of recording hinge-axis registrations using the Hanau H2-XPR articulator. Also, there has been some revision in the chapter on hydrocolloid impression material (changes in conditioning temperature and retraction methods), and the addition of a more recent method of baking porcelain on precious metal.

The new chapter on the evolution and technic of high-speed cutting instruments is thorough and comprehensive; however, the author does create an inconsistency in later chapters on tooth preparations. In the new chapter he states that carborundum stones were used to reduce and penetrate tooth enamel before the advent of high-cutting speeds, yet in later chapters he lists carborundum stones as major cutting instruments for tooth preparations.

An excellent and informative discussion is presented on the use of the mercaptan and silicone base impression materials. This chapter also includes the technic and equipment used for silver and copper electroplating.

The third new chapter discusses the measuring and recording of the hinge-axis relationship in a thorough detailed step-by-step procedure. The technic presented is quite involved; the same results may be obtained by using a simpler technic with the same articulator.

The illustrations are profuse, and for the most part well selected. Some of the older illustrations could be replaced by more clear and representative ones.

There are several areas in this book that could be modernized. For example: (1) much of the material in the first 22 chapters, although informative, is taught in other areas, and several chapters contain similar material; (2) the construction of the cast gold crown is discussed on the same basis as the swaged-cast and the cast-occlusal surface crown—these last two types are utilized in few

instances today; (3) a complete chapter (35) is devoted to the Davis and Richmond dowel crowns, which are obsolete technics; (4) in the chapter on pontic construction, several types are discussed that are out-moded when compared with the pontics which are the most widely used today; and (5) in chapter 29, mention is made of riveted copper or steel bands for a direct wax pattern technic—this is used little today.

This reviewer is of the opinion that this book serves as a good reference for the general practitioner, but falls short of its other goal as a text for undergraduate students. However, it is an excellent reference in *selected* areas for the undergraduate student, especially in the discussions and illustrations of basic procedures of tooth preparation.

James D. Harrison, St. Louis

PARTIAL DENTURE CONSTRUCTION. By William L. McCracken, D.D.S., M.S. 528 pp. St. Louis: C. V. Mosby Co. 1960. $14.00.

In recent years there has appeared a number of textbooks on the subject of partial denture construction. Not content with authoring these books, more than one author has completely revised an edition, thus attesting to the interest in the subject. Perhaps this in some way compensates for the period of years during which there was no modern text available on the clasp partial denture. This book by Dr. McCracken is so well written, so well organized and so informative that there seems to be little that can be added or little that can be omitted. It is rather difficult to review a book hat provides so little to criticize. The book can be recommended without reservation.

The author states that partial denture service may be logically divided into three major phases: planning and mouth preparations, support for the free-end base, and occlusal relationships. Since in no other field of restorative dentistry does the care and maintenance of the appliance play so important a role, the author could have included as a fourth phase, "The servicing of the partial denture." The author devotes a chapter to each of these important phases.

A partial denture consists of major connectors, minor connectors, direct retainers, indirect retainers, occlusal rests, and denture bases. The author treats these components in logical sequence. Chapter I is on terminology, and inasmuch as the author considers the term "Roach clasp arm" as being "not descriptive," your reviewer could only wish that the author had dropped the terms "Akers clasp" and "Kennedy bar" for the same reason.

There seems to be a messianic yearning on the part of dental authors to formulate a classification of partially edentulous spaces. Dr. McCracken reminds us that Cummer conservatively estimated over 65,000 combinations. This heroic feat may have given Cummer a great deal of satisfaction, but it is only of academic interest. Not so long ago Swenson wrote, "It is impossible at present to converse about a type of partial denture in class terms." Your reviewer is of the opinion that neither Dr. Swenson nor Dr. McCracken has solved the problem.

Another problem that confronts the dentist is the so-called temporary partial denture, and Dr. McCracken has an excellent chapter on the subject. The book is well illustrated with photographs and drawings, and the bibliography is more than adequate.

The author draws liberally from his colleagues. The chapter on endodontia by a colleague is written in the same crusading style that Dr. McCracken uses

and it seems appropriate. The philosophy of partial denture service is stated in the preface and should be read by every dentist, every student, and every technician.

Eugene H. Taylor, St. Louis

GENERAL ANESTHESIA IN DENTAL PRACTICE. By Leonard M. Monheim, B.S., M.S., D.D.S. 461 pp. St. Louis: C. V. Mosby Co. 1960. $10.50.

Since the advent of present day dentistry, dental educators have wanted a modern textbook primarily concerned with general anesthesia for dentistry. This is such a book. It is written by a dentist for dentists. The need for a book of this type is indicated by the fact that there are more general anesthetics given for dental purposes than for any other surgical specialty requiring anesthesia.

At first glance, one might think that this book would appeal to only a limited number of people in the professions; this is not true. The scope of its application is enormous, and some part will reach every person who treats a patient. The first three chapters are excellent, concise discussions of the anatomy and physiology of respiration, circulation, and the nervous system. The physiology involved is equally important for the unanesthetized patient as it is for the patient undergoing general anesthesia. Therefore, every dentist using drugs which have systemic action (and all of them do) should be aware of the information presented. For this reason, this book has considerable merit for the general practitioner of dentistry simply as a reference book in basic physiology.

General Anesthesia in Dental Practice is essentially a group of lectures concerning subjects related to and directly concerned with general anesthesia. It is directed toward the dentist who is using or will use general anesthesia in his practice. There is probably no phase of medicine or dentistry where sound practical knowledge of the basic sciences is of more importance than it is for anesthesia. In many books, the reader is overwhelmed with detail on these basic subjects. Dr. Monheim presents just enough detail for understanding but does not dwell on unimportant and irrelevant matters.

Very little time and space is devoted to technical aspects of anesthesia. Dr. Monheim feels that actual techniques of administering anesthetic agents can be developed and improved only by practical clinical experience under proper supervision. He wishes his book to serve as a source of basic information for the student and practitioner interested in anesthesia. In presenting his ideas, the author covers such subjects as: The anatomy and physiology previously mentioned; physics, as applied to anesthesia; the pharmacology of the anesthetic agents and associated drugs; the phases, stages, and signs of anesthesia; methods of administration; the airway; complications and emergencies; pre-anesthetic evaluation; pre-operative preparation and post-operative care of patients; operating room hazards; pediatric anesthesia; medicolegal considerations; and armamentarium used.

Some revision of ideas presented in older books concerning general anesthesia are developed. As an example, Dr. Monheim suggests new terminology and modification of the classical phases and stages of anesthesia. The phases are designated induction, maintenance, and recovery. The stages of anesthesia are classified as first, preparation; second, chemanesia; and third, surgical (light, moderate, depressed). He discusses to some extent one of his favorite topics, chemanesia, which he defines as that state of amnesia produced in a patient by a chemical or drug.

The chapter of physical evaluation is outstanding. The author emphasizes that the general dentist or oral surgeon occupies a unique position among the surgical specialities in that he alone makes the decision to use general anesthesia for patients outside the confines of a hospital. This privilege carries with it the responsibility of properly evaluating the status of the patient prior to the procedure, and deciding if consultation or hospitalization is necessary. Dr. Monheim classifies patients according to the operative procedure as to the advisability of operating on them as out-patients or hospitalized patients. However, he implies that many factors must be taken into consideration to determine if a patient should be hospitalized. These consist of the facilities available for out-patient anesthesia together with the training and ability of the personnel involved in the anesthetic and surgical team. These things, together with the physical status of the patient, are equally if not actually more important than the operative procedure in determining the ideal location for the proposed surgery.

This is one of the few textbooks concerning general anesthesia for dentistry which can be recommended for teaching purposes. It is a must for all trainees and practitioners of general anesthesia, and a valuable reference for the dental profession as a whole. This book is unquestionably a great contribution to dental literature by one of the outstanding men in the dental profession.

Bernard S. Snyder, Columbus, Ohio

ORTHODONTICS IN MID-CENTURY. Edited by Robert E. Moyers, D.D.S., Ph.D. and Philip Jay, M.S., Sc.D. (Hon.). 344 pp. St. Louis: C. V. Mosby Co. 1959. $8.75.

This publication is a record of the transactions of a workshop held in June, 1958, at Ann Arbor, sponsored by the University of Michigan W. K. Kellogg Foundation Institute of Graduate and Postgraduate Dentistry, with the cooperation of the Education Committee of the American Association of Orthodontists. The purposes of the workshop were to review the progress of orthodontics, to evaluate its current problems, and to plan for the future. In order to achieve this end, seven study groups discussed and gave opinions revolving about as many areas that were representative and significant to orthodontics as related to the broad field of health service.

These discussion groups were oriented about the subjects of: 1. Educating the Undergraduate in Orthodontics; 2. Educating the Specialist in Orthodontics; 3. The General Practitioner and Orthodontics; 4. Research; 5. Meeting the Demand for Orthodontic Services; 6. Relationship of Orthodontics to Other Health Services; and 7. Practice Administration.

To state briefly the findings of these discussion groups will of necessity omit much that was treated at length. Before proceeding with this attempt it may be well to point out that the answers to the questions raised represent the opinion of about 25 men in each section. As might be expected, not all reports represent unanimity of thought, and some compromise was inevitable on controversial issues. Such an issue was the indefinite line between interceptive and corrective procedures; another was concerned with the preceptorship method of training for limited practice in orthodontics.

Group 5 based a large part of their report on the results of surveys. Repreactivities being carried on in the different schools and centers. Training for research, publication of findings, criteria for determining the quality of orthodontic research, and clinical applications were among the many items under

debate. Specific ideas on the communication of research information included a microfilm library of research reports, publication of titles of work in progress, a cross-index of completed projects and the formation of an international research society. Group 4 felt that the week devoted to the workship was insufficient time and so plans were made to meet at a later date for continued discussions.

Group five based a large part of their report on the results of surveys. Representative of these are the correlation of family income and dental service, the availability of orthodontic training, the ratio of orthodontists to the under 18 age group, and the geographic distribution of orthodontists. The range of questions considered by this group ran from why an individual seeks orthodontic help to problems inherent in orthodontics as a public health service.

Group 6 discussed means of improving service to the public through more intelligent cooperation with related dental and medical services. Specific attention was directed toward the problems encountered in cooperation with the pedodontist, periodontist, oral surgeon, and pediatrician as well as the hospital staff and cleft palate team responsibilities of the orthodontist.

Group 7 considered questions arising when the economics, the ethics, and the public relations of orthodontic service are blended into one discussion. Such fundamentals as office location, fees, records, transfer cases, partnerships, and ethics are included and special mention is made of Mann and Easlicks' *Practice Administration for the Dentist.*

In order to maintain perspective, it should be noted that complete agreement concerning the questions discussed was the general rule. By way of example: the section dealing with research unanimously agreed that the area most in need of further study as an aid to clinical procedures was that of predictability of growth. Another such point of universal acceptance was the need for enlarging and improving orthodontic care as outlined by study Group 5.

Much of the material presented was the result of surveys which sought to gather facts about such pertinent subjects as the incidence and type of malocclusion in a community, or the comparative assessment of graduate training programs.

Study groups 1 and 2 made recommendations relative to objectives and methods of training, physical plant and staff specifications, student selection, etc. For the individual interested in any form of orthodontic instruction, be it undergraduate, graduate, postgraduate, or preceptorship, there is presented a rather complete outline of training programs at these various levels of teaching.

Study Group 3 considered means whereby the family dentist might be of more service to his patients in the area of orthodontic problems. This type of service logically begins with the need for recognition of present or impending malocclusion and continues to the presentation of a rather detailed outline to serve as a guide to the family dentist in deciding which type of problem to take care of personally and which to refer to the orthodontist. It is a modification of a similar outline previously published in the *Journal of Dentistry for Children.*

This volume contains both factual material and group opinions covering many questions relative to orthodontic service. Approximately 250 specific and pertinent questions were considered, and replies formulated. Much of the material included in this report is published for the first time and so it becomes a rather unique contribution to the orthodontic literature.

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