

The U.S. Government and the future of international medical research : hearings before the Subcommittee on Reorganization and International Organizations of the Committee on Government Operations, United States Senate, eighty-sixth congress, first session ; international health study (pursuant to S. Res. 347, 85th Cong., S. Res. 42, and S. Res. 255, 86th Cong.) July 9 and 16, 1959.

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THE U.S. GOVERNMENT AND THE FUTURE OF
INTERNATIONAL MEDICAL RESEARCH

HEARINGS
BEFORE THE
SUBCOMMITTEE ON REORGANIZATION AND
INTERNATIONAL ORGANIZATIONS
OF THE
COMMITTEE ON
GOVERNMENT OPERATIONS
UNITED STATES SENATE
EIGHTY-SIXTH CONGRESS
FIRST SESSION

INTERNATIONAL HEALTH STUDY
(PURSUANT TO S. RES. 347, 85TH CONG., S. RES. 42, AND
S. RES. 255, 86TH CONG.)

JULY 9 AND 16, 1959

PART I
(INCLUDES TRANSCRIPT OF CONFERENCES IN EUROPE,
NOVEMBER-DECEMBER 1958)

Printed for the use of the Committee on Government Operations

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COMMITTEE ON GOVERNMENT OPERATIONS UNITED STATES SENATE

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INTERNATIONAL HEALTH STUDY

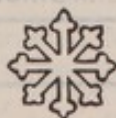
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THE U.S. GOVERNMENT AND THE FUTURE OF INTERNATIONAL MEDICAL RESEARCH

(Long-Range Trends, Opportunities, and Problems)

THURSDAY, JULY 9, 1959

U.S. SENATE,
SUBCOMMITTEE ON REORGANIZATION
AND INTERNATIONAL ORGANIZATIONS OF
THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met, pursuant to call, at 10:20 a.m., in room 3302 New Senate Office Building, Senator Hubert H. Humphrey (chairman of the subcommittee) presiding.

Present: Senators Humphrey, Muskie, Gruening, and Mundt.

Also present: Julius N. Cahn, director of medical research project; and Walter L. Reynolds, chief clerk and staff director, Committee on Government Operations.

Senator HUMPHREY. We will call the meeting of the subcommittee to order.

This is a hearing of the Subcommittee on Reorganization and International Organizations of the Committee on Government Operations.

We meet pursuant to Senate Resolution 347, 85th Congress, and Senate Resolution 42, 86th Congress.

These resolutions provide "for a complete study of any and all matters pertaining to international health, research, rehabilitation, and assistance programs * * * and the coordination of programs related to international health."

The purpose of these hearings is to consider broad policy questions. It is not within the jurisdiction of the committee to consider at the present time any specific legislation or to consider questions of appropriations. Both such matters are within the jurisdiction of other committees of the Senate.

FISCAL JURISDICTION OF THIS COMMITTEE

Under rule XXV of the Standing Rules of the Senate, our own committee is responsible for matters relating to "budget and accounting, other than appropriations."

It is for this budgeting and accounting reason that several of our subcommittee publications will describe how individual Federal agencies budget their medical research and assistance work, particularly their oversea projects.

We intend moreover, to prepare a comprehensive budget-type volume on the entire organization of Federal health activities. That volume will show how Federal biomedical research fits into the much larger overall pattern of all health and health-related expenditures by the U.S. Government.

THREE BILLION DOLLARS OF U.S. HEALTH SPENDING

It might be noted at this point that the Federal Government spends over \$3 billion per year in health and health-related activities.

Of this sum of \$3 billion, the Federal Government is spending over \$100 million for health activities abroad. In addition, we are spending approximately \$50 million overseas in U.S.-owned and/or U.S.-controlled foreign currencies.

All of these figures will be itemized in detail in the budget publication which is now being assembled for the subcommittee by the director of the medical research project, Mr. Julius N. Cahn.

Publication of that particular volume will represent one of the most important tasks of the subcommittee. I believe that never before, will comparable statistical information on Federal health expenditures have been assembled in such detail in a U.S. Government publication; and that includes the executive branch's own annual budget volume. Only the two Hoover Commissions on Organization of the Executive Branch of the Government made anything like a comparable statistical study of the finances of Government-wide health activities.

SPECIFIC FOCUS OF HEARINGS

The specific theme of the hearings today is the U.S. Government and the future of international medical research.

We are concerned basically with long-range trends as they affect, first, numerous U.S. Government agencies involved in international medical research and international medical assistance; and second, the several intergovernmental organizations in which the U.S. Government participates that are similarly involved.

As a part of its standing jurisdiction under the rules of the Senate, the Committee on Government Operations has interest in matters which concern numerous Federal agencies "across the board" as well as intergovernmental organizations of which the United States is a member.

The witnesses whom we have scheduled this morning represent a cross section of the leaders in scientific endeavor in this field. We are very privileged to have such an illustrious group of witnesses. We have extended a cordial invitation to each to join with us to present his individual views on international medical research as it affects his or her particular specialty. We are most grateful to each and every one of you for interrupting what are invariably exceedingly crowded schedules in order to be with us this morning.

ORAL TESTIMONY TO BE SUPPLEMENTED BY EXHIBITS

I might, for a moment, preview the testimony which we will hear today and next Thursday.

We are going to hear from some of America's and the world's greatest experts in various fields. Their disciplines include: Cardiovascular research, virology, gerontological research, cytology, mental health, epilepsy, obstetrics and gynecology, genetics, medical electronics, and other fields.

We know that we will unfortunately not have sufficient time today and next week to do full justice to the very important subjects which our witnesses will attempt to cover. Therefore we warmly invite them to file supplementary statements. These will be published within this volume in the form of exhibits to their testimony.

APPENDIX OF EUROPEAN TRANSCRIPTS IN PART I

Let me note too at this point that we expect to publish as an appendix to this volume much information which we gathered in the course of our trip to Europe last November and December.

During that trip, Mr. Cahn and I met with health authorities and other governmental leaders in France, Switzerland, Sweden, Finland, the Soviet Union, Norway, and the United Kingdom—in that order.

Transcripts of our conferences were made and the most pertinent excerpts will be published within the appendix to this volume.

In addition, many of the individuals whom we met asked that they might file with us supplementary statements and memorandums. We welcome these additional materials.

We have also carried on extensive correspondence with these authorities since we left Europe. We will therefore include some of this correspondence within the appendix to the present volume.

AN ADDITIONAL VOLUME OF EVIDENCE—PART II

As a companion volume to this hearing-exhibit publication, we expect to publish an additional compendium of evidence.

It will consist of a wide amount of other subcommittee correspondence with American and foreign authorities whom we have not met in person, but with whom we have been and will be in close correspondence.

So voluminous is this information—particularly from overseas—that it will be published in a separate appendix volume.

The most important single part of that appendix volume will consist of official reports. That is, it will comprise correspondence from agencies of the U.S. Government engaged in medical research and in international medical assistance programs. Naturally, this committee's primary responsibility is to review Federal activities as such, for these involve expenditure of the tax resources of the people of the United States.

ONE VOLUME OF HEARINGS AND EXHIBITS; ONE OF APPENDIXES

To recapitulate, the present volume (Part I) will consist of three elements:

- (a) The present hearings.
- (b) Exhibits to the hearings.

(c) Transcripts and memorandums from the conferences in Europe last year.

The separate appendix volume (Part II) will consist of:

(a) Subcommittee correspondence with diverse U.S. Government agencies.

(b) Additional correspondence and information from other medical authorities at home and abroad.

Of this latter volume, I shall have more to say a little later on this morning.

Now, our first witness will be Dr. Paul Dudley White. Dr. White's distinguished record is so familiar to everyone that I need not even state it at all in any detail. He is a past president of the American Heart Association. His name is also identified with the International Society of Cardiology of which he is president.

It is particularly in the latter capacity that we welcome his comments in our hearing this morning. I may say that at the conclusion of these hearings we will incorporate a biographical sketch of Dr. White and of our other distinguished witnesses.

We bid you a warm and friendly and thankful welcome, Dr. White. It is indeed an honor to have you with us this morning.

Would you proceed?

STATEMENT OF PAUL DUDLEY WHITE, M.D., PRESIDENT, INTERNATIONAL SOCIETY OF CARDIOLOGY FOUNDATION

Dr. WHITE. Senator Humphrey, thank you.

I shall identify myself first. I am Dr. Paul Dudley White, of Boston, practitioner and teacher of cardiology, President of the International Society of Cardiology Foundation, Clinical Professor Emeritus, Harvard University, a former president of the American Heart Association and of the International Society of Cardiology, and former Executive Director of the National Advisory Heart Council of the U.S. Public Health Service.

I would like to speak from my personal experience in the field of international medical research and cooperation, which is similar to that of many of my colleagues who have had such experiences.

MEDICAL EDUCATION IN EUROPE

For over 200 years the pattern was for American physicians to go to the old countries of Europe for their graduate training. This was true in the case of my father, who went from 1880 to 1882, having graduated from the Harvard Medical School in 1880. He studied in a number of the leading medical centers of that day—Paris, London, and other cities. In 1913, I similarly went to Europe for a year to study in London and in another year, from 1928 to 1929, to Paris, Vienna, and a few other centers.

This was characteristic of many of the older physicians of today as well as of their fathers who were physicians, and it had been going on for 200 years.

But at the time of the Second World War, the tide began to turn. Latin Americans, who could no longer go to Paris, as they had in the past, began to come to the United States and they are still coming;

then the tide turned still more so that the old world now largely comes to the United States for its graduate training.

In this way we are able to pay back some of the debts that we owe to the Old World for our own instruction.

More important than this flow back and forth of individual physicians for their training has been that of their association in various ways, internationally. For example, we began to send after the Second World War missions of doctors, sometimes relief missions. This also occurred after the First World War.

I had the good fortune to be on a relief mission to eastern Macedonia in Greece in 1919 and again after the Second World War on one to Greece and in Italy, and on another to Czechoslovakia. We were in a way both relief missions and teaching missions. But we always went with the declared profession of sharing our good luck. We had been lucky in this country and we, therefore, were able to repay some of the good luck we had had in taking to others as much help as we could, both from the standpoint of relief and otherwise. But all this was very much less important than what is going on today in cooperation in international medical research.

DEVELOPMENT OF HEART ASSOCIATIONS

But before I discuss this, I would like to speak of the way the heart field developed in this country and in other countries, the associations that were formed. In many countries there have been heart associations established during the past several decades.

In the United States first there were community groups in New York, Boston, Philadelphia, and Chicago, in the early 1920's, and then in 1924 the American Heart Association started, organized by these community groups.

This was 35 years ago. The American Heart Association has been a very important factor in bringing together a large group of workers in the field of heart disease, that is cardiology, as it is designated today. Cardiology is the term used for the scientific study of the heart in health and disease, although it was objected to as recently as 30 years ago because many didn't believe in specialization in the field.

This idea still prevails in certain parts of the world. For example, when I went to Moscow 2 years ago, we suggested that the Russian cardiologists join the International Society of Cardiology, which had been very active, and they said, "But we have no cardiologists."

It was just what was said about the specialty in the 1920's, that it was too narrow, too small a field in which to specialize. But then we said to the Russians that there were some of them interested as internists particularly in cardiovascular disease, and that they should join the International Society of Cardiologists. They are beginning to ponder over that; I think they will join us.

But the societies in various countries, in France, England, Mexico, and other lands have joined with us finally, or rather we joined them, in establishing the International Society of Cardiology in 1950 in the first cardiological congress in Paris.

The second congress took place here in Washington in 1954, at which more than 50 countries were represented. And finally, in 1958, last fall, there was a third congress in Brussels; the fourth congress will be in Mexico City in 1962.

These congresses take place every 4 years. During the intervening years, every 2 years we have continental congresses in behalf of the International Society of Cardiology. There will be such meetings next year for the Americas in Brazil, for Europe in Rome, and for the Asian-Pacific Society of Cardiology in Melbourne, Australia.

The Asiatic countries and Australia and New Zealand have banded themselves together as a society of cardiology. All of them are members of the international society.

SIGNIFICANCE OF INTERNATIONAL COLLABORATION

Although these congresses have a vital importance because they bring together the special workers in important fields of medical research, not only in heart disease but also in cancer and in other diseases, the intervening years aren't adequately taken care of. In other words, between congresses we settle down to a much less active period of interest, and work in a desultory fashion. We have now tried through the establishment of committees of international research in the field to have some activity between the congresses represented, for example, by teamwork in research. I do want to emphasize particularly the fact that research by international teams is the highest type of international medical relationship.

Here we are working together in many countries: first, in establishing new knowledge which will be valuable for every country; some of this knowledge can be acquired only in countries outside the United States. It can't all be obtained in this country. We need comparisons of population, for example. We thus not only acquire new knowledge, but secondly, we also standardize techniques, so that when these various individuals go back to their own countries, we can compare accurately the results of tests which, although they are in the textbooks, aren't always done the same way, unless we work together. And thirdly, we establish international friendships that are most rewarding. This has been experienced personally by myself since 1954, when I joined some of these international teams in various parts of the world—in Japan, in Italy, in Greece, and recently in Africa—and it has been a thrilling experience.

I will cite one when we went to Crete a year and a half ago.

EPIDEMIOLOGICAL STUDY IN CRETE

Senator HUMPHREY. Where was that?

Dr. WHITE. In the island of Crete, in Greece. We made a study of an olive-oil population, to see about the effect of dietary differences with particular interest to atherosclerosis; this type of atherosclerosis that is now in this country the chief cause of death through its effect on the heart, the brain, the kidneys or other vital organs. This disease of atherosclerosis is being studied intensively by several international teams.

Our team in Crete consisted of representatives of about 12 countries, perhaps a total of 20 workers, spending together several weeks in concentrated research, working every day. The team included a very able professor from Japan, who was almost the highlight of the group, an experienced worker from Finland, one from Yugoslavia,

one from Austria, one from France, one from England, and several from Italy, Greece, and the United States.

This teamwork resulted not only in obtaining new knowledge, but in establishing a better understanding of nomenclature, what we meant by atherosclerosis, and also in continuing our program actively. This type of research is costly, it is difficult, it is new; we call it epidemiological research, but it will be probably one of the most important things we can possibly do in the next decade or two to bring knowledge that will save our own people, because in this country we have established such an average way of life, in diet, in physical activity, or rather in the lack of it, in stress and strain, in the use of tobacco, that there is very little chance to compare great differences in the way of life in this country.

STUDY IN AFRICA

But such differences still exist in certain parts of the world, for example, in Africa, where the black man is just beginning to emerge. I have seen him recently in several countries of that continent, especially in East Africa and in West Africa, beginning to emerge from his state of undernutrition and infections of various sorts, into the beginning of a more prosperous era. That is particularly true in Uganda, which is now a black man's country, where black men are beginning to join the Rotary Club. As soon as they have been members of the Rotary Club long enough, they are likely to be exposed to the hazards that we are facing in this country; it will be very interesting and of vital importance to find out what will happen in the next few decades.

This research is very important, to see whether the black man will develop this serious disease of atherosclerosis, which affects the arteries supplying the heart muscle and the brain with blood. It is a disease which hardly exists among these black men now. I didn't see a single black man with serious coronary atherosclerosis anywhere in Africa—east, west or south.

Is that due to race or is it due to the way of life? Well, we don't know yet. But the next 10 or 20 years will be absolutely vital in this type of study. That is just one example of what can be done.

We know also that, in any race, heredity counts a great deal and we must pick out the candidates for atherosclerosis at the same time that we are studying the environmental factors that may affect the candidates. There is no need of applying the same rules of health to everyone, because people vary very much in their inheritance, their candidacy. Who are the candidates for early atherosclerosis? We must find them out as well as find out whether diet, lack of exercise, tobacco, or stress and strain are important causes of this serious disease of atherosclerosis that is such a great hazard in the United States today.

From the standpoint of the cardiologist, there are two eras, before Herrick and after Herrick. You might say BH and AH. It was Herrick who in 1912 described for the first time clinically coronary thrombosis. We had never heard the word when I was in medical school. Now it is the most popular of all diseases in the United States today. It has all come about in 40 years.

All this study is vital and the answers will be obtained from some of these researches.

LETTER FROM DR. ANCEL KEYS

I would like to quote, in closing, information from Ancel Keys, who is one of the pioneers in this field and with whom I have had the good fortune to have been associated during the past 5 years in several of these countries—Japan, Hawaii, Greece, and Italy. Recently I asked him what his plans were and what he needed in the way of aid in his international epidemiological cardiovascular research. That is research by international cooperation and teams into the causes of diseases. And I shall quote brief paragraphs from the letter he sent me within the last 2 weeks.

We in the United States compete with Finland for the unhappy distinction of having the highest frequency of coronary heart disease—

including coronary thrombosis due to the encrusting of the small arteries of the heart, the coronary arteries, the same thing applying to the vessels going to the brain, for example, the internal carotids; if we protect ourselves from disease in one area, we simultaneously protect ourselves in the other—

while many other populations suffer far less. You and I have seen how much less coronary heart disease there is among men in southern Italy, Japan, and Crete.

We know that these differences are not accounted for by race or climate.

Because we compared the same race under different conditions; in Boston there are six times as many cases of coronary thrombosis among the south Italians, as among the south Italians living in Naples. We ourselves made ward rounds in the hospitals of both cities and found that the Italians living in Boston showed six times more coronary thrombosis than the south Italians in Italy.

The indications are overwhelming that differences in the mode of life, particularly in the diet and possibly in physical exercise, are responsible.

That is a possibility not wholly proved as yet.

Here then are clues that offer great hope for discovering major factors in the cause of this disease and for learning how we may be able to prevent or at least to delay its development.

But much more systematic research on these populations is needed to establish the facts in detail, to examine important questions not yet studied and to learn the characteristics of men and the way they live that are associated with different degrees of risk of developing this disease in the future. It is necessary to compare and to follow up groups of men who offer large contrasts in diet, physical activity, and other features that may influence the tendency to develop the disease.

This applies, for example, to the south Italians in Naples, compared to their relatives in Boston who have changed their way of life.

Enough men must be studied to establish true differences and tendencies with statistical security.

It is desirable to conduct comparative studies on a series of different populations because our own U.S. population is relatively unstable geographically and occupationally and contrasts in the diet, physical activity, etc., are relatively small.

Most of us are all living the same way now. That wasn't true a generation ago. It would have been possible a generation ago to have made a comparative study in this country, but now practically all Americans live the same way. Everyone has an automobile, eats too much, takes little exercise, and so on.

Further, we cannot now identify groups for study in the American population that differ sharply in the tendency to coronary heart disease—

the laborers in Chicago didn't have coronary disease, now they have more than the professional people—

but we do know where to find such groups in other countries.

From personal experience we know that it is readily feasible to conduct such comparison studies in different countries. And fortunately we now have organized teams of able and dedicated medical scientists who realize these problems and challenges and are ready to collaborate in an international research program. Agreement has been reached on the use of identical methods, the pooling of results for analysis, and the exchange of experts to assure constant criteria and procedures. Such teams are ready to work in Italy, Finland, Yugoslavia, and Greece, and are being organized in Japan, Denmark, Norway, and the Netherlands.

Extensive experience in many areas has shown that such a joint program, with experts of various nationalities working side by side, can work extremely well and that local populations give splendid cooperation.

I would like to say that with experience from these studies in several years we had 96 to 100 percent voluntary cooperation of men aged 40 to 70 in Italy and Crete and Yugoslavia, the preparations were so well established before we went to these countries.

So we can be sure that the detailed program, already planned and agreed to by all, will be successful. The plan provides for general coordination and common services and analysis by a central organization directed by me and a staff to be assembled for that purpose. This central organization will provide for the exchange of experts between the cooperating groups in the various countries. In each of the countries committees will raise local funds—

about 50-50—

and devote themselves to the common task.

The program is planned for about 8 years, with an intensive phase of collecting initial data, followup for 5 years afterward, then repetition of all studies on the same men (the survivors), and a final period of analysis of the findings.

The budgetary needs to be covered from sources outside the various foreign countries are estimated as follows per year:

(1) For each country (2 to 3 population samples of 600 to 1,000 men, 40 to 59 years old, in each country), from \$10,000 to \$16,000, depending on the local economy. This means a subsidy of the order of \$100,000 to \$160,000 per year, in the expectation that 8 to as many as 12 countries would be involved.

(2) For the central organization a subsidy of about \$75,000 to \$150,000 per year, depending on the number of national units involved.

The immediate need is for a total subsidy of about \$125,000 for the year beginning, if possible, September 1, 1959. But, because of the nature of the work, it is essential to have a guarantee of continuation for at least 6 and preferably 8 or more years.

It should be noted that most of the senior medical scientists involved would contribute their services without asking for more than their actual costs or direct loss of income during periods when they would necessarily be away from their ordinary place of work.

I might say the same thing for Dr. Frederick Stare. He also is doing this important international epidemiological research.

We should be able from this program alone to obtain information that within 10 to 20 years should, I think, begin to save some of our own young and middle-aged men at the very height of their careers from this atherosclerosis, which is so crippling today.

This has been a personal experience which I have presented to you. I shall now be glad to try to answer any questions you have.

Shakespeare said, through one of his characters:
 "Our remedies oft in ourselves do lie
 That we ascribe to Heaven."

We sometimes say that sudden death is God's will, but I don't believe it. It is often our own fault.

REPORT OF COMMITTEES OF CARDIOLOGY CONGRESS

Senator HUMPHREY. That is certainly a splendid statement.

Before commencing with our questions, Dr. White, I should like to acknowledge the fact that you were one of the earliest correspondents of our subcommittee. As far back as October 18, 1958, you had helpfully responded to our invitation and had reported on the work of the International Society of Cardiology. I am happy to refer to your letter and enclosed memorandum at this point in the record.

BOSTON, MASS., *October 18, 1958.*

Senator HUBERT H. HUMPHREY,
U.S. Senate, Washington, D.C.

DEAR SENATOR HUMPHREY: Thank you very much for your recent letter about a study of international health which you have initiated.

I greatly appreciate the opportunity to tell you of my own interest of many years in this field and of recent developments with respect to the activity of the Research, Nomenclature, and Social Cardiology Committees of the International Society of Cardiology which met at the Third World Congress of Cardiology in Brussels last month.

We have decided to maintain as far as possible a high level of activity internationally between Congresses which meet only once in 4 years. We have enrolled in a number of cardiovascular epidemiological research teams experts from many countries and many special disciplines; for example a year ago in Greece and Italy there were included in an important research, specialists in the fields of biochemistry, physiology, nutrition, and dietetics, pathology, statistics and clinical medicine from a dozen different countries including Japan, Finland, Yugoslavia, Sweden, France, England, Italy, Greece, and the United States. We feel sure that this activity which has been going on with only shoestring support from private funds during the past 5 years will aid not only in the acquisition of much new knowledge for our own citizens, but result in the standardization of technics and nomenclature in many parts of the world, a problem which has been a great source of confusion in the past.

Finally, international medical friendships have been initiated in the case of these research teams, the members of which work together for many weeks. This friendship can be a potent factor to encourage world peace.

I am taking pleasure in enclosing a copy of the joint report of the Research, Social, and Nomenclature Committees of the International Society of Cardiology held in Brussels in September.

With kindest regards,

Sincerely yours,

PAUL D. WHITE, M.D.

JOINT REPORT OF THE RESEARCH AND SOCIAL COMMITTEES OF THE INTERNATIONAL SOCIETY OF CARDIOLOGY SESSIONS IN BRUSSELS, SEPTEMBER 15 TO 19, 1958

The Research Committee and the Social Committee of the International Society of Cardiology met in joint sessions on September 15 to 19, 1958, to discuss matters of mutual interest and responsibility. Members of the Committee on Nomenclature and invited experts participated in the meetings. A list of participants is attached to this report. Members of the committees continued these discussions between the sessions to obtain agreement. The results are embodied in the following report to the council of the Society. It is the hope of the committees that, if endorsed by the council, the substance of this report will be given wide publicity throughout the world by the council and the constituent national societies.

1. Activities and responsibilities of the committees

The Research and Social Committees recognize their important responsibilities, especially between the Congresses themselves, in the promotion, on a worldwide basis, of cardiological knowledge and practice and in the campaign against cardiovascular disease. The committees believe that it is highly desirable to increase their activities in the discharge of these responsibilities with particular emphasis on:

(a) The examination of the needs and the potentialities of international cooperation in cardiovascular research and in the social problems related to diseases of the heart and blood vessels.

(b) The standardization of methods, tests, and the reporting of findings in research, especially in surveys, field researches, and other studies on or pertaining to populations and statistical analysis. The committees believe that in regard to terminology, nomenclature, and classification they have interests in common with the Committee on Nomenclature.

(c) The promotion of the international epidemiological approach to the study of the etiology, natural history, and the possible prevention of cardiovascular disease. This approach should be joined with the approaches by way of laboratory experiments and clinical observations so as to bring all useful scientific disciplines to bear on these problems.

(d) Cooperation with the Committee on Nomenclature, as suggested above, in the development of definitions and classifications concerned with cardiovascular disorders and characteristics for the special purposes of research on populations. The committees ask consideration of the desirability of forming a Tripartite Committee on Research, Social Problems, and Nomenclature which, it would be hoped, would continue its deliberation and activity between as well as during the world Congresses.

(e) Assistance in the development of more active cooperation between national and local heart societies, and their respective research and social committees, and all other organizations, especially the International Cardiological Society Research Foundation, that can contribute to the campaign against heart and blood vessel diseases throughout the world. Among the goals of such cooperation are increased provisions for the exchange of research experts as well as of students and fellows, the formation of international research teams and groups and the formulation of cooperative and collaborative projects and programs.

2. Standardization of methods and reporting

The increasing use of comparisons between results in different laboratories and in different populations, as a research tool, is applauded by the committees but it is noted that assurances about the validity of such comparisons is essential. The committees insist on the great importance of standardized methods and the reporting of findings in uniform, clearly defined, and objective terms with the least risk of confusion in regard to interpretations. Emphasis should be placed on reporting the actual findings without recourse to interpretation, which would follow later. Accordingly, the committees note:

(a) An objective classification of electrocardiographic findings has been developed and is being applied in surveys in Greece, Japan, Finland, Italy, Yugoslavia, as well as in the United States of America. Without endorsing the details of this system, it is agreed that some such system, after further testing and modification may be recommended for application in wider research, not to supplant the usual clinical interpretation but simply to provide an agreed framework suitable to statistical analysis without prejudice to any interpretation.

(b) Tentative forms for recording the history, present health, personal habits and the findings in the physical examination, with particular reference to the needs in surveys on cardiovascular disease, have been developed and are now being tested in surveys in the countries mentioned above. One form is intended for screening purposes; a second form provides for recording more detailed information concerning persons suspected of having cardiovascular disease. Both forms provide for the comments and interpretation by the physicians but their special feature is the provision for recording fuller details on signs and symptoms in a manner suitable for statistical analysis. The committees endorse the principles embodied in these forms.

(c) The committees note the need for similar standardization in objective reporting of the findings in radiological examinations as well as in other tests and measures that may be used in surveys on heart disease. There is particular need for standardization in methods for the measurement of cholesterol and other

lipids in the blood. The committees urge that efforts be made to establish an international center for the control and calibration of blood lipid measurements.

3. *Epidemiology of cardiovascular disease*

The epidemiological approach to the study of the etiology of cardiovascular disease so far has been applied on little more than an exploratory basis but it has already provided valuable information. The need for further development in this area is clear. The committees urge:

(a) Exploration of possible avenues of financial support for international research on the epidemiology of diseases of the heart and blood vessels. There is a particular need for long-term support of programs aimed at discovering the prevalence, incidence and prognosis of cardiovascular disease in populations differing in the mode of life, including diet, physical activity, personal habits and mental stress, as well as in race and possible genetic constitution.

(b) The development of strictly comparable survey and followup studies in a considerable number of countries and population groups so as to cover the widest possible range of the parameters concerned. It is essential to adopt a common battery of tests and measurements as well as of basic items to be covered in the history and the physical examination. Similar attention should be given to the investigation of the diet, physical activity and social customs. It is important in such comparative investigations to consider the requirements for the eventual separation of the variables by analysis of the combined findings from many separate studies on population groups. The participation of international teams in such programs is recommended to assure identity of methods and criteria as well as to promote international understanding and friendship.

(c) The committees call attention to current discussions, plans and operation in many countries in regard to the epidemiology of cardiovascular disease. Among the countries concerned, and in which there is strong endorsement of the idea of international cooperation in such research, should be mentioned Italy, Japan, India, Israel, Finland, Norway, Denmark, Sweden, the Netherlands, Greece, Rumania, Spain, Yugoslavia, South Africa, and the United States of America. In many of these and other countries there is need for assistance from experts in various scientific disciplines as well as for financial help. The committees note with approval the recent steps taken by the World Health Assembly of WHO to aid in the promotion of epidemiological research on noncommunicable diseases, including cardiovascular disease. It is hoped that the International Society of Cardiology and the constituent national societies will play an active role in this development.

(d) The committees believe it is important to recognize the necessity in planning as well as in the operation of such epidemiological studies to provide for the joint efforts, in closely integrated teams, of physicians, biophysicists, biochemists, physiologists, statisticians, social anthropologists, geneticists, and public health administrators.

(e) In the selection of areas and population groups for epidemiological study attention should be paid to the importance of including: (1) Areas where it is believed that widely differing frequencies of cardiovascular disease may be found; (2) areas exhibiting great contrasts in the mode of life, especially in the diet; (3) areas where the available statistics suggest discrepancies or special problems; (4) areas where medical standards, facilities, etc., should assure the probability of obtaining the most reliable data.

4. *Cardiovascular fitness*

The estimation of cardiovascular fitness is important in the management and rehabilitation of cardiac patients as well as in the evaluation of drugs and methods of management. However, the development, standardization and interpretation of cardiovascular fitness tests at present are inadequate for both research and social needs. While admitting the difficulty of the subject, the committees recommend: (a) Stimulation and support of research on methods for the evaluation and enhancement of cardiovascular fitness, with a view both to the need for exact research and for practical application with a minimum of equipment and specialized personnel.

(b) Formation of study groups and expert panels to give continued attention to the needs in this field.

(c) Attention to the concept of positive health in addition to recognition of degrees of disability.

5. Other items

The committees call attention to the need for more prolonged discussions on all of the items mentioned in this report. Interim meetings and participation of members in international research should aid in this regard.

PARTICIPANTS IN THE JOINT COMMITTEE MEETINGS AT BRUSSELS SEPTEMBER 15-19, 1958

Members of the Research Committee:

Mariano Alimurung, Philippine Islands.
John F. Brock, Union of South Africa.
P. Duchosal, Switzerland.
Noboru Kimura, Japan.
Ancel Keys, United States of America.
J. Lequime, Belgium.
Haquin Malmros, Sweden.
Vittorio Puddu, Italy.
Paul Soisalo, Finland.
E. Wollheim, Germany.
Paul D. White, United States of America.

Members of the Social Committee:

Gunnar Biorck, Sweden.
William Evans, England.
H. K. Hellerstein, United States of America.
Roger Froment, France.
Charles Kossmann, United States of America.
Blas Moia, Argentina.
S. Padmavati, India.
F. van Dooren, Belgium.

Invited participants:

E. Cowles Andrus, United States of America.
E. Blegen, Norway.
Josef Brozek, United States of America.
Francis Chamberlain, United States of America.
Joseph Doyle, United States of America.
J. Groen, Israel.
P. Halonen, Finland.
Louis N. Katz, United States of America.
Maurice Nellen, Union of South Africa.
A. Poppi, Italy.
Charles H. Rammelkamp, United States of America.
M. M. Suzman, Union of South Africa.
James Watt, United States of America.
J. Franklin Yeager, United States of America.
Henry Blackburn, United States of America.
Jacques Cariotti, France.
A. Condorelli, Italy.
Frederick H. Epstein, United States of America.
Tybjaerg Hansen, Denmark.
Martti Karvonen, Finland.
Felix E. Moore, United States of America.
D. Papapanayotu, Greece.
Gilbert Queralto, Spain.
P. Ryland, Belgium.
Louis Vogelpoel, Union of South Africa.
Robert Wilkins, United States of America.

CORRESPONDENCE FROM DR. ANCEL KEYS

Senator HUMPHREY. It was good moreover to hear your helpful reference to the pioneering research of Dr. Ancel Keys, Director of the Laboratory of Physiological Hygiene, University of Minnesota. Ancel Keys is not only a warm personal friend, but, in my judgment, a great

beacon of research. I believe that it would be appropriate at this point to quote excerpts from one of Dr. Key's communications to the subcommittee. His letter, incidentally, touched on the very themes that Dr. White had mentioned in his letter and his testimony today.

UNIVERSITY OF MINNESOTA,
LABORATORY OF PHYSIOLOGICAL HYGIENE,
Minneapolis, December 1, 1958.

HON. HUBERT H. HUMPHREY,
U.S. Senate,
Washington, D.C.

DEAR HUBERT: Your "Background Materials on International Medical Research" is of special interest to me as I return from the latest in a long series of international medical research projects, this time in Yugoslavia. During this trip I had, in eight countries, extensive conferences pointed toward the development of a cooperative international research program on the causes and possible prevention of heart disease. And everywhere I found great interest in such a program in which we in the United States would take the lead.

You may know something of the research, in which Dr. Paul D. White has often joined, that has stimulated interest both in the diet fat question and in the possibilities of cooperative international research on heart disease. A central feature is the study of the experiments of nature, as represented by populations living in different ways, as a means of discovering what promotes arteriosclerosis and coronary heart disease.

This started in 1951 when I had a sabbatical and a Fulbright Research Award and turned to comparing populations to get information beyond what could be had in the experimental laboratory. The results were so interesting that I followed with similar work at the grass roots with doctors and populations all over the world. Both from the natives studied and from the international teams of researchers I assembled we learned much about the value of international cooperative research.

Of course you are dead right in the foreword of your document: "Men are linked by common pain and suffering. Men are linked also by the common joy of conquering disease and disability." Everywhere we have had wonderful cooperation, no politics and no strings attached—from farmers in Crete and Italy, loggers in Finland, miners in Japan, even Bantu laborers in South Africa. And everywhere both doctors and the common people say over and over again, why can't we have much more international cooperation in medical research?

In our work we have not pretended to be giving any particular help to the local people—we couldn't anyway—and at best they had only a dim idea of what we were after. But they knew we wanted to find out something about heart disease and had no other axe to grind. That was enough and we ended up far more in their debt than the other way around.

People everywhere fear and hate bombers and atomic weapons and intercontinental missiles, even if they are reluctantly persuaded of the need to arm for self-defense. But fighting against disease with modern research has an immense and universal appeal. A small fraction of armaments money put into international medical research would do wonders, not only in advancing scientific knowledge but also in swaying world opinion, especially if some of that research could escape the secluded laboratory and make contact with people.

These views were persuasive to the International Society of Cardiology Research Committee, of which Dr. Paul White and I are cochairmen, at our September meetings in Brussels. I enclose a copy of the report.

* * * * *

In any case I am delighted to know you are giving such useful attention to the whole field of international medical research. The idea of an International Health Year is most appealing, too. I should be glad to learn more about your activities and I hope you will let me know if there is any way I can help.

With warm personal greetings,

Sincerely,

ANCEL KEYS, *Director.*

BILL FOR INTERNATIONAL INSTITUTE

Senator HUMPHREY. Dr. White, I gather from your statement that you have keen interest in and apparently have expressed your support in behalf of the Hill bill, Senate Joint Resolution 41, which is currently in the House of Representatives, having already passed the Senate.

Dr. WHITE. Yes; I appeared at the hearing in favor of that.

Senator HUMPHREY. Yes. I also note that you have indicated interest in and support of the pending proposal for a declaration and observance of an International Public Health and Medical Research Year. You feel that that is a worthy enterprise as well; is that correct?

Dr. WHITE. That is right.

Senator HUMPHREY. I am hopeful that we will be able to get international cooperation on that project. I personally feel it means a great deal. It offers some real possibilities.

Dr. White, we, of course, express our thanks to you. I have one or two questions. Then I know Senator Mundt and Senator Gruening may have questions.

U.S.-U.S.S.R. CARDIOVASCULAR COOPERATION

Would you tell us, please, about recent cooperation between the United States and the Soviet Union in cardiovascular research?

Dr. WHITE. Several of us who went to Moscow in 1956 found our Russian colleagues interested both in rehabilitation—Dr. Howard Rusk could speak to that—and in this plan of epidemiological research; we found them very receptive and anxious to join us.

Sometimes such cooperative endeavor is difficult. It is slow in developing. Several doctors came from Moscow in 1957 to study with us in these two fields of rehabilitation and of the causes of heart disease, epidemiological research; two of them went out to Minneapolis to receive instructions there where Dr. Keys is professor and where he has his research center whence he spreads his teams all over the world.

Our associations with the medical profession in the U.S.S.R. have been always very cordial from the standpoint of the individual doctors and institutes. I am sure they would like to join us. But they haven't yet. We should continue to urge them, because I am sure that their participation in these international teams working on these important subjects in all parts of the world would be invaluable. This is the highest type of international medical effort—namely, research teamwork.

Senator HUMPHREY. The Soviet doctors and scientists are now participating in the World Health Organization, are they not?

Dr. WHITE. Yes.

Senator HUMPHREY. I imagine, therefore, that some of our specialists and professional representatives do work with the Soviet officials, Soviet doctors and scientists, at the World Health level; is that correct?

Dr. WHITE. Yes, but I think we need to be together in the field, living together.

EFFECT ON WORLD RELATIONS

Senator HUMPHREY. Do you feel that this contributes anything meaningful to the relaxation of international tensions, Doctor?

Dr. WHITE. Oh, yes, I am absolutely sure that that is so.

We carried out one of these researches this last fall in Yugoslavia, comparing a population on the Dalmatian coast, where we had as much as 100 percent volunteers to be examined, men of middle age, with a Yugoslavian population up in the country, where the way of life is different. This is an example of what can be done.

I went to Poland late last summer and found a very great interest in this same sort of activity. It is a matter of patience and time, and I think that finally we will be able to do this, because we doctors, possibly better than any other group, have rich opportunities for working together. We have no ax to grind, we have common interests in the health of the world, and I am sure that this would be a very fine thing to bring about.

Senator HUMPHREY. Would I be correct in saying, then, that you feel that the international congresses and conferences of professional people, particularly in the field of the medical profession, contribute to better understanding in areas even broader than medicine?

Dr. WHITE. Oh, yes. They are vital, but I think that they are not as important as actual medical research that can be done in these same areas by international teams whose members work together and live together and really get to know each other personally.

ROLE OF WHO

Senator HUMPHREY. Would you comment as to the role of the World Health Organization in connection with plans for strengthening world cardiovascular research?

Dr. WHITE. I was very much interested in meeting in Brazzaville a few weeks ago, Dr. Cambournac, who is director of the regional office of WHO for Africa, where problems are tremendous. They are so involved in the control of infectious diseases, like leprosy—a million lepers loose, south of the Sahara—and undernutrition like kwashiorkor in babies—still to be combated—that there is little or no time for research. But we can and should get going before the WHO organization can get going. Time passes.

There is a good deal of redtape and slow motion in some of the work of these large organizations. We need support for individual enterprises such as that which Ancel Keys has been carrying on for about 6 years now, and which is already producing results without having to wait for the more cumbersome machinery of the World Health Organization, which is of course very important and does bring people together. Some of these research projects can and should be done now and they will be welcomed in various parts of the world. For example, Dr. Albert Schweitzer, whose hospital I visited in West Africa on the Ogooué River, is very receptive to the idea of some research to be done there in health problems; he himself will accept men that we may send over from here to help start a program of research into epidemiologic findings, not just in a routine program of diagnosis and treatment, such as is going on in many places on an

emergency basis; that is not enough. We can continue to diagnose and treat disease indefinitely. What we must do is to study the causes and prevent the diseases which will make unnecessary much of the work that is going on now.

ROLE OF PRIVATE GROUPS

Senator HUMPHREY. Can this great research effort that you are describing be carried on entirely by private means or is there a role for government and private cooperation in view of the substantial amount of funds that may be needed for the extensive projects that are contemplated?

Dr. WHITE. The surface has barely been scratched. We have done some of this work on a shoestring, as we might say, getting small sums, a thousand dollars here and a couple of thousand dollars there, in order to expedite this obviously necessary work. We are just starting and we need very much in the way of support, both moral and material, for these research projects that are just beginning, which will, I am sure be more than worthwhile for us in this country to support for the sake of our own health, not just to aid these other countries, but to do both; and these other countries are anxious to join us. We have encountered complete cooperation and the reception of these teams everywhere we have gone, in fact, has been enthusiastic.

Senator HUMPHREY. You feel that funds for the Federal Government, through our own Public Health Service or our ICA, or whatever agency of Government may participate, are helpful in these matters?

Dr. WHITE. I think they are essential. I don't believe that private funds can cover the field although we need private funds too. We should have a balance always between public and private enterprise and initiative in these studies, but we do seriously need public funds in order to get ahead with the job that must be done.

Senator HUMPHREY. There will be considered in the Senate-House conference on the mutual security bill an amendment I offered, which was adopted in the Senate, authorizing the allocation of \$2 million at the discretion, of course, of the President, for additional demonstrations and field trials, particularly the testing of new drugs that may have some application to particular diseases.

What is your view of such a proposal?

Dr. WHITE. I think that is all very well, but what we need is immediate support for some of these ongoing research projects, such as those of Professor Keys, who has started and won't be able to carry on unless he gets more support than he has at the present time. Having worked with him, I am sure that this is necessary.

Senator HUMPHREY. Would it not be possible for a project such as that of Dr. Keys to fall within this category of what we call field trials, surveys and the collecting of statistical information, to be contemplated under the auspices of WHO?

Dr. WHITE. I should think so. But meanwhile we have to try to make sure that these funds when available should not be interrupted. From our experience we have found that sometimes funds are programmed too far in the future to be available when needed.

Senator HUMPHREY. You need them now?

Dr. WHITE. We need them now.

FINANCES OF INTERNATIONAL SOCIETY OF CARDIOLOGY

Senator HUMPHREY. I agree. We hope we may be able to get something going.

Would you like to comment about the problem of financing expanded efforts on the part of the International Society of Cardiology? I was leading up to your own particular international group.

Dr. WHITE. As I say, the International Society of Cardiology which holds its congresses every 4 years, like other international health societies has done some important things, but we have had to set up a special foundation, which we called the International Society of Cardiology Foundation, to receive funds in the United States, to support some of the work that we want to carry on between congresses, in order to keep the research committee, the nomenclature committee, and the social problems committee active all the time.

This International Society of Cardiology Foundation has only a few thousand dollars in its treasury. It is just a beginning. We need much more to support the interchange of information and the establishment of these conferences, but particularly, support the international research teams in various parts of the world.

We need to bring people over here for training for the teamwork. It isn't just the exchange, it is the working together that we are so interested in, because that will be fundamental not only for the acquisition of new knowledge, the standardization of tests, but the establishment of permanent friendships which we ourselves have experienced.

THE TOLL OF HEART DISEASE

Senator HUMPHREY. I think, Dr. White, that it might be helpful for me to mention for the record at this point that in 1958, heart disease killed 637,000 Americans. Strokes and other vascular lesions killed 190,000 Americans. The next worst killer was cancer, which took 254,000 lives. After that, came accidents—53,000 Americans died from accidents of all types other than automobile deaths, and 36,000 died from automobile accidents. Later on this record will contain some additional information on the cost in human life of these various diseases.

The fact that I want to emphasize, however, right now is that heart disease, strokes, cancer, and accidents accounted for 71 percent of all deaths in 1958. And of these deaths, heart disease was, of course, the worst killer.

I am glad to say that we have enjoyed very helpful suggestions from the American Heart Association, the great voluntary agency which, as Dr. White states, has done such enormous good in our own country in stimulating cardiovascular research. A later subcommittee publication will refer to the American Heart Association's work in detail.

DIRECTORY OF CARDIOVASCULAR RESEARCHERS IN EUROPE

As to the counterattack against heart disease I should like to mention at this point a very valuable 9-page directory by Collette A. Robillard. It is entitled: "Directory of Cardiovascular Research Workers in Europe." It was prepared by the Office of Naval Re-

search, London, on the basis of a request from the National Heart Institute. The directory lists certain scientists throughout Western Europe. It is a very useful guide supplementing another ONR publication titled: "List of Outstanding European Scientists," which is issued by ONR, London, biannually.

This is one example of Federal interagency cooperation which I am glad to note at this time. The Office of Naval Research, I may say, is one of the most important information-gathering agencies for international biomedical science. ONR, London, was visited in October 1958 by our project director. It will be referred to in that part of the appendix volume which will be devoted to research activities within the Department of Defense.

Thank you very much, Doctor. I know that my colleagues may have some questions. Senator Mundt.

AUSPICES OF CURRENT RESEARCH

Senator MUNDT. First of all, may I say, Dr. White, that your testimony has been not only informative but inspiring. I am interested in this pooling arrangement you referred to by Dr. Keys, on which some progress has been made. Is that visualized as an operation under WHO or is it an organization set up under the UN, as such, or is this under the aegis of the United States?

Dr. WHITE. At the present time, it is more or less privately but internationally financed; money is supplied, some support is given by each of these countries in which the research is being carried out. (Although the major part of the support is from the United States.) I don't think that it matters how the support might come, provided it were timely and sufficient.

Senator MUNDT. It occurs to me it is easier to get adequate support, I am sure, if the organization is established in such a way that its format is generally understood. I was wondering whether this is something that is just a loosely drawn, cooperative plan, or whether it is under the heading of some responsible single central organization.

Dr. WHITE. This plan has been submitted to and approved by the American Heart Association, the National Heart Institute of the Public Health Service, and the International Society of Cardiology. Under any one of those three groups, or perhaps under two or all three, it could be carried on well.

Senator MUNDT. As I gathered from your testimony, it is not only a question of immediacy in trying to get some funds soon, but primarily one of continuity. Once you are established, this has to go on over a period of years.

Dr. WHITE. That is right. It is a program of 10 years at least.

Senator MUNDT. And as of now, then, is the committee to understand those primarily interested are not quite certain as to whether it is to be under one organization or another, that you are not specific as to who should head it?

Dr. WHITE. Yes. I don't think that those of us who have been engaged in research are interested particularly in which special body supports it. But it would seem to be an especially important project for the Public Health Service over here, inasmuch as this has an important relationship to the health of this country; the International

Society of Cardiology Foundation as a recipient of funds from hither and yon can support this kind of research.

Senator MUNDT. This would not be anything that the National Health Institutes would concern themselves with?

Dr. WHITE. Oh, yes. The National Heart Institute, for example, in this particular case.

PARTICIPATION BY OTHER COUNTRIES

Senator MUNDT. In the list of countries you went into some detail as to the desirability of Russia participating and gave us the reasons why it does not. I am sure any of us who have been in Russia or who have dealings with the Russians recognize the difficulties involved in that area. But I was slightly more than curious as to why some of the other countries of the world were not included among these teams, which are either in being or in the process of formation. You referred to teams that worked in Italy, Finland, Yugoslavia, and Greece, and in process of being organized in Japan, Denmark, Norway, and the Netherlands.

The question immediately pops into my mind, where are Great Britain, Germany, Austria?

Dr. WHITE. I didn't name them all. Research workers from South Africa and many other countries have already worked with us. Doctors from Britain, France, and Sweden have been actually on these teams. In some of these places their own local research is going on too, which is very good.

Senator MUNDT. In other words, you are researching people living in these areas rather than——

Dr. WHITE. Dr. Keys is only one individual who has developed all this remarkable procedure, but others, like Fred Stare, are taking other parts of the world, for example, in North and South America and Central America, and in Indonesia. In other words, the world can be covered in this way, and South Africans, for example, have been working with us in Japan. So that it is pretty much international.

Even Yugoslavia, a Communist country, has joined in the research on its own soil as well as adding its members to the teams, and we would like very much to have Poland, Czechoslovakia, and Russia involved also in these teams and their work. It would be very helpful, I am sure.

Senator MUNDT. No teamwork is being planned apparently in these areas where no disease of the heart appears to be widely prevalent.

Dr. WHITE. I didn't hear.

Senator MUNDT. Are you planning no study in those areas of the world, like Ghana, where you say there is no such disease?

Dr. WHITE. Oh, yes, we are. The field is wide open.

Senator MUNDT. Trying to find out why they are doing so well?

Dr. WHITE. They are not doing so well for other reasons, but the African blacks don't have the serious atherosclerosis I am speaking of.

There is one other quotation I must give you from Shakespeare. In the "Merchant of Venice," Narissa said:

"They are as sick that surfeit with too much

As they that starve with nothing."

You see, we are in the first group.

ACTIVITY IN LEADING COUNTRIES

Senator MUNDT. Is it to be concluded from what you said that in the field of heart study the United States is the leading country today?

Dr. WHITE. For population studies, yes. There are, however, certain other countries, like South Africa, which have done magnificent work in cardiovascular research, as in the case of atherosclerosis at Capetown. They have joined in some of these teams. Good studies have been made in England, in Sweden, and in Finland, partly through stimulation from over here and partly because they have pioneers themselves.

They want to join in these teams, and they do. In Japan they have done some of this research, and we have a wonderful ally there in this work as well as allies in the Philippines and Australia. There is no limit.

Senator MUNDT. Mr. Chairman, I must say that for the challenge confronting the world in this area and for the type of enterprise and activity envisioned by Dr. White, the amount of money required seems to be exceedingly small in this little budget he submitted.

Dr. WHITE. I beg your pardon.

Senator MUNDT. I say you have a very modest budget.

Dr. WHITE. That is just one small part of it.

Senator MUNDT. This is the camel's nose under the tent we are talking about.

Dr. WHITE. That is a beginning. We don't have that much. This could be multiplied many times by other types of research. For example, there is a monkey colony in Sukumi in Russia, which is a very important place for research, which we in this country do not possess, although something is being planned. In other words, research on animals is still of importance internationally as well as on man, but there is still so much to do and so little time unless we get at it, to save our own middle-aged people today. Every year is going to count. You read in the headlines in the papers about sudden death of relatively young persons every day. I think that such a situation is completely unnecessary if we can only learn more.

Senator MUNDT. I think all of us could ask questions of Dr. White all morning, Mr. Chairman, but I think probably I have consumed my share of the time, and I will desist and let Dr. Gruening take over.

Senator HUMPHREY. Dr. Gruening.

Senator GRUENING. I am very glad to see my classmate appearing here.

Dr. WHITE. Yes; we are old friends, Dr. Gruening and I.

SUMMARY OF FINANCIAL PROBLEMS

Senator GRUENING. Inevitably, I am very much stimulated by what you said, Paul. I suppose this subject has been covered by you, but I am wondering this, in view of the great importance in this field on every basis, not merely for itself, but for its tremendously important implications in promoting international friendship and understanding, I wonder whether there has been presented, or could be presented to the Congress, if it hasn't already been done, an analysis of what is needed, where the objective is short of private funds, and what the

Government could do to fill those vacuities and bring this proposed undertaking up to a point where we can have intensified and amplified research in all these various fields.

This would be a goal to shoot at. We might not be able to obtain it because there are always budgetary and financial problems, but if we had the picture, if we had the estimate of what is needed to be done immediately, what could be achieved within reason, I think it would be very useful. And those of us who are intensely interested in this field would be happy to work for it.

We know there is never enough, but certainly we ought to raise our sights to the highest possible point, because, as Thoreau said, "Men hit only what they aim at, therefore they had better aim high." We all want to aim high.

Dr. WHITE. I am sure that in Africa alone, there is unlimited opportunity for research, which would be welcomed, as Dr. Schweitzer welcomed our sending over, probably by the National Heart Institute of our Public Health Service, two investigators to his hospital to study the diseases up and down the Ogooué River Valley. There has been little or no time in the past to make such studies, there is so much emergency work in diagnosis and treatment that research has had to be neglected. Here is an opportunity which he has accepted. That is just one spot and there are many others, in east Africa, too, and in south Africa.

TRIBUTE TO SENATOR HILL

Senator GRUENING. Of course, we are very fortunate in the Congress to have Lister Hill, who has done such a magnificent job in promoting an interest and understanding of these problems and has carried it forward into much active legislation, including the HEW appropriation bill that was recently passed, which for health research, far exceeded the budgetary estimates. I sincerely hope it will not be vetoed on that account. Perhaps you could use your great influence with the President to make sure he doesn't do this, as he did the housing bill.

Dr. WHITE. I might add that I always send the President a personal letter of these expeditions of mine, so he knows of my interest.

Senator HUMPHREY. Dr. Gruening is a very good political scientist as well as, may I say, a bit of an advocate and propagandist, too.

Dr. WHITE. Dr. Gruening and I at one time envisioned before we actually accomplished it, getting an electrocardiogram of some whales in Alaska.

Senator GRUENING. We finally did.

Senator HUMPHREY. Will wonders never cease?

Thank you very much, Dr. White, it was wonderful of you to come and share this time with us.

PERSPECTIVE ON WITNESSES' TESTIMONY AND SUBCOMMITTEE'S APPROACH

Dr. White's correspondence and testimony has amply fulfilled our expectations and has proven of real value to us.

At this point, I believe that it may be helpful to have for the record a memorandum on our subcommittee's interest. This memorandum points out how testimony such as our first witness has so ably presented fits in with our overall subcommittee objectives.

This testimony by a distinguished private physician helps, it should be noted, to answer several major questions with which the subcommittee is concerned.

But there are other questions as well. Many of them concern activities of Federal agencies and international organizations, as such. For testimony on these activities, we will naturally turn primarily to Federal officials.

In order that these other questions will be borne in mind, in proper perspective, I am going to have printed at this point a pertinent memorandum. I had asked our project director to prepare this memo so as to indicate the overall pattern into which the testimony by our various witnesses fits.

(The memorandum follows:)

MEMORANDUM FROM PROJECT DIRECTOR ON SUBCOMMITTEE'S APPROACH

Memorandum to: Hon. Hubert H. Humphrey, chairman, international health study.

From: Julius N. Cahn, project director.

Re types of questions being studied by subcommittee in international health review.

Pursuant to your direction, the following types of questions are being studied in accordance with Senate Resolution 347, 85th Congress.

Answers to these and other questions will, as received and edited, be transmitted to yourself, to Senator McClellan, and other members of the subcommittee for your review and decisions.

For purposes of brevity, the list of questions of interest to the subcommittee is limited to a dozen in number.

1. *Agencies.*—Which Federal department, agencies, bureaus, offices, and divisions are now directly or indirectly engaged in programs of international medical research and international medical assistance?

2. *Spending.*—How much are these Federal agencies spending for these purposes, where, how, and why? Of the sums expended, how much are in U.S. dollars and how much in U.S.-owned or controlled foreign currencies? Are these sums being properly accounted for?

3. *Authority.*—What is the authority for such activity and spending? That is, what are the pertinent—

- (a) Statutory laws,
- (b) Executive orders, and
- (c) Administrative regulations?

4. *Intergovernmental organizations.*—Which intergovernmental organizations, of which the United States is a member, are currently engaged in programs of either or both this twofold nature; namely, international medical research and medical assistance? What is the nature of these programs?

5. *Intergovernmental spending.*—What is the share of U.S. expenditures for these intergovernmental organizations as compared with other nations' shares for both regular and special programs?

6. *Coordination.*—To what extent is there adequate coordination between—

- (a) The respective programs of those agencies of the U.S. Government which are engaged in these activities;
- (b) U.S. Government agencies and intergovernmental organizations working in related fields;
- (c) the intergovernmental organizations themselves?

7. *Foreign nations.*—What are the activities of foreign governments in international medical research and international medical assistance, particularly in bilateral donor-recipient programs?

With regard to nations being assisted bilaterally or multilaterally, what are they doing for themselves in relation to the assistance they are receiving?

8. *Citizen action.*—What are the leading private national and international organizations engaged in international medical research and medical assistance work?

What, in particular, are the health roles of (a) voluntary health agencies abroad, (b) professional medical organizations, (c) religious organizations, (d) foundations, (e) research institutes, (f) medical schools, (g) professional organizations in related scientific disciplines, and (h) pharmaceutical companies and other private sources?

9. *Duplication or overlapping.*—To what extent may there be avoidable duplication or overlapping on the part of official, as compared with private programs—i.e., programs of U.S. Government agencies or of intergovernmental organizations as compared with programs of private groups?

10. *National and international.*—Since medicine has always been termed international, what is the relationship between research carried out within the borders of the United States by U.S. citizens and research—

(a) carried out within our borders by foreign nationals;

(b) carried out outside the United States by American nationals;

(c) carried out abroad by non-American nationals; and

(d) carried out at home and abroad by Americans working side by side with other nationals?

11. *Trends.*—What are some of the most significant trends in international medical research and medical assistance? How do these trends affect the activities and expenditures of Federal agencies and intergovernmental organizations?

(It is this particular subject which is the main theme of the subcommittee's present hearings. That is, during these hearings, the subcommittee seeks understanding of the nature of some of the principal medical research problems, particularly from a long-range standpoint. The subcommittee endeavors to identify, in effect, the challenges which face medical research. In that way, it hopes to be in a better position to review the pattern of expenditures by agencies of the U.S. Government.)

12. *Economy and efficiency.*—Finally, on the basis of these and other questions, how may further economy and efficiency in official U.S. activities be promoted?

Conclusion

As members of the subcommittee are aware, determining answers to these many complex questions represents a difficult challenge. In view of the limited time and resources available to the subcommittee, it is not anticipated that the factfinding process can be carried on in great detail or with extensive analysis.

Therefore, many of the answers which we will compile will of necessity be limited in depth. In every instance, however, as the subcommittee has stressed, we hope to add to the Congress' existent knowledge by developing descriptive data which is not otherwise available.

DR. ALBERT SABIN

Senator HUMPHREY. The next witness will be Dr. Albert Sabin. Everyone familiar with the battle against poliomyelitis realizes the pioneer experiments that have taken place in the United States and in Africa, particularly in the Belgian Congo, using live attenuated virus. This was developed principally through the efforts of our next distinguished witness, Dr. Albert Sabin, professor of research pediatrics, University of Cincinnati, College of Medicine.

Dr. Sabin has received splendid support from the National Foundation. He has had extensive experience and cooperation with the scientists of many countries, including the Soviet Union. His name was mentioned with high esteem by the eminent doctors with whom Mr. Cahn and I conferred in Moscow.

Your name came up several times, Dr. Sabin, all with great praise for your professional competence. We welcome you here to the subcommittee, and we look forward to your testimony.

**STATEMENT OF ALBERT SABIN, M.D., PROFESSOR OF RESEARCH
PEDIATRICS, UNIVERSITY OF CINCINNATI, COLLEGE OF MEDICINE**

Dr. SABIN. Thank you very much, Senator Humphrey.

I received this invitation 2 days ago, 1 hour before I had to leave Cincinnati for New York. Yesterday I had 2 hours of free time and prepared what you requested—a brief statement, not more than 10 minutes time to read. So I shall proceed to read it.

Senator HUMPHREY. May I say we knew you could do all of this in a short period of time. That short notice was only, in a way, an expression to you of our profound respect and regard for you.

Dr. SABIN. I appreciate that very much.

I have been asked to tell this committee about my experience in cooperating with scientists in different parts of the world in attempting to obtain an answer to a question of international public health importance. The question concerned the safety and effectiveness of a live attenuated poliovirus vaccine that could be administered by mouth instead of by injection at approximately one hundredth the cost of the currently available Salk vaccine.

SUPPORT BY NATIONAL FOUNDATION

The basic work on this vaccine, which I carried out in Cincinnati at a cost of more than \$1 million supplied by the National Foundation for Infantile Paralysis, currently known as the National Foundation, indicated that such a vaccine might be expected not only to prevent paralytic poliomyelitis but also to eradicate the naturally occurring polioviruses as a constant threat to human welfare. This vaccine is also different from all other vaccines, used heretofore in human preventive medicine, in that it reproduces the natural infectious and immunizing process by which not only those who receive the vaccine become immune but also a large proportion of unvaccinated persons who are merely in intimate, continuous association with vaccinated children.

BACKGROUND OF TRIALS

In 1957, the basic work on small groups of human beings had reached a stage which led the expert committee on poliomyelitis of the World Health Organization to recommend that trials on increasingly larger numbers of human beings be undertaken to determine the safety of such a vaccine not only for those who receive it, but, because of its capacity for natural spread, also for those who may become immunized by contact infection. This committee also pointed out that such large-scale trials would yield significant results only in countries in which a large proportion of the population was susceptible to the polioviruses and in which Salk vaccine was not being used extensively to immunize the population. For this scientific reason, and also because one did not wish to interfere with the maximum utilization of the already established Salk vaccine, one could not carry out large-scale field trials on this new vaccine in the United States.

The potential usefulness of a polio vaccine that could be taken by mouth, that would be very cheap, and could be easily applied on a mass scale remained an important question not only for the people of the United States, where after years of prodding almost half of the population has failed for one reason or another to take advantage of the protective effects of the Salk vaccine, but even more so for most of the rest of the world where the Salk vaccine had been used little or not at all, for economic and other reasons.

EXTENT OF TRIALS

At this point, scientists in many other countries undertook to do the job which, for the reasons indicated, we could not do ourselves in the United States. At the end of 1956, after 4 years of tests on experimental animals and human volunteers in search of the best modified strains of poliovirus to use in such a vaccine, I prepared enough for about 2 million doses of each of the 3 types with the cooperation of the Merck, Sharpe & Dohme Research Laboratories. After preliminary studies on a small scale in the United States, three groups of investigators requested portions of these lots for studies in their own countries—Prof. J. D. Verlinde of Holland, Prof. A. A. Smorodintsev and M. P. Chumakov of the U.S.S.R., and Dr. M. Ramos-Alvarez of Mexico City. The careful studies of these investigators on increasingly larger numbers of children, led finally to extensive field trials on millions of children at the end of 1958 and early 1959. Prof. James H. Hale, in association with the Ministry of Health in Singapore, carried out tests on 200,000 children in the face of a developing severe epidemic. The Ministry of Health of Czechoslovakia, carried out trials on 143,000 children. In Mexico, under the direction of Drs. M. Ramos-Alvarez and Federico Gomez, approximately 200,000 children have received portions of this vaccine since the end of February 1959. The largest trials of all, however, were carried out in many different republics of the U.S.S.R. under the direction of Profs. M. P. Chumakov and A. A. Smorodintsev, where up to the present time more than 6 million persons have been fed partly the original vaccine that they received from me but mostly further lots which they had prepared themselves from the material that I sent them.

TENTATIVE CONCLUSIONS ON BASIS OF TRIAL

All these investigators have concluded that the vaccine was safe not only for those who received it but also for those who became immunized by contact. Some believe that not until this summer has passed will it be possible to have a definitive answer to the question of safety of such a vaccine for the community at large. By the end of this year, however, a definitive answer should be at hand.

I have been to the U.S.S.R. and Czechoslovakia three times during the course of these cooperative studies, and have been highly impressed with the quality and validity of the work of my colleagues. This venture is to me a good example of the results that can be achieved by international cooperation among scientists in the solution of health problems that plague all mankind.

Thank you very much.

INTEREST OF ELIZABETH KENNY FOUNDATION

Senator HUMPHREY. Thank you, Doctor.

Doctor, has the Kenny Institute and Kenny Foundation been involved in this at all?

Dr. SABIN. In the work that I have been carrying on in association with other institutes and other scientists in other parts of the world, not at all.

Senator HUMPHREY. Not at all?

There was some work. The reason I am asking this question—I did meet with some of the doctors who have been doing some testing, I think in Nicaragua, if I am not mistaken.

Dr. SABIN. I have reported to this committee my own experiences and I did not mean to slight thereby the efforts of the Lederle Laboratories who have been engaged in work in Latin America. But I thought that they would be best able to describe that themselves, and that is why I did not mention it.

As regards the Sister Kenny Foundation, I know that they have helped in that work in Minneapolis. I know too, that they have helped the Pan American Sanitary Bureau with funds to organize the recent international conference on live poliovirus vaccine that has been held in Washington.

Senator HUMPHREY. The reason I asked the question is that I understood there had been some field tests taken in Minneapolis of live vaccine.

Dr. SABIN. Those have been small-scale studies which are very important. They are the only kind that have any significance in the United States.

Senator HUMPHREY. They are the only types we have had in the United States, the small-scale type?

Dr. SABIN. The only kind we can probably carry out scientifically because the basic answers that can be obtained on a mass scale cannot be done here because too large a part of the population has been immunized with Salk vaccine, and we would never be able to get the answer.

COOPERATION BY WHO

Senator HUMPHREY. You indicated that cooperation of this study was had from the World Health Organization; is that correct?

Dr. SABIN. The World Health Organization has helped in this only indirectly by having an expert committee in July 1957 evaluate the current situation and make certain recommendations that could be used as a guide to member governments. It was actually through the World Health Organization that I was approached by the Government of Czechoslovakia with a request for giving them a portion of the lots of the vaccine that we have studied.

Senator HUMPHREY. The program of field surveys or mass testing—is this a vital type of research activity in the testing of new drugs and vaccines and other medical properties?

Dr. SABIN. Field surveys are necessary in order to obtain an idea of the role of various infectious agents in different countries and they are indeed different.

By coordinating activities and getting international agreement on the best methods to be used in order to obtain comparable results, the work in one country can be properly compared with that obtained in another. It is in that effort that the World Health Organization up to the present time has given its greatest service.

BACKGROUND OF CURRENT AMENDMENT TO MUTUAL SECURITY
AUTHORIZATION BILL

Senator HUMPHREY. When I was in Geneva, I talked to Dr. Candau and the members of his staff. One of the points they brought to our attention was the matter of field surveys and testing on a broad basis. Their efforts in this field ought to be helpful, but their inadequacy of revenues or funds limits their endeavors. It was with this in mind that I offered an amendment to the mutual security authorization bill wherein our country could make available to the World Health Organization up to \$2 million for these field surveys and trials.

Do you feel that this could have a beneficial effect in medical research?

ROLE OF WHO

Dr. SABIN. I look upon the World Health Organization somewhat along the lines that the Federal Government is looked upon in this country in relation to the States. It is said that the Federal Government should carry out those functions which the States individually cannot for the welfare of the whole population. So, I look upon the World Health Organization as having a function particularly in those fields. I would be inclined to limit it to those fields for greatest achievement and for utilization of limited ability and funds—that is, to those fields where the work in one individual country cannot achieve the same purpose. The World Health Organization consists of what sometimes are called bureaucrats—people who sit at a desk and plan. We need people like that. I am not speaking slightly of the so-called bureaucrats. They are needed to formulate plans and activities. Without such plans, you get nowhere.

But they cannot operate except by bringing into being and putting a spark of activity in some country that might not be able to do it by itself.

I think the greatest attention and care must be given to the way funds made available to the World Health Organization should be properly utilized. That is a study in itself.

Senator HUMPHREY. This is one of the studies that this subcommittee has been making and I agree with you as to the concept of functions of WHO. It is more or less a staff agency, so to speak, not a line agency. It should perform limited activities of the expediter nature, as a catalytic agent, getting others to live up to certain standards and procedures.

Dr. SABIN. Right.

Senator HUMPHREY. The reason I asked a question is that the jurisdiction of this subcommittee relates to U.S. participation in international agencies. As you know, a year ago—about a year and a half ago, the President made available to WHO \$300,000 for advanced research

studies to prepare the way for real research in certain diseases. Do you feel that that type of activity is properly within the scope of WHO?

Dr. SABIN. Yes, if they keep in mind that their function is not merely that of another granting agency, like the Rockefeller Foundation or the U.S. research grants under the Public Health Service. But insofar as this grant may have been expended in drawing up programs of work that might be done anywhere by anybody, without emphasis on problems requiring international cooperation for their solution, I say that it would not have been wisely expended.

I think that the precise sphere of research activity for the World Health Organization still needs to be elaborated upon. From my limited knowledge of the results of these preliminary surveys, I am personally not satisfied that the particular sphere of activity requiring international cooperation has been kept in mind by the staff currently working on these problems in WHO.

I have the greatest respect for the ability of the staffs now working on this. I think they have some of the best people in the world.

Senator HUMPHREY. Senator Muskie.

Senator MUSKIE. No questions.

Senator HUMPHREY. Senator Gruening.

Senator GRUENING. No questions.

DR. SABIN'S REPORT ON TROPICAL MEDICINE

Senator HUMPHREY. We are very grateful to you, Doctor.

Before concluding with Dr. Sabin, I should like to mention that he has conveyed to the committee a most helpful statement which concerns another matter of deep interest to us. I refer to the issue of research in tropical diseases. Dr. Sabin's statement is entitled "Medical and Hygienic Problems in the Development of the Tropics—The Responsibility of the U.S.A." Dr. Sabin had previously presented this statement on behalf of the American Society of Tropical Medicine and Hygiene.

It is not possible for our subcommittee during these 2 days of hearings to explore this particular field. It is a field nonetheless of tremendous significance to us and is definitely being explored in the course of our continuing correspondence and contacts with experts here in the United States and throughout the world. So in view of the fact that, unfortunately, time does not permit us to receive oral testimony on tropical medicine, we are very pleased to have Dr. Sabin's written presentation on this subject.

I am going to ask, therefore, that his statement as published in Tropical Medicine and Hygiene News, issue of June 1956, volume 5, No. 3, be printed at this point in the record. The statement was presented at the annual meeting of the Division of Medical Sciences, National Academy of Sciences—Research Council on May 19, 1956. In addition to his many other activities, Dr. Sabin is chairman of the Committee on Development and Needs of the American Society of Tropical Medicine and Hygiene. The statement contains insight and suggestions almost as pertinent today as on the date they were originally presented.

MEDICAL AND HYGIENIC PROBLEMS IN THE DEVELOPMENT OF THE TROPICS—THE RESPONSIBILITY OF THE U.S.A.

Statement presented at annual meeting of the Division of Medical Sciences, National Academy of Sciences—National Research Council, on May 19, 1956, by Dr. Albert B. Sabin, chairman of the Committee on Development and Needs of the American Society of Tropical Medicine and Hygiene. Published in *Tropical Medicine and Hygiene News*, June 1956, volume 5, No. 3.

I am here on behalf of the American Society of Tropical Medicine and Hygiene which has been concerned with the role to be played by the United States in the development of the tropics. Permit me to be elementary for just a moment and repeat something that you all know—something that needs, however, to be brought into focus for the sake of this discussion. It is—that the tropics include an area which encompasses most of Latin America, almost all of Africa, the Middle East, south Asia, and most of the Pacific Islands—an area of the world that includes most of the underdeveloped regions which are now in a great ferment seeking new ways of life—an area with almost a billion people—some living in regions which are overcrowded to the bursting point and others in a wilderness which under appropriate conditions could provide a haven for expanding world populations. A billion people most of whom are ridden with disease, undernourished and malnourished, with an average life expectancy of only about 30 years—people who are less and less willing to spend their short lives dreaming about the rewards of the hereafter but who instead are seeking more and more a better life here and now. The tropics, which in general can now barely feed its own population, could under appropriate conditions become the source of abundant food supplies so badly needed by the undernourished millions in the rest of the world. The tropics—an important source of vital raw materials—and at the same time, with proper development, one of the most important potential outlets for the products of the highly industrialized nations of the world. The challenge of the tropics lies not only in the fact that a billion of its inhabitants are badly in need of help but also that the continued well-being of the United States and other highly developed and industrialized nations is dependent on the future development of the people, resources, and territories of these hitherto dormant land masses. No science—be it of medicine, hygiene, nutrition, climatology, agronomy, or any other—can by itself be expected to bring about the desired developments in the tropics, but it may also be said that without the help of science all the great efforts of the statesmen and economists may yield only stillborn progeny. That wise economist, Stacey May, recently stated: "In a true sense it may be said that tropical medicine is the midwife of economic progress in the underdeveloped areas of the world. Where mass diseases are brought under control, productivity tends to increase—through increasing the percentage of adult workers as a proportion of total population, through augmenting their strength and ambition to work, and in many cases by actually making possible the opening of new or the reclaiming of abandoned land previously untenable because of the prevalence of disease."

In the era which has just passed the great colonial powers found it necessary and desirable to support extensive programs of research in large institutes of tropical medicine and hygiene as an aid to the development and exploitation of the areas under their control—and many important discoveries of benefit to all mankind resulted from this effort. During World War II, impelled by the needs of its Armed Forces, the United States for the first time became a great center for the investigation of urgent problems in tropical disease, hygiene, climatology, and nutrition. World War I abolished Germany as a colonial power and World War II, in one way or another, was instrumental in marking the beginning of the end of colonialism as a way of life. The future of the tropics is becoming more and more the concern of the people who inhabit it and of the united nations of the world who have taken upon themselves the responsibility of dealing with the problems that are the concern of all mankind.

It is in this framework that the council and many of the members of the American Society of Tropical Medicine and Hygiene looked at the research activities in the United States in the field of tropical medicine and hygiene and wondered whether this was indeed all it should or could contribute. Late in 1953, a memorandum was submitted to the council of the American Society of Tropical Medicine and Hygiene entitled "Some Thoughts on the Establishment of a Commission To Evaluate the Medical and Hygienic Problems in the Future Development of the Tropics and To Make Recommendations for the Future Activities of

the U. S. A.," and late in 1954 the society approved the establishment of such a commission. I should like to read you parts of the memorandum and to amplify some of the points.

"The future development of the tropics for the benefit of all mankind requires, among other things, an organized, well-planned and continued attack on those problems of tropical medicine and hygiene which interfere with the well-being and productivity of the present inhabitants, with the possibilities of extensive animal husbandry, and with the potential accommodation of new populations overflowing from the more crowded regions of the world, when and if that should become economically feasible and politically possible. Current American activities in the field of research and development in tropical medicine and hygiene are limited in scope and are not planned or coordinated to achieve specific objectives—this despite the estimated expenditure by the United States of about \$41 million on international health activities in 1953.

"Main objective of proposed commission: To determine the role to be played by the United States in future research and development on problems related to human and veterinary medicine, hygiene nutrition and climatic influences in the tropics.

"Some suggestions for actual activities of commission:

"1. Collect best factual information on present status of diseases of human beings and animals of foremost economic importance in various tropical regions. [And here I should like to stress that what we need to know is not so much about the millions who are infested with worms, or have been infected at one time or another with a host of viruses, but how many people actually suffer ill health from certain parasites, worms, bacteria, viruses, fungi, etc. We must clearly differentiate between incidence of infection and incidence of disease.]

"2. List the most important human and animal diseases which at present cannot be controlled because—

"(a) While means of control may be available the methods are too costly for practical purposes, or

"(b) Insufficient knowledge is available to permit control.

"3. Analyze the hygienic, climatic, and nutritional problems which are responsible for low productivity of peoples currently inhabiting various tropical regions, as well as those which would constitute the greatest hindrance to the movement of new populations into those areas, when and if such migration should become economically and politically feasible.

"4. Evaluate research and development work on these problems at present in progress in—

"(a) Research institutes of governmental and private agencies of other nations, and

"(b) Various private and public institutions sponsored by the United States.

"5. Gather information on the specific problems of concern to American industry and commerce, Government, and Armed Forces in various tropical regions.

"After an analysis of these and other problems, the commission may decide that—

"(a) Current activities of the United States in this field are adequate for its needs and interests, or

"(b) They are inadequate but that, in the light of other needs, it is not feasible to expand research and development specifically directed to the solution of problems in the tropics, or

"(c) That it would serve the best interests of the United States and the world if an organized and coordinated plan for expansion of work in this field were adopted and properly implemented.

"If the Commission should reach decision (c) it should draw up a blueprint not only of the objectives to be achieved, but also specific and detailed proposals for the manner in which the United States can best supplement the activities of other nations in this field. [And here one cannot stress too much the importance of establishing a general staff whose mission it would be to see to it that the desired objectives are achieved—to see to it in brief that another regiment or division attempts again where a previous one may have failed.]

"Composition of commission and duration of its activities: The commission should consist of several people, who would devote their full time to its work, and of an advisory and consultative group which would include representatives of industry and commerce, the State Department, Public Health Service, Armed Forces, educational institutions, in addition to outstanding authorities in the

field of tropical medicine and hygiene. The work of the commission may require several years for completion, and the members of the commission should be enabled to travel where necessary to gather firsthand information."

As a result of a recommendation transmitted by a governmental agency to the National Academy of Sciences, the Division of Medical Sciences of the National Research Council has undertaken the task of setting up a commission such as has just been described. The question of who should finance the operations of such a commission has received careful consideration by at least two governmental agencies and it now appears that it might be most appropriate to seek the funds from private educational foundations or other groups, although it is conceded that the findings and recommendations of this commission would properly concern various governmental activities of the United States. The American Society of Tropical Medicine and Hygiene is highly gratified that the Division of Medical Sciences is assiduously pursuing this task. Everyone realizes that this is something that cannot and should not be done in a hurry, because the findings and the recommendations of the proposed commission will influence the planning and activities of the United States in this sphere for many years to come.

LETTER FROM DR. JONAS SALK

Senator HUMPHREY. Most Americans familiar with Dr. Sabin's work would probably simultaneously recall another illustrious name which, like his, has become almost synonymous with the battle against polio.

I refer, of course, to Dr. Jonas Salk. Dr. Salk was one of the earliest individuals whom the subcommittee contacted. I believe it would be appropriate, therefore, for us to reprint in the transcript the text of his letter to the subcommittee.

UNIVERSITY OF PITTSBURGH,
SCHOOL OF MEDICINE,
November 10, 1958.

HON. HUBERT H. HUMPHREY,
U.S. Senate, Washington, D.C.

DEAR MR. HUMPHREY: I have been aware of your interest in the problem of international health and was very pleased to have received your letter and the preliminary work plan of your subcommittee. I do not know whether or not any observations I might make are necessarily relevant to your present purpose; however, these do represent thoughts that have occurred to me in connection with your letter.

I believe I see two problems: One concerns unsolved problems upon which research is underway in this and other countries; the other is that of application of the knowledge we now possess about restoration or maintenance of health and prevention of disease.

In regard to research and its conduct on an international plane, I believe that by and large this is now occurring. Scientific journals are exchanged throughout the world; international translating and abstracting services exist; there is free movement of scientific people as their time and interest permit. In this country, men and women with scientific background and judgment have extensive resources at their disposal, while in other countries people with equal ability have rather limited resources that restrict their ability to function at a level commensurate with their ability.

I have wondered whether or not the granting of funds for research to persons working in other countries, whose proposals could compete favorably for available funds with those who are now supported from within our own country, might not bring the solution to problems and their attendant advantages to us and to the world much sooner than might otherwise occur. A scientific-aid program of this kind would acknowledge the existence of individuals of talent and ability in all nations and would acknowledge the international character of health and of knowledge in this field, and would demonstrate that we, who have the resources, are also able to assume an appropriate share of responsibility not only for ourselves but for those who by chance and circumstance were born

in countries that do not have those advantages that could be converted, if available, to benefits for men everywhere.

I am certain you will find a no more willing group than the scientists of the world for cooperation and collaboration on any and all matters pertaining to new knowledge in any area; and when there is the further opportunity to see the fruits of their labors used for improving the lot of their fellow men, wherever they may be, then their efforts are further rewarded and they are stimulated to even greater effort and effectiveness.

There is nothing more personal to an individual than his health. If a nation, or a group, is afflicted with ill health, or is deprived of the opportunity to take advantage of what is known to exist elsewhere for maintenance of health, then intense dissatisfactions could understandably arise. It is clear that to those who would make possible the restoration of health, or make available the means whereby advantage could be taken of practices for the maintenance of health, an incalculable measure of good will would be forthcoming. It is self-evident that our attitude about the problem of international health, and, more importantly, what we do about it, could influence greatly some of the most urgent world problems.

I would hope that your study will bring insight into what is needed to improve the efficiency of the application of new knowledge and new advances for peoples everywhere, both in our country and throughout the world. When such understanding has been achieved, I can well imagine enormous savings in money, effort, human resources, and life itself.

Sincerely,

JONAS E. SALK, M.D.

BACKGROUND OF EXPANSION OF WORLD HEALTH EFFORT

Senator HUMPHREY. Before proceeding with the other witnesses, I am going to ask that one additional series of quotations be printed in the record.

Brief reference has already been made to the role of the World Health Organization in international medical research.

It may not be generally realized, but there is quite a record of activity on the part of both the executive and the legislative branches which has led up to the present point of strengthened cooperation in international research through WHO, and, bilaterally, between the United States and the Soviet Union.

WORK OF COMMITTEE ON FOREIGN RELATIONS

I, personally, have had the opportunity of working on this problem in the Committee on Foreign Relations. It was in that committee that we wrote into the mutual security law of 1958 a declaration of war, so to speak, against the diseases of mankind.

Simultaneously, we wrote a new provision into Public Law 480 which permits the use of foreign currencies for international scientific research.

As a matter of fact, it was out of that committee's work on that law that the present world health study by this subcommittee developed.

I had worked on this health phase with the assistance of Mr. Julius N. Cahn, who was then a member of the professional staff and consultant to the Committee on Foreign Relations. Following my work on the mutual security law, I decided that it would be a sound investment of time and manpower on the part of the Senate to make a comprehensive study of international health. I felt, too, that we should make such a study through a committee with as broad a vantage point as the Committee on Government Operations.

Therefore, I drafted Senate Resolution 347, 85th Congress, and introduced it. It was unanimously approved by the Committee on Government Operations, by the Committee on Rules, and thereafter by the full Senate. I asked Mr. Cahn to come with our committee and to head up the staff for this particular study within the Subcommittee on Reorganization and International Organizations.

This then is part of the legislative side of the chronology involving international health. But the executive branch has played an important role, as well as regards both authority and expenditures. Accordingly, we have assembled a series of quotations from the official actions taken by both branches of Government. I shall ask that this chronology be printed at this point in the record. It will provide very helpful background, I believe, on the series of actions before, during, and after the 10th anniversary meeting of WHO in Minneapolis last year which I was privileged to attend as a delegate.

CHRONOLOGY OF OFFICIAL STATEMENTS ON COOPERATION IN WORLD MEDICAL RESEARCH

EXCERPTS FROM ADDRESS BY PRESIDENT DWIGHT D. EISENHOWER ON THE STATE OF THE UNION, BEFORE JOINT SESSION OF CONGRESS, JANUARY 9, 1958

[From the Congressional Record, Jan. 9, pp. 171 ff.]

WORKS OF PEACE

My last call for action is not primarily addressed to the Congress and people of the United States. Rather, it is a message from the people of the United States to all other peoples, especially those of the Soviet Union.

This is the spirit of what we Americans would like to say:

"In the last analysis, there is only one solution to the grim problems that lie ahead. The world must stop the present plunge toward more and more destructive weapons of war, and turn the corner that will start our steps firmly on the path toward lasting peace.

"Our greatest hope for success lies in a universal fact: The people of the world, as people, have always wanted peace and want peace now.

"The problem, then, is to find a way of translating this universal desire into action.

"This will require more than words of peace. It requires works of peace."

Now, may I try to give you some concrete examples of the kind of works of peace that might make a beginning in the new direction.

For a start our people should learn to know each other better. Recent negotiations in Washington have provided a basis in principle for greater freedom of communication and exchange of people. I urge the Soviet Government to cooperate in turning principle into practice by prompt and tangible actions that will break down the unnatural barriers that have blocked the flow of thought and understanding between our peoples.

Another kind of work of peace is cooperation on projects of human welfare. For example, we now have it within our power to eradicate from the face of the earth that age-old scourge of mankind: Malaria. We are embarking with other nations in an all-out 5-year campaign to blot out this curse forever. We invite the Soviets to join with us in this great work of humanity.

Indeed, we would be willing to pool our efforts with the Soviets in other campaigns against the diseases that are the common enemy of all mortals—such as cancer and heart disease.

If people can get together on such projects, is it not possible that we could then go on to a full-scale cooperative program of science for peace?

A program of science for peace might provide a means of funneling into one place the results of research from scientists everywhere and from there making it available to all parts of the world.

There is almost no limit to the human betterment that could result from such cooperation. Hunger and disease could increasingly be driven from the earth. The age-old dream of a good life for all could, at long last, be translated into reality.

EXCERPTS FROM SENATE REPORT 1627 BY THE SENATE COMMITTEE ON FOREIGN RELATIONS ON H.R. 12181, THE MUTUAL SECURITY ACT OF 1958

(Filed May 26, 1958, pp. 33 ff.)

K. WORLD HEALTH ORGANIZATION

The bill adds a new section 6 to the act authorizing U.S. participation in the World Health Organization. The new section recognizes that the "diseases of mankind, because of their widespread prevalence, debilitating effects, and heavy toll in human life, constitute a major deterrent in the efforts of many peoples to develop their economic resources and productive capacities and to improve their living conditions."

It is declared to be the policy of the United States "to continue and strengthen mutual efforts among the nations for research against diseases such as heart disease and cancer."

Finally, in furtherance of this policy, the World Health Organization is invited to, "initiate studies looking toward the strengthening of research and related programs against heart disease, cancer, and other diseases common to mankind or unique to individual regions of the globe."

The policy statement in this section is of broader application than, but is similar to, that which is already contained in section 420 of the Mutual Security Act in regard to malaria. It seemed to the committee desirable to broaden the expression of congressional interest in the conquest of debilitating diseases. It will be recalled that in his State of the Union message, the President invited the Soviet Union to join in the worldwide malaria eradication program and then added: "Indeed, we would be willing to pool our efforts with the Soviets in other campaigns against the diseases that are the common enemy of all mortals—such as cancer and heart disease."

The amendment does not provide any additional funds. The U.S. contribution to the World Health Organization is limited by law to one-third of the Organization's assessed budget. The committee is hopeful, however, that the Organization will broaden its activities in the field of research in accordance with a sound and well-thought-out program.

L. SCIENTIFIC ACTIVITIES ABROAD

The bill adds to section 104 of the Agricultural Trade Development and Assistance Act of 1954, as amended (Public Law 480) a new subsection (k) which would make it possible to use foreign currencies accruing under title I of Public Law 480 to "collect, collate, translate, abstract, and disseminate scientific and technological information and to conduct and support scientific activities overseas."

It is specified that these activities could include "programs and projects of scientific cooperation between the United States and other countries, such as coordinated research against diseases common to all of mankind or unique to individual regions of the globe."

Activities of the kind authorized by the amendment seem to the committee to hold great promise. There is, for example, great need in the United States for translations and abstracts of scientific works published abroad. There is equal need abroad for such works published in the United States. There are many excellent scientific institutions abroad which could do even more effective work if they could receive even marginal increments in funds, and these funds are frequently available, in local currencies, as a result of operations under Public Law 480. Obvious possibilities are raised of fruitful collaboration between the American and foreign scientific communities. This collaboration should be advantageous not only in terms of its scientific results but also in terms of better people-to-people understanding. This is perhaps particularly true in regard to medical research.

The amendment does not in itself make funds available. It simply authorizes the use of Public Law 480 foreign currencies for the purposes stated. The amendment leaves to the President the question as to which executive agencies will administer these programs. However, it is contemplated that the National Science Foundation might be a principal collating and disseminating agency of general scientific information and that the Public Health Service would be active in regard to collecting, translating, and disseminating medical information.

EXCERPTS FROM H.R. 12181, MUTUAL SECURITY ACT OF 1958, AS REVISED BY SENATE
COMMITTEE ON FOREIGN RELATIONS

(Reported on May 26, pp. 61 ff.)

(n) Section 104 of the Agricultural Trade Development Assistance Act of 1954 (Public Law 480, 83d Cong.; 7 U.S.C. 1704), as amended, is further amended by adding after paragraph (j) the following new paragraph:

"(k) To collect, collate, translate, abstract, and disseminate scientific and technological information and to conduct and support scientific activities overseas including programs and projects of scientific cooperation between the United States and other countries such as coordinated research against diseases common to all of mankind or unique to individual regions of the globe."

(o) The act of June 14, 1948, as amended (22 U.S.C. 290), authorizing participation in the World Health Organization, is amended by adding the following new section 6:

"SEC. 6. The Congress of the United States, recognizing that the diseases of mankind, because of their widespread prevalence, debilitating effects, and heavy toll in human life, constitute a major deterrent to the efforts of many peoples to develop their economic resources and productive capacities, and to improve their living conditions, declares it to be the policy of the United States to continue and strengthen mutual efforts among the nations for research against diseases such as heart disease and cancer. In furtherance of this policy, the Congress invites the World Health Organization to initiate studies looking toward the strengthening of research and related programs against these and other diseases common to mankind or unique to individual regions of the globe."

EXCERPTS OF ADDRESS BY HON. MARION B. FOLSOM, SECRETARY OF HEALTH, EDUCATION, AND WELFARE, AND CHIEF, U.S. DELEGATION FOR THE 10TH ANNIVERSARY LUNCHEON COMMEMORATING THE FOUNDING OF THE WORLD HEALTH ORGANIZATION

(May 27, 1958)

And so on this anniversary occasion, in glancing back, we look not so much for reasons to congratulate ourselves for what has been accomplished as to learn from those experiences how we may quicken our pace in the years ahead.

The men and women of the World Health Organization cannot, of course, hope to do the whole job alone. You will need ever-increasing understanding of people everywhere. You will need greater support.

One of the most pressing needs, certainly, is wider support of what Dr. Candau has identified as the "real backbone" of WHO's varied activities; namely "to pool all available scientific and technical knowledge, constantly appraise it, and to study its applicability to the solution of public health problems."

In his most recent State of the Union address, as many of you will recall, President Eisenhower noted this need and expressed the willingness of the United States to engage, with other nations, in research on pressing world medical problems.

As a concrete step toward this objective, the United States will propose that the World Health Organization undertake a special study to search out new and more effective ways of fostering medical research on an international basis. If the forthcoming assembly views this proposal with favor, I am happy to announce that our Government, through the Department I represent, is prepared to provide a grant on the order of \$300,000 to the World Health Organization to support this study. We believe such an undertaking holds bright promise for the future welfare of mankind.

Many of you, I am sure, are familiar with the work that is already being carried on by the Public Health Service in the field of international health. At present there are about 100 visiting scientists representing 30 different nations engaged in research at the National Institutes of Health. Since 1947, fellowships awarded by the National Institutes of Health have enabled about 300 American scientists to study in other countries. These and other research arrangements between the United States and other countries will be continued and wherever possible expanded. For example, through a relatively new program of research fellowships, we are planning to bring many more medical scientists to the United States to study in laboratories of their own choice.

This kind of interchange of professional people—with all their specialized knowledge and their ideas—not only increases our skills but contributes immeasurably to the further development of that human understanding upon which all progress depends.

* * * * *

History teaches us that international undertakings which seek to establish political harmony among nations are one of the most difficult of all human endeavors.

But history also indicates that political harmony can be advanced through common interests in fields which are primarily nonpolitical in nature. I can think of no field which presents a better opportunity to promote harmony among men than the field of good health—a common desire among all peoples.

As we strive to deal ever more effectively with the diseases of man, we look toward that further horizon of the World Health Organization—the physical, mental, and social well-being of all peoples—to the end that man may live in greater understanding and in peace throughout the world.

EXCERPTS OF ADDRESS BY DR. MILTON EISENHOWER, PRESIDENT, JOHNS HOPKINS UNIVERSITY, PERSONAL REPRESENTATIVE OF THE PRESIDENT OF THE UNITED STATES, BEFORE THE 10TH ANNIVERSARY COMMEMORATIVE SESSION OF THE WORLD HEALTH ORGANIZATION AT MINNEAPOLIS

(May 27, 1958)

The President of the United States has asked me to bring you the following message:

"Personally and on behalf of the people of the United States, I extend to you, the delegates of governments of so many countries, a warm welcome. You have come here from all corners of the world to deal with very human and personal problems that affect us all. I wish you notable success.

"The 10th Anniversary Commemorative Session of the World Health Organization directs our attention to the fact that the nations of the world are working together in harmony for the improvement of the living conditions of all peoples. As a result of the work of the World Health Organization and the stimulating leadership it has given to its member states, millions the world over are spared from disease and suffering that would have been their lot. The United States is proud of its part and the part of its health leaders in this mutual endeavor. We look forward to even greater accomplishments in the control of disease, in the building of health services and in the opening of new avenues of medical knowledge through research. We look to the World Health Organization with confidence as a proven instrument through which the nations and the peoples of the world can combine their efforts, in friendship, toward the building of true peace.

"DWIGHT D. EISENHOWER."

* * * * *

As the infectious diseases—the historic scourges of mankind—are gradually brought under control and eradicated, we find other problems moving into the foreground of our concern. Two such are heart disease and cancer. A certain amount is known about both—enough so that the vast uncharted areas of knowledge concerning them are recognized, as an explorer recognizes the borders of a new continent.

Yet we know that intensive exploration will solve the mysteries of heart disease and of cancer—that a way will be found. It is even now a question of when, not whether. Where is almost immaterial. For the man or woman who achieves the final breakthrough may come forward in any part of the world.

The great medical advances over the last century evoke names from many countries: Pasteur and the Curies of France; Koch and Ehrlich of Germany; Noguchi of Japan; Fleming of Britain; Houssay of Argentina; Pavlov of Russia; Florey of Australia; Semmelweis of Austria; the Mayos and Salk of the United States. India has given us the tranquilizers; Switzerland, DDT; Germany, the sulfa drugs.

What great names, and what countries will take their places on the high pediment of future medical history we do not yet know. But what is clear is that, whoever they are, wherever they are, their achievements will be based on the shared knowledge of scientists everywhere, and will benefit all mankind.

I wish to submit a proposal for your thoughtful consideration. I propose that those who conduct a special study during the coming year—through a staff selected for the purpose, working with the world's leaders in medical research—determine how it may most effectively perform its fullest role in research. If this seems to you to offer promise, Secretary Folsom has told me that the Department of Health, Education, and Welfare, on behalf of the United States, is prepared to make a special grant to the Organization for such a preliminary study. From this study, emphasizing initially cancer and heart disease, we would anticipate the emergence of a plan that would merit the support of member states.

Furthermore, the United States is prepared to consider providing substantial support for any sound program that may result from the study. In research the World Health Organization has been a stimulator and coordinator, not a doer. This is as it should be, and we should assure that it can play this key role with full effect.

The first steps toward the coordination of research have already been taken. By the end of the last year the WHO had established close working relationships with 1,800 institutions and laboratories. It was making use of 35 expert panels in as many fields, with a total membership of 1,400 health experts. It thus is able to stimulate and coordinate research in a wide variety of fields through laboratories in many lands. WHO facilitation of interchange of ideas and information in 1957 included worldwide or regional technical conferences, seminars and expert committees in cancer, addiction-producing drugs, heart disease, malaria, insect resistance to insecticides, atomic energy, mental health, yellow fever, professional education, and other fields.

The sum total of these research activities represents only a small percentage of the Organization's budget. Their significance, however, cannot be measured in terms of the amounts spent. One example of this important type of work which has impressed me was the rapid development of an effective preventive vaccine against Asian influenza last year. This was the direct result of having an internationally coordinated network of laboratories that received reports on its occurrence, and determined the prevalence of the causative virus strain.

The record is impressive. But much more is needed.

We need more rapid exchange of ideas and information between laboratories and scientists. We need more opportunities for scientists to meet together and discuss freely their work and their problems. We need to find the gaps in research and fill them. We need to develop research workers and give them scope and opportunity. We must search worldwide to know where disease occurs and why. We must test, in the laboratory, empirical observations that are made in the field and in the hospitals. We must examine those materials and ideas that have persisted through the centuries as traditions and superstitions in the folklore of the world.

It is our expectation that out of the special study which I have proposed the world can, through the WHO, address itself more vigorously to finding solutions to the great unsolved mysteries of disease. Thus, again, the WHO would establish international patterns of effort, which might lead, as President Eisenhower suggested last January, to "a full-scale cooperative program of science for peace."

A reexamination and intensification of its research role is one of the significant challenges before the World Health Organization. The United States has faith in the will and ability of the WHO to meet this challenge. Our faith in the future is based on the performance of the past—indeed, on a decade of accomplishment which it is our pride and our privilege to celebrate today.

PRESS RELEASE NO. 297 FROM DEPARTMENT OF STATE, MAY 29, 1958

The Department of State today released the texts of the notes exchanged with the Soviet Union concerning suggestions made by President Eisenhower for international cooperation in the struggle against disease. These suggestions in the President's State of the Union Message on January 9, 1958, invited the Soviet Union to join with the United States and other nations in the existent campaign against malaria and in other campaigns against illnesses such as heart disease and cancer.

In a note delivered May 26, 1958, the Department of State expressed gratification at the positive response given in a note from the Soviet Embassy dated

May 19, 1958. The note contained specific suggestions for cooperative measures in the field of public health and indicated that the Soviet Union was prepared to cooperate in the programs of the World Health Organization.

The Department's note in reply pointed out that the United States was presenting proposals to the World Health Organization relating to a cooperative program of research, with initial emphasis on cancer and heart disease, and expressed the hope that the Soviet Union would support these proposals and cooperate in the proposed program. Should some aspects of the Soviet suggestions not be covered by the current programs of the World Health Organization, or those adopted in the near future, the Department expressed willingness to discuss these aspects under the arrangements established for Soviet-American discussions of exchanges between the two countries.

The American note pointed out that the recent agreement on exchanges between the United States and the Soviet Union provided for exchanges of medical delegations, reciprocal trips of medical specialists, and the exchange of medical films and medical journals. These features of the agreement are being actively developed at present. A delegation of American women doctors has been visiting medical installations in the Soviet Union in reciprocity for a previous visit by Soviet women doctors to the United States. Exchanges of medical publications are being expanded. Plans are being developed for American medical scientists to deliver lectures at Soviet medical institutes and for Soviet scientists to reciprocate. An exchange of technical films on medical subjects is under discussion.

The American proposals to WHO, mentioned in the Department's note, were outlined by Dr. Milton Eisenhower on May 27, 1958, at the current session of the World Health Assembly at Minneapolis. Dr. Eisenhower proposed that WHO conduct a special study during the coming year to determine how it may most effectively perform its fullest role in international cooperative research, with initial emphasis on cancer and heart disease. He stated that the United States is prepared to make a special grant for such a study and would consider providing substantial support for any sound program resulting from it. He also reaffirmed U.S. support for the current campaign sponsored by WHO against malaria. Dr. Eisenhower praised the great strides which have been made in this cooperative effort, which has already halved the incidence of malaria and saved millions of lives. He recalled the President's invitation for nations, including the Soviet Union, which were not yet participating, to join in this international effort, and expressed the hope that many would do so.

The text of the Department of State's note of May 26, 1958, follows:

"The Department of State acknowledges the receipt of note No. 14 dated May 19, 1958, from the Embassy of the Union of Soviet Socialist Republics.

"The Department is gratified that the Union of Soviet Socialist Republics has found it possible to respond positively to the suggestion which President Eisenhower made in his State of the Union message on January 9, 1958, that the Soviet Union join with the United States and other nations in the existent campaign against malaria and in other campaigns against illnesses such as cancer and heart disease. As the Embassy's note states, the President's suggestions were discussed during the negotiations on the agreement between the United States of America and the Union of Soviet Socialist Republics concerning cultural, technological, and educational exchanges. It was agreed during the discussion that the exchanges of opinions on the President's suggestions would be continued. The agreement on exchanges between the United States of America and the Union of Soviet Socialist Republics in the cultural, technological, and educational fields, which was signed on January 27, 1958, provides for certain exchanges of medical delegations in 1958-59, reciprocal trips of medical specialists, and the exchange of medical films and medical journals.

"The Embassy's note contains certain specific proposals for further cooperative measures in 1958-60 in the field of public health. The note also refers to the World Health Organization as an organization through which the Union of Soviet Socialist Republics is prepared to cooperate with other nations in this field. The Department considers that some aspects of the proposals in the Embassy's note might most appropriately be discussed and carried out through the World Health Organization. At the forthcoming commemorative 10th anniversary session of the World Health Assembly at Minneapolis, the United States will have certain proposals to present relating to a cooperative program of research, with initial emphasis on cancer and heart disease. The United

States hopes that other governments, including the Government of the Union of Soviet Socialist Republics, will find it possible to support these proposals and to cooperate in the proposed program.

"Some aspects of the proposals set forth in the Embassy's note may not be encompassed by the cooperative measures which the World Health Assembly has adopted or may adopt. The Department is prepared to discuss these aspects of the Soviet proposals under the arrangements established for Soviet-American discussions of cultural, technical, and educational exchanges between our two countries.

"DEPARTMENT OF STATE, WASHINGTON, May 26, 1958."

[Unofficial English translation]

No. 14

EMBASSY OF THE UNION OF SOVIET SOCIALIST REPUBLICS.

DEPARTMENT OF STATE,
United States of America, Washington, D.C.

The Embassy of the Union of Soviet Socialist Republics presents its compliments to the Department of State of the United States of America and upon instructions from the Soviet Government has the honor to communicate the following:

During the Soviet-American negotiations about working out an agreement between the U.S.S.R. and the United States of America concerning exchanges in the field of culture, technology, and education, the question was touched upon as to whether the U.S.S.R. and the United States of America should agree upon uniting their efforts in the struggle against cancer, vascular heart ailments, and malaria, and it was agreed that an exchange of opinions on this question would be continued.

As is well known, the Soviet Union joined the World Health Organization for the purpose of cooperating with other countries in improving and preserving the health of all nations, and it also cooperates with other countries in the field of public health even outside the framework of this organization.

At the suggestion of the Soviet Union there were also included measures in the field of public health in the agreement between the U.S.S.R. and the United States of America for exchanges in the field of culture, technology, and education, which was concluded on January 27, 1958. In particular, the agreement provides for the exchange between the U.S.S.R. and the United States of America of medical delegations in 1958-59, reciprocal trips of specialists for giving lectures in the field of medicine, and the exchange of medical films and medical journals.

The Soviet Government considers that in addition to the measures which have been provided for by the said agreement, the Soviet Union and the United States might also agree on adopting other measures in the field of public health.

For the consideration of the Government of the United States of America the Soviet Government introduces the proposal to agree on carrying out the following measures in 1958-60:

Mutual exchange of plans and results of scientific research on the development of the problems of cancer and vascular heart ailments of scientific research institutes of the U.S.S.R. and the United States of America.

Periodic sending of leading American specialists in cancer problems and vascular heart ailments to the U.S.S.R. and of Soviet specialists to the United States of America for a more profound study of the setup of scientific research.

A mutual publication of works by American research men in Soviet journals and of works by Soviet research men in American journals on cancer problems and vascular heart ailments.

Organization of mixed Soviet-American groups for combating malaria and smallpox, to be sent, with the consent of the respective Governments, to the regions of Africa and South America where those illnesses are endemic.

The Soviet Government would appreciate a prompt reply to the above-mentioned proposals and, on its part, is prepared to examine the proposals that might be presented by the American side.

WASHINGTON, May 19, 1958.

[Signed] A. MENSHIKOV.

TESTIMONY BY DR. BORTZ

Senator HUMPHREY. We are happy now to welcome a distinguished physician who is not only a past president of the American Medical Association but a man who is world recognized as an authority on geriatrics and, but for the lack of better phraseology on my part, on "positive health," Dr. Edward L. Bortz.

Dr. Bortz is president of the Medical Staff of Lankenau Hospital in Philadelphia.

He has constantly been called upon by our government and by a host of private agencies for his wise counsel. He has previously given to this subcommittee his expert views in writing, for which I wish now to express publicly and personally our thanks. We are happy to welcome you in person, Doctor, and to have received your views and counsel on matters before the subcommittee.

STATEMENT OF EDWARD L. BORTZ, M.D., PRESIDENT, MEDICAL STAFF, LANKENAU HOSPITAL, PHILADELPHIA, PA.

Dr. BORTZ. Thank you very much, Mr. Chairman, for the privilege of appearing before this committee.

May I also extend my commendation to the chairman for his many efforts in behalf of medical research and congratulate him for his latest achievement in this field—the adoption by the Senate this week of two amendments which he sponsored to the mutual security bill. The first facilitates the use of some of our surplus currencies in foreign countries for this purpose, and the second provides for at least \$2 million to be used for field trials to ascertain the practicability of further programs of eradicating diseases, such as cholera, schistosomiasis, tuberculosis, and so forth.

It has been said that in the future, we will probably have two specialties in medicine—that of pediatrics for those from 1 to 50, and geriatrics for those from 50 to 100.

I think you have to admit that we are living in a rapidly changing world—a shrinking world. Man and his society are entering a new dimension of human experience.

While science is scanning the further reaches of outer space, the inner recesses of inner man are being examined with precision methods and instruments that promise amazing new insight into the finer mechanisms of living processes. From this significant new knowledge, a new kind of human being is emerging. He is living longer; he is staying young longer. All in all, he is potentially a stronger, more superior product.

The ongoing progress of science has conquered many diseases and maladies that, in former years, shortened human life. The result is a larger number of individuals are reaching the so-called later years of life.

CLASSIFICATION OF AGE GROUPS

Society is much perplexed about all these old people. For the purposes of study and analysis, they may be grouped into three categories.

First, the relatively small group of the aged and the infirm. This is a group requiring custodial care, nursing facilities, and subsidy.

These are the individuals who are living at the precemetery level. These are the living dead.

Second is the numerous group requiring medical services, for which rapid advances are being made in the better control of disease, more efficient restorative services. These services are daily being expanded.

The third group of older individuals is those in good health and for whom emphasis should be made on positive health, physical, and mental fitness. The major objective should be the promoting of individual potentials.

Priorities for research must be set up. The aged, the hopelessly deteriorated, the living dead should be given the finest tender loving care. They can appreciate these basic services. They cannot, however, utilize more. For them, the kindly act is to preserve them against the turmoils of the modern world.

Curative medicine—that is, restorative medicine—for the hospital population must be expanded.

NEED FOR IMAGINATION

Our greatest promise for a strong and mature future society exists in actively stimulating wholesome living routines that will bring about stronger bodies and finer minds. This can only be done by a realistic program with the selection of topflight priorities. Our entire educational philosophy is in sad need of drastic overhauling. We need a vigorous social catharsis. Our mechanical genius and wizardry are far ahead of our social wisdom. Our knowledge and know-how is far outdistancing our social customs. We are lagging. From our national leaders, we need creative imagination and intellectual daring.

George Bernard Shaw made the observation that "modern man is not God's last creation."

Man is changing. Experimentally, we can double the life span of experimental animals. If you will visit our research laboratories, we can demonstrate new techniques of adding quantitatively and qualitatively to the life span, not only of animals but also of man. Our Nation is overburdened with riches of every kind. We worship material success, bigness, speed. Yet, with our material abundance, we are being governed by a negative philosophy.

In terms of human welfare, we concentrate on repair work. We are fighting, at the present time, a receding battle.

We have been apologizing for people living so long and we would like to make their passing as easy as can be done, so they can withdraw from the living stream of usefulness, of useful existence as painlessly as possible at the prime years of their lives, around 60 or 70.

Unless we drastically revise this philosophy as a nation, we may face bankruptcy within a decade by the large numbers of older citizens that are with us, and are going to increase in number in the future.

NEED FOR ACTIVITY BY ELDERLY

These men and women can maintain good physical health but, for emotional and intellectual satisfactions, they need to be kept in the central stream of significant living. With longer life for the body, with more energy, maturing man needs new outlets for the additional power he is gaining.

Artificial barriers must be eliminated—for example, compulsory retirement, a totally outmoded practice today.

When man retires out of life, life retires out of him. To enjoy life a man must use his body or lose it. As a nation we can establish enlightened leadership in this changing world of fabulous human values. In this way, we can join with other nations in the establishment of international centers to carry on research, but of equal importance, to organize an energetic worldwide educational program to bring about a healthier way of life.

MAJOR TYPES OF DISEASE

At the biological level, there are four major diseases and deterioration that afflict man in the later years. The first of these has to do with the cardiovascular system—vascular deterioration that last year killed over 2 million Americans.

The second great curse is cancer. That killed between 260,000 and 270,000 Americans last year.

The third major condition is arthritis and rheumatism. And the fourth is nervous and mental disorders.

In all of these four categories, research is being carried on today of the greatest importance and significance and promise. I think that within the next decade or two, it will be commonplace for men and women to live the round century. If that is true, from what we know today, since the woman is stronger than the man, there will be approximately five women to two men reaching the century milestone healthy and hearty and, let's hope, well heeled.

OUTLOOK FOR 100 YEARS OF LIFE

So at the present time, we in our group are working on a blueprint for living a round century of healthy existence; we think that is in the cards within the next couple of decades.

We think that we need to observe the far horizon instead of only the immediate needs of emergency situations today in caring for our aged individuals. These people need immediate care. There is a pressure there that must be taken care of. On the other hand, in the future, in a decade or two from now, the better our research and the positive aspects of biological living and social existence today, the less will be the pressure from these elderly people.

I just talked with Dr. White this morning before the conference convened; I told him we were thinking in terms of a hundred years; he said, well, it would be better to plan in terms of 105 or 110 years, and then hope one could have a coronary about that time.

NEED FOR CULTURAL REORIENTATION

If we get control of these four major conditions, obviously we are going to have a huge number of individuals enjoying a spectacular quantitative extension of the lifespan. In order to have a vigorous culture in the future, we need a complete cultural reorientation today, to change the emphasis of our thinking from that of a youth-oriented society to that of a mature, age-oriented society; not only

concentrating on the individual, but on the family, because every sickness of an individual has an impact upon the family, particularly when the wage earner is involved. There is an impact on the family. So the modern approach medically is to study the individual within, and with, the family, too.

Also, chronological time is not nearly so important. The years an individual has lived are not nearly so important as the biological vitality of his tissues.

There are four basic tissues in the body that are being studied now, the tissues of the bones, the living bones; secondly, the muscles; third, the tissues of the vascular system; and fourth, the tissues of the nerves.

HAVING A POSITIVE APPROACH

I think that it would be very helpful if we, instead of being sickness oriented and talking about more doctors and more nurses and more hospitals and more of everything on the sickness line, if we oriented ourselves to the positive approach and thought more about being health oriented.

A distinguished teacher of mine, Dr. Hooten, at Harvard, the anthropologist, said that medicine today has a very myopic point of view, in starting at the autopsy and working backward, starting with a major disease and endeavoring to concentrate all of the majestic ability of science today, rather than starting with the healthy young individual and working forward. We think this comment has some merit.

A SECOND CAREER

Also, from thinking about the acute diseases to considering the long-term diseases; and, instead of talking about retirement, we believe that retirement should be eliminated at the age group that it is applied to today. Retirement should be moved back to 85 or 90. An individual coming to 60 or 65 years of age should be ready for his second career, and there is abundant evidence of that. If we were to retire all of our Congressmen at 55 or 60, how many would be left?

Well, we need to crystallize new broad objectives and through serving these goals we can bring about better international understanding. This will, of course, bring about finer relationships.

NEW VISTAS FOR BIOLOGY

There is persuasive evidence that the vitality and performance of body tissues may be extended and sustained by improved nutrition and exercise. For example, it is known that bone tissue and muscles, which constitute some 65 percent by weight of the body, can be maintained in excellent condition far beyond the usual experience of the average individual. Experimental evidence also indicates the importance of specific nutrients and exercise to the physical state of the walls of blood vessels of the entire body. Recent studies reveal that nerve cells, even when injured by trauma or disease, if not entirely destroyed, are capable of regeneration. This is a most significant discovery, made by Dr. Paul Weiss of the Rockefeller Institute.

The development of exquisitely refined techniques now available for research studies opens up new vistas for human biology. The use of radioactive tracers for the study of tissue nutrition and function (that is, exercise) offers promise of data of first importance concerning the maintenance of energy for the various body tissues. At the same time it furnishes insight into the nature of tissue deterioration.

RESEARCH IN OTHER LANDS

There is currently a great deal of research being carried on with focus on the biological aspects of human aging. Russia states they have thousands of centenarians and at the University of Kharkov they have some 6,000 being observed over a long period of time.

Sketchy reports from other Russian sources indicate their intense interest in this. In Scandinavia, Switzerland, Germany, France, and Great Britain, experimental observations at the basic and clinical levels are in process.

There is excellent work being carried on in the area of housing for the aged in those lands.

In our own favored land, there has been an almost explosive interest demonstrated in the infinite number of changes experienced by our aging population.

It is timely, therefore, that channels of communication be established between nations with qualified personnel flowing both ways. Exchange of ideas and observation of the various newly created precision techniques elaborated in the various scientific germinal centers would prove most helpful. A large amount of useful information intimately appropriate to the health, happiness, and welfare of older individuals is already available. Worldwide dissemination of this knowledge should prove most beneficial.

A long-range international research program mobilizing the best talents available would accelerate the discovery of new facts leading to a more efficient control of the diseases and deteriorations which affect aging individuals. This should be a continuing and long-range program supported by the leading nations of the world. Benefits in terms of more knowledge and understanding would become the property of all nations.

ENCOURAGING HEALTH

The tremendous savings in terms of human life, diminished disease, and a healthier citizenry are readily apparent. And this is the answer to the huge numbers of people in the hospitals today. It is my personal opinion that 50 percent of them should never be in the hospital, and we should very carefully review our ideas of encouraging people to be sick. Let's encourage them to be healthy.

Emphasis should be placed on positive health with priorities on nutrition, optimum function, and motivation. Already scientists of international renown are alert to the desirability of such a program.

World health in the future depends on the research of today.

Senator HUMPHREY. Thank you very much for your statement. Just one or two questions.

Are you satisfied with the degree of attention which the respective levels of government—Federal, local, and State—are paying to the problems of the elderly citizen or to the opportunities that should be forthcoming to the elderly citizen?

Dr. BORTZ. I think, Mr. Chairman, that convincing evidence of that is the White House Conference on Aging that will be held in January of 1961. All of the States now have conferences undergoing organization at the present time for mobilizing various major groups in society to look over the problems.

Now, these problems fall in certain general areas; that is, taking care of the aged. This is an immediate or practically an emergency situation, and all groups are now studying this problem.

IMPORTANCE OF EXCHANGE

We think that in the field of nursing homes and foster homes, a great deal of work can be done. We can learn also very much from Scandinavian countries and Switzerland and the Low Countries and Britain, how they are studying and solving these problems and taking care of elderly people. There is an amazing acceleration of scientific research today on four basic problems, having to do with vascular deterioration, arthritis, and rheumatism, and so on, being supported by the NIH. This is a most commendable procedure. If this could be extended on a worldwide basis, and we had a closer collaboration and interchange of students at various levels, the graduate level, the fellowship level, and the research level, whereby we could send our students and investigators abroad to Russia, to Scandinavia, to Britain, to Switzerland, and so on, and they, in turn, would send their students over here, this would be mutually beneficial. This would have both a direct and an indirect impact, we believe, sir, on the area of darkness and misunderstanding that presently exists. We think that art and science are the two major ways of approaching a better understanding, intellectually and culturally, in these fields of the different countries.

I think that our Government is doing a great job and your interest in promoting medical research is a very significant and inspiring factor.

Senator HUMPHREY. Thank you very much, Doctor.

Another question comes to my mind that was brought about by your statement here as to a change in emphasis, cultural reorientation. I thought that was a very compact statement and package of the changes that may be required and should be required in the present and in the days to come.

TRADE UNION INTEREST

We hear much, for example, on the part of organizations that are concerned about the welfare of their membership. For example, our trade unions are deeply concerned about hospitalization and welfare services, seniority, retirement; many times here in the Congress, we have long discussions over retirement plans for our civil service employees.

Do you feel that there ought to be more emphasis not only upon retirement, but beyond retirement and into the field, let us say, of recreation, new avocational opportunities? What is your view on this?

I gathered from what you had to say that there is a new emphasis, you believe, that is required even among some of the going, established institutions and organizations of our country.

MANY SCIENTIFIC INTERESTS

Dr. BORTZ. Mr. Chairman, I think it would be fallacious to think that certain organizations, such as the labor unions, are the ones that have a monopoly on welfare. Medical science, the anthropologists and sociologists have been interested. I think my professional activities have been in the welfare of the individual. So let's not have one individual or particular group take to itself the responsibility for welfare.

The greatest welfare, we believe, for older individuals, granted that they have healthy bodies (if they will take advantage of the information that is available), is to keep active physically and mentally. We think this ought to be taught in the school systems of the Nation today.

As individuals are growing older and maintaining vitality and vigor in the 60's, 70's, and 80's, for them to be retired out of significant work is a most unfortunate trend that should certainly not be encouraged.

What we have to do is to find new areas of useful activity. After all, in the last analysis, to live a meaningful life and to enjoy the harvest years, the mature years of human existence, individuals should participate in the meaningful activities of their communities, society, and government, if they have better bodies than our forefathers had, which they can have because of our increased knowledge of nutrition and exercise. Physical fitness for an individual whose genes have given him a good body, depends on proper nutrition, and proper exercise; that is the reason the doctors today are urging patients out of bed in hospitals. A normal individual, if he spends 3 days in bed, will become weak. If he is an older person, he would say he is weak because he is old, and he can't do it. It is ridiculous. It is because he hasn't exercised; physical activity is a basic necessity for the four tissues I have alluded to—the bones, the muscles, the vascular system and the nerve cells. For them to be kept healthy, they must have proper nutrition. Overnutrition or supernutrition does not make supermen.

It is easy to recommend a program that can keep these individuals healthy; what if they do have healthy bodies and a ready mind and they are then retired; we think this is one of the important barriers to living effectively in the later years.

NEW BLUEPRINT FOR LIFE

So far as I am personally concerned, sir, I would eliminate such terms as "emeritus," "retirement," and so on. We are working now on a program, a blueprint, a timetable for living 100 healthy years; we are dividing it into trimesters from 1 to 30, from 30 to 60, and from 60 to 90.

In the first trimester, from 1 to 30, the youngsters should be schooled in the basic facts of life, and in the latter part of the trimester, from 15 to 30, they should learn some profession or life work.

Then, from 30 to 60 would be the time for them to establish themselves in their life work, or profession, and also establish a family and their social contacts; at 55 to 60 or 65, from that to 90, they should enter their second career. We believe we know enough today to encourage people to the long-range view of living 100 years and planning really for the second career rather than retirement.

Senator HUMPHREY. Thank you, Dr. Bortz. I am just fascinated by what you have to say. I hope you didn't feel that my question was intended to indicate that only one group had an interest in welfare. What I was concerned about is the emphasis upon the re-reorientation of our cultural pattern that you give to us. This is one of the first times that I have heard it, and it is very exciting. It makes one feel better, particularly when you get over 40, you like to hear things like this. I imagine over 50 you like it even a little better, and over 60 it becomes really quite fascinating.

Dr. BORTZ. We think that young people should look forward to the days of maturity, mature existence, when life should have its richest values for them.

Senator HUMPHREY. Maybe then Shaw's statement that youth is too good to be wasted on the young is going to have real practical meaning.

Dr. BORTZ. That is right.

Senator HUMPHREY. Senator Muskie.

Senator MUSKIE. I have no questions, but I want to second the remarks of the chairman. This has been refreshing and inspiring to be exposed to your point of view. Someone said you shouldn't complain about life too much because you will never get out of it alive. I wonder now if we follow your point of view if we can't get out of it alive.

Dr. BORTZ. Senator, we are making it much more difficult today for people to die, and you might as well get accustomed to living. We also think that one man on his feet is worth three on their seats.

We think this is very important.

Senator HUMPHREY. You don't mind if we try to claim that as original, do you, for us?

Senator Gruening.

ARBITRARY RETIREMENT AGE

Senator GRUENING. Dr. Bortz, I too was very much stimulated and enlightened by your very excellent presentation. I noted under your various headings for cultural reorientation, the third, chronological time versus biological time, also, the sixth, retirement versus the second career.

Do you know whether any comprehensive studies have been made of the effects, medical and social and economic, of these arbitrary ages that have been established in our country by universities and corporations and in government and in business? Has there been such a study made?

Dr. BORTZ. Yes, Dr. Gruening. There have been a number of observations made and Consolidated Edison has observed some of their men who have retired. There are various experiments going on now at the present time with reference to young individuals who are going to be retired. The Cornell study on retirement is another.

I could cite many. This is one of my minor enthusiasms, because I think we should think more about maintaining the physical vigor of individuals and, for them to have a motivation, an all-absorbing motive to live. We think that the essence of maturity is for an individual to have his talents and abilities focused on socially valid activities.

Senator GRUENING. My question wasn't particularly directed at any particular studies in any one corporation, but at the general idea which has been pretty well adopted that at the age of 62 or 65 you have to get out, you have to quit, no matter how able the man might be mentally and physically, and whether this concept challenges it, or whether the study of it doesn't come under the heading of your No. 3, chronological versus biological time.

Dr. BORTZ. Yes, sir; this is true, Dr. Gruening. At our research in Lankenau Hospital in Philadelphia, we are working on an index of aging in addition to this timetable of living 100 healthy years; we find there are individuals who are old at 45 and individuals who are young at 85. I recently had a man of 104 in my office. He was working regularly, but he complained about being a little tired in the latter part of the afternoon and wanted to know whether he was slipping.

I asked him whether he had ever been sick before, and he thought about it and said, "Why, yes."

I asked, "When?"

He said, "One hundred two years ago."

Senator GRUENING. I have made the discovery that by and large the only occupation that one over 65 can safely enter is an elective office, and that entails certain risks, naturally. I think it is regrettable that so many fields of endeavor are arbitrarily closed.

Dr. BORTZ. All around, you see there is abundant evidence of the importance of keeping active in meaningful activities. This is one issue about which I gently chide the old age groups. Recreation is not enough. To live meaningfully and for life to have significance, satisfactions are in terms of achievement and usefulness and independence.

We believe that a philosophy of government which encourages individuals to become inactive at a given age is dangerous, particularly in view of the increasing number of individuals who are going to live into these higher years. I think it is going to be a commonplace to live up into the eighties and nineties within a decade or two.

I think we need to take this long-range viewpoint. It is not enough to talk about what we need today and what was done yesterday because times are changing; research studies are continually being refined, so that we are more and more becoming masters of our own destiny.

Therefore, it becomes tremendously important since the mind is the measure of the individual. It becomes tremendously important that we keep an individual's mind active because if he loses his mind, then he becomes one of the living dead, as you know. We want to curtail this group as much as possible. We think that this can be done by a positive approach.

Senator GRUENING. You have opened up a most stimulating vista. Thank you.

Senator HUMPHREY. Thank you very much.

Doctor, I might add that while the only occupation that may be available to those 65 or over, according to my distinguished colleague, the Senator from Alaska, is the elective office, those of us who are a little younger confront the seasoning, the experience and the accumulated wisdom which comes with that age of some of those who run for elective office, and are placed in a very unhappy situation on occasion.

You see what I mean. I have watched this man operate.

ARTICLE BY DR. EDWARD BORTZ AND BY DR. WALTER BORTZ

Before concluding with Dr. Bortz, I should like to say that he has given of his time most generously in cooperation with us. Our project director, Mr. Cahn, has visited with Dr. Bortz, in Lankenau Hospital, Philadelphia. There, he saw the marvelous new facilities which are being developed under Dr. Bortz' leadership. It is apparent that these facilities already represent an enormous asset to world medical research.

Dr. Bortz through his writings and lectures, has moreover carried the story of gerontological research throughout our Nation and the world. I believe that it will be extremely useful to have for the transcript the text of one such article in the current issue of "GP" magazine which he wrote with his son, Dr. Walter M. Bortz, on the theme, "Major Issues of Aging."

(The article referred to follows:)

MAJOR ISSUES OF AGING

(By Edward L. Bortz, M.D., chief, medical service, the Lankenau Hospital, Philadelphia, Pa.; and Walter M. Bortz II, M.D., resident in medicine, Charity Hospital, Louisiana State University, New Orleans, La.)

Old age is a natural period of human existence. It is inevitable when individuals survive the innumerable diseases and deteriorations which, since the beginning of time, have eliminated others from the world of the living. Whether the later years are to be productive of continued enjoyment and usefulness to society depends primarily on the individual himself and, secondly, on the supports which the family and society may furnish. A positive philosophy becomes essential in order that the dullness and boredom of advancing years may be kept to a minimum.

In a U.S. census report of 1900 compared with 1955, there has been a trend of increase in the population age 65 and over, from 4.1 to 8.5 percent. In this same period the number of individuals over 65 has increased to 12 million, or approximately 9.5 percent of the total population.

The rapid progress of science in bringing one after another of the common diseases and deteriorations under control in the mid-20th century now promises that more and more individuals are going to reach the century mark. This growth undoubtedly will have far-reaching consequences in all phases of human experience.

Man's hope for long life is noted in the most primitive biologic drive of nature—the instinct for self-preservation. If he escapes the violence of social conflicts, traffic crashes, and wars—and even more destructive, personal over-indulgences and underexercise of body and mind—mid-20th century man now is capable, by the application of new techniques, of further extension of his life span; he is gaining control of his own destiny. He now has implements of much greater efficiency for further modification of environmental factors.

Medical science is probing the dark recesses of the various maladies, infections, maladjustments and deteriorations which threaten the life span. A better appreciation of the importance of nutrition, immunization against infections, the

need for exercise of body and mind, the importance of rest, the significance of intellectual growth and social participation—all are valuable factors in bringing about a more vigorous life in the later period of human existence.

SOCIOLOGIC ASPECTS EMPHASIZED

Social and economic aspects of aging have received a great amount of attention during the last decade. The political pressure of large numbers of elderly citizens has forced the hand of those interested in the sociologic phases of our aging population. Accordingly, attention has been focused on income maintenance, housing, and specialized institutional care, education, recreation, and the social services. The rapid increase in need for hospital and nursing care of the elderly has been a problem of major concern of all facets of organized society. At present, many experiments are underway concerned with the health, welfare, happiness and security of the elderly.

Physiologic studies on total performance capacity, circulation response and health maintenance are receiving more and more attention in the scientific centers of the Nation. Practically all research in the biologic, psychologic and sociologic fields touches some phase of aging. This is recognizable in data bearing on life extension, improved health and living conditions which tend to influence the health of older individuals.

In the United States there are two organizations dedicated specifically to the study of aging, the Gerontological and the Geriatric Societies. The former includes not only qualified scientists and clinicians but in addition sociologists, economists, social workers and informed private citizens. The Geriatric Society is a medical organization primarily, with a membership of over 3,000, with the focus on clinical practice and research. Each of these societies has its own journal.

In other nations throughout the world, groups have become organized and are collaborating with each other through the International Gerontological Society. This organization meets every 4 years.

The American Medical Association in 1955 created a committee on aging. This committee has been active in stimulating interest on the part of medicine, with special reference to the medical needs of those over 65 years of age. The responsibility of physicians for the health and vitality of older citizens has long been recognized by organized medicine.

A timely development has been the forming of a joint council for the medical care of the aged. Four organizations making up this group are the American Medical Association, American Hospital Association, American Dental Association and the American Nursing Homes Association. This council is cooperating with other groups, medical and paramedical, and also with the Federal and State Governments, on behalf of a more effective broad medical service for older citizens. Through subcommittees and special groups, the council is acting as a clearinghouse for supplying information and stimulating research.

The broad spectrum of human aging includes a great many areas of first importance to physicians. Nevertheless, there are certain primary issues that should be given priority. The better the health of older citizens and the better their medical care the less time will be spent in the hospitals. The better they are integrated into society in productive capacities the less need will there be for financial assistance.

MATURITY VERSUS SENILITY

Aging is the phenomenon of change with passing time. The science of aging is the science of life. The dynamic progress of biologic processes involved in growth and development of the individual is set in motion with fertilization of the ovum and ceases when death occurs. There is a rhythm to human existence for the entire organism in the growth, development and recession of various specific tissues such as the thymus, the sex glands and the cells that make up the other tissues and organs of the body.

"Aged" as the end phase of growth, development and senescence, may connote the attainment of a mature state of being. Aged in the wood has a pleasant flavor to recommend it.

Aged implies the end state of living when vital powers have been exhausted and a sense of completion, of being finished, marks the individual.

Accordingly, search for a clearer understanding of the dynamics involved in nutritional maintenance, homeostasis, tissue vitality and repair becomes of first importance. Extension of human life is brought about by the control of disease, deteriorations and destructive agencies that destroy human tissues.

A measure of aging is an appraisal of the kinetics of decline of body vigor and motivation. Determination of the survival potential of an organism's tissues is a crude estimate of how long and how well an individual will live. Much that is interpreted as aging is but a particular aspect of development.

The human body is an amazing mechanism capable of self-recharging; while degradation of tissue is going on, an attempt at renewal exists. To a considerable extent, aging depends on the relative rate of these processes. From a recent report of the National Committee on Aging, it is pointed out that to prevent the added years of human existence from becoming a prolonged period of dying it is important to expand research on the physical, psychologic and sociologic factors in aging and in diseases common among middle-aged and older persons.

It can be predicted that the average length of life and the number of older people will increase still further. It is necessary, therefore, to proceed with all possible speed to control the diseases and deteriorations that come with age. It also is necessary to create a social, economic and health climate which will permit our middle-aged and older people to continue to lead proud and independent lives which will restore and rehabilitate many of them to useful and dignified positions among their neighbors; which will enhance the vigor and vitality of the communities and of our total economy; and which will prevent further aggravations from increased social, financial and medical burdens.

Areas of importance to medicine may be subdivided in three categories:

1. Care of the aged, those for whom life is far spent and the ability to adapt is lessened; a vegetative existence is all that remains. The kindly protection most required is that of supplying the basic needs of the body by nursing care. Elaborate housing facilities for this group of the elderly is inappropriate and unnecessary.

2. Curative medical care of older individuals. This embraces the current practice of medicine—repair and restoration, insofar as possible, of broken bodies, organs and spirits.

3. Positive health. The prevention of disease and the encouragement of energy maintenance and specific motivation represent a new field of great potential for aging man.

VAGARIES OF VITAL STATISTICS

The most common pathology of individuals in the later years involves the vascular system, neoplasia, skeletal system (osteoporosis, osteoarthritis) and nervous and mental disorders. A comparison of the most common causes of death in 1900 and those 50 years later indicates a rapid increase of the fatalities due to disorders of the circulation. The variety of diagnoses listed on death certificates include arteriosclerosis, hardening of the arteries, cerebral thrombosis, cerebral complications, coronary occlusion, myocardial infarction, hypertension, diabetes and other vascular diseases. The morbidity and mortality of all of these conditions have a common denominator, that is, a pathologic condition involving the vascular system.

Scientific progress has amassed a huge amount of valuable information. In order to derive maximum benefit from already available knowledge, simplification and clarification of statistics wherever possible should be established.

There are many different types of neoplasia. A more accurate classification would, no doubt, reveal a higher death rate than that in current vital statistics tables. The cause of cancer is not known. The American Cancer Society and leading authorities state that if the diagnosis were made earlier and adequate therapy instituted, a substantial number of lives now being destroyed could be saved.

CELLULAR AGING

The cells in the human body are in a perpetual flux of concurrent degradation and renewal; cells exist in a state of perpetual reorganization. The old man is not the same individual he was in his youth, for the material of which he is

composed is continuously being replaced by new material molded to the same shape.

Within a single person the process of aging acts at different speeds. Cowdry further points out that the coronary arteries seem to age more quickly, and the ovaries become senile long before the other endocrines.

The human life span, which many authorities now place at about 100 years, will be extended as the common diseases of deterioration which destroy life are brought under control. The possible life span of the several systems is different from that of the whole body. Friedenwald believes that the possible life span of the tissues of the human eye may be about 120 to 130 years, if the body itself could last that long. Weidmann has shown that the skin on the body of a man of 85 affords the same protection as it did at the age of 20. Cowdry has suggested that the epidermis in the healthy individual may have a life span exceeding even that of the human eye. He points out that there are reservoirs of cells that never age, such as those in the bone marrow.

Warren Andrews, in discussing the cellular basis for aging, also is impressed with the fact that cells and different tissues of the human body have a different life span. The cells of the nervous system have a duration of many years.

Important new data refute the long-held view that nerve cells, because of their high specificity, are incapable of division. Older textbooks presented the impression that the cells of the central nervous system were stable in number from the time of birth throughout the life of the individual. Andrews describes experiments with nerve cells in mice in which there was a tendency of nuclei and cell bodies of the nerve to divide. Observations by Weiss, Windle, and Andrews prove that the neuron is capable of regeneration following injury. The neuron has demonstrated an unsuspectedly rapid turnover of protoplasmic constituents. Weiss indicated that nerve tissues have a great propensity for regeneration.

Throughout the life of an individual the cells which make up the nervous system keep renewing their substance in a kind of adaptive process. Aging of nerve tissue, according to Weiss, is by no means a loss of physical substance but rather a matter of inadequacies and incongruities performed in the renewal phenomenon, with subsequent decline of the adaptive feature. The possibility exists, therefore, that under optimum conditions of nutriment supply and performance, the life of the nerve cell, in theory at least, can be extended. The nucleus and cell body of nerve cells enlarge in response to excessive functional bombardment. Neurons deprived of excitation atrophy. Nerve cells exist in a state of perpetual regeneration, and cell sizes vary throughout life. The cells are in perpetual renewal; therefore, they are capable of mutation both in adaptive and regressive direction. There is instability of the molecular life below and plasticity on the supracellular level above. Regenerative growth of the nerve fiber is a permanent feature of neuronal life as long as some contact exists with the cell body.

At present scientists in many laboratories are studying one-celled animals and others with relatively few cells. In certain protozoa and metazoa the life history is variable. Individual life ends for the protozoa not by death but by fission, where from one individual two individuals are formed.

THE AGING SKELETON

Since Virchow opened a chapter on connective tissue, knowledge has continued to accumulate with reference to the skeleton and its disorders. Osteoporosis and arthritis are the most common disorders of the skeleton in older persons. The refinements in research techniques, while they have added much in basic knowledge, have not carried over into clinical practice. There is a lag in the application of information which is bound to prove helpful when applied clinically.

The new techniques of studying the structure and function of ground substance, organized by Karl Meyer, focus attention on the ultimate site of degeneration in osteoporosis and arthritis. Colloid chemistry is deeply involved in the degenerative disorders of bone tissues. The mucopolysaccharides and mucoproteins, fibrillary elements and collagen are under examination.

TABLE 1.—10 leading causes of death in the United States per 100,000 population

Rank	1900		1946		1957	
	Disease	Number	Disease	Number	Disease	Number
1.....	Tuberculosis.....	195	Diseases of heart.....	307	Diseases of heart.....	369
2.....	Pneumonia.....	176	Cancer.....	130	Cancer.....	150
3.....	Diarrhea and enteritis.....	140	Accidents and violence.....	88	Accidents.....	57
4.....	Diseases of heart.....	137	Cerebral hemorrhage.....	78	Diseases of infancy.....	39
5.....	Nephritis.....	89	Nephritis.....	58	Pneumonia.....	32
6.....	Accidents and violence.....	88	Pneumonia.....	38	Arteriosclerosis.....	20
7.....	Cerebral hemorrhage.....	77	Tuberculosis.....	36	Diabetes.....	16
8.....	Cancer.....	64	Premature birth.....	29	Congenital malformations.....	13
9.....	Bronchitis.....	45	Diabetes.....	25	Nephritis.....	10
10.....	Diphtheria.....	40	Arteriosclerosis.....	17	Tuberculosis.....	8

Source: Public Health Service, Department of Health, Education, and Welfare.

The diagnosis of osteoporosis and osteoarthritis is made by radiography, which reveals thinning of bone cortex, expanded intervertebral discs, and collapsed vertebrae. These conditions set the stage for frequent fractures in the elderly. At the October 1958 symposium on "Bone as a Tissue" at the Lankenau Hospital, authorities from various parts of the world presented results of negative calcium balance, either due to low intake, malabsorption, or hypercalciuria. Whedon believes that in paraplegics osteoporosis of disuse may result from neuroendocrine factors. Reifstein is of the opinion that endocrine imbalance in old age is but one of the factors in the production of osteoporosis.

A healthy old age can be reinforced by a rugged skeleton. M. R. Urist reports that nutrition of calcium is a secondary factor insofar as low intake or malabsorption exists. It may accentuate the condition in those susceptible to osteoporosis. Normally the body has a capacity to adapt to low calcium intake in several months; however, this may invite trouble.

At present the literature on osteoporosis shows the majority of authors in favor of endocrine imbalance rather than calcium deficiency as a primary factor.

Until definitive information becomes available, the aging individual should have an adequate calcium intake of at least 1 gram per day. In addition, an adequate well-balanced diet and other nutrients are necessary. The use of hormones can be determined only by the needs of each individual.

The bone cell, like the nerve cell, is in a continual state of flux throughout its life. The cellular activity of the skeleton is dependent on endocrine function, nutriment, and exercise. The work of Albright, Reifstein, and their co-workers has shown control of bone metabolism to be a function of the parathyroid glands. Deficiency of knowledge exists concerning the primacy of calcium in the diet and bone structure. The aging skeleton tolerates inactivity badly and osteoporosis, the result of disuse, is widely observed. Suggestive evidence now at hand indicates that the brittleness of the aging skeleton can be in a measure controlled by diet, exercise, and glandular supplements.

AGING MUSCLES

Physical fitness is the ability to maintain normal equilibrium during strenuous exercise with minimum deviation from the resting state. After vigorous activity, prompt restoration of basic conditions is noted. A person with high physical fitness will be able to fulfill tasks involving physical activity more effectively and with less effort than a person with low physical fitness. Human tissues are created for performance.

It is possible to measure performance capacity under varying degrees of stress. Åstrand, by the use of the bicycle ergometer, studied maximum oxygen intake, blood lactic acid concentration, heart rate, pulmonary ventilation, and electrocardiographic tracings in a group of males ranging in age from 25 to 70 years. While there is a diminution in the performance capacity with advancing age, training can improve performance in older bodies; the more a muscle is kept

active the better its ability to perform. Alternating rest periods add to the performance durability of the older individual. A high standard of physical health means that the individual can carry on heavier muscular exercise for a long period of time. These observations point to the advisability of aging individuals to maintain their muscular equipment in good tone.

Åstrand emphasizes that organs (muscles) are created for an activity level much higher than the basal metabolic rate. Experimentally, it is essential to know the maximum activity level of healthy, normal subjects of different sex and age. This represents valuable information with reference to circulatory and respiratory function or insufficiency in health and disease states. The capacity for physical work in industry can be determined by methods devised by the Åstrands. Useful information of the body as a muscular machine pertains to its ability to perform prolonged work. Obviously overstrain, especially in an older body, may precipitate serious consequences. Testing an individual's capacity is a desirable and practical prophylactic measure. The capacity of oxygen intake is of first importance; the level of the blood lactic acid furnishes a valuable control for the degree of exhaustion. The diminished heat output of older people is ordinarily the result of less exercise.

Quantitative measurements of the strength of various muscle groups shows a gradual decrement with passing time. More reliable data may be forthcoming as more refined methods are developed to measure the stamina of various muscle groups under controlled conditions of tension. The peril of disuse should be kept in mind. Lack of exercise, it would appear, invites atrophy, a condition synonymous with the decrepitude of old age.

THE AGING VASCULAR WALL

Paramount in discussion of aging tissues is consideration of the vascular system. A logical argument can be made out that all age changes actually are secondary to compromises in the circulation. The relative position of the dividing line between physiologic and pathologic processes in arteriosclerosis is important. Lansing and others have studied alterations in the vessel wall which appear with the passage of time. The mechanistic theory of thrombosis-induced arteriosclerosis sponsored by Duguid is somewhat in this area of age change as well. Changes in the intima have been seen even in infants; studies of the vasculature of young Americans killed in battle showed much premature change. However, even acknowledging to the fullest a chronologic factor, the real scourge of atherosclerosis appears to be primarily a disease process. If it is not initiated as a disease, at least it is perpetuated as such.

Many factors are operative in atherosclerosis—heredity, sex, exercise, associated disease states, blood pressure. Yet when factors which can be corrected are accounted for, there still remain many Americans crippled and killed by the disease for which some other factor must be held accountable. At present, the most likely explanation available is that of diet. We are certainly in an era of public awareness of all diseases—of this one in particular. Enthusiasm has engendered premature statements; confusion has followed. From controlled studies it is evident that dietary fat is of prime importance in atherosclerosis. The quantity eaten has been amply documented by Keys as a basic factor. The quality, that is, degree of saturation, has more recently been implicated by Ahrens, Bronte-Stewart, Kinsell, and others. Morrison has demonstrated the prophylactic benefit to be derived from a low-fat diet in a group of coronary patients. Other similar studies are becoming available.

Behind such clinical work lie exacting explorations of metabolism. Siperstein, Chaikoff, and Gurin outlined details of tentative pathways. Emphasis now has shifted from qualitative relationships to precise quantitative measurements of mass action effects of body nutrients. The recent discovery of the mechanics of the hexose monophosphate shunt and their application to vital problems is a great advance in knowledge.

Evidence is accumulating that a more generous use of nonesterified fatty acids in the diet will act as anticholesterolemic agents and have a controlling influence in the preservation of the vascular wall.

Dietary fat has been accorded a central role in the pathogenesis of atherosclerosis. It has not been until recently that the qualitative, as well as the quantitative, aspects of fat ingestion have been appreciated. The final practical application of this appreciation to the processes of human atherosclerosis is not yet clear. However, in experimental animals the deposition of arterial plaques

has been shown to be markedly affected by the fat type as well as its abundance. In addition, in human and animal studies the serum cholesterol levels are seen to be influenced by alteration in the types of dietary fat provided.

Strict vegetarians have been noted to exhibit low serum-cholesterol values. Schonheimer is said to have advised his patients with elevated cholesterol levels to adopt a vegetable-fat program as early as 1933. Others came to this realization as well, so that a few years ago mention of the relative value of vegetable fat in contrast to animal fat was commonplace. Initially, vegetable fat was considered to be merely not so atherogenic as the animal counterpart, but the concept soon evolved that vegetable fats were not only less harmful but that they exerted, in some way, a protective influence against deposit in the arteries. The possibilities that this was due to the presence of cholesterol-inhibiting sterols or to phospholipids were discarded in favor of that of the unsaturated fatty acids. Nearly all studies on this subject have been directed toward the correlation of the iodine number of a fat with its effect on atheroma deposit and/or serum cholesterol levels.

The early studies on the nature, role and importance of nonesterified fatty acids by Gordon, Dole, and Havel are representative of the information which is sure to follow.

Twenty rabbits were fed high-cholesterol diets, with 12 receiving a supplement of fatty acids with varying amounts of saturation, by Bortz, Larsen, and Civin.

Those that received the unsaturated fatty acid supplements developed distinctly less atherosclerosis than those fed cholesterol alone or cholesterol plus a saturated fatty acid.

The unsaturation appears to have increased the serum cholesterol levels above the levels of the animals fed cholesterol alone or those with a saturated acid addition. No alteration in serum lipid phosphorus or total serum lipids is apparent.

Progress goes forward on a broad front. It is not premature to urge application of the precepts described above. Restriction of saturated fatty acids in diets and incorporation of unsaturated fatty acids should prove of immense value in protecting the aging vascular wall.

MALE AND FEMALE AGING

Nature apparently places a higher value on the female, the mother of the species, than the male. The more fragile male fertilizes, the female nourishes the individual and the race. The female is anabolic, the male, catabolic. The female conserves, the male spends. The sperm searches for the egg, the egg awaits the sperm. The female body appears to be more complex, especially in its glandular equipment. The female usually requires more repair work. However, while her body will bend, the male body will break. The female can withstand more abuse possibly because her cellular constitution has a greater reserve capacity built into it.

In a comparative study of the life records of some 41,000 Roman Catholic celibate educators in the United States from 1900 to 1954, F. C. Madigan found that although their life expectancy was greater than those of the general white male population, it was exceeded by celibate white women in relatively comparable conditions of stress and demand. If this trend continues, as more and more of the population attain a round century of the lifespan, women will outnumber men by the ratio of approximately five to two.

Sex potency waxes and wanes in both male and female. The tempestuous drive of early adult life seems to be at its height with optimum ability of both male and female for reproductive purposes. Beyond climacteric, sex potency exists in variable forms and interest. Goethe, when in his seventies, wrote, "Every man is an Adam for he is sooner or later driven out of the Paradise of the warm emotions." The stimulation of specific (sex) tissues to action by hormones (testosterone) may produce temporary potency at the expense of myocardial and liver (focal necrosis) damage. Reproductive capacity of the female may persist into the later years. A recent report from England testifies that a woman in a small village became pregnant at 75. Another report from South Africa announces the birth of quadruplets, three boys and a girl, by a 51-year-old African woman. All were doing well after delivery.

Sex allure may be enhanced by maintenance of resilient physical fitness (muscular strength), tissue tonicity (avoidance of tissue relaxation) and attractive grooming. Sex attraction need not entirely disappear in later life, provided the intangibles of relationships and body vitality are maintained.

PSYCHOBIOLOGY OF AGING

The psychobiology of aging is an area in which explorations have thus far not attained the accomplishments made in studies of somatic processes.

Aging is a normal phase in the life of the individual that has been preceded by infancy, childhood, adolescence, adulthood, and the middle years. Each of these has its own unique qualities with reference to growth and development. In each of these periods, there may be specific recession, the result of a disease process.

Considerable research work has been carried on to try to evaluate behavior, attitudes, and motivation. The results thus far are not convincing; so many variable exist that progress has been slow. Many misconceptions exist in the popular mind with reference to senescence and decline; these should be reevaluated.

In discussing the performance of older individuals on the basis of the abilities of younger persons, we attempt to measure the ability of the older person only on the basis of those possessed by a younger man. We should include the assets which the older man has acquired which the younger man does not yet possess. Indeed, many of the abilities of the young workingman are those which have with the machine age become of considerably less importance. Physical strength, speed, and the capacity for prolonged physical endeavor may be essential for the performance of heavy tasks. In an age rapidly becoming mechanized even with respect to the trivia of life where automation has applied greater skill and accuracy, the physical power and dexterity of the young workingman becomes of less importance. Indeed, it would appear that the mature, older individual, as the result of knowledge and experience, may well become of greater value to industry than he was in the simplified mechanical era of former years.

NERVOUS AND MENTAL DISORDERS

The cause of mental deterioration in the elderly is as yet an unsolved problem. It has been shown that satisfactory mental function may occur even with advanced brain pathology; conversely, many individuals with no demonstrable lesions in the nervous system have become mental invalids.

In a review of current psychologic trends, Dr. Howard P. Mitchell has indicated the trend of current investigations.

Psychologic research in gerontology first centered upon the assessment of changes brought about by age in intelligence, perception, memory, and mental efficiency. Results of these efforts first suggested a marked deterioration in old age of all psychologic components evaluated. In the last 5 years investigators have begun to realize that much of the earlier findings pointing toward rapid decline in abilities were obtained from restricted samples of aged individuals and were not truly representative. The samples were biased in that they were principally composed of aged individuals available for study in our institutions and hospitals. As Lorge points out, "a significant step in the growing sophistication of psychologic research in this area has been the increased emphasis given to reducing the possibility of bias in the sample tested or appraised during recent investigations." Therefore, recent studies now suggest that there is a slow but steady decline in intellectual abilities from age 20 to 60, with a slightly increased rate of decline after 60. Moreover, Bayley and Oden's investigation of well-educated, intellectually active adults suggests they not only do not lose their verbal skill but they may even improve with age. There has also been strong argument in favor of studying aging from the developmental point of reference, and as a process closely related to other life processes and not an isolated pursuit. The recent work of Pressy and Kuhlen adopts this developmental perspective and traces many interesting aspects of "Psychological Development Through the Lifespan."

If it is our goal to aid the increasing millions past 50 to achieve a more meaningful adjustment to longer life, then some facts emerging from the social, psychologic, and sociologic studies are important to us. Distinctive contributions to understanding the nature of the development and decline of abilities also have been obtained from studying extreme manifestations of them—in outstanding

accomplishments and mental illness. Notable on the one hand is Lehman's comprehensive study of the age at which outstanding people have made their creative contributions. The results suggest: "The lengthening of life in modern times (and the increasing complexity in such fields as science) does not seem to postpone the age of best creative effort or lengthen that period. Instead, it has recently tended to come earlier, perhaps because of better opportunities. Somewhat in contrast, great leadership comes at later years—military leadership most often appearing in the forties and political and business leadership in the fifties and sixties." Development and change in the nature of abilities through adult life seems clearly indicated but we know little about such change relative to different levels of attainment.

Mental illness, largely absent in childhood and early youth, grows steadily in frequency in earlier adult life, hits a plateau in the middle years but mounts rapidly in old age. Study of individual cases points out that contributing factors are constitutional inadequacy or instability and identifiable physical disease. Moreover, it is becoming increasingly evident that largely controllable stresses of life play at least a precipitating part.

Some of these stresses are sociologically and culturally determined. Havighurst reports in *The Sociologic Meaning of Aging* that social competence varies as a function of its usefulness in society. The extent to which a society continues to expect a man to contribute to his and the community's welfare through his independent efforts will affect the degree to which he feels competent. This raises the question of the great need of psychologic studies of motivational patterns in aged people. We agree with R. E. Tunbridge that such studies might well begin with those reaching the later years successfully. We need to know more about the man who continues to have wide interests and has full retention of his faculties as he reaches old age.

W. W. Morris, of the State University of Idaho, has likewise said that while some slowing of mental process occurs in the elderly, there are compensatory values which more than offset this. He agrees that while there may be some real decline, it cannot be regarded as the general rule for psychologic processes.

THE HISTORIC PERSPECTIVE

The changing attitudes toward the elderly are clarified by noting the respect shown them in different cultures through the ages. In primitive times there were no gerontologists. Attrition of the aged might be described as geriatricity, with somewhat different connotations from the title of the modern specialist. Life was rugged and dangerous at the dawn of history; all of the resources of the tribe were required to withstand the dangerous threats surrounding them. Inadequate individuals were promptly discarded. In the Greco-Roman period age was looked upon as a cumulative evil. "Even the gods hate old age," spake Aphrodite. In ancient Chinese culture the aged were regarded with deep reverence.

In Biblical times, the Judeo-Christian ethic brought them compassion, and, in the papacy there was a ruling gerontocracy. Although evil demons and irrational fears threatened society, advancement in knowledge concerning disease and human deterioration was not increased. Late in the 19th century Louis Pasteur demonstrated the value of observation and scientific study, from which data society began more effectively to find the way to a longer and richer life.

In the middle of the 20th century there is a recognition of the potential of growing with the years. George Russell Harrison, dean of science at the Massachusetts Institute of Technology, has written a stimulating book entitled "What Man May Be."

The rapid progress of science since the turn of the century has completely transformed society. The industrial revolution of the latter 19th century was followed by a scientific revolution. The discoveries of Pasteur, Lister, Koch and other scientists have had a unique impact on man's search for a healthier existence. Medical educators in the past quarter century have found it difficult to systematize and classify data from the world's numerous centers of science and culture. Medical practice is undergoing a transformation. In addition to concern for the treatment of disease and trauma, physicians now recognize the enormous potential of the human body and mind in the promotion of positive health. What man may be will become an exciting new area for medicine in the latter part of the 20th century.

SOCIOLOGIC ISSUES

Many important observations are being carried on regarding the intimate relationship between the older individual, his family and his community. The Teaching Institutes of the Association of American Medical Colleges set up by George Packer Berry, then president in 1949, emphasized the basic interdependence of medical science, anthropology, and sociology.

Medical education is undergoing a cautious transition, with new courses in growth and development in some schools that furnish opportunity for students to develop a positive attitude concerning health, development, maturation, and aging of the individual.

Great challenge for medicine

In the widening approach of science and its concern for health maintenance, the sociologic problems touching on the health and satisfactory function of the individual are brought into the realm of medical responsibility. This is the modern look in medicine. It is an exhilarating new dimension, for medical science can now offer society a healthier living program.

The new knowledge bearing on longer and healthier living should certainly have a wholesome impact on society. The innumerable technologic advances that will revolutionize the fields formerly needing heavy manual labor, will reflect on the well-being of the working man and his family. All of these advances should lead to a healthier social order—provided they are directed and utilized appropriately. No one member of society is so qualified as the physician to advise the public in its search for better health. The time has arrived when the medical man should confer with the sociologist, psychologist, anthropologist and their coworkers in evaluating the primary influences in the community that concern aging citizens.

There is a considerable lag between the information available on maintaining health, and its application, and teaching in the schools of the Nation. This represents a unique challenge to the medical profession. Unfortunately, medicine has only recently turned its attention to those customs and attitudes of society which have been detrimental to older people.

In our confused thinking of the complicated issues facing us, there is need for reexamining accepted attitudes and practices concerning older people. In meeting the challenge of our aging population, cultural reorientation is indicated. (See table 2.) For example, as emphasis on youth and precocity of the young has characterized our educational and social philosophy during the first half of the 20th century, the time is here to take cognizance of mature and older citizens. Since youth has been served, now age has come of age. Also, the family should be included in assessing health and medical problems of the individual. This broader approach, sufficiently developed, will produce broader-informed physicians and better health.

Emphasis on age and evaluation of the individual with reference to the biologic rather than his chronologic age, will make for a sharper and more exact assessment of the whole person.

The shift from the acute to the long-term illness of common occurrence makes it necessary for keener appreciation of the multiple pathology that results in prolonged illness. As much emphasis has been placed on illness and human deterioration, additional knowledge concerning the avoidance of many acute diseases brings to the fore a more hopeful prognosis for the prevention of many of these afflictions. Therefore, a change from a sickness-oriented point of view to a positive and health-oriented approach has much to offer.

As many of the common acute diseases have been brought under more effective control, long-term disorders have become the principal threat to the health of older people. Public institutions are overloaded by patients suffering from a break in the integrity of the vascular system, skeletal system, neoplasia, and nervous and mental disorders. These four diseases must be neutralized if man is to enjoy longer life.

Reevaluation of the family

Relaxing of family bonds and loyalties has resulted in two social maladies, juvenile delinquency and disregard for the health and happiness of the elderly. A recognition of the intangibles bearing on family living is essential. Sociologists are studying various phases of family life in an endeavor to revitalize the basic values inherent within the family circle. A conference under the auspices of the Insurance Co. of North America, held in California in January 1959,

highlighted the need for study of the family as it bears on the health of all its members. Well adjusted, healthy families are the basic units of a strong, healthy community. A population within two decades including 25 million citizens 65 years of age and older will depend upon a healthy integration within the social fabric, in a meaningful capacity of these oldsters. This is of first importance. The fight against old age is not so much a battle of deteriorations of the body as for the preservation of the capacity for happiness.

A second career

To achieve this goal for a vigorous society, outmoded manners in the realms of education, industry, and government must be altered. The custom of compulsory retirement, at an age when many individuals have attained their top performance capacity, must give way to more realistic programs. These should be plans looking forward to a second career. This will bring about more enduring satisfactions bearing on work, recreation, and a sense of belonging.

Since the span of life of modern man is moving nearer the century mark, with a higher level of well-being in the later years, the advisability of definite plans for utilizing the added years becomes apparent. Perhaps the years of future man might be divided into trimesters with an epilogue. During the first trimester, from 1 to 30 years, basic growth and development should be encouraged, with training to fit the individual for the second trimester. Establishment of a family and entrance upon one's first major life work would represent the second period from age 30 to 60. During this time attention should be directed to the third trimester from 60 to 90, the period of the second career. The years beyond 60 in reality should be the harvest years in human existence. In this period of fruition, when an individual has had years of knowledge and experience, and with the encouragement of society to maintain a useful place within the social fabric, a new dimension can be evolved for older citizens. During this time participation in the broader activities of the community, civic and religious organizations could well become rich dividends in terms of achievement. Beyond 90 would be the epilogue of a long life. In these twilight years moderate recession would be according to the nature of things. With such a program, if society were to encourage this broader view of human living, the potentials of older men and women would stand a better chance of development.

TABLE 2.—*Cultural reorientation*

<i>From—</i>	<i>To—</i>
Youth-oriented society.....	A mature-age oriented society.
The individual.....	The family.
Chronologic time.....	Biologic time.
Sickness-oriented.....	Health-oriented.
Acute disease.....	Long-term disorder.
Retirement.....	A second career.

New social patterns needed

Building social patterns takes time and leadership. It must be based on careful thought and study and this, in turn, to be effective must be developed by pilot activities conducted over a period of time.

Left alone, much of this would be done by welfare workers, politicians, and social scientists. On this basis, there is no assurance that the result will be in line with the thinking of other community leaders, including doctors, nor may it reach its full development as well or as quickly as if guided by the latter.

The assumption of a role of leadership in this field is not new to medicine. Industry and science have shaped the fabric of our society by the products they have developed and the new fields of endeavor they have pioneered. All these new changes have been accomplished by getting the public to accept and adopt new social patterns.

Medicine has a large stake in building such a society. It has the needed skill and experience. What is being done and can be done to insure that the transition will be made in a well-thought-out manner, with clear objectives and carefully developed policies to the end that our senior citizens—20 years hence—will contribute a new and constructive dimension to our democratic society? The answer to this problem is the major issue of the present era.

Senator HUMPHREY. Doctor, it is fair to say that tens of thousands of women owe their lives to the distinguished scientist whom we will next hear from. We can rightly call you, Dr. George Papanicolaou, the father of exfoliative cytology? Is that right?

Thanks to you, much uterine cancer, for example, is being diagnosed through the test procedure known throughout the world as the Pap smear.

From the laboratory at Cornell Medical College, your laboratory, sir, we welcome you to this subcommittee. It is indeed a real privilege and honor to have you here.

STATEMENT OF GEORGE N. PAPANICOLAOU, M.D., PAPANICOLAOU RESEARCH LABORATORY, CORNELL UNIVERSITY MEDICAL COLLEGE

Dr. PAPANICOLAOU. Thank you, Senator Humphrey.

I am most stimulated by the most interesting remarks made by Dr. Bortz. Being 76 years old, I feel that I still should try to continue my work as long as I can.

While I am honored to be here, I am afraid that my concentration on scientific matters will prevent my being as helpful as I might otherwise be on the administrative problems you are considering.

MEANING OF EXFOLIATIVE CYTOLOGY

I have prepared a statement for the record which I could read, but if I am allowed, I will attempt to summarize it here in fewer words. I am referring to a branch of science called exfoliative cytology.

All of you may know that the cells covering the body's exterior and interior surfaces are multiplying and being cast off at a relatively rapid rate. These cells may be either normal ones or cancerous ones, and this can be determined by examining them after suitable preparation through a microscope.

Within the last 5 years, this technique has been applied widely in the diagnosis of cancer of the uterus in women. The application of this technique to this form of cancer is especially profitable because it permits diagnosing the disease when it is in a stage that is almost always curable.

SAVING 10,000 LIVES

It is my own opinion that if all women benefited from the results that can be achieved through using this technique, no less than the lives of 10,000 women in this country alone would be saved each year.

More recently, our efforts are being directed toward finding out how to apply this technique to the diagnosis of cancer of other sites such as cancer of the lung, cancer of the stomach, the urinary bladder, and others. We have every reason to believe that these studies will find practical application in improving the diagnosis and treatment of many different forms of cancer.

While it is true that this discovery is essentially an American development, its future refinement and application will depend upon the findings of many other investigators from all parts of the world. Although I am not prepared to tell you exactly how it might be

accomplished, I do believe that one way to obtain more useful results would be to encourage the scientists throughout the world in pursuing their ideas for research and publishing their results.

The more we learn about this broad field of cytology, the better we will be able to forge practical tools for the diagnosis and treatment of disease. Such findings are not the prerogative of any one country.

INTERNATIONAL TRAINING IN CYTOLOGY

Interest in this new investigative and diagnostic approach has rapidly spread throughout the world. This is attested by the fact that since 1947, when the very first course in exfoliative cytology was given in our laboratory at Cornell University Medical College, some 550 doctors—mostly pathologists and gynecologists and many cytotechnologists—representing 53 foreign countries, have come to our laboratory for instruction and guidance. An alphabetical listing of these countries may be given here to exemplify the extent of international participation in this special field.

These countries are Algeria, Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Cuba, Cyprus, Czechoslovakia, Denmark, England, Egypt, France, Germany, Greece, Guatemala, Holland, Hong Kong, Hungary, Iceland, India, Indochina, Indonesia, Iran, Israel, Italy, Japan, Korea, Mexico, New Zealand, Norway, Paraguay, Peru, Philippines, Poland, Portugal, Scotland, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, Uruguay, Venezuela, and Yugoslavia.

This list does not include three Russian scientists who were sent to my laboratory by the U.S. Public Health Service in 1946. They were Dr. A. Serebrov, director of the Institute of Oncology of Leningrad; Dr. M. Podebinsky, chief gynecologist of the U.S.S.R. Ministry of Health in Moscow, and Dr. R. Kavetskii, of the Bogomoletz Institute of Kiev.

WIDE USE IN RUSSIA

They all expressed great enthusiasm for the method and its potentialities in early cancer diagnosis and control, and made it a point to take back with them a good supply of all that was needed to introduce this type of work there. As I have had no personal news from them since they left, I was not aware of the remarkable progress made in the application of this technique in Russia until 2 years ago when I met Prof. A. Novikov, Director of the Hertzen Institute of Oncology of Moscow, at a luncheon given in Brussels by the Cancer Control Committee of the International Union Against Cancer.

It was then that I learned from him, with much amazement, that during the preceding year the smear test had been used in Russia in very extensive mass screening surveys covering 8 million women for the detection of early malignant lesions of the uterine cervix. This appears to be a most remarkable accomplishment. It would, however, be presumptuous to comment on it without knowing the training standards of the personnel, the general organization of the tests, and the routine technical procedures used.

Increased interest in exfoliative cytology is also evident in the satellite countries, particularly in Poland, Czechoslovakia, and Hungary. A very good and richly illustrated textbook was recently published

in Poland by Dr. Maria Kawecka. Some research work is now being conducted in the satellite countries, but there, as well as in Russia, it does not seem to keep pace with the widespread diagnostic use of the method. Western European countries are more advanced in this respect, as indicated by the ever-increasing number of original articles dealing not only with the clinical but also with the morphologic and cytochemical aspects of exfoliative cytology.

We have references from about 1,000 papers published in the past few years in European countries. Practically half of them were published in the last 3 or 4 years. Much investigative work relative to this special field is now being carried out in many other countries, such as Australia, Argentina, Brazil, Mexico, Japan, and India.

FUTURE OF CYTOLOGY

We, of course, should take great pride in the fact that this notable scientific advancement, which has now attained worldwide significance, has been an original contribution of American science. However, we should never feel that our mission is completed. To be able to retain our hard-won leadership in this important field and to be worthy of it, we should broaden our horizon beyond the narrow walls of our laboratories. As you yourself, Senator Humphrey, said:

Medical research has always had an international character. Medicine has been the beneficiary of discoveries which have transcended national boundaries * * * No man can really foresee how our future discovery may benefit men everywhere. * * * The future lies in our hands.

If I am allowed to slightly modify this last sentence, I may say that the future lies in your hands as well as in ours.

8 MILLION TESTS IN U.S.S.R.

Senator HUMPHREY. Doctor, we are very grateful to you for your report. I am particularly impressed with the scope of the activity which is going on in terms of the uterine cancer tests.

Did I understand you to say that in the Soviet Union there have been 6 million?

Dr. PAPANICOLAOU. Eight million tests. This is a statement made by Professor Novikov of the Hertzen Institute of Oncology of Moscow 2 years ago. A similar statement has also been made by others—that no less than 8 million tests are done every year in Russia.

This number appears to be extremely high since all the tests conducted here in the United States at the present time total probably no more than three or four million. As I already stated, it is likely that their standards differ from those used by us here.

Senator HUMPHREY. We also have some difficulty, do we not, Doctor, in getting accurate medical statistics from some of the countries behind the Iron Curtain, as well as other countries.

Dr. PAPANICOLAOU. Exactly. This is all information given here and there by Russian scientists, and we have no accurate statistics about it. Of course, there is no reason to question the correctness of these statements. When I saw Dr. Novikov in Brussels in 1957, I asked him how they could secure the very large number of well trained doctors and technicians necessary for performing this test on such a

large scale. His answer was, "Yes, we were able to do it." No further information was given to me during the brief conversation I had with him at that time regarding the question of training and the technical procedures used during these tests. It would, indeed, be of great interest to know how they have been able to make so many tests.

18,000 WOMEN DIE OF UTERINE CANCER

Senator HUMPHREY. Do I understand, Doctor, that 18,000 women in the United States each year, on the average, die of uterine cancer?

Dr. PAPANICOLAOU. Yes. This is close to the figure given by various statistics.

Senator HUMPHREY. With the Pap smear—do you say that 10,000, or a major portion of those lives could have been saved?

Dr. PAPANICOLAOU. Of course, by taking into consideration the steadily expanding use of the test. At present, I think that the tests for cancer of the cervix are probably no more than 1 million.

Senator HUMPHREY. The total?

Dr. PAPANICOLAOU. I mean the total screening tests for the detection of early, incipient cancer of the cervix. The total number of cytologic examinations, including all of the diagnostic applications of the method, is, as I said before, much higher. It is figured that unsuspected cancer is found in approximately 5 out of every 1,000 cases. On the basis of this, one may estimate that the number of women in whom cancer is detected at a very early stage approximate 5,000. You know that with this method cancer of the cervix can be recognized even before it is actually visible. Thus far, we have no other method by which a diagnosis can be made so early.

Early cancer may also be diagnosed in other organs. In the lung, for instance, cancer cells may sometimes be found in a sputum specimen 3 to 4 or even 5 to 6 months before its presence is proven by X-ray. In the cervix, of course, we can usually easily find where the cancer is, but in some of the other organs we cannot do this so well. We have to wait until evidence of its localization is provided by X-ray.

Senator HUMPHREY. Doctor, in the light of your statement and the figures which you have given to us, the rate of incidence of cancer per thousand, would it not be well for every woman in our country—of course, we hope it could be done on a much broader basis, but let us speak only for the United States—in the childbearing age group to have a Pap smear each year?

NEED FOR CYTOLOGISTS

Dr. PAPANICOLAOU. This would be, of course, very desirable, but, at the same time, an effort should be made to increase the number of cytologists and cytotechnologists, who can help. At present, there is a great scarcity of men who have had complete instruction in this field. Unfortunately, this method cannot be taught in a month or two. It requires at least 6 months to 1 year's training, and there is a particularly acute need for cytotechnologists. Any effort to extend the use of the test should be made parallel with an effort to increase the number of trained personnel.

MASS SCREENING PROGRAMS

Senator HUMPHREY. I was wondering, for example, Doctor, in the factories where there are a substantial number of women employees, whether it might not be a possibility that the management in those factories could, through the cooperation of the medical profession—as you have noted, of course, this requires specific training—set up a testing procedure for their own employees. Would this not have a good effect?

Dr. PAPANICOLAOU. Yes. I think that there are now several industrial concerns or companies, that are interested in the welfare of their employees, that provide this test as a routine procedure. As you probably know, this cytologic test has also been used very successfully in dyestuffs factories for detecting early carcinoma of the bladder, which is not uncommon among workers in such factories.

It was in 1947, that my attention was first called to the possibility of such an application by a letter written to me by the Imperial Chemical Co. of England. A doctor was then sent to me for training, who, upon his return, applied the method very successfully. The test is now in use in several factories and industrial concerns here and abroad, not only for cancer of the bladder but also for cancer of other organs, chiefly cancer of the cervix and, to a smaller extent, cancer of the lung. So, the method has by this time a very wide application.

Senator HUMPHREY. Senator Muskie, do you have any questions?

Senator MUSKIE. All these witnesses anticipate questions by their testimony.

Senator HUMPHREY. They do. Senator Gruening?

Senator GRUENING. Nothing.

Senator HUMPHREY. Doctor, we are very grateful to you, and I know that I may speak for millions of people when I express our everlasting gratitude and thanks to you for your great achievements.

Your prepared statement will appear in the record at this point.

(The statement referred to follows:)

PREPARED STATEMENT OF GEORGE N. PAPANICOLAOU, M.D., PH. D., EMERITUS
PROFESSOR OF CLINICAL ANATOMY, CORNELL UNIVERSITY MEDICAL COLLEGE, NEW
YORK CITY

Mr. Chairman, I greatly appreciate the honor of this invitation and the privilege of presenting here before this committee some of my views on the general significance and the international aspects of exfoliative cytology. This is a relatively new branch of the cytologic sciences which has in recent years received universal recognition for its notable contribution to the field of cancer diagnosis and research.

The principle upon which exfoliative cytology is based is a fundamental biological process which consists in the continuous shedding of cells from all the superficially located tissues of our body, such as the skin and the membranes lining all body cavities. These exfoliated cells may be studied microscopically in properly fixed and stained smears prepared from fluid aspirated from these cavities.

Since every carcinomatous growth has its inception within the superficial tissue of an organ it is also subject to this same fundamental process of exfoliation. Thus, a carcinoma that would develop within the uterine cervix, for example, even if it were so small as to be invisible to the naked eye, would throw some of its cells into the cervical canal. Such cancer cells, when found in a smear, can be distinguished from the normal cells by their abnormal structural features. As a result, a carcinoma of the cervix can be diagnosed by the smear method, or the Pap smear, as it is often called, at a very early stage, when the cancer is still a localized lesion and can be removed by surgery or destroyed by irradiation with very good chances for a complete cure.

Thus far, the most widespread and most successful application of the smear technic has been in the diagnosis of cancer of the cervix. Progress has been particularly notable in the study of early malignant lesions brought to light by the examination of vaginal and cervical smears. The great number of incipient carcinomas uncovered has provided the pathologists with excellent material for the study of the early developmental stages of cervical carcinoma, and the clinician with the opportunity to attack cancer more effectively at a curable stage.

As we slowly, yet steadily, move forward toward these still largely unexplored areas, our research extends more and more into the vast realm of what one may call premalignant or potentially malignant lesions, the nature of which is still obscure. The clarification of these baffling and elusive borderline cases poses a most provocative challenge for both cytologists and pathologists.

Since 1945 cytology has progressively been introduced as a regular diagnostic procedure, first in the organs of the urinary and respiratory systems and then in the gastrointestinal as well as all other organs from which any secretion or fluid could be obtained. In all these organs extensive tests have shown it to be a valuable adjunct to biopsy and other established procedures for the diagnosis of cancer. Here again it has proved to be of great value in the detection of early, unsuspected malignant lesions.

The growth and expansion of exfoliative cytology in its use in cancer diagnosis during the past 15 to 20 years has indeed been phenomenal. The sanction given to the cytologic diagnostic approach by the College of American Pathologists and the American Society of Clinical Pathologists, and the fact that several years ago exfoliative cytology was included as a prerequisite for certification in pathology have greatly contributed to its general recognition. It also encouraged many pathologists to introduce the cytologic technic in their laboratories. A survey conducted about 2 years ago by the American Cancer Society among the pathologists belonging to the College of American Pathologists disclosed that at least half of the 2,500 pathologists belonging to the organization were offering cytologic services. It was estimated that 2 million specimens were examined the previous year and that possibly twice that many could be handled without straining existing facilities.

A recent report which was kindly made available to me by the New York City Department of Health shows that in the city of New York alone there is a total of 149 laboratories performing cytologic examinations with a total of 332,034 smears screened annually.

Since complete figures on the total number of cytologic examinations done per year in the United States are not yet available, such fragmentary reports as those just mentioned may be of help in arriving at an approximate estimate, which may be conservatively figured to be above the 3 million mark.

As for the number of lives of women which may be saved each year through the utilization of the smear test it would again be very difficult to try to give an accurate overall estimate. However, since it now appears to be well established that routine smear examinations of women for the detection of cancer of the uterine cervix run into rather high figures, approximating, if not surpassing, the 1 million mark, and that the rate of detecting early cancerous lesions in this organ at a still curable stage is somewhere between three to five per thousand, one might fairly safely conclude that the number of women whose lives could be saved through the timely detection of a preclinical cervical carcinoma may total several thousand.

Interest in this new investigative and diagnostic approach has rapidly spread throughout the world. This is attested by the fact that since 1947, when the very first course in exfoliative cytology was given in our laboratory at Cornell University Medical College, some 550 doctors, mostly pathologists and gynecologists, and many cytotechnologists representing 53 foreign countries have come to our laboratory for instruction and guidance. An alphabetical listing of these countries is given here to exemplify the extent of international participation in this special field.

Algeria, Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Cuba, Cyprus, Czechoslovakia, Denmark, England, Egypt, France, Germany, Greece, Guatemala, Holland, Hong Kong, Hungary, Iceland, India, Indochina, Indonesia, Iran, Israel, Italy, Japan, Korea, Mexico, New Zealand, Norway, Paraguay, Peru, Philippines, Poland, Portugal, Scotland, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, Uruguay, Venezuela, Yugoslavia.

This list does not include three Russian scientists, who were sent to my laboratory by the U.S. Public Health Service in 1946. They were Dr. A. Sere-

brov, director of the Institute of Oncology of Leningrad, Dr. M. Podebinsky, chief gynecologist of the U.S.S.R. Ministry of Health in Moscow, and Dr. R. Kavetskii of the Bogomoletz Institute of Kiev. They all expressed great enthusiasm for the method and its potentialities in early cancer diagnosis and control and made it a point to take back with them a good supply of all that was needed to introduce this type of work there.

As I have had no personal news from them since they left, I was not aware of the remarkable progress made in the application of this technique in Russia until 2 years ago when I met Prof. A. Novikov, director of the Hertzen Institute of Oncology of Moscow, at a luncheon given in Brussels by the Cancer Control Committee of the International Union Against Cancer. It was then that I learned from him with much amazement that during the preceding year the smear test had been used in Russia in very extensive mass screening surveys covering 8 million women for the detection of early malignant lesions of the uterine cervix. This appears to be a most remarkable accomplishment. It would, however, be presumptuous to comment on it without knowing the training standards of their personnel, the general organization of the tests, and the routine technical procedures used.

Increased interest in exfoliative cytology is also evident in the satellite countries, particularly in Poland, Czechoslovakia, and Hungary. A very good and richly illustrated textbook was recently published in Poland by Dr. Maria Kawecka. Some research work is now being conducted in these satellite countries, but there, as well as in Russia, it does not seem to keep pace with the widespread diagnostic use of the method. Western European countries are more advanced in this respect, as indicated by the ever increasing number of original articles dealing not only with the clinical, but also with the morphologic and cytochemical aspects of exfoliative cytology. We have references from about 1,000 papers published in the past few years in European countries. Practically half of them were published in the last 3 or 4 years. Much investigative work related to this special field is also now being carried out in many other countries, such as Australia, Argentina, Brazil, Mexico, Japan, and India.

As is well known, an international symposium on exfoliative cytology was held in Brussels 2 years ago and was attended by many outstanding gynecologists and pathologists representing practically all of Europe and many other countries.

It was during this meeting that the first international cytologic society, known as the International Academy of Gynecological Cytology, came into being.

A cytologic society consisting of members from North and South America is the Pan-American Cancer Cytology Society which was established in 1954.

In 1952, the first organization in the field of exfoliative cytology, known as the Inter-Society Cytology Council, was founded here in the United States.

We, of course, should take great pride in the fact that this notable scientific advancement, which has now attained worldwide significance, has been an original contribution of American science. However, we should never feel that our mission is completed.

To be able to retain our hard won leadership in this important field and to be worthy of it we should broaden our horizon beyond the narrow walls of our laboratories. As you yourself, Senator Humphrey, said, "Medical research has always had an international character."

CORRESPONDENCE FROM CANCER SPECIALISTS IN APPENDIX VOLUME

Senator HUMPHREY. I should like to say at this point that the subject of cancer research is of such tremendous significance that I feel this subcommittee will want to devote special attention to it. I know my colleagues will share that sentiment.

In the course of these brief hearings, we do not have the opportunity to explore this topic in great detail. However, I am going to direct, as part of the appendix volume which will accompany the published transcript of this hearing, that there be printed a series of responses which I have received from cancer specialists all over the world in response to subcommittee correspondence with them.

The particular group of letters which I have assembled is concerned with the subtopic of the identification of cancer patterns in various populations throughout the world. These responses come by and large from geographic pathologists. They provide welcome insight to one of the many approaches which is not only open, but which is tremendously desirable, if we are to find new clues toward solving the deep mystery of cancer.

Our next witness is the very distinguished anthropologist, Dr. Margaret Mead.

STATEMENT OF MARGARET MEAD, PH. D., ANTHROPOLOGIST

Dr. MEAD. I understand that I am to confine myself today within your frame of reference to biomedical research, and not to get extensively into problems of psychiatric research or mental health, which is the word we use for positive health, as Dr. Bortz used it. I am to try merely to explicate the ways in which the inclusion of anthropology, sociology, and psychology in the whole research program will improve it and what sort of contribution these human sciences can make in the kind of research that you are discussing here.

Senator HUMPHREY. We are speaking primarily of international medical research and, of course, any reflections or observations you wish to make will be welcome.

Frankly, I am fascinated by this whole business. So do not hesitate.

DR. MEAD'S BACKGROUND

Dr. MEAD. I am speaking from two points of experience. One is from 33 years of research in the Pacific that is extended from working with a tribe where everybody over 8 had been a cannibal, up to revisits after World War II where I found people who were savages 25 years ago are now able to understand the intricacy of the relationship between the World Federation of Mental Health and the World Health Organization. They have spanned something like 2,000 years of our own history in 25 years.

I have also had an opportunity to return to Bali after 20 years and see an ancient traditional Southeast Asian type of culture transformed into a modern society where people take medical care for granted. There, leprosy, which was the worst oath that anybody could swear—the word “leprosy” 25 years ago—is now expected to be brought under control within 10 years. There, too, the programs of the World Health Organization and UNICEF have been wiping out such scourges as malaria and yaws and, at the same time, doubling the population. These programs have been making Bali a country that now has to import food, and have been raising the level of expectation and aspiration of a people who used to hope they would not have more than 4 children to a people who fully expect to have 12 and send them all to the university, which has not yet been established. But that does not trouble them in the least.

They are working on the general principle that you get the students first and the professors later.

WORLD MENTAL HEALTH FEDERATION

The second background from which I am speaking is work since 1948 with the World Federation for Mental Health. There, we have concentrated primarily on techniques of international cooperation and on the effects of change in all of these countries in the world on the mental health of the population, as we encounter the changes that come with improved medical care with the eradication of epidemics, with the beginning of industrialization and the introduction of modern forms of urbanization and communication.

Senator HUMPHREY. Dr. Mead, I am not going to interrupt you very much, but I could not help but reflect for a moment on how important it is that people who conduct our foreign policy and who have responsibility for the design of foreign economic policy and our cultural activity have an appreciation of the kind of information you have just given to the committee. I mean these fantastic, spectacular changes that have taken place in rather primitive societies from only a few years ago into, at least approaching, what we call a modern social condition.

Does the State Department ever call upon a person of your competence and your ability to sit down with the officialdom of that Department and discuss these matters leisurely and thoughtfully and constructively?

Dr. MEAD. Periodically, Senator Humphrey. There have been periods of greater and lesser receptivity.

Senator HUMPHREY. Would you mind being a little more exact in your comments.

WARTIME WORK OF ANTHROPOLOGISTS

Dr. MEAD. Well, I think the major statement one can make is that during World War II there was a tremendous willingness on the part of all Government agencies, not only the State Department but the various branches of the armed services, to use very effectively and very fully the skills of those of us who today are called behavioral scientists.

At one point, there were about 300 anthropologists in the United States and all but 8 or 10 of us were being used in some way or other in relationship to the war effort. After the war, there was a deterioration in Washington on both sides, I think, in the willingness of governmental agencies to draw on these rather new skills, on the one hand, and also a good many of the scientists themselves went back to their laboratories to try to refurbish the state of their theories, on which they had perhaps rather overdrawn during the war.

CURRENT INTEREST IN BEHAVIORAL SCIENCE

So there was a period of much less use of the behavioral scientists in Government. The new uses that are coming up now are in connection with programs like yours, with research that is being backed by the National Institutes of Health, with the National Science Foundation,

in programs of international and worldwide importance in the cementing of better understanding and peaceful ties among nations.

So I think we could say now that there is a beginning of a new and greater use of these scientists. We still have a great shortage of trained people.

TESTIMONY BEFORE "FOOD FOR PEACE" HEARING

Senator HUMPHREY. Dr. Mead, the reason I asked the question is that in the past 2 days I have sat in the Senate Committee on Foreign Relations, listening to a host of witnesses discuss with us the utilization of our food and fiber abundance on the world scene as an integral part of American foreign policy, American aid in material and economic aid, American expression of compassion and understanding. All that goes with the use of food and fiber on the international scene.

I say this not in bitterness, but in sadness: The testimony of the Government witnesses was the same old cliches, the same old cant I have heard so many times that it no longer relates to anything that exists.

Yet, when the citizenry came in—people in business, in the professions, and thankfully, people in the churches and our great voluntary agencies, people in medicine, science; we have had, as I said, a parade of witnesses—there was a sense of appreciation of what is going on in the world, and the depth and the nature of the conflict in which we are involved, and the problems that beset us.

It was like seeing the sun shine after a terrible storm. All at once life became meaningful. I am beginning to wonder whether or not we, at the Government level, get so stale because we never fill the well. We are talking in language that was related to things of yesterday, and the things of yesterday have passed. Problems change; if not, they have become more difficult.

That is why I asked about your kind of activity and your relationship to government. I know that a lot of research is going on, but the problem in our society today is that the research may be going on over there, so to speak, while other policies that relate to our lives, life or death, peace or war, are being made over here.

CULTURAL STUDY IN U.S.S.R.

Yet, I do know, for example, that in the Soviet Union the foreign ministry is directly related to all the areas in the fields of behavioral sciences and cultural activities. Their information is fed up to it through the channels of communication. Thus when the policies are made, relating to Africa or even an area of Africa, before there is any contact made with that area, people have studied the mores and the culture of the tribe and the dialect and the language and the social pattern. Then, policies are laid down for the conquest thereof.

That is my problem.

Well, I got way off the meaning here, but when I am staying up late at night, working, I think of these things.

Dr. MEAD. I think this. I can use as a background a very brief summary, now, of what you wanted from me because it is this knowledge of the local culture and the language and psychological back-

grounds of each people that is essential at every stage of these proceedings.

ROLE OF CULTURE STUDY IN EPIDEMIOLOGY

You cannot conduct the kind of field studies which Dr. White talks about, Dr. Sabin talked about, without knowing something about the language. There has been a tremendous waste of good will in the last 15 years through a lack of expertise in setting up the field researches because specialists in this field of cultural behavior have not been included.

What we have depended on is accidental genius in the field of medical research and public health where we have had a few personalities of such charismatic quality they have been able to vamp an African or New Guinea native into doing almost anything. But this is not sufficiently reliable, and we need much more work of the order you have been discussing, of this systematic work that was done in Germany before World War I and is being done in the Soviet Union at present, systematic studies of each country which make knowledge of the language and the customs available when research is being done.

We would not be able to interpret the information we get about these differences of which Dr. White talked in the instance of heart disease among the same racial group in different countries unless we know a great deal more about the conditions under which they live. It is possible that mothers-in-law may be more important than diet in certain forms of family constellations that introduce stress.

It is also very probable that different patterns of urbanization have to be examined. If these are not examined at the start, we will not be able to interpret the evidence that we get from this detailed, beautiful, biological research on the proportions of particular diseases among different sorts of peoples.

Then we have, as a very important available source of information, the very small populations about the world where there are only 600 people who speak the language, or 2,000, or something of that sort. Or we may find a disease of children, for instance, that occurs in this country at a rate of 1 in 10,000, but it may occur there to 1 in 100. We have an opportunity to study it. But only if we can take all of these other things into account.

CAREFUL GENEALOGICAL STUDY

For instance, if it is a genetical disease you have to be able to find out who is the actual father of whom, which is much more difficult in many primitive societies, even, than it is here. Dr. Gajdusek, who is one of our outstanding researchers of this sort, has developed in his work in New Guinea, by the use of a combination of medical and anthropological techniques, magnificent methods of getting genuine genealogies, so he can study the genetically determined diseases he wants to work with.

Furthermore, we have got to train the people in each of these countries to become first-class research workers themselves. The Dutch in Indonesia were able to take people, whose fathers wore G-strings and combed their hair straight up in the air, and put them through medical school so that they are today able to become WHO fellows

or FAO fellows in Europe, and go back to institute programs affecting millions.

To be able to do this involves a great deal of understanding of the psychology of these peoples and how they are to be educated from such very ancient and primitive conditions to a modern scientific state of mind and state of accuracy.

UNDERSTANDING PROBLEMS OF COMMUNICATION

Finally, we waste a tremendous amount of effort at present in our international conferences because we lack an understanding of the specific techniques of international communication, of how to handle language, how to handle mixed groups, how to handle visual means of communication, so that much of the expensive and infinitely valuable interchange between specialists in the medical field is hampered by lack of a full use of what is now known to the behavioral scientists about international cooperation in small conference groups.

If we are to prevent the fragmentation of this very valuable and increasing international store of medical information, then it is vitally important that we should include the skills that are being developed by such groups as the World Federation for Mental Health in making all of this interchange more effective.

So that in the field of research itself, in the interpretation of the research, in the training of members of each culture all over the world and in the field of intercommunications, it is very important to include the contribution of the behavioral scientists.

Senator HUMPHREY. Thank you very much, Dr. Mead.

Senator MUSKIE?

Senator MUSKIE. Nothing. I think this has been one of the most stimulating mornings I have had in a long time. I am sorry I have to leave and cannot hear the rest of these witnesses.

You have, obviously, Dr. Mead, knowledge and experience and know-how that this committee would love to pick at considerably.

I am sorry I cannot stay.

Senator GRUENING. Dr. Mead, I hope that does not conclude your testimony. I could sit here and listen with pleasure indefinitely, even foregoing a couple of rollcalls if necessary.

Dr. MEAD. I hope I may have a chance to come back and consider some of these wider issues at another time, Senator Gruening. I am obeying my instructions at the moment.

MENTAL IMAGES OF UNITED STATES AND U.S.S.R.

Senator HUMPHREY. I want to just put one statement to you that can be interpreted as a question, but I most likely will make it as a positive statement. I would like to get your reflections upon it.

This is in relation to psychology. In dealing with the U.S.S.R., many psychologists feel, according to some of the things that we have read and some of the information that has been brought to the attention of this subcommittee through our communications, that our very mental image of a hostile Soviet Union creates hostility in us and by them, just as their mental image about us fosters hostility in us.

This is the sort of reflection or observation that we get out of a number of letters and statements that have come to us in response to questionnaires. What is your view about that?

Dr. MEAD. Our general position, as far as mental health is concerned, is that as long as there are sectors of the world that live in fear and hostility toward other sectors, we cannot hope to have the order of mental health or positive health to which Dr. Bortz referred and which we are working for; that the existence of enormous degrees of fear and hostility in our images of other peoples prevents our living as whole human beings, because as long as we take part of the human race and, in a sense, rob them of their full humanity by the images that we have of them, we decrease our own ability to live as complete, healthy people.

The high incidence of mental ill health today and the increasing incidence of mental ill health all over the world, as epidemic diseases decrease and industrialization increases, may be partly attributed to the amount of anxiety that exists in the world at present. This amount of hostility, we hope, however, is only immediately preparatory to our being able to take up our membership in the whole human race.

But this will involve what is essentially a new human invention. That is, how to take responsibility, not only for the members of our own group, our neighbors, our brothers, members of the free world, but also how to take responsibility for the children of those who are politically defined, at the moment, as the children of our enemies.

Senator HUMPHREY. I notice that in my very short visit to the Soviet Union, and as a result of that visit, more information comes to one than you ever dreamed was possible. The only advantage that I really have seen from the visit was that it opened up new vistas of communication with hosts of people. It is just unbelievable the amount of information that ultimately comes to you.

SOVIET YOUNGSTERS QUESTION UNITED STATES ON HOSTILITY

One of the things that impressed me, and has impressed everyone else with whom I have had the chance to talk, or reports of which I read, is that the young people in the Soviet Union say, no matter where you go, whether it is in Siberia or the southern provinces or Leningrad or Moscow or Kiev or the Black Sea area, the first thing: "You are not going to start a war, are you? Why don't you want peace? Why is it you wish to destroy us?"

In other words, they have been led to believe by their Government, and possibly by the interpretation, through various means of communication, of some of the things that we say and do, that they are to be doomed to destruction, nuclear destruction.

I think this is very, very definitely a pattern that has been validated, at least in terms of its expression, by thousands of people.

What is our reaction on the other side when a Soviet citizen comes over here? He is obviously subject, because of our mental picture of him, to all kinds of, not only curiosity, but suspicion, doubt, hostility. I imagine that we, too, wonder when they are going to start the war.

But it is more characteristic of their people, particularly of the young, to say, "Are you going to start the war? Why don't you want peace?"

Do you not think this has some impact upon mental health and mental strength?

IDEALS FOR AMERICAN YOUTH

Dr. MEAD. I think it has an enormous impact. Furthermore, there is a second level of this whole position, Senator Humphrey. That is that our young people need something to live for. Our young people today are perhaps more endangered by a lack of a positive vision of a world of the future that does not need to blow itself up than they are by any other noxious element in the world.

A program that envisages reducing the tensions in the world by shared goals for the health of all mankind is the kind of program that our young people need to give them that kind of motivation for living that may motivate them to live this 100 years that we heard about earlier this morning. That is, I think, one of the most important aspects about your program.

It gives a focus for the necessary sorts of idealism in our young people to counteract the images of hostility and despair that are being foisted on them today.

WHAT ARE WE FOR?

Senator HUMPHREY. I will never forget an incident at Christmas time—I was discussing with a group of teenagers in my home some of the observations on our tour of Western Europe, particularly emphasizing the visit in the Radium Institute in Paris and the Children's Hospital in Stockholm and our visit in Moscow. I was talking to them about what I knew of the 7-year plan because, as I recall, there was quite a lot of newspaper copy in the American press about the Soviet 7-year plan.

We had discussed this plan with about five or six of the Ministers of the Soviet Government and some of their economists. When I got all through talking about this, one of the young people in the group, namely, my son, said something to me that left me kind of cold. It gave me a sort of social and political chill.

He said, "Dad, what are we for? What are our goals?"

I want to tell you, I keep hearing this from young people all the time. Only yesterday I met with a group of young students, and it was the very first question asked me. What are we for?

Dr. MEAD. Quite.

Senator HUMPHREY. What are our goals?

These are young people who have to have something to latch on to. They get a little tired of the trite platitudes.

ROLE OF GOVERNMENT

Senator GRUENING. Dr. Mead, I would like to ask one question. Pursuing your last thought about the objectives and the very pertinent comments of our chairman, do you not think that possibly one of the great obstacles to this better understanding lies in the attitudes and actions of the little groups of men called "Government"?

Dr. MEAD. I think that probably governments are the foci of some of the lack of understanding, and they have necessarily been so because, as we have developed our idea of nations, we developed a kind

of exclusiveness in each nation which was part of the historical process that produced nations.

But, I see no reason why governments cannot also be the foci of greater understanding rather than misunderstanding. It is particularly important in connection with this whole program because the only way one can really cooperate with the Soviet Union and the other countries associated with it is through governmental channels. Those of us who are very much in favor of voluntary activity and non-governmental activity nevertheless realize that for worldwide cooperation at present, and especially for really good cooperation with the Soviet Union, we have to do what was done with the International Geophysical Year. Governmental levels have to be involved in the communication and in the carrying out of such a plan, just as they would be with the international medical research year.

Senator HUMPHREY. A very fine statement. Thank you so much, Dr. Mead.

There will now appear in the transcript the text of Dr. Mead's specially prepared supplementary statement.

SUPPLEMENTARY STATEMENT OF DR. MARGARET MEAD

I. The Use Now Being Made of the Human or Behavioral Sciences in Government Operations, Especially in Government Operations Which Involve Underdeveloped Areas and Foreign Relations

Amplification

During and immediately after World War II, both the regular agencies of Government, such as the Department of State, the various branches of the armed services, the Department of Agriculture, etc., made consistent use of the scientific disciplines which I am representing here, anthropology, psychology, psychiatry, and sociology, as well as of the more traditionally used disciplines of economics, political sciences, and history. The principal difference between the two sets of sciences, sometimes grouped together as social sciences, is one of scale. The behavioral or human sciences take a more systematic account of the behavior of individuals as living organisms, of the way in which individuals are shaped by the culture in which they are reared, of the way in which individuals can be transformed through changes in education or social institutions, of the intractabilities due to our common human nature, and of our human potentialities, which man has so far not begun to use. Specifically, anthropology provides information about the language and culture of different societies, so that we are prepared to understand the different ways in which Burmese and Nigerians and Frenchmen and Russians act and respond to change, and to make systematic allowance for these differences in any program of international research, technical assistance or international cooperation which we undertake. Sociology provides us with methods of studying the behavior of peoples of known culture and history, in groups, to describe major trends, in such matters as population, age of marriage, patterns of urbanization, etc., and, in combination with psychology, to report on trends of public opinion and the processes and changes among small groups, such as the crews of planes or submarines, or the behavior of a group of men on an assembly line or in a government office. Psychiatry provides us with material on the way in which man's deeper and less rational motivations are organized, in peace and in war, in loyalty to one group and hostility to another, in willingness to be led, or desire to be dictated to, in capacities for taking responsibility or passively delegating it to the authorities. The lines between these disciplines are not sharp, and the best results were obtained during World War II by the establishment of teams which included experts in various types of research techniques who could tackle together a set of relevant problems, for example: the morale of the American soldier, an understanding of such unfamiliar tactics as the Japanese kamikaze, the responses of the American people to rationing problems, the psychology of the German Wehrmacht, the expected behavior of peoples in occupied countries

like Burma or Holland. During World War II, a whole field known as area studies was developed—which was somewhat similar to the type of thorough preparation which Senator Humphrey described as undertaken by the Soviet Union—within which all of these different kinds of experts worked together on understanding a specific area.

Even greater use of these disciplines was made by some of the special wartime agencies like the Office of War Information, the Office of Strategic Services, etc. After World War II, we had such ongoing institutions as the Foreign Service Training Institute in the Department of State, and extensive research programs under the Office of Naval Research, various divisions of the Air Force, and the Army. In the early postwar years extensive research was done on the Soviet Union, Poland, Czechoslovakia, and China, all countries which are relatively inaccessible to direct research.

I will list briefly here some of the literature dealing with these fields:

- Benedict, Ruth, "The Chrysanthemum and the Sword." Boston and New York: Houghton, Mifflin, 1946.
- Dicks, H. V. "Psychological Foundations of the Wehrmacht." London: War Office, Directorate of Army Psychiatry, 1944.
- Gorer, G., "Themes in Japanese Culture." Transactions, New York Academy of Sciences, Series 2, 5, 1943, 106-122.
- Guetzkow, H., "Groups, Leadership and Men." Pittsburgh: Carnegie Press, 1951.
- Leighton, A. H., "The Governing of Men." Princeton: Princeton University Press, 1945.
- Leites, N., "The Operational Code of the Politburo." New York; McGraw Hill, 1951.
- Mead, M., "The Application of Anthropological Techniques to Cross-National Communication." Transactions, New York Academy of Sciences, Ser. 2, 9, 1947, 133-152.
- Mead, M., "Soviet Attitudes Toward Authority." New York: McGraw-Hill, 1951.
- Mead, M. and Metraux, R., "The Study of Culture at a Distance." Chicago: University of Chicago Press, 1953.
- National Research Council, "Report of the Committee on Food Habits, 1941-43," "The Problem of Changing Food Habits." National Research Council Bulletin No. 108.
- Office of Strategic Services Assessment Staff, "The Assessment of Men." New York: Rinehart, 1948.

Stouffer, S. A. et al., "The American Soldier: Studies in Social Psychology in World War II," 4 vols. Princeton: Princeton University Press, 1949-50.

Within a few years after the war, these direct extensions of wartime studies, in which the human sciences made specific contributions, began to taper off, from lack of support within Government, tightening of security regulations which made this type of research—often necessarily carried on with individuals who had once been nationals of other countries—less feasible, and because of changed interests on the part of the research workers.

At the same time, work was just beginning in the general field of mental health, the area of cooperation of all the disciplines with professional skills concerned with the welfare of the individual (that is, those skills based upon a detailed study of individuals, singly or in groups, rather than those skills directed toward the analysis of large-scale events, such as world trade, growth of administrative procedures, or standards of living). This interest grew in many ways—at the Federal level, in the mental health program within the National Institutes of Health, with extensive provision for the support of training, basic research and pilot programs in community mental health, and in the National Association for Mental Health. It grew also through the parallel formation, on the international scene, of the World Health Organization, with its definition of health as: "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity," and of the World Federation for Mental Health, in London, in 1948. (I attach a copy of the statement adopted by the International Congress on Mental Health held in London in 1948, "Mental Health and World Citizenship"—in this report the term "world citizenship" did not refer to political citizenship but, rather, to a state of mind in which each individual human being took moral responsibility for the welfare of the peoples of all other countries, whether currently allies or enemies.) Through the subsequent 11 years, the World Federation for Mental Health, which was founded as a result of the International Congress, and the World Health Organization have cooperated on a series of ventures, notably a Seminar on Mental Health and Infant

Development held in Chichester in 1952¹ and in interchange of personnel for work on expert committees—e.g., the WHO Study Group on Mental Health Aspects of Peaceful Uses of Atomic Energy and the WFMH Committee on the Peaceful Uses of Atomic Energy. The World Federation has also cooperated with other international agencies, notably in the preparation of a manual on "Cultural Patterns and Technical Change in 1955"² and in conferences held at the United Nations on "Mental Health Aspects of Urbanization and Africa: Social Change and Mental Health."

Members of the human sciences have also been involved in international research relating to health through conferences and expert committees and study groups of WHO, especially the Study Group on the Psychobiological Development of the Child³ which brought together an outstanding group of experts under the best possible international governmental auspices. UNESCO, through such activities as the projects on technical change, the study of world tensions, etc., also made outstanding contributions to this field.

New areas of international cooperation have opened up with the use of Federal and voluntary agency funds in the fields of technological change, atomic energy, automation, and education—particularly, but not exclusively, in science education—involving UNESCO interest in technological change; the WFMH Committee on the Peaceful Uses of Atomic Energy; the First Conference on Mental Health in Africa South of the Sahara, sponsored by the WFMH and the Commission on Technical Cooperation in Africa South of the Sahara; the National Science Foundation; and studies by the armed services in the human factors in space exploration. Attention to these shifts in points of receptivity is part of our long-term strategy in these fields to insure the proper involvement of the behavioral sciences in the problems of relieving international tensions and promoting the health and welfare of mankind; but, in comparison with the needs and problems in these fields, behavioral science support has grown very slowly. Foundation support has, in fact, waned considerably, a notable example being the withdrawal of the Ford Foundation from this field after an initial interest which included popularizing the term "behavioral sciences." The Josiah Macy, Jr., Foundation has stood almost alone in supporting a notable series of conferences which, in the past, have helped initiate a whole series of efforts in the international field, notably those on health and human relations in Germany; protein malnutrition, sponsored also by FAO and WHO; human protein requirements and their fulfillment, sponsored also by FAO and WHO; and oxygen supply to the human fetus, sponsored also by the Council of International Medical Organizations.

A committee such as this, armed with a mandate which makes it possible to introduce strategic as well as tactical change, can do a great deal to identify and correct points of weakening interest, and encourage new areas where the behavioral sciences can make significant contributions.

II. The Use Made by the Soviet Union of Specific Information on an Area

In planning for the utilization of the behavioral sciences and other social sciences in increasing our knowledge of other countries, their culture, language, history, and current situations, I believe it is wise to distinguish differences between the way such information would be appropriately used by us, as a democracy, and the totalitarian, or specifically Soviet use. Our information about these activities in the Soviet Union is partial and inadequate; and much of the little that is known is protected by security regulations of various sorts. We can, however, distinguish two trends: (1) Intensive and usually secret preparation of individuals in the language, history, customs, and geography of a country, with the intention of using this information for various sorts of control—in gathering intelligence, as background for agents, to beam propaganda, to designate target areas, etc. In all these cases, this information is part of a type of arsenal of information which would be subsumed in this country under the function of intelligence agencies; it is primarily hostile in intent, a part of warfare, whether hot or cold, military, psychological, or tech-

¹ Soddy, Kenneth (editor), "Mental Health and Infant Development," New York, Basic Books, 1955.

² Mead, Margaret (editor), "Cultural Patterns and Technical Change," New York, UNESCO, 1955.

³ Tanner, J., and Inhelder, B., "The Psychobiological Development of the Child," vols. I, II, and III, New York, International Universities Press, 1955.

nological, and it focuses on the weak spots in the culture and social organization of the other countries. (2) The Soviet Union has pursued a policy of economic, political, and technological penetration of other countries, which has involved a very extensive use of the nationals, even of local tribesmen, of the target countries. This has been exceedingly successful because it has resulted in the inclusion in planning for these countries of the local customs, beliefs, prejudices, and specific hopes of the nationals of the countries in question. The Russians have stayed in the background and let whatever skills or ideas they wished to inculcate percolate through this sieve of local peoples.

Now if we contrast these two operations with those which have been and should be followed by the United States, as the leader of the free world, we can say: (1) Preparation and training of individuals for work with foreign peoples which is directed toward peace and not toward conquest or war should take the form of an equally basic knowledge of their language, history, customs, geography, and situation, such as can only be provided by a team of social and behavioral scientists with extensive experience with nationals of the country. But our use of this knowledge—and this is the essential difference—should be directed toward a study of strength rather than weakness. Where it is consistent Soviet Communist policy to undermine the social structure of people outside their sphere of influence, in order to so weaken the existing structure that a new, pro-Communist structure can be instituted, it has been our declared intention that we are not seeking ideological and political conquest, but, rather, to support the existence of many free, self-determining and prosperous countries. If our intent is genuine, then we must direct our knowledge and efforts toward the open strengths, rather than the secret weakness, of other countries. The compilation of information appropriate primarily for warfare is not only inadequate but specifically inappropriate for the purposes of increasing the possibility of a peaceful world. A tendency to concentrate on the failures, often real enough, of U.S. bilateral aid may also intensify the emphasis on the weaknesses, gullibilities, vulnerability, crude ambitions, and desperations of the uncommitted and committed peoples of the free world at the very moment when we should instead be working, with every scientific means at our disposal, on their strengths. (2) The policy of using local leaders, and the extensive use of nationals, which has been pursued by the Soviet Union for expedient and ideological reasons, is one which can be supported on the soundest scientific grounds also. Yet the United States has been singularly lacking in just the knowledge and skills which would make this possible. Our representatives seldom speak the languages of the people among whom they work; they are too often woefully ignorant of the history and culture of the country; they lack the training necessary to live and work in remote, rural and often primitive conditions; they do not utilize the kind of scientific help which would permit them to correct these errors.

Without a tremendous increase in the use of specialists on the cultures in the various countries with which we work, we may expect a continuation of our present lamentable loss of popular support in uncommitted, and even in many allied countries. Examples of instances in which informed social science data might have had as far-reaching effects as it did during World War II when we were able to predict the necessary role of the Japanese Emperor, are the present state of Indonesia, the problem of Algeria, and our relationships with many Latin American countries, as highlighted in Vice President Nixon's trip in 1958, and the strategy in the recent Geneva Conference on Berlin.

III. The Importance of the Social and Behavioral Sciences in International Medical Research (1) in the Collection of Data, (2) Interpretation of the Data, (3) Communication of Research Results, (4) in Training Research Personnel, and (5) in Applying the Results so They Genuinely Result in an Improvement of Human Welfare

1 and 2. Collection and interpretation of data

International medical research means research in other countries, among people speaking other languages and following other traditions. The simplest operations, like taking samples of blood, getting people to report regularly for reexamination, obtaining records of food intake or of recent exercise, involve an exact use of the language and a specialized knowledge of the way in which the people who are being studied regard their own bodies; handle ideas of time and number, accuracy and truth; and of how their memories work. A research

that it has taken weeks to set up may collapse because the medical research worker fails to take into account some local belief about pregnancy, or mourning, or mentions the name of a man's wife in his presence. In addition to the danger of expensive disruption of any research operation, whether it be the examination of individual hearts and lungs, the experimental inoculation of a group, or the experimental spraying of an area, there is the continual danger of the invalidation of the results by deliberate or unconscious disregard of instructions, falsification of reports, unreported use of local pharmaceuticals, loss of a crucial experimental group through disregard of local religious or social habits, etc. The great insights which we can expect from the study of peoples who live under conditions very different from our own, to which Dr. Sabin and Dr. White referred, cannot be obtained without proper knowledge of language and culture.

Most of the research of this kind which is going on in the world at present depends upon the accidental qualities of individuals who happen to be able to establish rapport or enlist the help of amateurs who have good relations with the people they wish to study. There are also, as is always the case among members of the healing profession, those who have enough special ability to charm any people into cooperating with a research program. But for international medical research to be carried on on a significant scale, with an assurance that months, and perhaps years, will not be lost, the inclusion of those who are technically conversant with the local culture and methods of working with the local people is essential. Such specialists should be members of the research team at the very start.

An outstanding example of the successful combination of the skills of the behavioral sciences in a particularly dramatic form of such international medical research—the search for isolated areas where rare genetical diseases occur with sufficient frequency to make it possible to study their course and experiment with their cure—is the work of Dr. D. Carleton Gajdusek of the National Institutes of Health, who has utilized the help of anthropologists and linguists in his work in New Guinea.⁴ Such exploratory work includes studies of diseases which may occur for 1 in 100 in such a localized population and only 1 in 10,000—but to a child of any one of us—in the United States, can make most precious additions to our medical ability to save life and prevent unnecessary illness or handicap.

Not only in the collection of the primary research information but at every stage of the interpretation of the information, a knowledge of the culture and social situation of the individuals involved is necessary. Recent work on stress as a factor in disease⁵ combining the work of the last three decades in psychosomatics has demonstrated the importance of various kinds of stress, varying from definition of woman's role to speed of change within a family, type of feeding situation in childhood, minority position as immigrants, shift from civilian to military life, or accumulation of stress patterns through several generations, in the production of overt forms of disease. When research reveals particular types of incidence or prevalence of disease, in particular parts of a country, particular countries, or economic or social groups within a population, a specific knowledge of the culture and of culturally patterned habits of life, of child rearing, eating, sleeping, working, etc., are essential. Otherwise, differences, for example, in the speed of healing of wounds, as between parts of New Guinea and Bali, or in incidence of disease among Negroes in Africa and in urban United States may be ascribed erroneously to a difference in the bacterial population, to nutrition, or to cultural patterns; and there is no way of resolving the question satisfactorily.

3. The communication of research results between members of different national groups

Members of research teams not only speak different languages but have culturally patterned and radically different styles of communication; uses of statistics; ways of validating findings; methods of adapting methods developed in other countries (e.g., either imaginatively and appropriately or with types of imitation which destroy the usefulness of the method); and behavior in international meetings in regard to hierarchy, precedence, and the political

⁴ E.g., Gajdusek, D. C., and Zigas, V., "Degenerative Disease of the Central Nervous System in New Guinea: The Endemic Occurrence of 'Kuru' in the Native Population," *New England Journal of Medicine*, 257: 974-978, 1947.

⁵ E.g., Wolff, Harold G., "Stress and Disease," Springfield, Ill., Charles C. Thomas, 1953.

significance of scientific results. International congresses today suffer severely from a failure to utilize existing knowledge in the fields of communication—use of audiovisual aids, interpretation, and the complexities of cross-national communication.^{6, 7, 8, 9, 10} The World Federation for Mental Health has made it one of its special tasks to explore and experiment with this problem, and now has a secretariat and a group of experienced persons, including members of the various interpreters' corps, physicians and behavioral scientists in different countries who are equipped to solve new problems in this field. There are instances on record in which the scientific position or knowledge in another country has been totally misinterpreted because of lack of specialist knowledge of culture. These instances are likely to multiply rapidly as international cooperative medical research gets underway, unless steps are taken to correct them at the source.

4. Training

Training of nationals from other countries, especially training of students from underdeveloped countries in countries with available medical schools and institutes of medical research and foreign research experience for highly experienced research workers from highly developed countries, are essentials of international medical research. Extensive research has shown the extent to which these periods of training in other countries are wasted, distorted and vitiated because available knowledge of cultural and linguistic problems and social situational differences is not used.^{11, 12, 13, 14, 15, 16, 17} Methods, such as those used by WFMH and WHO in short-time seminars and those used at the Harvard School of Public Health,¹⁸ are available to prevent this terrible waste. Any plan which envisages a great increase in exchange of students in training and of senior research workers and the creation of international research teams of experts should provide for systematic scientific planning in the orientation, briefing and periodic reexamination of the communication and learning processes involved. The quickest way to find out what is going on, for example, in Japanese genetics is either to invite a senior Japanese geneticist—who speaks English—to spend a year here or to send an American—who speaks Japanese—to Japan. Either plan involves intricate and complex problems of understanding which, if not solved, lead to scientific confusion on the one hand and international tension and hostility on the other. For example, many Japanese can read and write English but have never attempted to pronounce the words which they can read and write so easily. The present conventions of many international scientific societies demand that the scientist read his paper. Such papers read by Japanese are very often unintelligible, especially to an audience that is not itself primarily English-speaking. The solution is simple if, with simultaneous translation, one channel is reserved for one of the interpreters to read the Japanese paper in English while the audience can watch the speaker, speaking in Japanese in which

⁶ The Scientific Conference on Interpreting and Intercultural Barriers to Communication sponsored jointly by the U.S. Department of State and the Josiah Macy, Jr., Foundation, reported in ETC., Winter 1957-58.

⁷ Capes, Mary (editor). A report on small conferences, resulting from a joint conference of the World Federation for Mental Health and the Josiah Macy, Jr., Foundation, to be published in London by the Tavistock Press.

⁸ Mead, Margaret. "Some Cultural Approaches to Communication Problems," in *The Communication of Ideas*, Lyman Bryson, editor. New York, Institute for Religious and Social Studies, 1948, pp. 9-26.

⁹ Murphy, Gardner. "In the Minds of Men: The Study of Human Behavior and Social Tensions in India." New York, Basic Books, 1953.

¹⁰ Sharpe, Walter (editor), "The Technique of International Conferences." New York, UNESCO, 1951. (UNESCO/SS/3.)

¹¹ Beals, Ralph L., and Humphrey, N. D. "No Frontier to Learning: The Mexican Student in the United States." Minneapolis, University of Minnesota Press, 1957.

¹² Bennett, John, Passin, H., and McKnight, R. "In Search of Identity: The Japanese Overseas Scholar in America and Japan." Minneapolis, University of Minnesota Press, 1958.

¹³ DuBois, Cora. "Foreign Students and Higher Education in the United States." Washington, American Council on Education, 1956.

¹⁴ Lambert, Richard D., and Bressler, M. "Indian Students on an American Campus." Minneapolis, University of Minnesota Press, 1956.

¹⁵ Metraux, Guy S. "Exchange of Persons: The Evolution of Cross-Cultural Education." SSRC Pamphlet 9. New York, Social Science Research Council, 1952.

¹⁶ Scott, F. D. "The American Experience of Swedish Students: Retrospect and Aftermath." Minneapolis, University of Minnesota Press, 1956.

¹⁷ Smith, M. Brewster (editor). "Attitudes and Adjustment in Cross-Cultural Contact: Recent Studies of Foreign Students." *Journal of Social Issues*, vol. 12, No. 1, 1956.

¹⁸ Paul, Benjamin D. (editor). "Health, Culture, and Community: Case Studies of Public Reactions to Health Programs." New York, Russell Sage Foundation, 1955.

his gesture and tone will be natural and meaningful. (A complementary solution was made recently by a Japanese anthropologist dealing with a paper in English which was untranslatable in detail into Japanese. It was to be presented to a Japanese audience with a considerable reading knowledge of English; the paper was mimeographed in English, a Japanese summary was presented in advance, to orient the audience, and the visiting scientist spoke in English.)

5. Application of the results of international medical research

The application of the results of international medical research is the medium through which we can expect the greatest easing of international tensions. Here the need for the human sciences is so obvious that it seems hardly necessary to make a case. This is so from the point of view of introduction of a new method of immunization, or a new method of insect control, or a change in diet which has been the precondition of a nutritional deficiency disease like pellegra, or the combination of starvation and withdrawal, which leads to the terrible infant disease of kwashiorkor. It is equally true of the resulting changes introduced in family life by the survival of a larger number of the infants born; the greater safety of the mother when she gives birth; the reduction in deaths from acute disease, with the resulting greater number of frail children who require special care in raising; and the change in family authority when, instead of a few old men and women capable of wielding the kind of power found in the traditional Asiatic family, we have no old men and women, many of them weak and ailing, with whom to deal. At every step of the way, as new methods of prevention and cure of disease are introduced, expert behavioral science help is needed. All that has been said earlier about knowledge of language, culture, social situation and methods of communication is, of course, relevant, if the changes are to be introduced at all. But each advance entails many sociocultural changes; and, unless these can be taken into account, recognized, and planned for, the introduction of new methods of medical care will not add to the sum total of human well-being. We know that sudden increase in population, change in balance among generations, or increase in the proportions of handicapped and fragile may all produce conditions of lowered mental health unless the necessary education and social and economic planning accompany them. It is to this subject particularly that the World Federation for Mental Health has addressed many meetings, conferences and publications.

IV. World Mental Health Year

Finally, I would like to call your attention to World Mental Health Year, inaugurated by the World Federation for Mental Health, beginning in April 1959 and extending through 1960, during which the 52 member countries of the World Federation for Mental Health will reassess their present status and plan for research and application in the future. The creation of the World Mental Health Year was one of the conditions establishing a favorable climate of opinion for Senator Humphrey's proposal for an International Health and Medical Research Year. It was appropriately in the area of the human sciences, whose members are specialists in human behavior, that this preliminary spade work has been done. The International Geophysical Year provided us with an initial impetus and model in the area where there is greatest ease of communication and least ideological disagreement—the physical sciences. The World Mental Health Year will provide a dry run in the problems of involving worldwide governmental and voluntary cooperation, and the experience we gain will be available for the International Health and Medical Research Year with its great vision of the whole of mankind united in research for human health and welfare. As plans for the International Health and Medical Research Year and its accompanying vast program for worldwide medical research get underway, it will be important to include representatives of the behavioral and social sciences from the very beginning, for experience has shown that, unless there is such representation at the planning stage, efforts to introduce it later meet with difficulty. Better health for all mankind and better relations between all the countries of the world are goals which should galvanize the young people of the world into activity: to set such a movement going will require all the knowledge we have and all we can get by immediate, specific research, from all of the sciences which deal with man.

INTRODUCTION OF DR. LENNOX

Senator HUMPHREY. Now, everyone who is familiar with the battle against epilepsy knows, Senator Gruening, that there is no single greater authority on it than our next witness. "Lennox on epilepsy" is the synonym for innumerable expert volumes in this field.

Dr. William Lennox of the Neurological Institute, Children's Medical Center of Boston, has come all the way from Colorado in order to be with us today, and we know this is a considerable personal sacrifice. We are very happy to have you with us, sir, and look forward to your testimony.

STATEMENT OF WILLIAM G. LENNOX, M.D., NEUROLOGICAL
INSTITUTE, CHILDREN'S MEDICAL CENTER

Dr. LENNOX. Thank you very much, Senator.

I do have a sense of time, and you will be glad to know that I have thrown my statement away. I think I should speak informally, especially of the international part of the picture which particularly interests you.

Senator HUMPHREY. Dr. Lennox, could we have, at least for our official record and transcript, any statement that you may have prepared because we will want that plus your informal comments.

EARLY EXPERIENCE IN CHINA

Dr. LENNOX. Very good. As a matter of fact, my international experience began back in 1916 when I took my small family and settled in China with the idea of rescuing these people from disease and misery. I worked there under the Rockefeller Foundation for 4 years, but I became unhappy about what I was doing.

I was saving lives all right, by assisting in campaigns of, for example, vaccination. What was the result?

As you know, nature has three ways of keeping populations in balance: First is famine, second is war, and third is disease. By preventing deaths from disease, we were only adding to those who would die from war or starvation. China, I thought, needed not more but better lives. Physically incapacitating rather than quick killing diseases were the ones to fight. The problem of overpopulation seemed utterly insoluble until help arrived from the endocrinologists. These have found that by the ingestion of a certain hormone at the proper time the female can avoid pregnancy. The efficacy of various preparations is being investigated in India and Puerto Rico. Nualdine is the name of one. Success could be a momentous event in the progress of international medical research.

INITIAL WORK ON EPILEPSY

My experience with epilepsy did not start until I came home from China because of family health. In this country there seemed to be great need of help for persons with epilepsy. No one was interested in that seemingly hopeless disease. It was called the "Cinderella" of medicine.

Under Dr. Stanley Cobb at the Massachusetts General Hospital, we started on a long-term project of research which has been going on ever since, from 1922 to 1959. Epilepsy is a subject bristling with interest and opportunities both scientific and humanistic.

In respect to the money value of this research, we can emphasize saving rather than spending. Two circumstances have been responsible for that. First, Dr. Berger of Germany developed a machine called the electroencephalograph. This records the electrical waves of the brain. Fortunately, epilepsy, which has long been neglected by scientists, is the chief beneficiary of this test. The machine also tells us a great deal about how the brain works, and there is no article in the universe that is more important than the human brain.

VALUE OF DRUG RESEARCH

The second big advance has been in the discovery of drugs that will prevent seizures in the great majority of patients. Skilled use of the brain-wave machine and of the various medicines now available, given to the 800,000 epileptics, can save the country the sum of something like \$40 billion in each generation. The data about this are in my statement which will be submitted.

Also, if this does not give you all the information you want about epilepsy, if you wait a few months you can read my two-volume book on the subject. So you will excuse me if I do not tell the whole story here.

Senator GRUENING. I hope the committee will secure a copy of this.

Dr. LENNOX. Thank you. I will send you one.

Senator HUMPHREY. That sum of money—\$40 billion—is equivalent to the total defense budget for this year.

NEED FOR SOCIAL RESEARCH

Dr. LENNOX. I will not attempt to say anything about medicine and about treatment, but I want to speak on another phase of research which I have not heard mentioned today and which, as regards epilepsy at this juncture, is just as important as the medical research.

That is social research. Because this particular class of patients is subjected to indignities and have all sorts of obstacles placed in their way, I believe that the causes of this unfair social and psychological mistreatment needs to be laid bare and remedial measures applied.

Social problems arise "across the board." Education may be barred from kindergarten to college. Men who are able bodied may be refused work just because of their history of a few seizures in the past.

Then there are the obstacles to marriage. Nineteen of our States have had laws which prescribed that the epileptic shall not marry; to do so may be considered a crime.

Our Physicians' League Against Epilepsy has been able to do something about that, and today only seven of the States continue to have such a law. But it is quite an insult to the intelligence of the legislators to let such laws remain on the books, even though they are covered with dust.

PROBLEM IN IMMIGRATION LAW

Immigration laws equate the epileptic with the criminal, the alcoholic, the prostitute, and the insane. For example, some years ago the judge of a supreme court in another country brought his daughter to this country just for medical advice. He and his family were taken off the boat at Ellis Island and were detained there until he had posted bond that they would quit the United States at a specified date. Returning 7 years later, thinking he had cleared matters with the Attorney General, he was again required to post bond.

INTERNATIONAL LEAGUE AGAINST EPILEPSY

Now I will say a few words about the International League Against Epilepsy.

In 1935 I went to London to an International Congress of Neurology. At that time the International League Against Epilepsy, which had been founded among doctors and neurologists in 1909, had reassembled again after World War I. I, as an innocent bystander, was dragged into the seat of the presidency and was not able to get out for 13 years. More than that, I found myself in the editorial chair of the international periodical called *Epilepsia*.

I was only able to get out of the presidency 9 years ago because I said I had a book that I had to write, and that book is just now being printed.

This league is composed of doctors who represent some 15 countries. They carry on research, establish clinics, and endeavor to educate doctors and the public to a better understanding and treatment of the disease. The secretary-general is Prof. Henri Gastaut of Marseilles.

Obviously, this international organization is the best vehicle for stimulation of fresh research and for spreading the news of successful treatment. This International League Against Epilepsy needs a subsidy for the quarterly periodical which represents that society and goes to all its members around the world.

The international congress meets every 4 years. A subsidy would greatly increase the size and value of this gathering. Perhaps even more important are the trainees or the scholarships that should be allotted to doctors and scientists to travel to other countries for study.

For example, at our own epilepsy clinic at the Children's Hospital in Boston we almost always have one or two foreign doctors who are with us. We may need to pay these from our own hard-earned funds.

Altogether, in the last years, we have had doctors from 14 different countries working with us for a time. The friendships formed may be as important as the work accomplished.

Senator HUMPHREY. Could I ask this one question, Dr. Lennox? It is a question on which you may give us some help.

Would you comment on the United States-Soviet Union cooperation in brain-wave research, in which apparently the Russians seem to have considerable interest?

Dr. LENNOX. Neurologists and neurophysiologists all over the world have interest in this technique. They got aboard the bandwagon rather late, and they certainly are interested, but we have not had any contact with them.

Senator HUMPHREY. You have had no contact with them?

Dr. LENNOX. No.

Senator HUMPHREY. Senator Gruening?

WORLD POPULATION PROBLEM

Senator GRUENING. Dr. Lennox, at the first part of your remarks you spoke about the three ways in which population could be diminished. I think you mentioned disease, war, and famine. Then you talked somewhat about hormones, but you did not follow up that theme.

Do you think that the present explosive increase in population poses certain perils? Do you think we should revive the Malthusian theories about too many people and not enough to eat or something like its equivalent?

Dr. LENNOX. I believe overpopulation is the biggest public health problem before the world today because efforts to stop it seem so futile. The hydrogen bomb might be outlawed perhaps by only a relatively few men with top authority, but cooperation in the limitation of birth would require the cooperation of millions of couples. It would call for tremendous propaganda to put anything of that sort through, aside from what ecclesiastical opposition there might be.

Senator GRUENING. Well, you think that is a problem that we should face seriously?

Dr. LENNOX. I think we shall have to.

Senator GRUENING. At the same time that we are improving the health of people and helping to multiply the population, thereby we are creating other problems, are we not?

Dr. LENNOX. Yes, sir; that is obvious.

Senator GRUENING. I think Margaret Mead stated that you now had so much population in Bali that they were no longer self-sufficient. That is true in other parts of the world. In Samoa, also.

Dr. LENNOX. There have been statistics showing percentage increases in population in various countries. Those with the lowest standard of living are the ones with fastest increase in their population.

Senator HUMPHREY. Do you have anything else to report at this time?

Senator GRUENING. Nothing else.

Senator HUMPHREY. Thank you very much, Dr. Lennox. We are very grateful to you.

I will ask that Dr. Lennox's prepared statement appear in the record at this point and that there be printed in the appendix volume a few of the many messages which the committee has received from other experts on epilepsy.

STATEMENT BY DR. WILLIAM LENNOX

The illness which carries the Greek name "seizure" is of compelling interest and importance. Its history is long, its scientific ramifications many, its control has been difficult. The effect of the social stigma and the unfair legal restraints imposed upon its victims have been devastating.

Epilepsy is simply a disturbance in the metabolism of the brain which shows itself as a paroxysmal discharge of the electrical currents of the brain, which in turn causes a variety of abnormal movements or sensations with usually an impairment of consciousness.

The number of persons affected is large—according to the U.S.A. draft figures, 1 in 200 young adults, or 800,000 persons in all.

There are three types of seizures (grand mal, petit mal, and psychomotor) and many possible causes of them.

Deep-rooted but false beliefs are being discredited through persistent investigation and public education. Epilepsy is not inherently deteriorating. Activity, muscular or mental, is an antagonist of seizures. In a detailed study of 225 pairs of twins affected by seizures and 20,000 relatives the hereditary element proved to be no greater for epilepsy than for many common illnesses such as diabetes, migraine, rheumatoid arthritis, hypertension, cardiac thrombosis, obesity, schizophrenia, and tuberculosis.

BRAIN WAVE STUDIES

Today the peculiar "brain waves" of epileptics are being recorded and studied in laboratories in many countries.

The pattern of the waves is an hereditary trait as proven by recordings from twins. Tracings made from the scalp of the epileptic may help to confirm the diagnosis, suggest the type and severity of seizures, and in the presence of a localized brain injury, they may indicate its position to the neuro-surgeon. Electrodes can be placed in the depths of the human brain or in the interior of a single brain cell invisible to the naked eye.

In addition to having the electroencephalogram, physicians are now armed with a dozen different medicines that are effective in different degrees in preventing seizures.

POSSIBLE DOLLAR SAVINGS

Experienced use of today's means of examination and of treatment will bring virtual cure of epilepsy to more than 400,000 of the approximately 800,000 epileptics in the United States.

Suppose that the 400,000 persons who are rendered substantially free of seizures become self-supporting instead of being maintained by the family or society. The savings for each person might amount to \$2,500 a year for 40 years. The total theoretical return during the working lifetime of this army of persons would be something like \$40 billion.

What was the principal investment that yielded this particular bonanza? It was the time and effort spread over a half dozen years by a half dozen doctors (and their assistants) working in the wards of a city hospital.

Those who dispense funds for purposes of medical research must face the question, "Should the probability of returns on the investment determine or at least strongly influence the amount of money to be dispensed?" If so, then dispensers should know that epilepsy research is on the bargain counter.

However, we emphasize that the actual return on the investment is far below the \$40 billion of theoretical attainment. First, only a minority of patients, even in these United States, receive the best modern medical care. Second, employment is usually denied to persons who though now healthy have experienced seizures in the past.

SUPPLEMENTARY GAINS

In searching for a cause of seizures, investigators have encountered facts that cannot be counted as dollars savings for either patients or society, but do add to knowledge of the normal brain and its needs. Thus, studies of the circulation and of the metabolism of the brains of human subjects reveal that the something like 10 billion storage batteries which make up the brain depend solely on sugar for their fuel. The entire brain consumes only one or two spoonfuls a day, at a market cost of only 1 or 2 cents. Surely this is the ultimate in cheap labor.

PSYCHOLOGIC-SOCIAL RESEARCH

This can be as important and as rewarding to the patient as clinical or laboratory investigations, but is sadly overlooked. The child with seizures may be denied an education. In 19 of the United States, marriage of the epileptic has been declared a crime. (This number is now reduced to eight.) In the face of present knowledge, antimarriage and prosterilization laws do not have a shred of justification. The same is true of the portion of immigration laws which equate the epileptic, even if he comes only for medical advice, with the insane, the alcoholic, the prostitute, the indigent and the criminal. Details are given in the book, "Epilepsy and the Law" by Barrow and Fabing.

Social questions can be analyzed as easily as purely medical ones. In a contracting social world the ability to explain and correct prejudice is of growing importance. The deep-rooted stigma attached to epilepsy provides an experimental testing ground. Thus, in the United States, Gallup polls have revealed the overriding importance of the educational level—the lower this level the less ready is the population to accept the epileptic. How would polls taken in other countries compare? Dr. Gallup has offered to make such a survey.

RESEARCH IN THE FUTURE

Has the bonanza of epileptic research "played out?" Contributions of pharmaceutical manufacturing companies in the past have been immensely important, and we trust will continue their interest. Increasing understanding of the human brain and of the mind which resides within it provides a challenge far beyond that of the conquest of outer space. A brain research foundation, as proposed by Dr. and Mrs. Frederic Gibbs for this and other countries would serve the research needs of a variety of persons and organizations.

For investigations of metabolic epilepsy, studies must be made of a larger collection of twins and detailed family histories, the latter as a means to learning the mode of inheritance of seizures. Study of the chemistry of the genes and of the hereditary material is preliminary to any investigation of possible epilepsy-producing mutations from radiation; or much more remotely, possible favorable mutations.

Neurochemistry is taking its rightful foremost place in the study of areas of the brain from which seizure discharges originate. Neurochemistry is the fresh interest of the present and the principal hope of the future.

INTERNATIONAL RESEARCH ALLIANCES

The quadrennial meetings of the International Congresses of Neurology and of Epilepsy are commonly held at the same time and place.

The International League Against Epilepsy was formed in 1909. Except for the continued publication of the official journal *Epilepsia*, it was static during and for a time after the two world wars. One symposium (on juvenile epilepsy) was held in London in 1955 under the auspices of WHO. The epilepsy leagues are small by necessity, and cannot be expected to carry the financial load carried by much larger organizations.

The international cause of epilepsy should be supported by grants or subsidies which would guarantee continued publication of *Epilepsia*, which is now in financial jeopardy. Also, there should be support of the international quadrennial gatherings and provision for symposiums and for trainee and fellowship grants.

In 1958 NIH participated in international research, training and other scientific activities (omitting the United States) to a total of \$3,619,671. Of this amount epilepsy (a study of the genetics) accounted for \$13,190, or 0.37 percent of the total. In the same year the NIH contributed toward research on diseases of the nervous system carried out in the United States the sum of \$9,462,522. Of this amount \$457,782 or 5.3 percent was set aside for convulsive disorders. In the same year voluntary health agencies are credited with giving for research less than one-tenth of that amount, \$44,433.

From the beginning of the International League a half century ago, the officers have been leaders in their specialties. The present Secretary-General is Prof. Henri Gastaut of Marseilles, France. Chapters of the League number more than a dozen. The members in each chapter vary in number from less than a score to more than 500 (the last-named in the United States). On this continent the North American chapter of the International League (renamed the American Epilepsy Society) plays an active role in supporting a federation of 20-odd lay organizations which work as proponents of the epileptic. There are also a National Epilepsy League and a United Epilepsy Association with headquarters in Chicago and New York City, respectively.

THE LACK OF PUBLIC SUPPORT

A large and as yet unsolved problem which deserves research study refers to the support of organizations which work for the epileptic. In the United States the organizations which appeal to the public for funds for a certain group of the sick have multiplied greatly. The critical reaction of donors is being called

the mutiny of the bounteous. The appeal by many of these organizations for their afflicted does not have the force that can be made for the epileptic, such as the large numbers of those affected, the unfair, biased treatment and neglect by the public and lawmakers alike, the responsiveness to proper medical treatment—in other words, the excellent return for the money invested in their favor. An organization for epileptics in 1939 was one of the first in the field, yet it lags far behind all others in donations received.

Neither the national nor united organizations have a yearly budget as large as \$200,000, whereas the relatively few persons with muscular dystrophy have the benefit of a collection above \$3 million.

The starvation budget of voluntary epilepsy organizations is explained in part by the following. Patients and relatives attempt to maintain secrecy by abstaining from participation in efforts in behalf of the epileptic; also, an epileptic once rid of his ailment, may want to forget the whole distressing affair. Of positive importance are the efforts of physicians, patients, relatives, and public minded persons to educate the public to a knowledge of its obligations and opportunities. An alliance of effort is better developed in North America than in other countries.

TESTIMONY BY DR. CLEMENT SMITH

Senator HUMPHREY. Dr. Clement A. Smith is our next and final witness for today.

Dr. Smith, during my trip to Europe last November and December 1958, I was particularly interested in the cooperation in what we call perinatal research—that is, research into the conditions in the mother's womb which help shape the life of the fetus.

We have with us today, of course, in Dr. Smith, one of the outstanding experts in the field of pediatrics. You are the chairman of research on newborn infants at Boston Lying-In Hospital.

I ask Dr. Smith to come before us and give us his observations, and I thank him for not only his attendance here today but his patience, his genial good nature.

STATEMENT OF CLEMENT A. SMITH, M.D., HARVARD MEDICAL SCHOOL, BOSTON, MASS.

Dr. SMITH. Senator Humphrey, I have wondered whether the only thing worse than the man at the end of the morning with a prepared statement might be a man at the beginning without one.

I would not like to read my prepared statement to you because it is much too long.

Senator HUMPHREY. Well, now——

Dr. SMITH. I will try to take up the points that you asked me about.

Senator HUMPHREY. I do not think it looks too long at all.

Dr. SMITH. Well——

Senator HUMPHREY. It is very short, as a matter of fact.

Dr. SMITH. Well, perhaps I can save time by reading some of it.

In my own field of pediatrics, the greatest toll of life is taken during the first week after birth, and the largest cause of this peak is contributed by premature birth.

In 1945, my own interest in investigating and preventing disease and death of premature and other newborn infants caused me to accept very gladly the invitation of the late Professor Irving in obstetrics at Harvard to move out of the Children's Hospital into the Lying-In Hospital and learn about babies right from the beginning.

IMPORTANCE OF FETAL STUDY

Such investigations have increasingly included the fetus or the unborn child as well.

This is partly because birth is not really the beginning, partly because almost as many infants die just before and during birth as just after it—the total number being that described as the perinatal mortality or the deaths around birth.

One cannot be responsible for just one part of perinatal mortality.

Dr. Irving used to tell us, "A woman doesn't come to our hospital to get over a case of pregnancy. She comes to take home a baby." And we have failed equally badly if that baby dies before, during, or just after birth.

But the interest of the pediatrician in the unborn infant is also because the premature infant is a physiologically displaced person. We cannot understand and help him without knowledge as to how he lives in the womb, where, of course, he really ought to be.

TRIBUTE TO DR. EASTMAN

In applying these interests to the protection of infants through what I have thought of as the valley of the shadow of birth, one of my most valued friends and preceptors has been Professor Eastman, who will speak here, I think, a week from now.

Dr. Eastman, in Baltimore, has been as helpful to me 350 miles away in Boston as have many experts a good deal nearer to my hospital.

Not only does he publish papers that I never miss reading, and not only do we correspond about ideas and activities, but we often manage to share the same platform at medical meetings or sit at the same table at research conferences. If we were not quite so busy and planned our lives accordingly, I might go and see him for a month sometime or he might come and see me for a month sometime. Such visits would certainly advance my work greatly, and might even be helpful to his.

In this same way there are a good many other men and women in hospitals and laboratories in Canada, in Europe, in Latin America, in Australia, or in other parts of the world, with whom it would be extremely advantageous to share ideas and experiences, rather than be writing now and then.

It is particularly because newborn infants all over the world are just about the same as our own and have just about the same problems as our own—some of them more commonly in certain countries than ours—that this kind of interchange is particularly important to me and those interested in babies.

Whatever the color of the baby or whatever language the parents speak, it is interesting that little Finnish children, little Italians, Africans, Swedes, Peruvians, all speak the same language on the first day, and none of them speaks it with a foreign accent, I find.

And they all have the same problems in being born that our babies do.

I would like to say something more about the contribution of babies, mothers, and doctors in other countries to our progress before I close, but you have asked me to discuss promising new developments and

high-priority ideas in the biomedical sciences by means of which progress is likely to come in the years just ahead.

A few words then, about those matters first.

STUDIES OF THE NEWBORN

I suppose the most promising new development is the growing acceptance of the fact that deaths of newborn babies are not just "acts of God" but may be as open to investigation and prevention as mortality at any other age. This implies a willingness to have newborn infants studied by analyses of body fluids in the laboratory, by wider use of X-rays, electrocardiograms, even passage of fine tubes along the blood vessels for samples from the various heart chambers, and all the other methods which have been so effective in uncovering information in older patients.

Because of the belief that one cannot accept a hands-off attitude while a baby, even a 2-pound baby, appears to be dying, we have been devising special equipment and tests to study respiration, circulation, kidney function, and so on, in even the smallest and youngest of our patients.

Some of my colleagues with truly fantastic operating skill are beginning to get information from laboratory animals still in the womb indicating how the unborn animal and (probably) the unborn infant live in the very different environment of life before birth.

These are fields to which all kinds of biomedical sciences can be applied, among them the enzyme chemistry of the cells themselves.

INTERNATIONAL COLLABORATION

My laboratory neighbor at the Lying-In Hospital, Dr. Claude Villee, is investigating not how babies live nor how organs function but how cells live. In this special field of biochemistry he can tell us increasingly more about the special needs of body and brain cells in fetuses who are, when they are born too early, premature infants.

Dr. Villee's work is done with one foot in Stockholm, where he has especially talented colleagues and unusual opportunities, and one foot in Boston.

Our own work on the mechanics of breathing, circulation of the blood, and function of the kidneys of newborn and premature infants is mostly an outgrowth of work done in the English universities, at Cambridge and Oxford. We lay our problems and our results before our colleagues there by mail almost as often as before those in this country.

At least half of our research fellows over the past 15 years, and some of the best, have been young men from other countries. Indeed, most of the apparatus now in our research nursery was built there either by a research fellow from Sweden or by another from London. We now happily await the arrival of colleagues from Athens and Helsinki.

Sometimes we can best go over there. I hope we shall never have in our country an opportunity such as was opened to me by the wonderful people in Holland and their doctors and hospitals in 1945 and 1946 to study relations between maternal nutrition and babies

by measuring the results of a winter of wartime maternal starvation. But when the opportunity presents itself anywhere in the world for an investigator to learn something which may improve the health and strength of babies everywhere in the world, including the U.S.A., I hope no lack of funds will interfere with prompt and full utilization.

Thank you very much.

Senator HUMPHREY. Well now, Dr. Smith, that is another one of these very interesting and, to a layman, fascinating statements; it is most informative to us.

During our visit in Paris last year, Mrs. Humphrey, Mr. Cahn, and I visited the neonatal clinic of the maternal hospital under Dr. Alex Minkowski. We saw a great deal of work going on in this field of perinatal research and care.

Do you feel that there is more that can be done in the field of international cooperation on the part of our Government as well as, of course, our great private institutions that would expedite the work? And if so, how do you think we could best do it?

ROLE OF U.S. GOVERNMENT SHORT-TERM ASSISTANCE

Dr. SMITH. More could certainly be done. First of all, may I say how very much the Government has already done in medical research. We are all aware of the enormous steps forward and the enormous investment that has been made by the Government in this field.

Now, if the Government could somehow increase the availability of what I like to think of as risk capital in research, this would be far more useful than present investments in projects that were planned years ahead of time and all arranged in the grant application. Suppose I hear by chance that somebody in London has a particular project which would help one of my young men to visit, or that someone from our group could help with a going or a projected activity in Latin America or somewhere else. And suppose there could be made available—and properly supervised—money by means of which people with bona fide reliability could move about the world in these ways; this would have enormous advantages.

I have a young clinical investigator now working at the hospital who thinks perhaps if she could investigate infants in India where we are told that a certain disease that we see very commonly is never observed, this would perhaps save an enormous amount of trouble in finding out why our infants do die in this particular way.

To go there, she would have to have money and she would have to have statistical help, and she would have to have some of Dr. Margaret Mead's understanding of the people. But the most difficult thing might be to get all these things at the same time, especially the money.

This is what I think we need funds for rather than the long-term sponsored project—or as well as those long-term sponsored projects.

Senator HUMPHREY. Interestingly enough, Dr. Smith, this is the sort of observation that we heard again and again from eminent scientists and doctors in European medical centers. I refer to the importance of this kind of travel and of on-the-spot observation and

contact, as you say, relying upon the reliability of the individual doing the travel—

Dr. SMITH. Yes.

Senator HUMPHREY. And his professional competence.

Dr. SMITH. Yes.

USE OF COUNTERPART CURRENCIES

Senator HUMPHREY. One of the ways that some of this can be done, which we hope that we have provided for and will provide for even more specifically in the future, is through the use of our soft currencies which have been accumulated rather widely throughout the world as we export agricultural commodities and take payment in soft currencies.

We have, for example, in country after country—let's take countries such as Great Britain, France, Germany, Spain, Italy, Greece, Turkey, Poland, and, of course, all through the Asian and African areas—vast amounts of currency which are presently unallocated or unused.

It seemed to me that the U.S. Public Health Service, for example, or its National Institutes, or Senator Hill's proposed project, the International Medical Research Institute, should be able to get hold of a portion of that currency which is already owned by the Government, which is not a new appropriation, and which is not new cost to the American people. They should have some leeway, some latitude in the use of it—rather than tying them down with all kinds of rules and subsections and sub-subsections of rules. We should trust the Surgeon General or trust the Director of the International Medical Research Institute, once Senator Hill's bill, Senate Joint Resolution 41, is passed, to utilize these travel funds together with a certain amount of dollars that would be required to supplement the soft currencies. This, I believe, would be very helpful.

For example, we could fly from the United States to Rome on Italian airlines using Italian lira. We could fly on Scandinavian airlines using Finnish finnmaks, and so on.

And also I might add that it seems to me that it would be desirable to empower this same Governmental official—it would have to be in Government—the Director of the proposed International Medical Research Institute, for example, or the Surgeon General, or select whatever officer—it may be Dr. Shannon over at NIH—empower that individual also to make available to qualified doctors and scientists, let's say, in Finland, of Finnish citizenship, to travel, let us say, to Rome or to Vienna or to Ankara or to New Delhi or to Amsterdam or wherever else it may be, wherever these currencies are available.

Well, I think this has some merit. Do you feel this is meritorious?

Dr. SMITH. Oh, I think very meritorious.

Senator HUMPHREY. Thank you very much, Dr. Smith.

ADDITIONAL HEARINGS

Next Thursday morning these hearings will resume with testimony by other distinguished witnesses. That day, we will commence with the Director of the National Institutes of Health, Dr. James Shan-

non, after whom we will hear from Prof. H. J. Muller, University of Indiana, Nobel Award-winning geneticist.

Others will be Dr. Nicholson J. Eastman, of Johns Hopkins University, distinguished obstetrician; Dr. Emanuel R. Piore, director of research of International Business Machines Corp.; and Dr. George Stevenson, of the National Association of Mental Health, the national and international consultant to that association.

I believe those are the witnesses scheduled.

We are deeply grateful to our distinguished guests and witnesses this morning for their cooperation and helpfulness.

SUPPLEMENTARY STATEMENTS IN THIS VOLUME

We will appreciate, moreover, the supplementary statements which they will be filing with us.

Their supplementary comments will be incorporated directly in the body of this transcript, that is, within or immediately following their oral presentation.

APPENDIX VOLUME TO BE PRINTED

However, as I mentioned earlier this morning, we are in the process of assembling a very considerable amount of additional material as well. This material will be published in an appendix volume—Part II.

I should like to mention that this latter volume will represent one of the most important guides to the work of this subcommittee. It will consist of a compendium which will represent what might almost be considered an inventory of our efforts.

In order to assure fullest understanding of the important exhibits in the compendium, I have prepared a statement which I shall direct be printed at this point in the record.

STATEMENT BY SENATOR HUMPHREY ON INFORMATION TO BE PRINTED IN APPENDIX VOLUME

The exhibits in the appendix volume will consist of memorandums and correspondence from leading medical authorities in the United States and throughout the world. Similarly, it will contain messages from other scientists—from biologists, chemists, and physicists—who directly and indirectly have made and are making contributions to the healing arts.

PUBLICATION TO BE TEMPORARILY DEFERRED

In order that the volume may be as complete as possible, it is our intention to defer its publication for some months.

We will also delay temporarily the publication of the present hearing volume. Thereby, we will give our busy witnesses ample time to prepare supplementary statements.

TWO VOLUMES TO BE PUBLISHED AT THE SAME TIME

Similarly, by publishing the hearing volume and the appendix volume simultaneously or approximately at the same time, we will be able to strengthen the cross-referencing. In that way, we hope to enhance the permanent utility of both volumes. They will have been edited in effect as a unit and with much care.

Time is needed particularly because many distinguished foreign physicians and other scientists have promised us reports which are highly pertinent to the subcommittee's work and which belong in the appendix volume.

LETTERS FROM ABROAD SUPPLEMENT TESTIMONY

Indeed, in many instances these reports bear directly upon the very topics which our witnesses will discuss today and next Thursday. For example, we have heard testimony on cancer today and we will be receiving during the months to come additional observations on the worldwide problem of cancer.

Next week, we will be receiving testimony on perinatal research, on mental health, on genetics, and on other topics. In every single one of these instances, too, we will be receiving pertinent memorandums and letters from experts abroad. The value of these messages from overseas will be multiplied if they can be read in the appendix volume, as they will be, side by side with the oral testimony to be published in this hearing volume.

HIGH ESTEEM OF CORRESPONDENTS

If time were to permit, this subcommittee would hear orally from scores of witnesses rather than from a dozen or so. Since time does not permit, we want to make sure that the messages in writing which we have received and will receive are given the fullest consideration.

Publication of such material within the appendix volume, is however, but a first step. Thereafter, we will review this material so that it can help us come to our conclusions. If we were to fail to publish it, we feel that much of the educational and informational value of this correspondence might be reduced.

In other words, we regard this written material with high esteem similar to that which we feel for the oral presentation by our witnesses.

DILIGENT SEEKING OF COUNSEL

I think that the record will show this fact: this subcommittee has made as diligent an effort as has ever been made to my knowledge within the legislative branch of Government to search literally throughout the medical world for counsel.

This subcommittee has not simply relied upon American authorities, as much as we respect NIH and other American public and private experts.

Rather, we have spread what might be termed a "dragnet" for constructive ideas and suggestions from all corners of the world.

MANY FOREIGN GROUPS CONTACTED

Since our focus is international, we have sought international advice as to what the world should be doing.

This subcommittee has literally written to every Minister of Health throughout the world. We have communicated with the president of every national medical association and every national medical academy, every national and international voluntary health agency and with as broad a list as we could find of other biomedical organizations. To each, we have tried to send pertinent, detailed inquiries. We have asked their specific reactions and suggestions to world medical problems.

After receiving their responses, we have sought to follow up with additional inquiries, whenever need required. To do all this has posed a tremendous burden of correspondence upon us, particularly upon our project director. But it is a burden which we and he were delighted to assume.

The result of all this laborious effort is a wealth of insight which we are most anxious to make available and to utilize.

FOREIGN CORRESPONDENCE INVOLVES DELAYS

All of this effort has required time. It is not unusual for 6 months or more to elapse from the date an inquiry is first sent overseas by us to the time the response has been received. The longest lapse usually occurs between its receipt abroad and the date it is responded to. Often our letter in English must be translated into a foreign language. Often, too, it may be transmitted to a number of other medical experts before it gets into the final hands. If a response is received in a foreign language, it must, of course, be translated here.

I want to make quite clear that the overall delay is not due to any lack of diligence on the part of our correspondents. Rather, it is invariably due to the pressure of the professional duties of these busy foreign experts. Sometimes it is due to the fact that our foreign friends may not be fortunate enough to have the stenographic force capable of handling a heavy volume of correspondence.

Thanks to their cooperation, however, we have assembled and are still assembling this considerable volume of useful information. We are anxious that it be capitalized upon to the fullest by publication in the appendix volume.

Of course, the exhibits will not be unique. Much of the insight gained through our own inquiries and reports has long since been gathered in the course of the regular work by expert agencies such as the National Institutes of Health, the National Science Foundation, and other organizations and with much more technical analysis on their part.

As laymen, we do not presume to ask highly technical questions or to attempt technical evaluation.

But we point with pride to the fact that in the instance of this subcommittee, rather than over-rely on Federal agencies, it is we of the Senate who have directly made the inquiries throughout the world. We have received the responses directly and are using them to develop our own evaluation of policies of the executive branch.

Of course, many of the individuals whom we have contacted have been the scientists recommended to us by competent agency sources such as the National Institutes of Health, whose judgment we value so highly.

SUBCOMMITTEE HAS COMPILED MANY LISTS TO CONTACT

In addition, however, we have compiled our own lists to contact. These lists include organizations in the life sciences, foundations, research institutes, pharmaceutical leaders at home and abroad, medical publishers, and many other groups.

We believe, that by reprinting samples of what might be termed this "harvest" of material, we will serve not only this committee but perhaps other committees of the Senate which have important responsibilities in this field.

I emphasize the words "samples" and "highlights" because the total files of the subcommittee are far bulkier than we could attempt to cover through one appendix volume.

CHARTS ON TOLL OF DISEASE

Each correspondent has helped to answer the question: "What is the significance of international medical research in terms of the needs of our own American people?"

I, personally, would like to make available now for the record one type answer to that very basic question.

The fact of the matter is, that the American people, while enjoying the best health of the people of any other major power in the world, nonetheless, experience a great deal of avoidable pain, suffering, and premature death. On the average, within the last one-half minute someone died in the United States of cardiovascular-renal disease. Every 2 minutes someone in our country dies of cancer. Every 5 minutes someone dies from an accident. These estimates were made and a chart compiled by the National Health Education Committee. At my request, this outstanding citizen organization, whose distinguished chairman is Mrs. Albert Lasker, prepared this diagram to show why health is a matter of deep concern to every single American.

Down through the years, the National Health Education Committee has published as powerful, absorbing, and factual studies as have been issued by any organization—public or private—on the toll taken by disease in the United States. I cannot too highly commend its efforts, too, in acquainting the American people with the significance of expanded medical research.

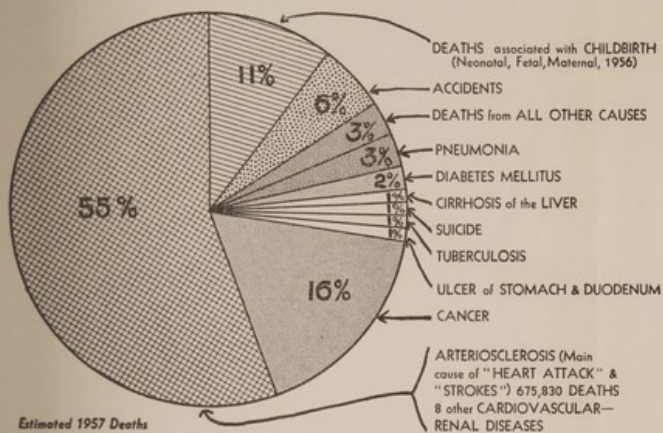
And, so, I shall ask that immediately following the transcript of testimony today there be published the chart prepared at the subcommittee's request by the National Health Education Committee.

Senator HUMPHREY. The meeting is recessed.

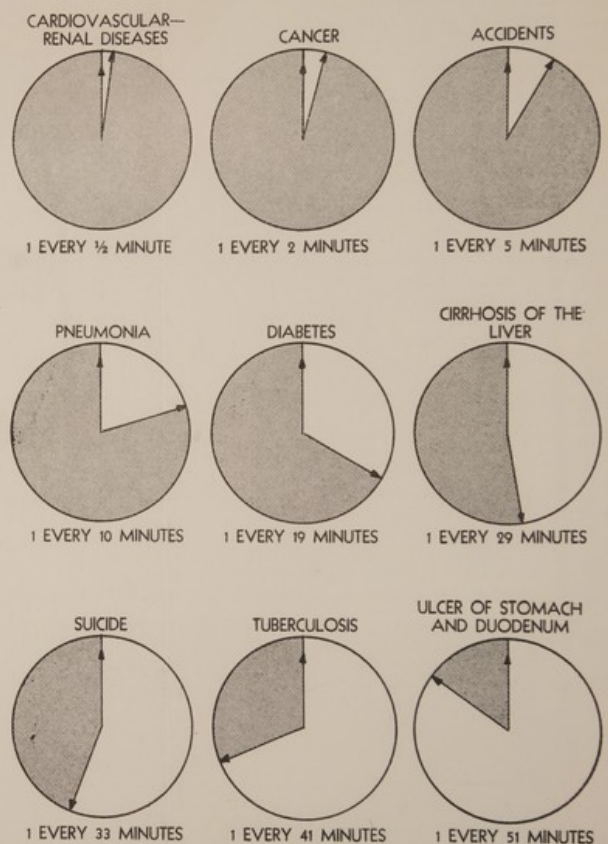
(Whereupon, at 1:14 p.m., the subcommittee was recessed, to reconvene at 10 a.m., Thursday, July 16, 1959.)

THE TOLL OF DISEASE AND ACCIDENTS IN THE UNITED STATES

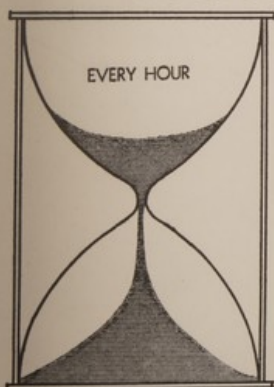
WHAT ARE THE MAIN CAUSES OF DEATH IN THE UNITED STATES TODAY?



AND IF FIGURED IN MINUTES AMERICANS DIE AT THE RATE OF . . .



AMERICANS DIE EVERY HOUR OF EVERY DAY THROUGHOUT THE YEAR AS FOLLOWS:

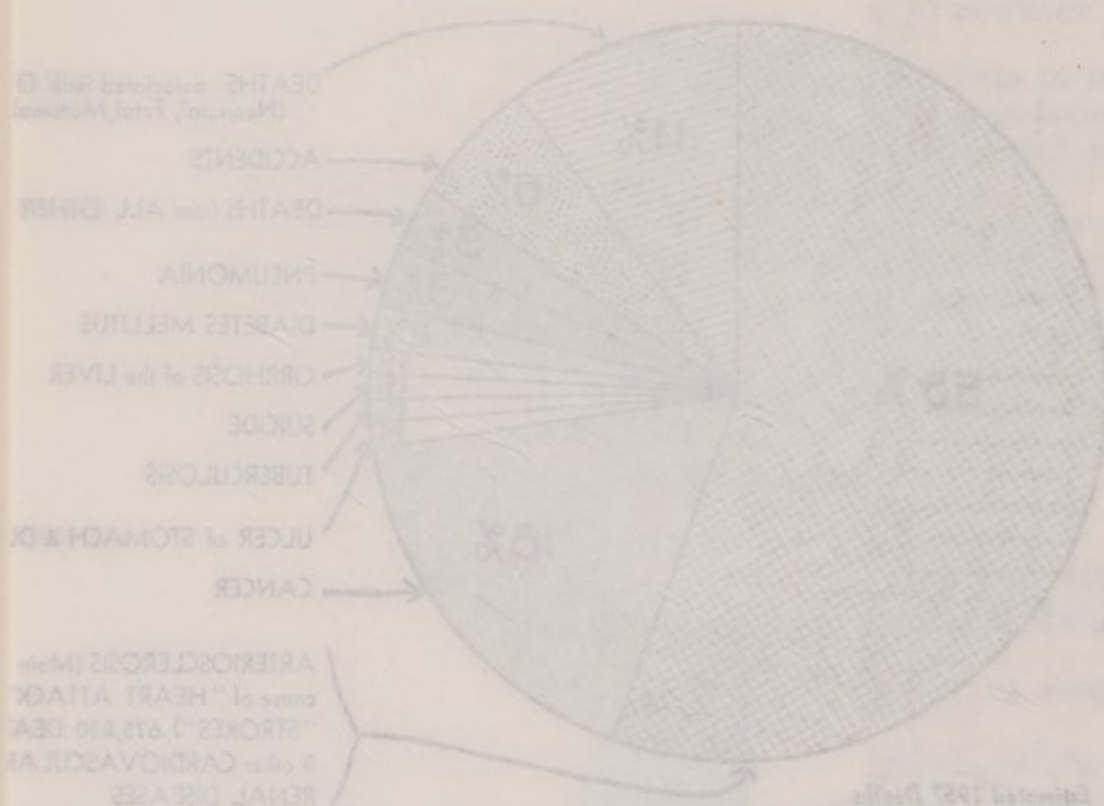


- 120 of CARDIOVASCULAR-RENAL DISEASES
- 30 of CANCER
- 12 in ACCIDENTS
- 6 of PNEUMONIA
- 3 of DIABETES
- 2 of CIRRHOSIS OF THE LIVER
- 2 of SUICIDE
- 1.4 of TUBERCULOSIS
- 1 of ULCER OF THE STOMACH AND DUODENUM

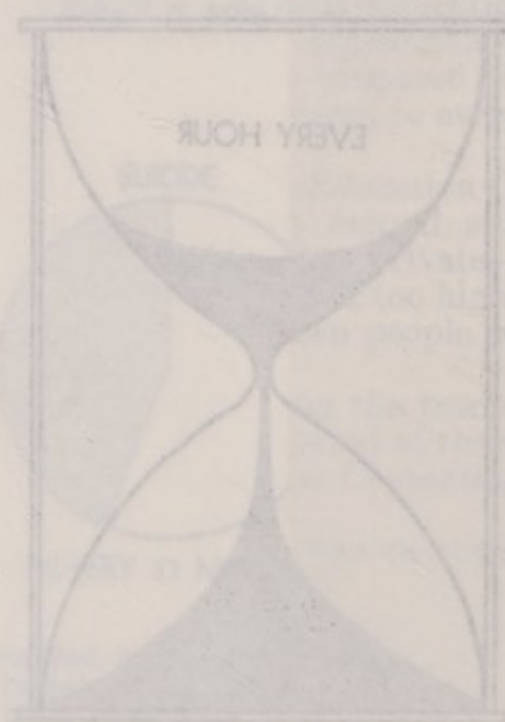
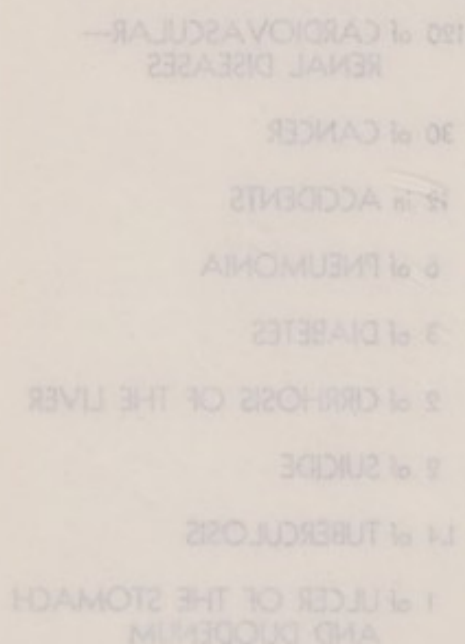
Prepared by the National Health Education Committee, January 1959, at the request of the Subcommittee on Reorganization and International Organizations, Committee on Government Operations, U.S. Senate.

GETTING THE TOLL OF DISEASE

WHAT ARE THE MAIN CAUSES OF DEATH IN THE UNITED STATES TODAY?



AMERICANS DIE EVERY HOUR OF EVERY DAY THROUGHOUT THE YEAR AS FOLLOWS:



THE U.S. GOVERNMENT AND THE FUTURE OF INTERNATIONAL MEDICAL RESEARCH

(Long-Range Trends, Opportunities, and Problems)

THURSDAY, JULY 16, 1959

U.S. SENATE,
SUBCOMMITTEE ON REORGANIZATION
AND INTERNATIONAL ORGANIZATIONS OF
THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 10 a.m., in room 3302, New Senate Office Building, Senator Hubert H. Humphrey (chairman of the subcommittee) presiding.

Present: Senators Humphrey, Muskie, and Gruening.

Also present: Julius N. Cahn, director of medical research project; and Walter L. Reynolds, chief clerk and staff director, Committee on Government Operations.

TEXT OF AUTHORIZING RESOLUTION

Senator HUMPHREY. I should like the official transcript of these hearings to be as complete as possible. I will direct, therefore, that there be printed at this point the full text of Senate Resolution 347, 85th Congress.

[S. Res. 347, 85th Cong., 2d sess.]

RESOLUTION

Whereas the Government of the United States has a vital interest in the health and well-being of the American people; and

Whereas the Government of the United States, in advancing this interest, is engaged in numerous large-scale research and other programs and operations designed to improve the health standards and well-being of the Nation, and in related activities carried on by various departments and agencies of the National Government in cooperation with the basic system of private medical care; and

Whereas, in recognition of the fact that the goal of a healthy Nation transcends national boundaries, the Government of the United States participates in numerous international unilateral, bilateral, and multilateral programs designed to help improve the health standards and well-being of peoples throughout the world; and

Whereas in furtherance of this purpose the Government of the United States participates in the activities, programs, and operations of the World Health Organization, United Nations agencies and organs, and other international organizations which are engaged in helping to wipe out disease and to improve standards of health throughout the world; and

Whereas there appears to be a need for increased coordination with respect to unilateral, bilateral, and multilateral health programs, both within the United States and by and between the international agencies in order to avoid duplication and overlapping which may tend to impair the effectiveness of these programs and activities; and

*Whereas there appears to be a need for increased coordination in international cultural, educational, and exchange of persons, programs, and activities; and*¹

Whereas, pursuant to rule XXV of the Standing Rules of the Senate, the Committee on Government Operations has the duty of studying the operations of Government activities at all levels with a view to determining its economy and efficiency, and the further duty of studying intergovernmental relationships between the United States and international organizations of which the United States is a member: Now, therefore, be it

Resolved, That the Committee on Government Operations, or any duly authorized subcommittee thereof, is authorized under section 134 (a) and 136 of the Legislative Reorganization Act of 1946, as amended, and in accordance with its jurisdiction specified by rule XXV of the Standing Rules of the Senate, to examine, investigate, and make a complete study of any and all matters pertaining to the international activities of Federal executive branch departments and agencies relative to worldwide health matters, and of any and all matters pertaining to intergovernmental relations between the United States and international organizations of which the United States is a member, as provided for in rule XXV (1) (g) (2), (B) and (D) of said Standing Rules of the Senate, and of any and all matters pertaining to international health research, rehabilitation, and assistance programs, international cultural, educational, and exchange of persons programs, including but not limited to (1) the general level of authorization of funds for the future to enable the programs efficiently to achieve their purposes, including the use of United States appropriations and foreign currencies generated by American aid and sales of farm surpluses; and (2) the coordination of programs related to international health, international cultural, educational, and exchange of persons programs, on the part of interested United States Government agencies, including but not limited to, the programs of the Department of State, the International Cooperation Administration, the United States Information Agency, the Department of Health, Education, and Welfare, the Atomic Energy Commission, the Veterans' Administration, and the National Science Foundation, in appropriate cooperation with nongovernmental organizations.

SEC. 2. For the purposes of this resolution the committee, from date of approval to January 31, 1959, inclusive, is authorized to (1) make such expenditures as it deems advisable; (2) to employ upon a temporary basis, technical, clerical, and other assistants and consultants: *Provided*, That the minority is authorized at its discretion to select one person for appointment, and the person so selected shall be appointed and his compensation shall be so fixed that his gross rate shall not be less by more than \$1,200 than the highest gross rate paid to any other employees; and (3) with the prior consent of the heads of the departments or agencies concerned, and the Committee on Rules and Administration, to utilize the reimbursable services, information, facilities, and personnel of any of the departments or agencies of the Government.

SEC. 3. The committee shall report its findings, together with its recommendations for legislation as it deems advisable, to the Senate at the earliest practicable date, but not later than January 31, 1959.

SEC. 4. Expenses of the committee, under this resolution, which shall not exceed \$30,000, shall be paid from the contingent fund of the Senate upon vouchers approved by the chairman of the committee.

Senator HUMPHREY. We commence the second day of our hearings by testimony from an individual who we feel is the best qualified in all of the executive branch to comment as regards the long-range future of international biomedical research in relation to the Federal Government.

We welcome, therefore, Dr. James A. Shannon, Director of the National Institutes of Health.

I am not going to take time now to cite Dr. Shannon's distinguished background: as in the case of other witnesses, a brief biographical summary will be incorporated into the record following the oral presentations.

¹ The subcommittee subsequently decided not to make operative the phrase which is italicized above.

APPRECIATION OF NIH COOPERATION

I should only like to say at this time that this subcommittee could not have attained the goals which we believe we have attained in the very few months since the study started if it had not been for the genuine cooperation of Dr. Shannon and his able associates.

The project director, Mr. Cahn, of the subcommittee staff, tells me that in every contact Dr. Shannon and his colleagues have been exemplary in responding with the exact information that we needed, when it was needed, and in the way we needed it.

Because of the limited time available for the subcommittee today, Dr. Shannon will be the only Government witness, or expert as such, who will testify. We will look forward, therefore, with special interest to the expert judgment which we know he is going to give us.

We have here a copy of the committee print, "Cancer, a Worldwide Menace—Some Facts and Figures on its Occurrence in the United States and Abroad." I might say at this moment that I believe that this particular committee print will be one of the most interesting, for the layman and also for the professional people, that the subcommittee will publish.

On my tour in Western Europe, visiting the medical institutes and talking with some of the leading medical experts, I was very much intrigued by the description of the occurrence of different types of cancer in various parts of the world, and of the efforts that are being made to discover and identify why this is so, why it happens this way. This committee print, we think not only with the help but with the genuine and full cooperation of the National Cancer Institute of the NIH, will present some valuable information.

With that, Dr. Shannon, again we welcome you, we are very proud of you and are honored by your presence.

**STATEMENT OF DR. JAMES A. SHANNON, DIRECTOR, NATIONAL
INSTITUTES OF HEALTH**

Dr. SHANNON. Thank you very much, Senator Humphrey.

It is indeed an opportunity for me to meet with this committee to discuss the opportunities and problems of international cooperation in medical research.

COMMENDATION OF SUBCOMMITTEE

I should like, first, to express my opinion concerning the excellent work being done by this subcommittee and its staff in this present project. In my opinion, the five committee prints which have been issued thus far are, indeed, timely, useful, and comprehensive portrayals of some major aspects of international health and medical research activities.

We look forward with interest to the analysis which will be forthcoming covering other important facets of worldwide relationships in the fields of health, medicine, and research to which you have directed inquiry.

The various activities of the National Institutes of Health on the international scene were covered in considerable detail in the first of

the committee prints entitled "International Medical Research, a Compilation of Background Materials." Therefore, I need not dwell at length on this phase of our programs in this testimony. Rather, I will turn to certain aspects of the background of international relations in health and medical sciences.

INTERNATIONAL CHARACTER OF LIFE SCIENCES

I find it difficult to approach a discussion of this subject without spending a moment with some of the more important influences which form the background of present-day international relationships in health and medical research. The life sciences generally, and medicine in particular, have been characterized in their development by an international point of view, both in the acquisition of new knowledge as well as in its distribution of application.

In this respect, I believe the life sciences are considerably in advance of the physical sciences. A number of forces have contributed to this progress.

In our own country, medical research had its roots in and was nurtured from the main stream of European science. In the 18th century and in the early part of the 19th, the dominant influence upon our beginning medical endeavors was British as might be expected from our colonial origins. The blossoming of French medicine with its focus upon clinical and pathologic studies in the middle 19th century exerted a pervading influence upon American medicine of that period.

However, it was the rise of intensive laboratory work in Germany in the latter part of the 19th century which perhaps had the most profound effect upon medical research in the United States, providing both an inspiration and a pattern which persists to some extent even to this day.

ORIGINS OF NIH

As a matter of interest, the origins of the NIH can be traced to this influence. In the 1880's a young Public Health Service officer, Dr. Joseph J. Kinyoun, made a study tour of the great European scientific research centers. He was so impressed and inspired with what he saw that on his return to the United States he set up in a small room in the Marine Hospital on Staten Island in New York a laboratory modeled upon what he had seen in Europe, particularly the laboratory of Koch in Germany. This laboratory of Dr. Kinyoun's was among the first of the bacteriological laboratories in the United States. It was here that began the research function of the Public Health Service, the embryo of the present-day National Institutes of Health which is now, perhaps, the world's largest medical research organization.

From these successive international influences emerged the independent tradition of medical research in the United States. For a century and a half we were a receiving nation, building upon and utilizing the achievements of the old world. Today our medical science, research technology, and theoretical work is the vanguard of scientific endeavor in the life sciences.

With this achievement we have inherited the responsibility of sharing our capabilities and aiding the beginning scientific efforts of the developing nations. In this way we can repay our scientific debts.

OTHER FACTORS IN INTERNATIONAL RESEARCH

Apart from the particular set of influences involved in the development of U.S. medical research, the international character of medical research derives from other broad forces:

1. The great colonial powers, Great Britain, France, the Netherlands, and Belgium, accepted in their colonial administration, responsibility for the conduct of research and the establishment of research facilities directed to the solution of disease and health problems impeding colonial development.

2. Military operations, both of the United States and of other countries, have contributed to an international framework for medical research. The threat of indigenous disease, environmental and other health problems to either combat or garrison troops forced establishment of military research facilities in local areas to search for solutions.

3. Nongovernmental organizations have also had, and continue to exert, a substantial influence in international health and medical research activities. Thus the major philanthropic foundations, such as the Kellogg and Rockefeller Foundations, have engaged in research and service activities in foreign countries and provided for the support of foreign investigators and institutions.

4. Intergovernmental relationships concerned with health activities are of a long-standing character. These reach back to the International Sanitary Conferences held in the 19th century concerned with problems of quarantine and the international spread of disease. There has been successive enlargement of such multilateral health activities proceeding through the health functions of the League of Nations to the present expression in the World Health Organization, operating as one of the specialized agencies of the United Nations. The activities of these international bodies have provided a framework of worldwide relationships in health, and more recently in medical research, which is quite unlike anything that exists in any other field of science.

5. In recent years these traditional patterns have been augmented by the direct international research activities of official Federal agencies such as the Public Health Service which alone or in conjunction with nongovernmental agencies, have sought new knowledge or the solution of urgent problems by enlargement of research efforts on a worldwide basis.

All of these factors have resulted in the emergence of a tradition, precedent, and framework of international relationships and patterns of action in the health and medical sciences which is of considerable substance and stature and in which the United States occupies an increasingly significant and responsible position.

FUTURE OPPORTUNITIES AND CHALLENGES

I have attempted to sketch what I believe to be some of the more important background influences which have contributed to the international development of the medical sciences. Looking to the future there are a number of important circumstances and conditions which, I believe, emphasize the need, opportunity, and promise of further international efforts in medical research.

First is the worldwide prevalence of the problems of disease and disability. The reports issued by this committee, particularly the one entitled "The Status of World Health," have amply portrayed the scope and magnitude of disease and health problems which confront the world's population. These range from the still uncontrolled ravages of the infectious diseases in many parts of the world to the grave and growing threats of the chronic diseases and the health perils of highly industrialized and urbanized communities.

I need not emphasize the significance of the shrinking geographical extent of the world as a result of modern transportation. This has had two effects of importance here. It has brought the peoples of the world closer together so that we cannot escape the awareness of the danger of disease and ill health existing in other countries nor the obligation to share our knowledge in its alleviation. In addition, we are witnessing changing patterns in the distribution of disease and a considerable lessening in the differences amongst countries and peoples in terms of their health and disease problems.

This has produced a community of interest and concern which supports collaborative effort. It also means that research progress in one area of the world has important meaning to all other areas.

The shrinking world has also underlined the great possibilities of gaining new insight and knowledge into disease and disease processes by studying the world's population as a single unit. We have achieved a degree of skill and sophistication in statistical, biometrical, and epidemiological techniques which can make it possible to derive the maximum benefit from such studies. We are also faced with the urgency of utilizing the opportunity to gain new knowledge about disease processes through studying the differences in disease prevalence while sharp contrasts still exist.

It is probable that in the not too distant future such differences will, in large measure, have disappeared. While we bring to the developing countries the prospect of victory over the infectious diseases, we unfortunately bequeath our heritage of chronic illness diseases and the increasing environmental hazards of advancing civilization.

It is almost a cliché today to talk about the essential unity of scientific knowledge and endeavor. This, however, is a basic contributing force to collaborative scientific endeavors and is one of the essential elements from which the value of international efforts in science derives its meaning.

REQUIREMENTS IN COLLABORATION

Without a doubt collaborative and cooperative research activities involving scientists and research investigators can contribute to accelerated programs in the solution of many problems. This, of course, involves careful planning, provision for the utilization of common

protocols, close correlation of findings and pooling of knowledge. The increasing complexity of medical research demands a wide range in the scientific disciplines and technology brought to bear upon the solution of problems. This places a premium upon greater interchange amongst scientists in various fields and more effective means for communication.

There is great need to make the greatest use of the existing medical research resources in the world in coordinated attacks upon major problems. The further growth of medical research must also be viewed in a world context in which there is great value to be derived by strengthening the capability of the developing countries. This can be done through expanded training programs, through making the most use of existing facilities, and the creation of the mechanisms necessary for this purpose.

PROBLEMS WE MAY ANTICIPATE

Although present-day circumstances and conditions seem particularly appropriate for further expansion of international relationships in medical research, many problems will be encountered.

First, there are those problems which arise from scientific considerations:

1. Enlarged international research activities will require greater effort to improve basic sources of demographic information. To do the kind of epidemiological studies which I have mentioned, accurate information on the demographic characteristics and current patterns of morbidity and mortality in many population groups will be required.

2. Comparability of results in research involving scientists in different countries must be assured and this will place a premium upon uniformity in observations, and standardization in measurements, nomenclature, and diagnosis and clinical criteria.

In addition to these problems which derive from the nature of scientific endeavor, there are a series of problems associated with the mechanisms or terms and conditions under which agencies engaging in international activities carry out their programs. In this area I am impressed with the importance of several considerations:

1. The necessity of supporting research activities in a manner which strengthens and enhances the activities of nonofficial and voluntary organizations and the various scientific groups and societies.

2. In like manner any effort on the part of U.S. agencies must be in a form which encourages other governments to accept and enlarge their responsibilities in medical and health research programs rather than supplanting them.

3. The increasing number of Federal agencies concerned with the conduct and support of research whose programs involve international activity pose a primary problem of communication which must be effectively solved in order to avoid confusion or conflict.

MAJOR POLICY PROBLEMS

There are a number of grave problems of policy which must be solved:

1. The development of an appropriate and viable relationship with international intergovernmental organizations with emerging programs of research support versus the sometimes clear advantages of bilateral relationships.

2. The possible dominance of short-range foreign policy consideration and factors affecting government-to-government relationships in an area where the maximum emphasis should be placed upon long-term scientific factors. In this respect it is important to emphasize that in international research efforts the questions of pace, direction, and magnitude of effort should have meaning in terms of scientific opportunity, inclination, and feasibility.

3. As a corollary of this problem there is the prospect that other countries may be alarmed at the prospect of their limited research capability and of being dominated by another country's sense of priority and needs through the single availability of superior resources.

UNRESTRICTED INTERCHANGE IN SCIENCE

4. I must repeat what has been frequently said, that a basic condition of progress in science is free and unrestricted interchange amongst scientists and in their communication. Fortunately in the medical sciences we have been singularly free of overriding security issues which have imposed their troublesome restraints in other scientific areas. Nevertheless, we are now faced with the desirability of enlarging our scientific relationships with Iron Curtain countries and we are at the present moment denied any insight into the state of research in the health sciences in the other nonrecognized regimes. In fact, we face the prospect, if these problems are not solved, of the loss of the present U.S. position as the primary center of world progress in the medical sciences. I realize there are grave foreign policy issues involved here which cannot be treated lightly. Nevertheless, we are approaching the situation where the only neutral ground upon which a complete cross section of the world's scientists can meet to discuss their scientific endeavors is Moscow. This, to me, is close to the ultimate in absurdity.

A resolution of many of these policy problems will be difficult and troublesome because, as I have indicated, international scientific activity will inevitably expand and scientific interchange, collaboration in research, will become more extensive and more complex.

As I have mentioned, the United States and its governmental and nongovernmental scientific programs in the health sciences will occupy an important role in this development.

LIMITATIONS IN U.S. EFFORT

Generally speaking we have arrived, that is, we in the United States have arrived at a position in respect to world science where we have acquired a grave responsibility as a result of our achievements and our scientific capability. This responsibility is, as I have

mentioned, to utilize our skills and resources in advancing the progress of science and the cause of human health both in our own interests and the interests of all people.

We are, however, particularly limited in our means to carry this out. We do not have a longstanding tradition in international research. We lack sufficient numbers of trained, mature, and capable people appropriately oriented and motivated to assume rules of responsibility in these international developments. Our university and Government operations do not provide patterns of career development which involve significant overseas experience.

As I have mentioned, the great colonial powers of the past developed a tradition of service and a pattern of action which served uniquely in carrying out their responsibilities in a similar but of course considerably lesser extent. This not only involved assignment of senior scientists overseas, the creation of research facilities, but, more importantly, the development of a specific, purposeful university-Government relationship which provided a flow of young talented men for overseas posts as a pattern of career development.

These arrangements, which were built up over many years, evolved a pattern of Government-university and overseas relationships which not only strengthened science in the home country but provided trained manpower and leaders for both education and science activities abroad.

I have covered some of the main points and hope to be able to answer such questions as you may choose to ask.

Senator HUMPHREY. I am sure my colleagues will have many questions. I have a few that I should like to pose to you in reference to your splendid statement. We are very appreciative of the statement, and of the directness and candor of it.

At this point, I will ask that your original statement, as prepared for our record, be printed in its entirety.

STATEMENT OF DR. JAMES A. SHANNON ON NATIONAL INSTITUTES OF HEALTH AND INTERNATIONAL MEDICAL RESEARCH

Mr. Chairman and members of the committee, I welcome this opportunity to discuss with members of this subcommittee the opportunities and problems of international cooperation in medical research.

I should like, first, to express my opinion concerning the excellent work being done by this subcommittee and its staff in this present project. The five committee prints which have been issued thus far are, indeed, timely, useful, and comprehensive portrayals of some major aspects of international health and medical research activities. We look forward to the analysis which will be forthcoming covering other important facets of worldwide relationships in the fields of health, medicine, and research to which you have directed inquiry.

NIH ACTIVITIES

The various activities of the National Institutes of Health on the international scene were covered in considerable detail in the first of the committee prints entitled "International Medical Research, a Compilation of Background Materials." Therefore, I need not dwell at length on this phase of our programs in this testimony. I should, however, like to point out that despite rather stringent criteria for the approval of overseas grants, the volume of NIH research support overseas continues to increase. In fiscal year 1958, NIH awarded a total of 95 grants involving \$1,143,142 for research projects in foreign countries. Foreign awards in fiscal year 1959, however, numbered 160 for a total of approximately \$3 million.

In addition to these funds for the support of research overseas other NIH activities international in nature operated at new levels in fiscal year 1959:

Some 95 U.S. scientists were awarded fellowships totaling \$581,326 for study in foreign countries.

Foreign scientists studying in the United States under our foreign fellowship program numbered 48 for a total of \$339,790.

Foreign visiting scientists now at work at NIH number 143 whose salary payments amount to \$1,160,253.

A total of \$357,000 was expended for translating and abstracting Russian scientific materials in the medical sciences.

Although NIH expenditures for these and other international scientific activities in fiscal year 1959 will total approximately \$5 million, action of the just completed series of June advisory council meetings on applications for support from foreign scientists in fiscal year 1960, even though the year has just begun, indicates further increases. In addition, NIH has submitted to the Bureau of the Budget a request for the appropriation of \$3,707,000 for the purchase of local currencies to be used under the terms of section 104(k) of Public Law 480 for the initiation of research activities in eight different countries.

Although our expenditures for foreign activities in fiscal year 1959 will amount to less than 2 percent of the total NIH appropriations, this level represents a tenfold increase over the approximately \$500,000 expended for this purpose in fiscal year 1955, just 4 years ago.

As I mentioned, the policy utilized by the NIH advisory councils as a basis for approving grants to foreign investigators is rather restrictive. In essence, for a foreign medical research scientist to secure research support from NIH at the present time he must present a unique research proposal unlikely of duplication in the United States and possess superior scientific qualifications. The growth of NIH research support overseas in face of these criteria denotes, I think, the measure and gage of the scientific talent available in other countries and the growing value and significance of their scientific endeavors to the solution of the major disease problems to which the categorical programs of NIH are directed.

The continued enlargement of NIH activities involving international considerations and the prospect of further growth has lead me to establish with the approval of the Surgeon General and the Secretary the position of Special Assistant to the Director of NIH for International Activities. Dr. James Hundley of the NIH staff has been assigned to this position. Dr. Hundley is a career service officer, a research scientist in his own right in the field of nutrition, and with a considerable background in international scientific matters having just completed a 2-year detail to the United Nations where he directed a number of worldwide nutrition studies. The appointment of Dr. Hundley is one of a series of steps we are taking at NIH to strengthen our organization and procedures for prudent and effective coordination of our mounting participation in worldwide medical research and scientific activities.

So much for the status of our international activities at NIH. There is, of course, a great deal more to tell and I should like nothing better than to spend my allotted time this morning in such an elucidation. The committee, I know, is interested in broader matters and there are a number of grave and perplexing problems in respect to the further development of medical research internationally, to which we should proceed with dispatch. If the committee members have further curiosity about NIH international activities, I should be pleased to answer such questions after the conclusion of my statement, if this is your desire, Mr. Chairman.

THE BACKGROUND OF INTERNATIONAL RELATIONSHIPS IN HEALTH AND MEDICAL SCIENCES

I find it difficult to approach a discussion of this subject without spending a moment with some of the more important influences which form the background of present-day international relationships in health and medical research. The life sciences generally, and medicine in particular, have been characterized in their development by an international point of view, both in the acquisition of new knowledge as well as in its distribution and application. In this respect, I believe the life sciences are considerably in advance of the physical sciences. A number of forces have contributed to this progress.

In our own country, medical research had its roots in and was nurtured from the main stream of European science. In the 18th century and in the early

part of the 19th, the dominant influence upon our beginning medical endeavors was British as might be expected from our colonial origins. The blossoming of the French medicine with its focus upon clinical and pathologic studies in the middle 19th century exerted a pervading influence upon American medicine of that period. However, it was the rise of intensive laboratory research in Germany in the latter part of the 19th century which perhaps had the most profound effect upon medical research in the United States, providing an inspiration and a pattern which persists to this day.

As a matter of interest, the origins of the NIH can be traced to this influence. In the 1880's a young Public Health Service officer, Dr. Joseph J. Kinyoun, made a study tour of the great European scientific research centers. He was so impressed and inspired with what he saw that on his return to the United States he set up in a small room in the Marine Hospital on Staten Island in New York a laboratory modeled upon what he had seen in Europe, particularly the laboratory of Koch in Germany. This laboratory of Dr. Kinyoun's was among the first of the bacteriological laboratories in the United States. It was here that began the research function of the Public Health Service, the embryo of the present-day National Institutes of Health which is now, perhaps, the world's largest medical research organization.

From these successive international influences emerged the independent tradition of medical research in the United States. For a century and a half we were a receiving nation building upon and utilizing the achievements of the old world. Today our medical science, research technology, and theoretical work is the vanguard of scientific endeavor in the life sciences. With this achievement we have inherited the responsibility of sharing our capabilities and aiding the beginning scientific efforts of the developing nations. In this way we can repay our scientific debts.

Apart from the particular set of influences involved in the development of U.S. medical research, the international character of medical research derives from other broad forces:

1. The great colonial powers—Britain, France, the Netherlands, and Belgium—accepted in their colonial administration responsibility for the conduct of research and the establishment of research facilities directed to the solution of disease and health problems impeding colonial development. These activities were characterized by the practice of placing scientists of stature in residence in colonial areas and the movement of younger men from the home country to assignments in such facilities. This afforded unique research and scientific opportunities important in career development. From these operations there emerged a pattern of scientific organization, interchange and career development in medical research distinctly international.

2. Military operations, both of the United States and of other countries, have contributed to an international framework for medical research. The threat of indigenous disease, environmental and other health problems to either combat or garrison troops forced establishment of military research facilities in local areas to search for solutions. For the United States this pattern is exemplified by the activities of such present-day military research units as NAMRU 2 and 3 in Taipei and Cairo, the Army installations in Tokyo and Kuala Lumpur, and the studies of the Interdepartmental Committee on Nutrition for National Defense.

3. Nongovernmental organizations have also had, and continue to exert, a substantial influence in international health and medical research activities. Thus the major philanthropic foundations, such as the Kellogg and Rockefeller Foundations, have engaged in research and service activities in foreign countries and provided for the support of foreign investigators and institutions. Religious groups have similarly approached their overall mission through education, research, and service. More recently the pharmaceutical industry has considerably extended research and testing programs in other countries and made sizable investments in overseas research facilities.

4. Intergovernmental relationships concerned with health activities are of a long-standing character. These reach back to the International Sanitary Conferences held in the 19th century which were concerned with problems of quarantine and the international spread of disease. There has been succes-

sive enlargement of such multilateral health activities proceeding through the health functions of the League of Nations to the present expression in the World Health Organization, operating as one of the specialized agencies of the United Nations. The activities of these international bodies have provided a framework of worldwide relationships in health, and more recently in medical research, which is quite unlike anything that exists in any other field of science.

5. In recent years these traditional patterns have been augmented by the direct international research activities of official Federal agencies such as the Public Health Service which alone or in conjunction with nongovernmental agencies have sought new knowledge or the solution of urgent problems by enlargement of research efforts on a worldwide basis.

All of these factors have resulted in the emergence of a tradition, precedent, and framework of international relationships and patterns of action in the health and medical sciences which is of considerable substance and stature and in which the United States occupies an increasingly significant and responsible position.

THE PROSPECT FOR FURTHER DEVELOPMENT OF HEALTH AND MEDICAL RESEARCH ON AN INTERNATIONAL BASIS

I have attempted to sketch what I believe to be some of the more important background influences which have contributed to the international development of the medical sciences. Looking to the future there are a number of important circumstances and conditions which, I believe, emphasize the need, opportunity, and promise of further international efforts in medical research.

First is the worldwide prevalence of the problems of disease and disability. The reports issued by this committee, particularly the one entitled "The Status of World Health," have amply portrayed the scope and magnitude of disease and health problems which confront the world's population. These range from the still uncontrolled ravages of the infectious diseases in many parts of the world to the grave and growing threats of the chronic diseases and the health perils of highly industrialized and urbanized communities.

I need not emphasize the significance of the shrinking geographical extent of the world as a result of modern transportation. This has had two effects of importance here. It has brought the peoples of the world closer together so that we cannot escape the awareness of the danger of disease and ill health existing in other countries nor the obligation to share our knowledge in its alleviation. In addition, we are witnessing changing patterns in the distribution of disease and a considerable lessening in the differences amongst countries and peoples in terms of their health and disease problems. This has produced a community of interest and concern which supports collaborative effect. It also means that research progress in one area of the world has important meaning to all other areas.

The shrinking world has also underlined the great possibilities of gaining new insight and knowledge into disease and disease processes by studying the world's population as a single unit. We have achieved a degree of skill and sophistication in statistical, biometrical and epidemiological techniques which can make it possible to derive the maximum benefit from such studies. We are also faced with the urgency of utilizing the opportunity to gain new knowledge about disease processes through studying the differences in disease prevalence while sharp contrasts still exist. It is probable that in the not too distant future such differences will, in large part, have disappeared. While we bring to the developing countries the prospect of victory over the infectious diseases, we unfortunately bequeath our heritage of chronic diseases and the increasing environmental hazards of advancing civilization.

It is almost a cliché today to talk about the essential unity of scientific knowledge and endeavor. This, however, is a basic contributing force to collaborative scientific endeavors and is one of the essential elements from which the value of international efforts in science derives its meaning.

Without a doubt collaborative and cooperative research activities involving the scientists and research investigators can contribute to accelerated programs in the solution of many problems. This, of course, involves careful planning, provision for the utilization of common protocols, close correlation of findings and pooling of knowledge. The increasing complexity of medical research demands a wide range in the scientific disciplines and technology brought to bear upon the solution of problems. This places a premium upon greater interchange amongst scientists in various fields and more effective means for communication.

There is great need to make the greatest use of the existing medical research resources in the world in coordinated attacks upon major problems. The further growth of medical research must also be viewed in a world context in which there is great value to be derived by strengthening the capability of the developing countries. This can be done through expanded training programs, through making the most use of existing facilities, and the creation of the mechanisms necessary for this purpose.

PROBLEMS PRESENTED IN ENLARGING MEDICAL RESEARCH ACTIVITIES ON AN INTERNATIONAL BASIS

Although present-day circumstances and conditions seem particularly appropriate for further expansion of international relationships in medical research, many problems will be encountered.

First, there are those problems which arise from scientific considerations:

1. Enlarged international research activities will require greater effort to improve basic sources of information. To do the kind of epidemiological studies which I have mentioned, accurate information on the demographic characteristics and current patterns of morbidity and mortality in many population groups will be required.

2. To assure comparability of results in research involving scientists in different countries will place a premium upon uniformity in observations, and standardization in measurements, nomenclature, and diagnostic and clinical criteria. This standardization of course relates to the means or instruments of research rather than to the conceptual processes through which research problems will be approached. Here the freedom of the scientists is a paramount consideration.

3. To assure the greatest usefulness and speedy application of the results of such research efforts, further pressure will be placed upon the means of scientific communication. This will force attention to the already acute problems of translation, the availability of facilities and media for publication of scientific findings, and the expansion of materials and devices for reviewing current status of scientific effort in individual fields of inquiry.

In addition to these problems which derive from the nature of scientific endeavor, there are a series of problems associated with the mechanisms or terms and conditions under which agencies engaging in international activities carry out their programs. In this area I am impressed with the importance of these considerations:

1. The necessity of supporting research activities in a manner which strengthens and enhances the activities of nonofficial and voluntary organizations and the various scientific groups and societies.

2. In like manner, any effort on the part of U.S. agencies must be in a form which encourages other governments to accept and enlarge their responsibilities in medical and health research programs rather than supplanting them.

3. The increasing number of Federal agencies concerned with the conduct and support of research whose programs involve international activity pose a primary problem of communication which must be effectively solved in order to avoid confusion or conflict. In this respect I feel that due consideration should be given to strengthening existing patterns and mechanisms such as exist in the area of health and medical research rather than attempting to impose a single monolithic pattern of coordination which may emphasize form rather than substance.

There are a number of grave problems of policy to be solved:

1. The development of an appropriate and viable relationship with international intergovernmental organizations with emerging programs of research support versus the sometimes clear advantages of bilateral relationships.

2. The possible dominance of short-range foreign policy consideration and factors affecting government-to-government relationships in an area where the maximum emphasis should be placed upon long-range scientific factors. In this respect it is important to emphasize that in international research efforts the questions of pace, direction and magnitude of effort should have meaning in terms of scientific opportunity, inclination and feasibility.

3. As a corollary of this problem there is the prospect that other countries may be alarmed at the prospect of their limited research capability and being dominated by another country's sense of priority and needs through the availability of superior resources.

4. I must repeat what has been frequently said, that a basic condition of progress in science is free and unrestricted interchange among scientists and in their communication. Fortunately in the medical sciences we have been singularly free of overriding security issues which have imposed their troublesome restraints in other scientific areas. Nevertheless, we are now faced with the desirability of enlarging our scientific relationships with Iron Curtain countries and we are at the present moment denied any insight into the state of research in the health sciences in the nonrecognized regimes. In fact, we face the prospect, if these problems are not resolved, of the loss of the present U.S. position as the primary center of world progress in the medical sciences. I know there are grave foreign policy issues involved here which cannot be treated lightly. Nevertheless, we are approaching the situation where the only neutral ground upon which a complete cross section of the world's scientists can meet to discuss their scientific endeavors is Moscow. This, to me, would be the ultimate absurdity.

A resolution of many of these policy problems will be difficult and troublesome because, as I have indicated, international scientific activity will inevitably expand and scientific interchange, collaboration in research, will become more extensive and more complex. As I have mentioned, the United States and its governmental and nongovernmental scientific programs in the health sciences will occupy an important role in this development.

Generally speaking we have arrived, that is, we in the United States, at a position in respect to world science where we have acquired a grave responsibility as a result of our achievements and our scientific capability. This responsibility is, as I have mentioned, to utilize our skills and resources in advancing the progress of science and the cause of human health both in our own interests and the interests of all people. We are, however, particularly limited in our means to carry this out. We do not have a longstanding tradition in international research. We lack sufficient numbers of trained, mature and capable people appropriately oriented and motivated to assume roles of responsibility in these international developments. Our university and Government operations do not provide patterns of career development which involved significant overseas experience.

As I have mentioned, the great colonial powers of the past developed a tradition of service and a pattern of action which served uniquely in carrying out their responsibilities in a similar but of course considerably lesser context. This not only involved assignment of senior scientists overseas, the creation of research facilities, but, more importantly, the development of specific, purposeful university-Government relationship which provided a flow of young talented men for overseas posts as a pattern of career development. These arrangements, which were built up over many years, evolved a pattern of Government-university and overseas relationships which not only strengthened science in the home country but provided trained manpower and leaders for both education and science activities abroad.

The problems which we face in strengthening the U.S. position in international science and research incline me to feel that we can well use this pattern as a useful precedent. This could be accomplished, among other mechanisms, by:

1. Providing the means and support for a number of the Nation's major universities to encompass international research responsibilities and functions as a part of, or complementary to, governmental programs. This would permit university departments to assign senior as well as developing faculty overseas for periods of research and teaching. Foreign assignments could then become an essential part of the career development of their scientists and educators, providing training and motivation toward international science activities.

2. Developing a planned interchange of personnel amongst the executive agencies with international functions and such university activities to broaden the public experiences of university staffs, the career opportunities of executive department scientists and engineers, and create a pattern of university-Government-overseas movement.

Under such arrangements a reservoir of able scientists and technicians experienced and informed in both international and national considerations could be built up. Oversea assignments would be viewed as career opportunities and not interruptions.

I have, perhaps, talked overlong. However, the matters being considered by this committee are of great interest to me, and the problems which I have cited in this discussion have engaged my attention and thought with increasing seriousness as NIH programs have enlarged their international aspects. I believe the kind of review which the committee is giving to these questions can contribute firm information and new viewpoints upon which we can proceed to deal with these issues.

BENEFITS TO U.S. RESEARCH

Senator HUMPHREY. First, it is clear, Dr. Shannon, that there will be a tremendous benefit through international cooperation in biometrical research, at least the reports we have so indicate. Would you agree with that?

Dr. SHANNON. Yes, sir.

Senator HUMPHREY. I would appreciate, now, if you could state for the record what you conceive to be the role of the U.S. Government and the objectives of our Government in facilitating and supporting research on the part of foreign scientists in foreign countries.

Dr. SHANNON. I will be glad to try to answer that question, Senator.

The first part of my answer I believe is quite clear and simple. We have an obligation to support our own scientists in the pursuit of new knowledge in this country or abroad, depending upon where the problem takes them, in order to arrive at solutions to serious disease affecting the American people.

It is quite clear in many areas of scientific investigation that answers are not wholly found within our own borders. Field trips are involved. At times definite information can only be obtained through the study of other population groups for comparison with our own population groups.

I consider this type of activity support of domestic research, the bulk of which is done in this country but some of which must necessarily be done abroad.

The second part of my answer is also quite clear to me, but the reasons are somewhat less obvious. That is why we support research by foreign scientists in foreign countries.

I have the conviction that any advance in the medical field will benefit us as much as it benefits the country of origin of the advance. Science today is at a state of development where the primary bottleneck to advancement is the availability of scientists with unusually good minds who are furnished adequate support to acquire new knowledge in a rather unrestricted fashion.

I believe that the American people would find no quarrel with the development of a U.S. science policy which supported some scientific activity overseas which resulted in a cure for cancer or the prevention of heart disease. They are more concerned with the successful conquest of disease than the country of origin of information, be this Sweden, Denmark, or in fact Russia.

It is our best professional judgment that relatively small quantities of money, supplementing funds available from other national sources, can mean the difference between a very vigorous medical research program in many areas as opposed to one that proceeds at a very slow pace.

Quite apart from humanitarian considerations—and I would hold myself to be one strongly in favor of support of this research because of humanitarian points of view, quite apart from a foreign policy point of view—there is a need to change the image of America from that of militarism to that of compassion. Hard benefits that are to be derived from support of such research warrant its support. The other benefits can be looked upon as tremendous dividends for which we pay nothing.

TRAVEL WITHIN EUROPE

Senator HUMPHREY. One of the points, Doctor, that was emphasized again and again in interviews that I had in different countries in Western Europe in the last few years was to this effect: Ways and means should be found for providing for travel and for limited scholarships amongst European countries themselves, not only amongst them but amongst other countries of the world. Let me see if I make my point clear.

We have a tendency to have exchanges between ourselves, let's say, and France or between the United States and India or the United States and Great Britain. But there isn't a tendency to have support for an international health and medical research program wherein, let's say, students from Czechoslovakia might come to Finland. In the Brain Damage Institute I saw in Helsinki there was excellent work going on, outstanding research and clinical work, where the individual student from another country might come and study and make a contribution. Such travel plans and arrangements were suggested.

Also, for example, students from France might go, let's say, to the Karolinska Institute at Stockholm, other students from Africa come into the same institute, wherein we would participate even though we ourselves might not have the students directly in our jurisdiction.

The theme behind this is that the international aspects of medical research are shared by all, and you gain from this even though you may not be a direct operating participant in the laboratory with one of your own people.

ATTENDING MEDICAL CONGRESSES

Another point that was emphasized was the importance of attending conferences and congresses. The name escapes me at this moment, but a noted scientist in Finland pointed out to us their very limited funds for travel, that it was just almost impossible for their younger students to go as they have such a limit on the availability of resources. When you are there, you see what this means. Yet if they could go, for example, to a 6-week congress on, let's say, internal medicine, or of some particular aspect, let's say like orthopedics, in Vienna, Rome, Paris, London, or wherever it may be, they would be sort of updated. They would come in contact with the fellows of their profession and receive great benefits.

Do you see some value in that, Doctor?

Dr. SHANNON. Well, sir, I do. I would agree with everything you have said, and, from my point, I would like to state it from the standpoint of a scientist.

Our primary objective is the collection of new knowledge. We go from that to the next point and say that we can do this best if we approach the problem on an international rather than a strictly national basis.

Then if we decide we are to support some medical research on an international basis, we determine elements that are necessary to make such support effective and economical and in what framework of reference it should be done.

Since we are primarily concerned with the development of new knowledge, we should provide such training as is essential to make a research unit that is supported on a current basis most productive. We should further make such training available as will permit the extension of research as a national activity at a later date.

Insofar as communication is an essential of modern science, and rapid communication is particularly essential at the present time because of the very pace of science, it would be folly to expend funds in support of research, were we not to provide some training to increase the competence of individuals, and some support to facilitate the communication process.

To my mind, these three things, support, training, and communication, are quite inseparable.

USE OF "SOFT" CURRENCIES

Senator HUMPHREY. One of the suggestions that I have been tempted to make every place I can get in Congress, as well as elsewhere, is the utilization of the currencies which we have accumulated in countries where those currencies would be acceptable.

In other words, let us say that we had Finnish scientists who could attend a particular type of institute, or undertake a study in Rome. We have Italian lira that could be utilized for this kind of activity and for payment for living costs, travel, etc.

It seems to me that here is a good way to put some of this to work, providing that it is all organized under a proper international medical institute so that we know what we are doing, and not just providing tours for people who are anxious to travel.

I am sure that you would agree that the concept behind the International Medical Research Institute bill, the Hill bill, would fit very much within the frame of thought that you are expressing now.

Dr. SHANNON. I would agree completely, Senator Humphrey.

I think that what is needed to make these foreign funds available in a highly effective way is a central operation which provides administrative surveillance, intelligence, and a mechanism for utilization.

The funds in themselves will not be effectively utilized unless they are balanced with a permanent centralized administrative setup where one can place long-term responsibility, and the development of a long-term program that incorporates the use of the foreign funds, maintained in balance with stable funds. Given the flexibility of utilizing the two devices, then the opportunity to use foreign funds effectively is greatly enhanced. I would agree with you completely, Senator.

SECTION 104(K) OF PUBLIC LAW 480

Senator HUMPHREY. I notice there is pending a supplemental budget request for appropriation for use by NIH of the equivalent of \$3,700,000 in local currency under the provision of 104(k) of Public Law 480.

We are trying to clarify the status relating to the availability of those funds as supplemental to your regular budget rather than being out of the regular budget.

Dr. SHANNON. I hope you are successful.

Senator HUMPHREY. Don't worry, we have it now in both the House and Senate bills on the Mutual Security Act of 1959, now in conference. We nailed that one down. In fact, I am going over shortly to make sure the nail is not only down, but sealed, twisted, turned, and locked.

One other matter that I wish to allude to in your comment concerns the three points on page 12 of your statement—pages 11 and 12. You name these three problems which arise from scientific considerations and also then move on over into a series of problems associated with mechanisms, curbs and conditions under which agencies engaging in international activities carry out their programs.

U.S. FUNDS AS CATALYST

In my testimony before Senator Hill's committee on the Resolution 41, I brought up these points, perhaps not exactly in the same way. But I paralleled the emphasis that you have made here in reference to the cooperation with the nongovernmental and voluntary organizations, and how our Federal research activities can be of help to expedite, to be a catalytic agent, and the importance of the recipient countries continuing on with their activities, in fact encouraging them to step up activities rather than falling back and relying upon American grants.

These matters I think are very necessary to emphasize. I only do so this morning because I understand that within a very short time in the other body, in the House Interstate Commerce Committee, there are going to be hearings upon the bill which we passed in the Senate. Is that correct?

Dr. SHANNON. I believe the latter part of this month, sir.

ACTIVITY BY OTHER GOVERNMENTS

Senator HUMPHREY. Now, Dr. Shannon, this leads right to the point as to what are the various foreign governments themselves doing so far as support of national and international medical research is concerned.

I ask that question primarily because there are always people who assert that when we in the United States appropriate money, make it available on an international basis, that it really doesn't add to the sum total of activity but is instead a replacement. Someone else allegedly tends to withdraw, and all we are doing is allegedly filling up a void or a vacuum.

We tried to secure facts on this subject, but thus far, aside from information on research in the United Kingdom and one or two other countries, we have not obtained very much data.

Would you give us any facts along this line which you may have at NIH as to the endeavors in the field of national and international medical research by the foreign governments, themselves?

Dr. SHANNON. Senator Humphrey, these are very difficult facts to come by. We have been trying for 4 years to obtain precisely the information you now request and we do not have it.

I can tell you of some of our experience with certain specific countries. Dr. Kidd, Director of the Office of Research Planning, and I spent some 4 weeks in West Germany to study the resurgence of research in the postwar period and determine what new mechanisms they had evolved in its support. This study was to serve as a pattern for the study of mechanisms of support and resources available to other countries.

We literally worked on a full-time basis for 4 weeks, and then only came out with a very rough approximation.

Finally, when Dr. Kidd was about to return to this inquiry as a staff job, the World Health Organization asked for him on a 1-year detail in Geneva. This was granted and he returns to us next month. The job is still undone.

Meanwhile there has been established, as you know, sir, a strong, firm expansion of the basic medical research function of the World Health Organization. I believe they will now have to conduct such a study as an essential to the development of their program; i.e., what is the current basis for support of research on a worldwide basis.

They have accepted the philosophy of strengthening national programs, rather than supplanting national programs, and consequently they will have to know what the national programs are, how are they supported, how much funds are now available.

Sir, we can give your staff such figures as we have, but they are sufficiently fragmentary as not to be too helpful.

I want to come back to one of the primary points of your question before going on. There is a complicating factor in obtaining data of this type. Many of the advanced countries have had very large colonial empires. In the last 10 to 15 years, these have been dissipated. The change in governmental structures has resulted in the creation of new nations and new relationships. Such changes make it literally impossible to acquire such information in a simple fashion.

Senator HUMPHREY. Well, this has been one of the sticky problems, as you know, and I think it is very important that we get this information, Doctor. I know you folks have done everything you could do to do it.

The reason I say it is important is because as these costs of Government go up, and as our country participates more and more in these international activities, there are people who say, "Well, we are just picking up the bill for the world," and I think that they would be wrong. I am not for that, and I tried to make my position quite clear when I testified before Senator Hill's committee.

I do hope, however, that we continue our international medical research programs and expand them, but in the knowledge that they are acting as an expeditor, as an agent to bring out more activity on the part of others.

Doctor, I am going to forego further questions for a while. I don't want to monopolize the time. I will ask Senator Muskie if he has a question. I have a number which if we can't ask this morning, due to not wanting to keep other witnesses waiting too long, I may submit to you and ask if you can give answers in writing.

Dr. SHANNON. We would be glad to do that.

Senator MUSKIE. I think I will forego questions, too, Senator Humphrey. I have listened to Dr. Shannon's testimony with a great deal of interest. Actually I am being educated in a field in which Senator Humphrey has already had his elementary and secondary course.

Senator HUMPHREY. Elementary, believe me.

Senator MUSKIE. He is proceeding into the college level. I have listened to the testimony with a great deal of interest, and am most appreciative of the contribution you made this morning to my understanding of this problem.

Dr. SHANNON. Thank you, sir.

Senator HUMPHREY. Senator Gruening.

MOSCOW AS A CENTER OF CONGRESSES

Senator GRUENING. I have listened to Dr. Shannon's very excellent presentation, and I have just one question.

On page 14 you say we are approaching the situation—

where the only neutral ground upon which a complete cross section of the world's scientists can meet and discuss their scientific endeavors is Moscow.

You say this would be the ultimate in absurdity.

Why is that the only place where a complete cross section of the world scientists can meet?

Dr. SHANNON. It is primarily over the problem of visa trouble. There is a developing science in Red China at the present time. We would like to know what that is. A Red Chinese scientist can't obtain a visa to attend a scientific meeting in the United States, at least not very simply. We in turn can't obtain visas to roam around the laboratories in Red China to find out what is going on there.

To a lesser extent, this involves the Iron Curtain countries. True, the Russians can come, but there are restrictions upon their entering this country and what they can do after they arrive. This, as I say, also obtains for the Iron Curtain countries.

They come to us with a feeling of not being wanted, of not, if you will, belonging to a scientific community that is composed of the immediate environment of the meeting, because of the restrictions imposed upon them.

Quite contrary to that, as a world center, Moscow will accept any scientist from any part of the world with relatively little, if any, restrictions on his attendance, or entrance.

In other words, as long as there exist restrictions of this sort, all of Western science is available to the Russians. Very little of Eastern science is available to the United States. It amounts to that, sir.

The only place—I shouldn't say that, because many countries will admit scientists of Red China, Russia, or the Iron Curtain countries. I suppose I really have in mind the developing centers of gravity in world science, one around the Russian sphere, one around the U.S. sphere, one permitting free congregation of scientists, the other not.

Senator GRUENING. Wouldn't the Chinese scientists be able to come to London?

Dr. SHANNON. Yes, but London is not developing as one of the centers of gravity in this sphere of science.

Senator GRUENING. That is a very depressing presentation, I would say, if our policies prevent the spread and interchange of scientific knowledge. I think that is something we ought to think very seriously about and see if we can't get a change of policy in this field.

ORIGIN OF ASIAN FLU IN RED CHINA

Senator HUMPHREY. Senator Gruening, when Mr. Cahn and I were at the World Health Organization, we heard the story there about the Asian flu epidemic which was really very revealing as to how policy decisions in the field of foreign policy affected medical knowledge and scientific knowledge.

We alluded to that in the report on the World Health Organization trip, which committee report has been published as a result of our notes and discussions. I think, as I recall it, there was a lag of several weeks of knowledge in the world outside of Red China as to the development of the flu epidemic in China. That lag prevented us from developing the vaccine as soon as we could have, and thereby, of course, the lag in time made possible much more illness, death, and, of course, considerable economic loss.

I recall that it was finally discovered only because of a doctor, if memory serves me correctly, who had been educated in an American medical school, and who had friends outside the Communist bloc, one of those friends being in the World Health Organization. Information came from this doctor in Red China to the outside, about the flu epidemic taking place in Red China, which was already spreading all over the world. But nobody then knew from whence it emanated, where its central point was. Only by the good fortune of friendship they overcame the road blocks of diplomatic policy and were able to track it down and to get at it so to develop a strain of vaccine that would do something about it.

You may recall that we discussed this.

Dr. SHANNON. We were able to obtain strains and have specific knowledge of the disease, its characteristics, and its potential hazard, when it spilled out of Red China, to Hong Kong, and then into Manila. These cities were our primary contacts with the disease.

If you take the geographical land masses on half a world sphere, and paint over in red the so-called Red countries, you will realize that the tremendous area geopoliticians call the central land mass must be important for an understanding of the genesis and spread of disease as it is for the genesis and spread of political philosophies.

We now are in relative ignorance of the happenings in this total area at the present time. This I think is bad.

Senator GRUENING. Nevertheless, the Asian flu came to our shores without passport or visas.

Dr. SHANNON. As a matter of fact, sir, we helped, because it came back with some of our Armed Forces, too.

Senator GRUENING. I have no further questions.

Senator MUSKIE. May I ask at that point, Dr. Shannon: You speak about our ignorance of the genesis and spread of disease in this great land mass. Are you referring only to Red China, or also to Russia?

EXPERIENCE WITH DISEASE IN KOREA

Dr. SHANNON. I am referring to Russia, too, and I can give you an example.

Senator MUSKIE. Recognition, then, is not the whole answer.

Dr. SHANNON. No, sir.

But, let me give you a devastating example of the consequences of our ignorance. The most serious epidemic disease in the early years of Korea was hemorrhagic fever, to us a completely new disease. Our physicians knew nothing about it, they had never seen it, yet this serious epidemic disease carried an initial mortality rate of 20 to 30 percent.

In the early days, it was killing more people than were being killed by the Reds. The Army did a superb job in setting up investigative teams, and quickly brought the mortality rate down to 3 or 5 percent and developed a concept on how the disease was transmitted and how it could be halted. After much intensive work the disease was very well under control by the time the Korean conflict ended.

It turns out, after the war, that the Russians had been studying the disease in a systematic fashion back as far as 1942 to 1943. They had recognized the disease in epidemic form in southern Russia in the late thirties. The Russians don't publish vital statistics on disease, they don't give the mortality rate, consequently the world was unaware of what was going on.

Had we the knowledge of this disease, an important infectious disease, had we knowledge of its mode of transmission, we could have protected our troops in that area, we could have looked for it and known it was there before we moved troops into the area and we would not have had the attack rate we had, nor would we have had the great mortality rate.

This is an excellent example of the cost we paid for our ignorance of the medical happenings in a large segment of the world.

Senator MUSKIE. When I listened to your prepared statement on this point, immediately the suggestion came to mind that perhaps political recognition is the answer to this problem, and that is what I was referring to earlier. But it is not.

NEED FOR SUPPORT OF WHO

Dr. SHANNON. I don't think that is it. I think that our greatest hope is through very strong support of the World Health Organization as a neutral body wholly outside the political sphere. WHO brings into its orbit countries that have opposing political views. They can work faster as a supranational organization in this area than can we as an individual government in a bilateral way. I think for this reason, if no other, we should support the activities of the World Health Organization to the hilt.

When it comes to communication, exchange of scientists, the ability of scientists to move and exchange ideas, then I think this is something

we must do bilaterally. We can't get outside help for that, although even here the World Health Organization would be helpful.

In the several conferences I have had in Geneva to discuss serious disease on a worldwide basis, the Russians have attended, and there they are as free and open in their discussions as are our own scientists. The WHO constitutes a neutral ground for the purpose of discussion that has no substitute. That is why I say we have a strong responsibility to support this organization to the hilt, not only in its service programs, but as it goes forward into a broadening research program.

Again I would say there are certain things we can do at home, too.

Senator MUSKIE. Are the Soviets inclined to cooperate in the program of the World Health Organization?

Dr. SHANNON. I think they are. They have given every indication that they are. In the WHO executive committee last February, when the concept of broadening the World Health Organization program on research was first discussed, one of the strongest proponents was the Soviet member.

Senator MUSKIE. To the extent that they will allow free entry to field research teams?

Dr. SHANNON. This remains to be seen. I think this will have to be on an individual case basis. I hope that within a year we will be able to come back and tell you, and say "yes".

Senator MUSKIE. You haven't had occasion to face that question yet?

Dr. SHANNON. No, sir, we have not.

Senator HUMPHREY. It is true, however, that there has been active participation by Iron Curtain countries in these conferences, has there not?

Dr. SHANNON. There has.

Senator HUMPHREY. Do you feel the additional funds that the World Health Organization has been able to obtain for its preliminary research studies has been of help?

Dr. SHANNON. Oh, I think they have been of tremendous help. They have permitted WHO to obtain really senior advice on a plan to put a complex organization such as the World Health Organization into a broad research operation, the fields of research suitable for them as opposed to national organizations, and to present a program to the World Health Assembly this spring which was accepted in its essentials. All this was achieved only because of U.S. support for the planning sessions. WHO has now accepted a broad plan for research and has provided enough administrative funds to give continuity to program planning. They have provided a mechanism for voluntary contributions that will initially have to be concerned with the doing of research, but there is every indication that as the planning apparatus becomes firm, as the research needs become clear-cut, that in their permanent budget, contributed by all nations, there will be a sizable segment for medical research.

Senator HUMPHREY. Doctor, I could ask you questions for the balance of the day, and I think, as we go along here, I would have stern competition from my colleagues, because they are likewise fascinated with your testimony, but we have other witnesses, and I am sure that you will be willing at any other time to come back to us, if we need you.

Also I am going to ask Mr. Cahn, the staff director, to submit the questions we had prepared over and beyond those that have been asked, to you, and at your convenience, within a reasonable time, we would like to get your replies.

Dr. SHANNON. Senator Humphrey, thank you very much for a very pleasant conference.

Senator HUMPHREY. Thank you, and we commend you, sir.

At this point I would like to have the record show Dr. Shannon's responses to several additional questions communicated to him in writing.

(The matter referred to follows:)

Q. Would you illustrate any specific and unusual problems experienced in making research grants overseas, as such, as compared with experience in connection with the standard NIH procedure of making research grants here in the United States?

A. We can consider this question in two broad areas. Namely problems involved in determining scientific merit, i.e., the process of technical review, and secondly problems relating to policy and program considerations.

With regard to technical review, surprisingly few problems have been encountered. Applications from foreign scientists are reviewed concurrently with domestic applications by the same advisory groups. A foreign grant application must have unusually high scientific merit and potential if it is to be approved. Occasionally problems have arisen related to language difficulties and inadequately described research plans. At times our advisory groups are not as familiar with foreign scientists and their record of research accomplishments as is the case with U.S. scientists. However, various measures are taken to overcome these deficiencies and no serious problems have been experienced.

The more troublesome problems are in the area of policy and program considerations. The volume of applications from foreign scientists has been increasing very sharply. The number of such applications judged to have very high merit has increased in proportion to available funds. In view of the rather equivocal nature of our legislative authority relating to support of foreign research, the question inevitably has arisen as to whether some ceiling needs to be placed on foreign grants. In addition, there is some problem in the determination of priorities for final payment when considering scientific merit as such as well as the importance of a project to the research mission of an institute. Somewhat related, the question frequently arises as to whether the same research could be done in this country.

There is a considerable range in the individual, personal attitudes of the scientists who compose our advisory groups on the question of foreign grants. This at times has created problems in obtaining uniformity of scientific review among various study sections and councils. However, we believe that this problem has now been largely overcome by the development of uniform criteria and guidelines.

Q. Likewise, would you illustrate any particular problems which have arisen, unique to the foreign research fellowship program, administered by Dr. Ronald E. Scantlebury, as compared with NIH experience in comparable programs here in the United States?

A. We believe that the administrative mechanisms developed for this program have largely avoided difficulties which might be expected. We have established in each of the participating countries a national committee which selects up to four candidates for us. These applications are further screened in that the candidate must be accepted by the U.S. institution where he desires to train. Final screening and selection is made at NIH by a foreign fellowship committee.

We anticipated that some countries who did not have four fully qualified candidates might decide to make up their quota with applicants having poor qualifications. In practice this has not happened. Three countries have forwarded less than their quota of applicants. Three additional countries forwarded no applicants during the first year although they expect to have fully qualified candidates later. Thus far it has been possible, based strictly on scientific merit, to make at least one award to each country which has forwarded applications. This has avoided what could have been an embarrassing problem of making no awards in a country which wished to participate in the program.

We still have not worked out an entirely suitable mechanism to cover

expenses of the national nominating committees. If these committees are to be truly national in scope, some members have considerable travel expense, particularly in larger countries. At the moment we pay travel expenses when requested if travel is in excess of 300 miles.

The major problem we anticipate relates to the ability of these fellows to apply their training in research when they return to their home country. In many countries this will be no particular problem. In others we are certain that this will be a major problem. We are now trying to develop a mechanism whereby a former fellow can receive a small grant for a "get started" period of 2 or 3 years after he returns. This grant would be sufficient to provide some equipment and other research expenses. We hope it would be sufficient for the fellow to develop his research far enough to give him a good competitive chance for a regular research grant or to locate other sources of support.

Q. Out of the large variety of applications, what are the criteria by which NIH determines whether or not to support a particular international scientific assembly through direct support to its sponsoring organization?

A. The criteria used on grants to support international scientific assemblies are related to the relevance and importance of a particular assembly to the mission of an Institute. Further considerations relate to whether a specific topic is to be discussed which is part of or connected to a coordinated research effort of international scope or whether the meeting is designed to plan an attack on a health problem of international dimensions. The assembly must be truly international in scope and there must be evidence that a significant number of U.S. scientists will attend and benefit from the exchange of scientific information.

TRIBUTES TO NIH RECEIVED BY SUBCOMMITTEE

Senator HUMPHREY. I would not want to complete this session with Dr. Shannon without mentioning this fact: When this hearing volume and the companion appendix volume are published some months hence, Dr. Shannon will see once again how widely his work is admired.

I can say to him now, that in the literally thousands of messages which we have received from the four corners of the world, I can hardly recall one which reflected anything but credit on NIH. These messages of approval have come spontaneously from doctors in literally scores of countries.

It should be a source of great encouragement to you, Dr. Shannon, to Dr. Van Slyke, Dr. Smadel, and to all of your colleagues in all of the Institutes that you are judged by your peers at home and abroad with such near unanimity of approval.

I am going to print at this point just one paragraph of quotation from a representative letter received from an American physician. He comes from a great State, Texas.

THE UNIVERSITY OF TEXAS, MEDICAL BRANCH,
Galveston.

Senator HUBERT H. HUMPHREY,
Chairman, International Health Study,
U.S. Senate, Washington, D.C.

DEAR SENATOR HUMPHREY: * * *

* * * * *

4. I should not close this letter without the highest praise for the National Institutes of Health and the tremendous job they are doing, especially in their extramural program. This has been a most rewarding activity and has greatly enhanced the level of biological research throughout this country. Considering the amount of money expended, I suspect that this is one of the most effective accomplishments of our National Government.

Sincerely,

HOWARD C. HOPPS, M.D.,
Professor and Chairman, Department of Pathology.

CHART ON FEDERAL AGENCIES INVOLVED IN RESEARCH

Senator HUMPHREY. My concluding point, Dr. Shannon, is this. As you have soundly pointed out, there are a considerable number of Federal agencies involved in medical research both at home and abroad.

The National Institutes of Health represent our leading official medical research arm both in the United States and overseas.

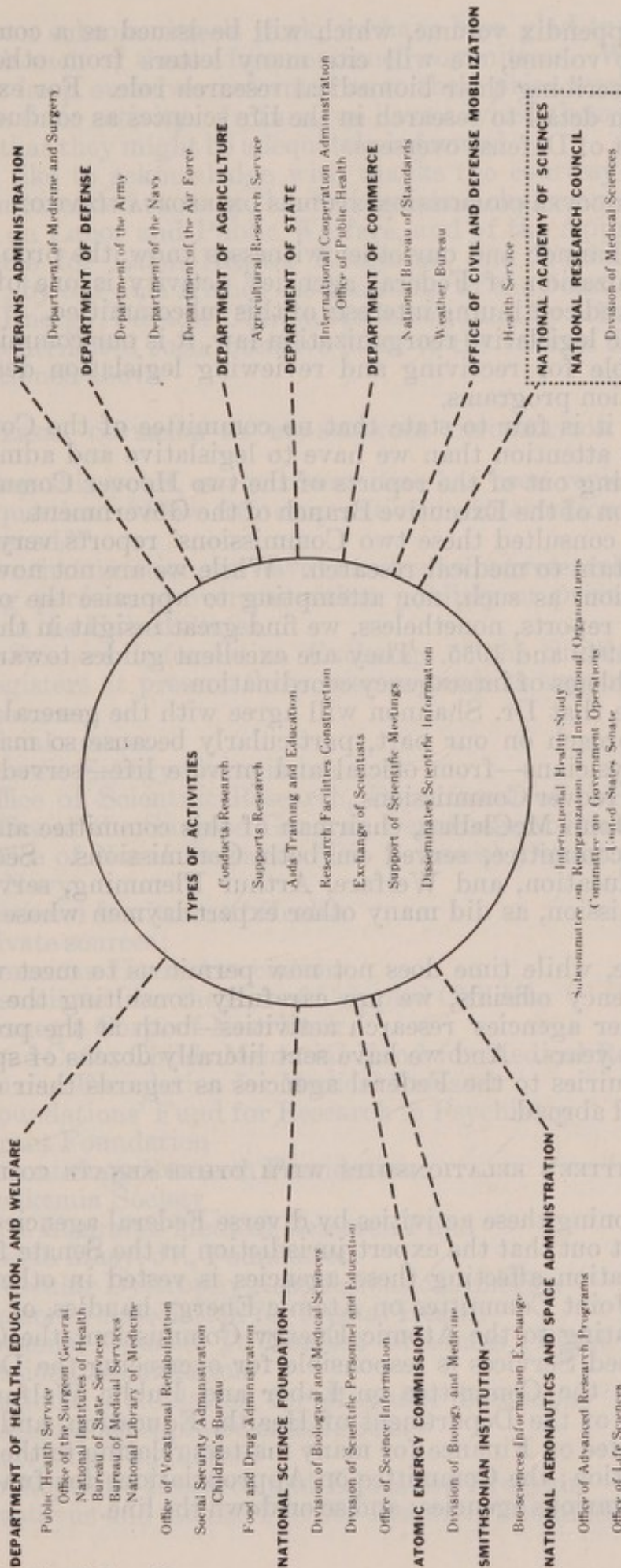
At the same time, the fact that so many other Federal agencies also have research programs in the life sciences requires a careful look-see on our part at their operations, as well.

Under Senate Resolution 347, the focus of this subcommittee is international. But it is clear that we cannot evaluate official overseas research unless we have a very clear idea of what the Federal research agencies are doing at home. This is particularly the case because Federal overseas operations represent but a very small fraction of the total—financially and otherwise.

You have referred, Dr. Shannon, to the need for flexible coordination of various agencies' overseas activities. This is one of our subcommittee's most important interests, but it extends to the agencies' domestic work as well.

The need for coordination can perhaps be best understood by actually listing the many Federal agencies involved in domestic and/or international research. I shall ask, therefore, that there be printed opposite this page a chart which has been prepared by the subcommittee staff for this purpose.

PRINCIPAL AGENCIES OF THE UNITED STATES GOVERNMENT INVOLVED IN MEDICAL RESEARCH



In the appendix volume, which will be issued as a companion to the present volume, we will cite many letters from other Federal agencies describing their biomedical research role. For example, we will refer in detail to research in the life sciences as conducted by the Department of Defense overseas.

HOOVER COMMISSION STUDIES ON REORGANIZATION

As Dr. Shannon and our other witnesses know, the problem of efficient organization of Federal agencies' activity is one of the most important and continuing interests of this subcommittee.

Under the legislative reorganization law, it is our committee which is responsible for receiving and reviewing legislation dealing with reorganization programs.

I believe it is fair to state that no committee of the Congress has given more attention than we have to legislative and administrative actions arising out of the reports of the two Hoover Commissions on Organization of the Executive Branch of the Government.

We have consulted these two Commissions' reports very carefully as they pertain to medical research. While we are not now studying reorganization, as such, nor attempting to appraise the outcome of the Hoover reports, nonetheless, we find great insight in those earlier reports of 1949 and 1955. They are excellent guides toward judging present problems of interagency coordination.

I am sure that Dr. Shannon will agree with the general soundness of this approach on our part, particularly because so many distinguished physicians—from official and private life—served with and on the two Hoover Commissions.

Senator John McClellan, chairman of this committee and member of the subcommittee, served on both Commissions. Secretary of Health, Education, and Welfare, Arthur Flemming, served on the 1955 Commission, as did many other expert laymen whose judgment we respect.

Therefore, while time does not now permit us to meet with other Federal agency officials, we are carefully consulting the record as regards other agencies' research activities—both at the present time and in past years. And we have sent literally dozens of specific and general inquiries to the Federal agencies as regards their operations at home and abroad.

SUBCOMMITTEE'S RELATIONSHIPS WITH OTHER SENATE COMMITTEES

In mentioning these activities by diverse Federal agencies, I should like to point out that the expert jurisdiction in the Senate for considering legislation affecting these agencies is vested in other committees. The Joint Committee on Atomic Energy handles, of course, all matters relating to the Atomic Energy Commission; the Committee on the Armed Services is responsible for overseeing the Department of Defense; the Committee on Labor and Public Welfare for the jurisdiction of the Department of Health, Education, and Welfare; the Committee on Finance for many matters relating to the Veterans' Administration; the Committee on Appropriations for fund bills for all of these various agencies; and so on down the line.

In our own subcommittee's work, we have been glad to be in close contact with each of these aforementioned committees. We have endeavored to keep ourselves informed as to their prior work so as not to duplicate their activity. In turn, we have advised them of our own projects so that they might be adequately informed.

I should like to acknowledge with thanks the courtesy which has always been extended to us by the distinguished chairman of both the Committee on Labor and Public Welfare, and of the Appropriations Subcommittee for Labor-Health, Education, and Welfare, Senator Lister Hill; by our able friend, the chairman of the Joint Committee on Atomic Energy, Senator Clinton Anderson; and by other Senators who have contributed such intensive labor to the various fields which I have mentioned above.

LIMITED OVERSEA COVERAGE BY BIO-SCIENCES INFORMATION EXCHANGE

Concluding this point, our subcommittee has been reviewing carefully this question: "How can cooperation in international research be strengthened?"

To answer that question, we have examined what research is now actually being performed overseas either publicly or privately under support from the United States.

The Bio-Sciences Information Exchange of the Smithsonian Institution registers at present those oversea projects supported by the following sources:

A. Official sources:

Atomic Energy Commission

Office of Scientific Research, Department of the Air Force

Office of the Surgeon General, Department of the Army

Office of Naval Research (Bio Sciences) Department of the Navy

National Institutes of Health

B. Private sources:

American Heart Association

Association for the Aid of Crippled Children

Carnegie Corp. of New York

Jane Coffin Childs Memorial Fund for Medical Research

Dazian Foundation for Medical Research

Foundations' Fund for Research in Psychiatry

Grant Foundation

Hematology Research Foundation

Leukemia Society

Life Insurance Medical Research Fund

Josiah Macy, Jr., Foundation

Muscular Dystrophy Associations of America

National Association for Mental Health

National Council To Combat Blindness (Fight for Sight)

National Foundation

National Foundation for Muscular Dystrophy

National Multiple Sclerosis Society

Nutrition Foundation

Orthopaedic Research and Education Program

Gustavus and Louise Pfeiffer Research Foundation

James Picker Foundation
Planned Parenthood Federation of America
Playtex Park Research Institute
Population Council
Research Corp.: Williams-Waterman Fund
Rockefeller Foundation
Damon Runyon Memorial Fund for Cancer Research
Scientific Research Society of America
Sugar Research Foundation
United Cerebral Palsy Research and Education Foundation

In subsequent subcommittee publications, we will examine in detail the very important issue of registration of (a) the many international projects supported by non-U.S. sources (none of which are now registered at any central clearinghouse), as well as (b) coverages of those U.S.-supported projects which are not now registered at any central location.

INTRODUCTION TO PROFESSOR MULLER

Senator HUMPHREY. The next witness is Prof. H. J. Muller.

One of the great pleasures of this subcommittee has been our contact with distinguished Nobel award-winning scientists. We are pleased to welcome to our hearing today one of the most distinguished of the Nobel winners, Dr. Muller, professor of zoology of the University of Indiana. Professor Muller's fame as a geneticist is so well known his record hardly needs reiteration. I know, however, he has kindly made arrangements to appear with us today just the day before he is to leave for Munich for an international conference, and just after returning from still another trip to Europe. I can imagine few subjects more important for intensive research than the field in which Professor Muller is so expert, namely, genetics. We welcome you, sir, and do express our gratitude and appreciation for your sacrifice in coming here just before you make this other trip.

STATEMENT OF HERMANN J. MULLER, PH. D., INDIANA UNIVERSITY

Dr. MULLER. I am very glad to have this opportunity to testify here.

Until 5 or 6 years ago even the word "genetics" was unfamiliar to most of the general public, who frequently confused it with gynecology. And although it was naturally assumed that one's doctor was the person to consult if questions of heredity arose—such as whether it was inadvisable to marry your cousin—nevertheless even medical men were likely to be just about as ignorant as the general public in matters of genetics.

Both groups, when they thought of genetics at all, tended to regard it as a rather frivolous subject, dealing chiefly with such cosmetic details as the form and color of the hair and facial features, and also with occasional monstrosities.

Even today genetics is rarely required for entrance to medical school, and after the student has entered, he will rarely find even an optional course in genetics given within the medical school.

Small wonder, then, that physicians, for some 30 years after genetic studies had proved the danger of radiation, failed to protect

adequately either their technicians, their patients, themselves, or passers-by against the radiation they, the physicians, were using, and small wonder that others dealing with radiation, such as the AEC, relying on the word of physicians and near-physicians, tended to regard the geneticists' warnings as expressions of eccentric or politically biased fanatics.

It is true that superficial traits like eye color have often served in geneticists' studies, but they were used only as straws to show how the wind blows, so to speak. It has been realized for more than 40 years that the same principles of genetics as are detected in these cases apply equally well to the most fundamental elements of the makeup of all living things. The conclusions drawn from observations of the inheritance of unimportant traits in regard to which individuals differ conspicuously tell us of the way those important basic components of organisms maintain themselves that are for the most part alike in nearly all organisms of the same species.

In other words, genetics has turned out to be an investigation of the most fundamental components of a living thing, about what they consist of, how they engage in reproduction and heredity, how they operate in causing the body to develop and function, what their changes or mutations consist of, how these changes come about, and what effects they have.

THE BASIC MATERIAL OF LIFE

In pursuing these inquiries, genetics has been increasingly stating its case in terms of the chemistry that lies beneath it. But in the other direction, following up long-term effects also, it has been able to deduce farflung results in evolution as well.

It is now becoming clear even to outsiders to the subject that the hereditary elements with which the geneticist deals, the genes, and their still finer components, the nucleotides of the chemist, constitute the core and essence of all living things. It is by means of the activities of these genetic elements that all the rest of the body is organized, and it is in consequence of their changes or mutations that all evolution has occurred, on the one hand, and that, in other cases, there is deterioration instead.

The genetic material dealt with by the geneticist is therefore the basic material of life itself. This being the case, genetics must surely be regarded as the most fundamental field of medicine, that from which we could see that everything else would follow, could we but know enough.

VALUE OF GENETICS

If you ask me what use is this knowledge to the people of the United States, I could cite you innumerable practical applications ranging, for example, from hybrid corn through the production of higher yields of penicillin, better beer from better yeast, and the anticipation of hereditary blood diseases from given marriages, to the protection of the race against radiation.

But the best answer would still be a repetition of the one that the great physicist, Faraday, gave to a lady who asked him what use his then new finding of the relation between electricity and magnetism

had: "Madame, you tell me, what use is a baby?" As the baby is the necessary beginning of a man or woman, who may have great but as yet indescribable potentialities, so basic research, represented here by genetics, is the necessary root for an unlimited and unpredictable number of concrete benefits.

Yet, even more important, man has a right to know, just to know. Thus seeking, he will be showered with unsolicited rewards. So it has been with genetics.

U.S. LEADERSHIP IN GENETICS

It is curious that the United States should be one of the countries in which the significance of genetics for medicine should be least recognized, in view of the fact that for over half a century this country has clearly led the world in this field. This subcommittee's admirable pamphlet, "International Medical Research," has a chart in which, rightly, England is given credit for the theory of evolution and Germany for that of the cell, as landmarks in the progress of the medical sciences. But nowhere are the equally basic developments of genetics mentioned that brought our knowledge of life down to the level of the gene and the nucleotide. Most of these advances took place in our own country throughout that part of the 20th century that we have traversed, and today they are more actively going forward than ever.

However, the give and take of world cooperation in these lines would be very beneficial, and so would the more intimate association with other lines of medicine that would result from genetics being given a recognized place in medical programs.

As diseases of external origin, caused by hostile micro-organisms, malnutrition and unhealthful living in general are now being brought under control by the brilliant advances of medicine to a degree hardly imagined as possible a generation ago, the bared bones of genetic defects come more and more to our view. They are especially evident in older persons, who form an increasing part of our population.

But a genetic defect is not one that cannot be ameliorated; it can often—not always—be dealt with, for the treated generation itself, provided it is known and understood.

On the other hand, we cannot tolerate an ever-increasing load of such infirmities or weaknesses, and that is what we will get if we do not heed the lessons of genetics, and if we do not extend its knowledge. We must become better aware of the extent to which much radiation, for example, can increase this load of mutations, and of just what other among the new conditions of modern life—such as some drugs or industrial wastes—may be having a similar effect.

Moreover, we must know to what extent the practices of medicine themselves, in saving lives, cause the load of hereditary defects to accumulate. That will bring us to study means of counterbalancing such tendencies through the introduction of more social conscience in regard to one's reproductive practices.

Genetics deals with such long-range effects that, like deforestation or erosion, it could be ignored until it is too late. I have had physicians tell me that they regard it as being no concern of theirs what effects their present practices may have on people of a generation a hundred years from now. The corrective of the geneticists is neces-

sary here. They take the long view, and their studies show them they are right.

The American people, and the people of the world, have the right to information that will enable them to plot a course that leads to greater happiness and fulfillment, not to a slowly creeping misery that comes they know not from where. This means research, free but integrated, pursued for its own sake yet with an eye to its implications for our lives and those of our children's children, and to ways of improving human existence everywhere.

MAXIMUM RADIATION DOSAGE

Senator HUMPHREY. Thank you, Dr. Muller, for your splendid statement. We are all very pleased that we can have the opportunity to visit with you, see you, hear you, and to exchange some thoughts with you.

I have a few questions, Doctor. I will get right to the \$64 question early.

As a scientist, do you feel you know enough to make recommendations on the so-called maximum permissible levels of radiation for world population?

Dr. MULLER. I think the recommendations that have already been made by the U.S. National Academy of Sciences-National Research Council Committee on Genetic Effects of Radiation, which are pretty well agreed to by the British Medical Research Council in their report, and also by that of the World Health Organization, are about as near as we can get at present, and I think it is unlikely that they will be changed very soon. They are founded on a combination of knowledge and ignorance, but there is real knowledge—not quantitative enough, as yet.

Senator HUMPHREY. There have been some revisions in the figures of maximum permissible radiation, however, in recent years.

Dr. MULLER. It was revised downward. In fact, over the course of 10 to 12 years, it kept being revised downward.

Senator HUMPHREY. The maximum permissible amount was less than originally had been contemplated?

Dr. MULLER. Yes, much less than had been contemplated by those drawing it up, although geneticists, I think, had to a considerable extent foreseen that.

CONTROVERSIAL QUOTATION ON RADIATION

Senator HUMPHREY. I refer now to a rather controversial statement, Doctor, which a recent witness before another committee of Congress made on the consequences of nuclear war.

You know, I am sure, of the hearings in the Joint Committee on Atomic Energy under the brilliant chairmanship of Congressman Holifield. This witness stated, and I quote:

Fortunately the human race has the power to go on leaving the fallen behind, cleansing itself gradually of genetic injury inflicted, and we can even draw an ideal picture of the survivors of worldwide irradiation emerging as a bigger, stronger, wiser, gentler, healthier race than would otherwise have developed.

Would you care to comment on this statement?

Dr. MULLER. Well, I think that is a masterpiece of misleadingness. Man came up from the ape, too, but it took him millions of years.

Provided there were any survivors that would reproduce, I suppose we might go on up again. But how can we ignore the wiping out of whole populations? Moreover, our becoming better and stronger would certainly not be a result of our having received irradiation. If it happened, it would be in spite of that, and only after not thousands, but I would say hundreds of thousands of years. It is quite misleading to put those two things together.

Senator HUMPHREY. I was rather shocked and surprised at the statement. I have a copy of the testimony here. The witness that appeared before the Joint Committee had these words to say, speaking now of this getting bigger and better and gentler:

The price would be a large and major fraction of the population killed or dying within a few months, survivors carrying much radiation and new mutations, high infant and adult mortality for many generations, straining the naturally high determinant of women to maintain the population. Then as populations began to build up again would come the opportunity for conscious eugenic management, with large families limited to parents of superior native endowments. The biological law has sometimes been stated, evolution goes rapidly only in times of stress, and we go on from the Biblical, the wages of sin is death, to the profane scientific, the price of selection is deletion.

Do we pay people for this? I think we do.

Dr. MULLER. I would take the opposite point of view there in some essential respects, because I think one of the most important characteristics of man as distinguished from other organisms is that he can look ahead, and that he doesn't have to always progress through his own errors.

He can utilize his knowledge and prior experience to avoid the pitfalls. If he wants to rush into them, just in order to teach himself a lesson, I think it is utterly perverse.

Senator HUMPHREY. Well, sometimes I am afraid that in the discussion of these highly technical and complex matters there is a tendency on the part of people who are in the scientific community, only a few people, may I say most respectfully, thank goodness very limited in number, to deal in the scientific aspects so objectively that they forget about the fact that some of us are just sort of human.

Take me, for example. I don't mind waiting a thousand years, but when you said hundreds of thousands of years, it kind of upset me. If you can get this gentler and healthier and bigger and better population within what I thought was the lifetime of my friend Senator Muskie, I would be willing to kind of go along.

Dr. MULLER. I think it would take us ever so much longer to reach that higher state if we had to go through that catastrophe, first, than if we avoided it. I will say that.

Senator HUMPHREY. Doctor, is there any possibility for developing a means of treating genetic damage once occurred? In other words, can the damage once done be undone?

Dr. MULLER. No. You can, as I said, ameliorate the condition or treat it in the individual. That will not affect his offspring, and you will have to treat it over again in each generation.

SOVIET GENETICS

Senator HUMPHREY. I note that you had a brief opportunity to work with Soviet geneticists within the U.S.S.R., itself. Would you comment on the state of Soviet genetic science, and might I add quickly, what is the current status of Dr. Lysenko, whose views on inheritance of acquired characteristics have been widely disproved by Western geneticists, and whose views found favor with the late eminent political scientist and misfit, Premier Stalin?

Dr. MULLER. In the late twenties and early thirties, Russian genetics was forging ahead rapidly, and I would say that Russia was second only to the United States in its advancement of knowledge on that subject.

That was all smashed purely by political interference, and Lysenko was simply a figurehead that, as you rightly say, was put up to the job by Stalin and given a buildup by the Communist Party.

Now, genetics hasn't been taught for more than 20 years; it has long been expurgated from medical school and college textbooks everywhere. No research has been done on it, until about 2 years ago. I met some Russian geneticists when I was at Geneva last September, but I wouldn't want to implicate them.

Anyway, I think I have a little more information about what has happened, in that they had been able to work for the last couple of years, but only on approved projects which the political people regarded as of use, such as, perhaps—well, getting a high yield penicillin, or being able to show that radiation damages the chromosomes of monkeys more than mice and therefore the nuclear tests should be stopped by the United States, or something like that, but genetics was not recognized as a subject of theoretical importance to be pursued in its own right, and the highest political authorities still question the truth of its tenets. There was a division, I am sure, in the upper circles.

Meanwhile the subject itself is languishing, but people aren't being put to death for it any more, as they were.

Now, we have that to contend with in international cooperation with them, but I think they would benefit in the end. They have some good geneticists still alive who would like to study here, relearn, and learn the new advances, who haven't been allowed by their own government to come over.

Senator HUMPHREY. Yes, we run into the problem of their own government being unwilling.

Dr. MULLER. Yes.

Senator HUMPHREY. Do you feel that the proposal for an international medical institute, the type of thing we have been discussing here in Congress, would forward your work?

Dr. MULLER. Yes, I do. I think it would very much.

BACKGROUND RADIATION IN INDIA

Senator HUMPHREY. I am pleased to get your testimony. I know it will mean a great deal in this record, because of the high regard in which you are held.

When we were in Geneva talking with WHO individuals, I had asked about the background of high natural radiation in southern India. We had a fascinating discussion of the different areas in the world in which the incidence of particular types of diseases seemed to be quite prevalent, and the relationship of those diseases to environmental habits, or the geography, the weather, or the soil conditions, and so forth.

Now, there are about 100,000 people in this area in southern India that constitute almost a field laboratory in themselves. As you well know, we have only been able, by and large, to study the genetic effects on animals. As you know, too, our present scientific knowledge of the genetic effects of low levels of radiation background—as low as 0.1 roentgen per year is based upon a projection or interpolation from animal experiments carried out at high radiation levels.

Now, in India, where radiation is 10 times higher, we will have direct data on the genetic effects on humans.

Do you think that the study has a good chance of success from a scientific standpoint? I give that background simply for the record.

Dr. MULLER. Well, I think it should be done, because it presents an opportunity, but I feel about it the way I did when I was asked my opinion about doing similar work at Hiroshima, when that was projected.

As I said in that connection, human breeding is so indiscriminate from the standpoint of genetic experiment, and we have so many abnormalities already, if we look for them, that it is extremely difficult to get significant evidence in that way.

I think they did finally find some Hiroshima results, although it was not possible at first to find what the much more recent studies there have shown.

Similarly, in Paris they have found results from examining the offspring of people irradiated in the course of medical treatment and diagnosis, but I am holding my fingers crossed about the studies in India.

I think, on the other hand, we have more exact methods, now, not quite as direct, in some ways more direct. I am thinking, for example, of the work of Dr. Puck, in Denver, on the effect of radiation on human cells grown in culture, and of the work of Dr. Atwood in Chicago on mutations in human bone marrow cells and other cells in the body, and I think he intends to extend that to people who have been irradiated. I think we will be able to get more exact results in that way.

CORRESPONDENCE FROM GENETICISTS IN APPENDIX VOLUME

Senator HUMPHREY. Before I conclude my comments with our distinguished witness, I should like to mention this fact: So highly do I—and, I believe, my colleagues—regard this field of genetics that we are arranging that there be included as one of the sections of the appendix volume, a series of letters received from other distinguished geneticists.

In my personal view, the Federal Government can hardly do too much to strengthen international collaboration in genetic science. I am referring, of course, to collaboration in basic research and in clini-

cal research. Genetics is literally revolutionizing biomedical science, and we would like to receive every possible impetus.

Now I should like to ask Senator Muskie if he has some comment.

Senator MUSKIE. In your statement, Doctor, you said the American people have the right to information that will enable them to plot a course that leads to greater happiness and fulfillment.

Was it your intention to suggest that information is lacking simply because research hadn't dug it all out yet, or did you intend to suggest that information is being withheld?

Dr. MULLER. No, I wouldn't say information is being withheld, only in the sense that the public and people in general, including physicians, aren't educated well enough in the information that is available, because it hasn't entered the curricula enough, but that isn't because of purposeful withholding, certainly not by Government.

Senator MUSKIE. Would you say information is being misinterpreted?

Dr. MULLER. I think the information simply isn't enough realized and disseminated.

Senator MUSKIE. As a result, various interpretations, even conflicting interpretations are being broadcast?

Dr. MULLER. Yes. That is true.

Senator GRUENING. Dr. Muller, I notice with much interest your statement that there are seldom even optional courses in genetics in the medical schools.

How do you account for the fact that the United States has done so well in the field of genetics?

Dr. MULLER. It has had to come from people who weren't medical men, just from people in zoology and biology departments. Very few of them have been medical men.

Senator GRUENING. Is there anywhere an institute of genetics, where something more than a course or two is given in a university in connection with zoology?

Dr. MULLER. Well, there is the Carnegie Institution which has a department of genetics—I am not sure whether that is the title—but it is for research, not for courses.

Senator GRUENING. I wondered whether there wasn't an opportunity and a field somewhere in connection with a medical school to establish a separate school of genetics that would bring together all the existing knowledge and train people not merely in animal genetics but in human genetics, and raise the importance of this great field to its proper level.

Dr. MULLER. Well, for example, physicians could take so-called refresher courses? Yes, I think that would be a very good idea.

Senator GRUENING. Could you tell us what some of the serious damages are in the form of mutations as a result of radiation? What would be found in people who were seriously affected in succeeding generations? What kind of malformations would they be likely to get?

Dr. MULLER. I can only say that we know of many different types of mutations that occur naturally, and that research in genetics with various organisms has shown that anything that can occur naturally, any mutation, can also be produced by radiation, and, as you know, one gets some of the most serious effects.

For example, as Dr. Stevenson will tell you in the field of mental health, there are various kinds of idiocy due to nutritional abnormalities, which in turn are caused by gene defects that arose by mutation, which radiation would produce.

Any one thing would happen with a low frequency, but in the overall picture, they would add up.

Senator GRUENING. Do you consider the amount of fallout, the amount of radiation spread that has taken place in our experimentation with these new weapons, is already a serious menace to the future of the human race?

Dr. MULLER. No, but I would give a different answer if it came to a nuclear war. And although I would not distinctly say the fallout from tests is a serious menace to the human race, I would say that the total number of people that will be made miserable by it, all told in future generations, will be in absolute terms a very large number, but in terms relative to the whole population a very small number.

Senator GRUENING. This very large number, although in terms of the whole a small number, from the present amount of experimentation that has gone on with atomic tests?

Dr. MULLER. Yes. I would say it will come to something like, say, 100,000 or more.¹

Senator GRUENING. Would you think it advisable in view of the attitude of the United States toward international health for us to stop atomic tests unilaterally, if there were no way of getting it stopped by agreement?

Dr. MULLER. I would be unable to answer that without knowledge of other considerations. In other words, I wouldn't allow this consideration to be the sole deciding one.

Senator GRUENING. You would consider political and defense considerations would have to be weighed against the damage that would result?

Dr. MULLER. Yes, that is right.

Senator GRUENING. Thank you, very much.

Senator MUSKIE. I regret, Dr. Muller, Senator Humphrey had to leave to attend another hearing. As a matter of fact, he postponed his departure about an hour in order to stay here as long as he could to hear this very stimulating testimony, so on his behalf and on behalf of Senator Gruening and myself, I want to express our appreciation and our pleasure at your testimony here this morning.

Thank you very much, sir.

Dr. MULLER. I was very glad to be here.

INTRODUCTION TO DR. PIORE

Senator MUSKIE. In our subcommittee work, we have found one of the most important frontiers of medicine is in the area of biophysics and, in particular, we have been tremendously impressed with the contributions which have been made by the science of mathematics and, in particular, by electronics providing new research to aid the scientist in his never-ending quest for knowledge.

We had hoped to hear from several physicists and mathematicians. Unfortunately, we can only hear from one today, but we know we

¹ The true value might even be as high as 1 or 2 million.

have chosen a very good one from the International Business Machines Corp.—which has been in the headlines recently—their director of research, an expert in digital computers, Dr. Emanuel R. Piore.

It is a pleasure to welcome you here this morning.

STATEMENT OF EMANUEL R. PIORE, PH. D., DIRECTOR OF RESEARCH, INTERNATIONAL BUSINESS MACHINE CORP.

Dr. PIORE. I don't know whether I am going to get into trouble or the committee is going to get into trouble in asking a physicist to testify on medical matters. This is something the medical people raise their eyebrows at. But if the medical profession will be tolerant with me I will proceed.

I have been thinking about why I—not so much as director of research but rather symbolically as a physicist—have been asked to testify here this morning. There are two reasons.

First, the physical sciences are injecting themselves more and more into biological research, and the techniques of the physical sciences are increasingly required in order to make progress in biological research.

Secondly, more and more people are receiving medical care for a number of reasons. This traffic will continue to increase. This poses a tremendous problem of medical records—their keeping, standardization, storage, availability, and interpretation.

Many hospitals and health systems are almost drowning in the medical record problem. Now, we are going to take care of more and more people medically, and we will need to have better systems of recordkeeping and correlation. In this area, it obviously becomes important to use some type of mechanization.

Now, I want to identify about five areas in which computers can play a role in medicine and biology. Before I do that I want to make sure that it is perfectly understood that this will not be possible without the intimate participation of the biological researchers and the M.D.'s themselves.

There are machines. Information has to be put into the machines, and the information has to be put in basically by the M.D.'s and biologists. The processed information coming out must also be interpreted by the M.D.'s and biologists. The principal skill of the computer people at this time is in processing the information and manipulating it.

The first area I want to identify is just making use of mathematical techniques in biology and medicine, pretty much as physicists use computers to elucidate and understand physical problems. This will reduce the time required to perform laborious computations. It will reduce the repetitive human labor required to solve existing problems. It will also broaden our horizons by permitting us to perceive and deal with a new class of problems, because it may remove inhibitions caused by laborious computations.

Numerical forecast of weather would not be possible without building a mathematical model of the whole air-mass-motion system, and then putting it on machines and interpreting it. Just the physical labor of doing it by hand would be prohibitive.

There is a whole class of similar problems in biology. One should be able to get a model of the circulatory system of the blood or of the nervous system, and manipulate it on a machine so as to make the model interpret more and more of the experimental information, thus possibly obtaining very basic new insight. This is one class of problems that machines have the unique capability of dealing with, provided the biologists and M.D.'s are willing to sit down with the computer people to try to formulate the model and translate it into machine language, in order to insure that the machine is dealing with and manipulating significant data.

MACHINES TO ASSIST DIAGNOSIS

A second area is the use of machines in diagnostic situations. At the moment, some of the physical data we get from the human body is represented in graphs—the electrocardiogram, for example. Sometimes in reading these graphs, very small variations which can be highly significant in medical diagnosis are obscured by the sheer size of the original data. To extract this possibly significant information now requires very laborious and time-consuming computations, which may be prohibitive. Computing machines can reduce the time required to obtain correlation. We should be able to design machines that will permit the diagnostician to obtain the results at the same time as he is obtaining the data—while the patient is under observation. Initially, this could be an important research tool. Eventually it should become a working diagnostic procedure.

Let me put it this way. You all have experienced this sort of thing in your television set. For instance, if you have noise in your television—a lot of dots and ripples—there is still information present in the form of a picture, and mathematical techniques can get this picture out for you. In information theory, these techniques are called correlation and autocorrelation.

I can foresee that we will be able to get much more exact diagnostic information—and again I am talking in terms of the future—by taking electrocardiograms, putting them into a machine, getting autocorrelation functions, and then looking at the results. With this procedure, there might be great opportunity to predict a potential physiological disturbance in an individual before it appears in the gross.

Now, I have used the electrocardiogram as an example. In any situation where you end up with some kind of curve in medical diagnosis, this type of technique may prove useful.

MECHANICAL SEARCH OF LITERATURE

A third area, and I am just giving one example after another, is the use of machines in diagnostic situations which require a searching of the literature. If you have some kind of symptom, the normal procedure is for an M.D. to take a look at you. If he is puzzled, he calls up a classmate of his. If he is still puzzled, he starts looking up the references in the libraries.

This search can be long and time-consuming, because medical and biological information is being generated at a tremendous rate and becomes available to the profession in a wide variety of forms scattered through a large number of publications.

We not only hope but we are confident that in the immediate future we will be able to mechanize this operation of getting information out of libraries, out of research papers, and so forth. This is not possible without a very intimate association with the medical profession, evolving a standard battery of questions or a standard procedure, so that one can translate these medical queries that are made on the human body into what is known as machine language, something the machine can manipulate.

After these data have been manipulated by the machine, the information must be translated back to a language understandable and usable by the medical people. This is another angle of the problem we must work on.

I have just covered the mechanization of medical literature. A related area is the mechanization of medical records. This is my fourth area. This, again, requires an intimate association of the doctor with the machine, the standardization of what goes into a medical record, and in what priority.

I think you will find that a single patient may have as many as five independent medical records in different places in a community which are not pulled together. It is highly desirable that they should be. The machine can play an important role in the future in simplifying the process of getting at medical records.

MACHINES FOR COMPILING STATISTICS

Finally, there is the whole problem of statistics. Greater and greater use of statistics and the development of statistical procedures was one element that Dr. Muller's testimony touched upon with regard to the handling of human genetic information.

Possibly statistical methods can be evolved so that significant medical information can be derived from the genetic data. Probably such statistical methods would be very laborious and, if this is the case, machines could facilitate manipulating the data.

I have cited these five examples very sketchily. Now let me reiterate my plea. We can make progress in this area only provided the MD's and biologists join the people that design machines in order that mutual understanding can evolve between those who supply the input data and use the output data on the one hand, and those who specialize in the manipulation of these data on the other hand, to permit rapid progress in the exploitation of machines in biology and medicine.

Thank you, very much.

Senator MUSKIE. Could you give us some indication of the degree of interest displayed by the medical profession in these possibilities?

Dr. PIRE. I think the best example to cite, and I don't have the exact statistics, is the comparison between the number of large computing machines installed in laboratories dealing with physics and chemistry, and the number in medical centers. The medical people

are just beginning to move into this area, and they are making some demands. We have tried to stimulate their interest. We held meetings at our research laboratories with medical people the middle of June for about a week, and the program has been made available to your committee to indicate the subjects we covered in our attempt to make medical and biological workers aware of the potentials of computing equipment in their professional fields.

The National Institutes of Health is very well aware of the problem. It is a question of education and of doing yeoman work and sort of preaching, let's call it religion, in this area.

Senator MUSKIE. Do you think a mechanical man will evolve out of this?

Dr. PIORE. No, I have been stressing that you need the human to put the right data in, and a human to interpret the results. The machine can only manipulate under your instructions.

Senator MUSKIE. I think you have been very exact in your description of the possibilities.

Senator GRUENING. I am interested in the fascinating vista you have opened up. I think many of those things will be applied not only in medicine, but in other fields of research.

Senator MUSKIE. I have some questions here that Senator Humphrey wanted me to ask to probe his interest in this field, so with your patience and indulgence, I will ask them.

Dr. PIORE. Fine.

Senator MUSKIE. He points out that the subcommittee, as I think you are aware, plans to publish in November a symposium which will be devoted exclusively to the subject of electronics and mathematics in medicine, and we hope and anticipate that your corporation will contribute its findings and observations to the symposium.

Would it be your feeling that a public presentation on the potentialities of electronics in relation to medicine would serve a constructive purpose?

MEETINGS ON MEDICAL ELECTRONICS

Or, if I may add to that question, would it be your feeling that you have got to work through the medical associations and through the National Institutes of Health in order to stimulate this kind of interest and cooperation?

Dr. PIORE. I think a public meeting would be most helpful. It should be done with the cooperation and aid of the National Institutes of Health, and possibly other research organizations such as the medical schools, research hospitals, the Rockefeller Institute for Medical Research, and other similar institutions.

I think that would be one type of meeting.

Another meeting could involve the whole problem of hospital records, and of mechanizing hospital recordkeeping, but I am afraid that if you mix the two meetings, you will miss the impact on either group. I would urge that you keep it more on the scientific side initially.

Senator MUSKIE. Would you say that existing machines can be adapted to the needs which you have described in your statement this morning, or would you suggest that perhaps new techniques and new machines may have to be developed?

Dr. PIORE. Some existing machines can be applied to the things I have enumerated very broadly. In other areas, you will have to evolve new machines, and different types of machine organization. Some problems basically require having just a very large dictionary. That means you want something with a very large memory as, for instance, for the language-translation problem.

Other problems, such as simulation of the hydrodynamics of the bloodstream, existing machines could do.

I have mixed both classes of problems in my presentation without trying to separate those that could be solved with existing machines from those that may require new machines.

ROLE OF FEDERAL GOVERNMENT

Senator MUSKIE. Would it be your opinion that cooperation between the medical and biological sciences and your people is something that ought to be stimulated by Government action in any way, or do you think simply the bringing together of these interests under Government auspices would be effective?

Dr. PIORE. Let me talk on this as a member of the President's Science Advisory Committee, rather than as Director of Research of IBM.

The Federal Government is the principal source of funds for medical research in many other areas, and if this field is to be stimulated, the Federal Government must play a large role. It is assuming greater and greater responsibility for the health of the Nation.

It is just a question of how we do it, not whether we are going to do it, so that the Federal Government must take the lead.

I would hope that it would take the lead in such a fashion that private foundations and voluntary organizations can also put their shoulders to the wheel.

Senator MUSKIE. To what extent is study in this field being conducted in other countries?

Dr. PIORE. I think, broadly, that we, as a country, are most forward in using these machines.

Senator MUSKIE. Despite our backwardness in applying it to this field?

Dr. PIORE. That is right. Except, I would say we are not backward, we are on the threshold of using machines in medicine and biology. Every country is building machines, but most of the emphasis is on some kind of commercial market, while if you look at our country there are more universities and more companies with research programs in this area than anywhere else in the world.

England has some, but there is nothing comparable anywhere, including Russia, to the activities in this country.

Senator MUSKIE. Well, we have been talking of course in a great deal of this discussion of international research. Would you say that we should move into the international field in this particular area?

Dr. PIORE. I think it would be very desirable, in starting an activity like this, to get the world involved, because in the final analysis this is a global problem.

Although our medical care and techniques, I am told, are the best in the world and are things we can export and be proud of, the sooner we get other countries involved, I think, the easier it will be to make progress.

Senator MUSKIE. Has there been any indication of interest by the World Health Organization?

Dr. PIORE. I am told that Dr. I-C. Yuan, Medical Director, World Health Organization, has inquired about our activities.

ACTIVITY IN SOVIET UNION

Senator MUSKIE. I have to return to another of Senator Humphrey's questions. I must not overlook the points he wants to make.

Would you be in a position to comment as regards the development of computer science in the Soviet Union?

Dr. PIORE. I will tell you, this is a smell test, and I will give you my smell test.

I think the Russians are as knowledgeable as anyone in the world with regard to basic theories and technology in computers, though I think behind us in the number of computers and the size that are presently in use.

If the Russians at any time want to put a great deal of stress on computers, the way they decided to put a great deal of stress on nuclear bombs or on these ballistic rockets, they can do it. They have the background and the knowledge. It is my observation that to date they haven't done it.

Senator MUSKIE. Have they developed this kind of equipment in the commercial field to the extent we have?

Dr. PIORE. They have initially had their noses away up in the air as far as using computers to run industries is concerned. This was not in the Marxist way of things.

Recently there have been a number of articles in the newspaper indicating that they have suddenly realized that it will be valuable for management purposes to have computers in industry, and I foresee the great drive in Russia for that purpose.

Senator MUSKIE. In the development of the complex machinery of space, it would seem to me that mechanical computers are almost a must.

Dr. PIORE. I am sure they have those for that purpose, but they haven't as many distributed throughout their realm as we have throughout our country.

SAFETY OF RECORDS

Senator MUSKIE. There is one other question that Senator Humphrey wanted me to ask, and that is this.

In connection with the fire at the Pentagon, he says, "I presume that duplicate tapes should be kept in some other location than simply a central headquarters, and in any event fireproof vaults should be used to store the tapes."

Would you comment on the matter of safeguarding valuable information which may be stored on magnetic tapes, information on the sciences, the Armed Forces, or anything else?

Dr. PIORE. I would like to ask that we prepare some written material for you because I am not, you know, on top of this situation.

I know we in IBM have been reviewing this thing at the Pentagon Building pretty thoroughly, and I would rather give you something we can stand behind without question. If we may, we will submit it for the record.

Senator MUSKIE. Thank you. We will keep the record open for that purpose.

(Statement follows:)

We recommend to the users of our equipment that magnetic tape records be maintained in the same fashion and with the same safeguards that one would use in protecting information of similar importance, if stored in printed form on paper. In those instances where information is irreplaceable or where it represents a substantial investment in time and money, prudence certainly would demand that the user provide safe storage for tapes and similar data sources.

Final determination, however, of what precautions to take must rest with the user. Only he can adjudge the real value of the information. Only he can decide how far he might wish to go in reducing the risk of loss. Safe storage of tapes is no more costly than safe storage of most other records. A great quantity of taped information can be stored at relatively modest cost in a fire-proof vault or tape storage room.

Since ours is basically a service business, we are always happy to consult with our customers and advise them, to the extent we can, on all matters having to do with data processing—including the safe storage of tapes. It is quite difficult, however, to generalize on this question of what precautions should be taken in storage. Each situation presents its own particular considerations. Each must be dealt with separately.

MECHANICAL TRANSLATION

Senator MUSKIE. I would like a comment from you on another subject on which we know that IBM scientists have been working very hard, the matter of the use of computers for mechanical translation, abstracting, and indexing of the huge volume of scientific information published in foreign languages. We had some testimony on this a while ago at another hearing before this committee.

I would appreciate it if you would comment on the state of development of electronic computers for such purposes.

Dr. PIORE. I would like to comment and then give you a more extensive summary to insert in the record, if I may, because it is a very complex subject.

We are working on a machine to translate Russian into English, which is quite different from the commercial run of machines, because the emphasis here is more on having a large memory, a large dictionary, than on a lot of fast manipulations.

Ultimately, what we want is to take any sheet, read it mechanically, translate it, and have a printed sheet come out.

One of the basic problems is to understand the structure of language, to write a dictionary that can be manipulated in terms of meaning.

Let me go a little further. A number has perfect meaning just in itself. You don't care whether you get 10 by adding two 5's or multiplying 2 by 5. When you are dealing with language, a word has its meaning depending upon what went before and what comes after, and you can cite a number of examples. The problem is how to form a dictionary taking this factor into account. This is the tough problem, rather than how to build still bigger memories.

We are working very hard trying to understand how you put things in a memory, and what kind of dictionary you can build up, but it is a problem that is soluble.

If you want an ability to deal with a thousand words, we could do it right now. If you start asking for 10,000 or 100,000 words, you are just making life tough for us.

(Statement follows:)

IBM research has made a strong effort on the investigation of the problems involved in automatically handling, with electronic machines, of information conveyed by words (in contrast with the handling of data in numerical form); that is, words as they occur in running text of natural languages. This includes searching texts for military, scientific or technical intelligence. As a specific problem by which to establish the requirements of machine handling and search theory, a large effort is being devoted to the automatic rendering of Russian into English. The effort at IBM is characterized by an appreciation of the fact that the real difficulties arise when one wishes to translate real texts in the large, where all the 100,000 words or so of the language may appear, in a very wide variety of contexts. A mathematical model of languages is being established with the view of formalizing their characteristics as a whole, so that they can be presented to a machine.

The evaluation of mechanical translation as a national requirement, rather than an academic stunt, has also led to the intensive study and development of equipment to handle a whole language. The principal feature is a very large memory (sufficient to handle a detailed and complete dictionary of both languages), with rapid access to the contents, as well as the ability to make flexible identifications or word groups, stems, endings, etc.

Both theory and equipment are sufficiently advanced that readable, although clumsy, translations are being made. Substantial improvement is expected in the next 12 months.

This work has been largely supported by the Department of the Air Force through the Rome Air Development Center.

Senator MUSKIE. You say you can do a thousand words. You mean if you had a sheet of paper using a combination of those thousand words, you could put it in a machine and get it out?

Dr. PIORE. Yes. That means if I take a highly specialized field, and if you look at the technical field you find that most scientific papers restrict the number of words they use.

Senator MUSKIE. Mostly words the rest of us can't understand.

Dr. PIORE. That is right. I think this could be done, but if you want something—take Pravda—to translate daily, that is another problem. It is looking at the mathematical structure of the language, but we will be prepared to go into detail for the record.

Senator MUSKIE. I appreciate that.

Thank you for your testimony, Dr. Piore, which I have found stimulating, as well.

Dr. PIORE. Thank you very much, Senator.

INTRODUCTION TO STATEMENT BY DR. VLADIMIR K. ZWORYKIN

Senator MUSKIE. The subcommittee had hoped to have with us in person today one of the outstanding scientists in the United States whose name has become a synonym for pioneering in advanced electronics. I refer to Dr. Vladimir K. Zworykin, of the Rockefeller Institute of Medical Research. Dr. Zworykin is overseas at the present time. He has, however, kindly prepared a statement for our transcript. His views will be an interesting supplement to the comments

of Dr. Emanuel R. Piore. While these views have a rather different emphasis and approach, they are obviously related.

I should like to note in this connection that Dr. Zworykin is among the many distinguished scientists who are cooperating with the subcommittee in the publication toward the end of this year of what we feel will be an exceedingly constructive new publication in this field. It will be a printed symposium on the subject of "Electronics, Mathematics and Medicine." In this symposium will be published the further views of outstanding leaders of the International Business Machines Corp., dozens of other corporations throughout the United States engaged in electronics research, Federal agencies with a deep interest in this subject, such as the National Institutes of Health and the National Science Foundation, leaders of many private laboratories, hospitals and others. Dr. Zworykin's prepared statement now follows:

**STATEMENT BY DR. V. K. ZWORYKIN, THE ROCKEFELLER
INSTITUTE, NEW YORK, N.Y.**

THE MEDICAL ENGINEERING RESEARCH CENTER—A PROPOSAL

In an era of increasing population and the broad expansion of hospitalization, surgical and other group health plans, there is urgent need today for the wider application of modern engineering techniques to the practice of medicine. Such techniques, based upon new devices, systems, and instrumentation, offer perhaps the only means by which the limited medical profession can continue to meet all of the health needs of our growing nation.

At the present time, progress in medical science is concentrated largely at two ends of the scale. At one end is the amply endowed basic research effort, resulting in new and vital knowledge relating to living organisms. At the other end is the extensive public and private investment in improved hospitals, clinics and other health facilities for the care and treatment of patients.

Between these two extremes lies the equally important area of applied research and engineering, covering the invention, design, and production of new electronic, electrical, and mechanical equipment techniques applicable in the field of medicine. But in this vital area, there is today a critical deficiency of supported activity, in contrast to the emphasis placed upon basic research and the provision of new health facilities.

CONTRIBUTIONS OF ENGINEERING GROUPS

Some recent efforts have been undertaken to help in filling this gap. The Professional Group for Medical Electronics of the Institute of Radio Engineers was formed several years ago specifically to promote the more intensive application of electronic methods in medical research and practice. The American Institute of Electrical Engineers, in cooperation with the Instrument Society of America and the Institute of Radio Engineers, has sponsored annual joint conferences on electrical techniques in medicine and biology. The Medical Electronics Center at the Rockefeller Institute has arranged confer-

ences for medical and electronic specialties, with the aim of advancing effective application of electronic techniques and equipment to biological applications. In addition, it has published a bibliography of medical electronics, which is made available to all workers in the field. Finally, an international conference on medical electronics was held for the first time in June, 1958, in Paris, under the sponsorship of the Council of International Organizations of the Medical Sciences, with representatives from the United States and 11 other nations in attendance. A second international conference is planned for this year with 18 countries participating and 120 papers being presented in the UNESCO headquarters in Paris.

All of these initial steps have been distinctly helpful in several respects. In particular, they have had the effect of facilitating the application of known electronic and electrical methods to medical problems, and they have served to generate cooperation between specialists in engineering and medicine. However, they fall far short of meeting the need that exists today for bringing the resources of engineering to bear upon the field of medical practice as a whole. The real need is for a degree of support in this area which would be comparable to the support now given to basic medical research and the provision of health facilities.

PROPOSED ENGINEERING RESEARCH CENTER

An endowed Medical Engineering Research Center is proposed as an answer to this critical need. The functions of such an institution would be to expedite the translation of electronic, electrical, and mechanical engineering advances into practical medical tools and to encourage their use by the medical profession. It would provide support and work opportunities for the inventor whose lack of technical assistance and physical facilities results in the loss today of valuable ideas bearing upon medical needs. It would serve as a clearinghouse for engineering information relating to medicine, and as a point of liaison between instrument manufacturers and hospitals or medical groups. It would help to overcome any undue conservatism among doctors in regard to new medical procedures by ensuring the distribution of small numbers of new devices to hospitals where doctors could become acquainted with their advantages by firsthand experience.

SOVIET APPARATUS INSTITUTE

A precedent for the establishment of the Medical Engineering Research Center exists today in the successful Institute of Experimental Surgical Apparatus functioning in the Soviet Union. The Russian institute employs large groups of mechanical and electrical engineers and medical specialists and is provided with a special hospital, laboratory, and pilot plant. Recent exhibits of its work, at the Brussels World's Fair and elsewhere, have given impressive evidence of the substantial and useful results that can be achieved through a concerted effort in applied medical engineering. In my coming trip to Russia I hope to make a particular study of the organization of this institute and would be pleased to report this to the committee.

The establishment of a Medical Engineering Research Center in this country could be undertaken on a relatively modest scale, with a total annual endowment of perhaps half a million dollars. Initially, it would require a small permanent staff which would guide and advise part-time workers and scientists or engineers on sabbatical leave from their regular positions. Apparatus could be constructed on order by instrument manufacturers and tested and demonstrated at hospitals affiliated with the proposed center. The center would require its own laboratories and shops only after it had demonstrated the need for them by the results of its initial operations on a smaller scale. It is reasonable to expect that the center would become entirely self-supporting within a relatively short period.

The creation of such an endowed Medical Engineering Research Center could overcome a major deterrent which exists today in the absence of an adequate financial return for individual companies in all but a few specialized areas of medical engineering. Discussion of this proposal already has aroused an enthusiastic response among various companies and professional organizations.

Thus, the Institute of Radio Engineers, one of the largest technical societies in the world, with 55,000 members, has through its board of directors, expressed its readiness to cooperate in the establishment of a Medical Engineering Research Center. Furthermore, several companies now engaged in activities that would fall within the province of the proposed center have pointed out that this work is proceeding at the present time on an extremely limited scale, simply because it does not fit in with their regular activities. In these cases, it has been suggested that the companies would assign such work to the center and share the development costs during the pioneering period.

A further advantage of the center would be to encourage invention and promote the exchange of ideas and experience, generating an ever greater flow of new devices, systems, and techniques. Thus, the center would fill a definite and alarming gap in the pattern of medical practice in the United States today. In this basic sense, it would be an eminently worthy candidate for funds assigned to philanthropic purposes.

Senator MUSKIE. At this point in the transcript, Senator Humphrey has asked that there be reprinted the text of a statement which he is preparing. In it, he expects to comment in response to inquiries concerning our forthcoming printed symposium on medical electronics.

This statement will represent Senator Humphrey's preliminary reactions to the replies received to date for the symposium. To it, Senator Humphrey states that he will append a few pertinent newspaper articles, the latest as of the time of publication of this transcript.

The statement follows:

STATEMENT BY SENATOR HUBERT H. HUMPHREY—THE IMPORTANCE OF EXPANDED
FEDERAL AGENCY ACTIVITY IN THE FIELD OF MEDICAL ELECTRONICS

Numerous sources have asked my preliminary reactions to responses to the questionnaire which was sent out by the Senate Subcommittee on Reorganization and International Organizations as part of its international health study.

Analysis of the responses is still incomplete as of the present time. However, it is clear even at this stage that medical electronics is one of the most important, promising, and challenging areas for the future strengthening of the healing arts in the United States and throughout the world.

Virtually every single respondent—public or private—indicates that he or she believes the Federal Government would do well to help accelerate development in this field.

It would appear, therefore, that all of the Federal agencies which are involved in any way, directly or indirectly, in this field—for example, the National Institutes of Health, from a direct standpoint; the National Bureau of Standards, from a more indirect standpoint—would be in a sound position to analyze the adequacy of their existing programs in this area. Their review should, in my personal judgment, be geared toward a strengthening of their programs—within each agency and in conjunction with other Federal agencies and private and public sources.

Already, I am glad to note that NBS for example has served, at their request, NIH, the Veterans' Administration, Department of Defense research units, the Atomic Energy Commission, and the Office of Civil Defense Mobilization on standards, instruments, and testing materials.

In my personal view, however, the "surface has hardly been scratched" as regards—

(a) Cooperation between agencies in medical electronics development; and

(b) Cooperation between disciplines within and between agencies, notably physics, biophysics, biochemistry, chemistry and biology.

The Congress, when receiving future requests for appropriations for various agencies has a right to ask whether each agency is drawing appropriately upon talents available within other agencies so as to help meet common problems. Excessive "compartmentalization" of Federal activity should in my view be avoided. Each has its own job to do, but each should extend a helping hand, as appropriate, to others, especially in advancing in a "frontier" such as this.

Informal opinion expressed to the subcommittee by working scientists within the Federal agencies indicates their keen desire for strengthening of their respective agency as well as interagency research programs.

What is necessary now, it appears, is a policy determination on the part of executive echelons of Federal agencies to expand existing programs in medical electronics. This should, of course, be carried out in a manner and to a degree consistent with presently assigned missions, as defined by statute and administrative orders.

However, if it is necessary to secure clarification of such missions in order to commence expanded medical electronics work, prompt action should be initiated. Where more than clarification is needed, i.e., broadened administrative or statutory authority, these should be requested. We are witnessing today a revolution in instrumentation because of intensified space-age requirements. It is essential to capitalize fully in the biomedical field on the basis of what is being invested in the physical sciences for outer-space purposes. The fullest cooperation with private enterprise, including private laboratories and institutes, should simultaneously be sought.

What I am reiterating in effect is that science is a unity. A discovery in one area of basic science may intimately affect a wide range of related disciplines. Similarly, the results of a discovery can be applied in as broad a range of fields as human imagination can cover.

TWO ILLUSTRATIVE FIELDS OF ELECTRONICS

Let me illustrate.

In addition to the wide array of uses of electronic computers, let me cite two additional fields of electronics: infrared and ultrasonics. I single out these two fields only for illustrative purposes. A great many other fields might have been chosen.

These two fields (on which our project director has compiled a great deal of information) are literally exploding today with new findings.

Into these fields is being poured a very considerable amount of Federal research and development funds, particularly on the part of the Department of Defense. The following are but a few of the applications, largely nonmedical, of ultrasonics and infrared, respectively.

ILLUSTRATIONS OF DEPARTMENT OF DEFENSE INTEREST IN TWO FIELDS OF ELECTRONICS

- A. Investigation and application of infrared radiation:
- Temperature measurement.
 - Skin heating for personnel comfort.
 - Drying of paints, lacquers, other surface coatings.
 - Cooking.
 - Studies of burns and their treatment.
 - Night vision.
 - Photography under poor visibility conditions.
 - Studies of thermal effects of nuclear weapons.
 - Analysis of materials by infrared spectroscopy.
 - Heat-seeking guidance systems.
 - Development of improved fire protection methods and materials.
 - Analysis of gases for particular substances, such as CO₂.
- B. Investigation and application of ultrasound:
- Basic research leading to an understanding of the effect of high-frequency sound on nerve tissue, cell membranes, and protein solutions.
 - Analysis and understanding of orientation and echo-locating abilities of bats.
 - Study of ultrasonic inhibition of marine growths.
 - Study of effects produced by new techniques for removal of tooth structures.
 - Study of destruction of micro-organisms by acoustic energy.
 - Use of ultrasonic energy as a tool in examining the central nervous system and as a surgical technique to produce localized changes in the brain.
 - Study of effect of ultrasound on muscle tissue.
 - Emulsification of fats for intravenous feeding.
 - Emulsification of presterilized ingredients directly within sterile sealed containers.
 - Fragmentation of viruses.
 - Research leading to improved ear defenders for protection against noise.
 - Determination of effects of jet-engine noise.
 - Dispersal of materials in suspension.
 - Surface cleaning or detergent action.
 - Nondestructive testing of coatings, etc.
 - Commercial fishing—detection.
 - Depth soundings.
 - Drilling operations.
 - Acoustic pump.
 - Cleaning and sterilization.

BYPRODUCTS FROM SPACE-AGE INVESTMENT

It goes without saying, that the infrared and ultrasonic principles which are being elaborated in military research and development work in the Department of Defense may also have indirectly opened up considerable uses for biomedical science. In other words, if the American taxpayer is investing tax dollars to explore these fields for purposes of national security, there is every reason to capitalize on that same investment by applying any new information which is discovered in another challenging field; namely, biomedical science.

Fortunately, the same private companies which are doing some of the leading work in these fields indicate in messages to the subcommittee their deep interest in such application. They stress their desire to carry through with research and development that might be of use in combating disease and disability in man.

Of course, in many of these electronic phases under Department of Defense contract, there is a necessary problem of maintaining the security of classified information. Naturally, we would not want in any way to abridge necessary security requirements. Without compromising military security, we would like to proceed to exploit, so to speak, discoveries in which taxpayers, through private enterprise, have already made sizable investment.

Toward that end, our project director, Mr. Cahn, will be in close touch with the electronics industry through its trade associations and member companies. In that way, we hope to get the benefit of the fullest insight of the engineering world. This will not only be in connection with these two specialties, but in the broad gamut of electronic areas.

APPENDED ARTICLES

Senator MUSKIE. There are appended to this statement certain materials illustrating the nature, the scope, and the significance of medical electronics:

(a) A summary article, "Electronic Medicine" from the Wall Street Journal, of August 17, 1959.

(b) A brief article, "Medical Electronics—the Fruitful Marriage," from the Journal of the American Medical Association, April 23, 1959.

(c) Excerpts from the advance announcement of the Third International Conference on Medical Electronics scheduled for July 1960 in London.

(d) An article, "Space Medicine Is Coming Down to Earth," from the November 1959 Reader's Digest.

[From the Wall Street Journal, Aug. 17, 1959]

ELECTRONIC MEDICINE—SCIENTISTS PRESS WORK ON ADVANCED MACHINES TO AID MEDICAL CARE; THEY SEE AUTOMATIC NURSES WATCHING SICK, COMPUTERS HELPING DIAGNOSE ILLNESSES—BROADCASTING A HEART BEAT

(By Jonathan Spivak)

SAN FRANCISCO.—Will the ranks of medicine be joined in the future by an electronic "doctor," automatically checking symptoms, diagnosing diseases with perfect accuracy, and recommending therapy? And an electronic "nurse," a sentinel fashioned of tubes and transistors, sleeplessly watching over patients night and day?

These are just two devices forecast by some scientists as electronics moves deeper into medicine. Although it's doubtful that either of these products will be on the market soon, researchers are hard at work on their development. And electronics already is playing a role in such complex medical procedures as heart and brain surgery and cancer therapy.

"I foresee some perfectly tremendous possibilities that are just beginning to be worked on in the field of electronic medicine," says Dr. Russell V. Lee, head of the 103-doctor Palo Alto, Calif., Medical Clinic. "It is coming more rapidly than many people believe."

DEMONSTRATION IN MOSCOW

Diagnosis of disease by computers, their magnetic memories crammed with vast amounts of medical data, already has been achieved to a limited degree. This year, in Moscow, Russian scientists exhibited an "electronic doctor" which diagnosed 100 illnesses based on symptoms fed to it by doctors, but U.S. researchers are skeptical as to its accuracy. A group of doctors at New York Hospital-Cornell Medical Center has developed a computer program that can produce, with considerable accuracy, a preliminary diagnosis of disease. However, the machine's conclusions still must be confirmed by physical examinations or laboratory tests.

On 350 patients, the machine erred slightly less than 5 percent of the time, compared with a 2 percent error, based on past medical histories, when physicians themselves made the diagnoses. Researchers in the field say much still must be done to perfect techniques for processing subtle medical data via computers.

The computer is only one of the sophisticated electronic tools to which the medical profession is turning. Complex and delicate surgery is being monitored in some hospitals by electronic circuits which flash a continual electrocardiogram (picture of the heart's electrical and motive responses) on a screen in front of the anesthetist. One such commercial product has a little plug-in attachment that reproduces the sound of the heart beat with a high-pitched bleat; any change in the heart's rhythm can be noted immediately.

"ONLY IN ITS INFANCY"

"I would say two people have been saved in operations I have attended by using electronic monitoring," says Dr. John W. Pender, a Palo Alto anesthetist. "This is only in its infancy, but it will be used more and more."

Some major medical centers now are installing electronic equipment of increasing complexity. At Mount Zion Hospital here in San Francisco, for example, brain surgery is being conducted with the assistance of electronics. A pencil-thin electrode is positioned in the patient's brain and a high-frequency current of electricity is passed through its tip in order to destroy a small portion of brain tissue. This technique, say Mount Zion researchers, has proved successful in removing the symptoms of muscular shaking and lack of coordination in Parkinson's disease and cerebral palsy.

To see the close bond between medicine and electronics, view an operation for Parkinson's disease at Mount Zion's Institute for Experimental Neurosurgery and Neurophysiology. The operating room is sheathed completely in a copper screen, which conducts away all extraneous electrical impulses. A control room, with banks of relays and switches, overlooks the operating room. Here an engineer, in constant communication with one of the two brain surgeons via a telephone headset, regulates the amount of current applied to the patient's brain. The engineer also is responsible for recording data showing the response of various parts of the brain to the electrical currents. These measurements, it is hoped, eventually will reveal new insights into the mysterious functioning of the brain.

RESPONSES ARE RECORDED

During the operation, the patient, who is under a local anesthetic, talks freely with the brain surgeon. His responses and the surgeon's own comments on technical matters, are taperecorded for later review. A motion picture camera automatically photographs an electronically reproduced picture of the patient's brain waves.

While few hospitals in the country can boast electronic setups as complete as Mount Zion's, which cost about \$100,000, others are mulling expenditures of sizable sums. At the new Stanford University-Palo Alto Hospital, a \$12,000 electronic installation for open heart surgery is under consideration. It would display on one instrument such things as a patient's temperature, pulse, blood pressure, and electrocardiogram, according to the hospital's Dr. Noel Thompson.

An instrument such as this, which monitors a variety of bodily functions, readily could be transformed into an automatic nurse, engineers say, by feeding the information from the patient to a central control panel.

"Instead of having a group of nurses writing numbers on a clipboard you would plug a patient in and feed the information back to a central control unit for an entire ward," says Ralph White, assistant to the manager of the Spingo division of Beckman Instruments, which specializes in medical instrumentation. "It would feed into a bank of recorders for continuous recording and also operate a system of bells or alarms so when a person's blood pressure, for example, rises above a pre-set level a warning is sounded."

Medical researchers report that Minneapolis-Honeywell Regulator Co. of Minneapolis already is working on such a device in cooperation with the Mayo Clinic of Rochester, Minn. The company, however, remains tightlipped about its progress. "We are doing development work along those lines, but we don't know what it will amount to. It is in the general field of trying to obtain simplification of data-gathering in the hospital area," comments a Minneapolis-Honeywell research engineer.

The world of electronics, of course, is no stranger to medicine. The X-ray, developed before the turn of the century, is an electronic device and for many years electronic devices have been used to test the condition of the heart and brain. But with recent refinements in engineering, the ability of these electronic tools to gather information has been vastly increased.

In the field of the X-ray, recent advances have made possible new roles for the tools of the nuclear physicist. At Stanford University Hospital a linear accelerator atom-smasher has been used experimentally to shoot a beam of electrons into cancer patients for radiation treatments. "Not only does it give us better penetration (than conventional X-ray radiation), but for the first time we can control the depth of penetration," comments Dr. Malcolm Bagshaw, assistant director of the Stanford School of Medicine's radiotherapy division.

LESS RELIANCE ON SPECIALISTS?

Some physicians figure electronics eventually could sharply reduce the reliance on specialists. Sophisticated computers, packed with medical data, could supply the general practitioner with medical information which at present can be provided only by specialists. And in mass screening programs, such as pre-induction physical examination for the Armed Forces, machines could sift out many of the medically unqualified by reading such things as electro-cardiograms.

Spurring electronic developments is the increasing complexity of medicine itself, as new drugs and techniques are discovered. Like other scientists, doctors are finding it impossible these days to keep up with current publications in their field. The proliferation of medical records and forms is overwhelming many large medical centers.

"Because they are scattered at separate locations, millions of patient records at various medical clinics are being lost to medical research," says a research scientist at International Business Machines Corp. "Through its ability to process this information and make associations, the computer will be a powerful tool of medical research."

IBM, like some other big electronic firms, is eyeing the medical field, but thus far has made no financial commitment for specialized research and development in this area. A major stumbling block for IBM, as well as for smaller electronic companies which specialize in medical equipment, is the restricted size of the medical market.

IT'S ALMOST FRUSTRATING

"It's such a low volume business, it's almost frustrating," comments a marketing specialist with Levinthal Electronic Products, Inc., a subsidiary of Radiation, Inc., of Melbourne, Fla., which produces a line of heart surgery equipment. "There are about 6,000 hospitals in the United States, but only half of them are financially able to invest in expensive equipment."

Research and development costs are high for this new equipment and, with low sales volume, prices put the products beyond the reach of most individual practitioners. One company, for example, introduced an electronic stethoscope equipped with transistors and speaker, selling at \$149. But doctors have shown little interest in throwing away their traditional rubber-tube-and-metal stethoscopes, which were developed in the early 1800's and still cost about \$10.

There also are some pressures which may slow the development of diagnosis by electronics. "This is probably the lowest priority use of computers in medicine I can think about," maintains Dr. Mark Blumberg of the Stanford Research Institute's medical economics section. "It has the faculty of insulting all M.D.'s, and for the public it's an obnoxious thought." Adds an official of the University of Southern California School of Medicine: "We are afraid that too much is going to be made of the catchy idea of machine diagnosis. Machines will just assist the human memory in giving the statistical probabilities of various diagnostic areas."

Nevertheless, scattered about the country, in such research centers as the Rockefeller Institute in New York and Systems Development Corp. of Santa Monica, Calif., a nonprofit group of 3,000 scientists, the computer's use in medicine is being probed and studied. At Systems Development, an \$80,000 "Project Medic" is underway, with the goal of developing a complete electronic medical data processing system.

HANDLING DOCTORS' DATA

If Project Medic is a success, each large population center in the United States might conceivably have one or more medical computers, predicts Charles J. Roach, who heads the project. These computers, he says, would be set up to process data submitted by individual doctors and clinics in its area. The machines could assist doctors with diagnoses and prepare various statistical studies, such as analyses of disease incidence in the area.

Although this may sound visionary, Mr. Roach and 10 assistants already have taken some important preliminary steps along this path. Working with the veterans' hospital in West Los Angeles and the University of California at Los Angeles Medical Center, Systems Development has run a computer analysis of 86 case histories in a type of serious infection of valves of the heart. The veterans' hospital had found that its experience in treating this malady was

counter to that reported in medical literature and was eager to analyze its data. Through a computer, the relationship of 250 variables in each of the 86 cases was analyzed in a matter of 8 hours, compared with several months that would have been required using sorting machines and punchcards. The results showed which of the variables were significant in predicting how long the patient would live and what his degree of disability would be.

"We are specifically interested in developing a master computer program that anyone having access to a computer could use to analyze medical health data," says Mr. Roach. By purchasing such a master program—which would consist of rolls of magnetic tape—a doctor or group of doctors could set up an existing computer so that it could process their data.

To a limited degree, electronic handling of hospital records and the production of elementary research data is being achieved by the Commission on Professional and Hospital Activities, a nonprofit group in Ann Arbor, Mich. Set up by the American Hospital Association and two other medical groups, the commission processes data from 107 hospitals in 23 States. It now codes clinical information sent in from the member hospitals on IBM punchcards and prepares a variety of statistical reports.

[From the Journal of the American Medical Association, Apr. 23, 1959]

MEDICAL ELECTRONICS—THE FRUITFUL MARRIAGE

The patient is placed in position, the technician makes minor adjustments to his equipment, and then steps behind his shielding screen.

When he sets his timing switch, the X-ray technician will be bringing into play the results of more than a half century of cooperative effort between physicians and engineers that has resulted not only in highly refined radiological devices, but a host of other electronic marvels. (See "Medicine at Work," the Journal, March 21, 1959.)

The debt that medicine owes to electronic engineering was cheerfully acknowledged this month by Dr. Gunnar Gunderson, AMA president. Writing in *Electrical Engineering* on the occasion of the 75th anniversary of the American Institute of Electrical Engineers, he stated: "The progress of science and medicine over the last century has been hand in hand, each benefiting from the other's discoveries and developments, and ultimately helping mankind."

Dr. Gunderson wrote that modern X-ray units not only provide better and more discriminatory diagnostic help than earlier ones, but also decrease the amount of radiation the patient receives.

THIRD INTERNATIONAL CONFERENCE ON MEDICAL ELECTRONICS AND ASSOCIATED SCIENTIFIC EXHIBITION, OLYMPIA, LONDON, JULY 21-27, 1960

Organized by the Electronics and Communications Section of the Institution of Electrical Engineers in association with the International Federation for Medical Electronics

The Institution of Electrical Engineers:

President: Sir Willis Jackson, D. Sc., M.I.E.E., F.R.S.

Secretary: W. K. Brasher, C.B.E., M.A., M.I.E.E.

The International Federation for Medical Electronics:

President: V. K. Zworykin, Ph. D., D. Sc.

Secretary: A. Remond, M.D.

During the past few years "medical electronics" has brought into partnership the two professions of medicine and electronic engineering and the international conferences held in Paris in 1958 and 1959 have clearly shown the extent to which this new subject is influencing biological research and aiding diagnosis and therapy in many fields of medicine.

The Committee of the Electronics and Communications Section of the Institution of Electrical Engineers in association with the International Federation for Medical Electronics have therefore arranged the Third International Conference on Medical Electronics to be held in London from July 21-27, 1960. Associated with the conference will be an international scientific exhibition in which research organizations, hospitals, universities and industry from all over the world will be displaying their latest developments.

The conference program will consist of general and specialist sessions and will include lectures, papers and discussions. The general sessions will enable those with a scientific or medical background to hear surveys of the field and to discuss future possibilities, whilst the specialist sessions will appeal to those more concerned with the study of particular problems and with more advanced developments. In order that the conference shall be as comprehensive as possible the organizing committee hope that papers will be submitted for consideration from all countries in which work on medical electronics is being carried out.

Papers submitted may be from 1,000 words to a maximum of 8,000 words in length and further information will be sent to those interested. As soon as possible after the conference the full proceedings, including the discussion at each session, will be published in bound form.

An indication of the scope will be seen from the following preliminary subject list:

- Instrumentation for medicine and biology.
- Medical electronics in space research.
- Isotopes and radiology.
- Ultrasonics and microwave radiation.
- The respiratory system.
- Digestive system metabolism and biochemistry.
- The circulatory system.
- Electronic aspects of sight, hearing, and locomotion.
- The motor and nervous systems.

It is planned to provide simultaneous translation facilities for those languages for which there is sufficient demand, and the reply form is designed to enable the need to be assessed.

The organizing committee plans to arrange visits of scientific interest as well as social events for delegates and their ladies. A particularly warm welcome is extended to ladies accompanying delegates, for whom a special program will be arranged including visits to places of interest in and around London.

Intending delegates and those wishing to receive information on the conditions of exhibiting are asked to return the attached reply form as soon as possible, and the organizing committee would appreciate your cooperation in making this conference widely known.

Further copies of this form may be obtained from the secretary, the Institution of Electrical Engineers, Savoy Place, London, W.C. 2.

ROBERT C. G. WILLIAMS, Ph. D., B. Sc. (Eng.)
M.I. Mech. E., M.I.E.E.,
Chairman, Conference Organizing Committee.

[From the Reader's Digest, November 1959]

TINY MEDICAL INSTRUMENTS AND COMMUNICATION DEVICES, DEVELOPED FOR EXPERIMENTS IN SPACE, HERALD AN EXCITING NEW ERA OF DIAGNOSIS AND TREATMENT FOR ALL OF US—SPACE MEDICINE IS COMING DOWN TO EARTH

(By Hugh C. MacGuire, M.D.,¹ with Allen Rankin)

Last May 28, as two monkeys named Able and Baker rocketed at 10,000 miles per hour, 300 miles out of this world, tiny medical instruments attached to their bodies radioed back to earth pertinent information about their heart behavior, temperature, pulse, breathing rate, oxygen intake. Doctors at the Cape Canaveral launching site could tell, second by second, just how the trip was affecting the two small voyagers.

Today some of the medical instruments developed for such outer-space experiments are being used to explore inner space—the mysterious universe of the human body—and already they are saving lives. Just as soon as medical research can put to work all of the communications devices proved practicable in the space program, we almost certainly can enter a new era of diagnosis and

¹ Dr. Hugh C. MacGuire, a distinguished children's surgeon in Montgomery, Ala., has for 4 years been a national leader in persuading science, industry, and medicine to combine their resources and bring "moongoing medicine" down to this planet. He is the organizer of Atomedics, Inc., a nonprofit organization which aspires to build a pilot-model "automated" hospital and research center which will use extensively the techniques described in this article.

treatment that will make previous medical techniques look like primitive guesswork.

One of the principal triggers for this coming revolution is the transducer, a device which picks up one form of energy and translates it into another. Telephone receivers and radio microphones, which pick up sounds, change them into electrical signals and relay them, are examples of transducers.

To detect minute physical changes in monkey or man hurtling through space in the tight quarters of a rocket nose cone, the new medical transducers and other devices had to be vastly shrunk, sometimes to microscopic size. They had to be made infinitely more sensitive than any available before. Riding in a cabin the size of a shoe box, the 1-pound monkey, Baker, for example, wore on her body half a dozen instruments, none larger than a matchbook, each containing transducers or electrical pickups. These did the same job that roomfuls of medical-examination equipment used to do—and they did it better.

Recently, at a medical demonstration at Air University, Maxwell Air Force Base, Ala., I saw and tried out some of these new devices. First, a stainless steel disk about the size of a thick dime was strapped against my chest. Instantly the lecture auditorium was filled with a sound like the booming of a bass drum—the beating of my heart, picked up by a tiny microphone inside the disk and broadcast to a nearby receiver and amplifier. At the same time, electrodes taped to my body flashed pictures of my heart behavior to a nearby television screen. An incandescent ball of light blazed periodically across the screen, leaving in its wake the familiar, squiggly lines of the standard electrocardiogram.

Other instruments, already being introduced to the commercial market (major producer thus far: Gulton Industries, Inc., Metuchen, N.J.), will soon begin to make medicine better and easier for all of us. For instance; the familiar bulky rubber sleeve that is slipped on your arm and pumped up to measure blood pressure has been miniaturized into a neat little pneumatic cuff, about the size of a Band-Aid, which slips on and off your finger like a ring. It connects with a radio which broadcasts its findings and automatically registers them. It can be worn at work or play and, if tuned to a receiving unit at a doctor's office, can show what your blood pressure really is under normal conditions.

There is also a cup-size breath mask which draws a graph of breathing. The transducer in this instrument consists of gossamer wires which converge toward the center of a metal cylinder like the spokes of a wheel. Breathe in and the wires bend one way; breathe out and they bend the other. Doctors can study a patient's respiration in the peaks and troughs of recorded lines. This new mask may well replace the more unwieldy mask or mouthpiece-and-nose-clip now used in basal metabolism tests. Since patients can wear it without discomfort while they sleep, it may be possible to obtain a more normal "at rest" picture of their metabolism. An even newer pickup no larger than a bead, which fits near the mouth or nose and measures breath flow in terms of electrical impulses, can make the metabolism test even easier.

The most common medical tool in hospital or home is the mercury-type fever thermometer, which takes 3 minutes to record your body temperature. Space science has come up with a "touch" thermometer, containing a pinhead-size disk of extremely heat-sensitive ceramic, which, taped to the subject's skin, can record temperature changes within half a second. Another handy model resembles a ball-point pen. When merely touched to the skin it registers temperature instantly on an electronic gauge. It is so sensitive that it registers even the chill of fright or the momentary flash of anger. In operating rooms this device allows continuous monitoring of temperatures in various parts of the body during surgery.

The rocket medics have developed an equally speedy device to register emotional strain. The astronaut wears metallic half-socks or spats which press a positive and negative electrode against the instep of each foot. When the subject becomes anxious, the sweat-salt that dampens his foot causes an increase in the electric current between the two metal poles. Thus doctors can detect subtle degrees of emotional change.

The device that probes deepest into inner space is the new intracardiac catheter microphone. Mounted in the end of a small catheter (a slender tube), this tiny mike, about as thick as a grain of rice, is inserted into a blood vessel in the arm and pushed upward and inward until it reaches the innermost chambers of the heart! Its metal-sheathed ceramic pickup reacts to every slightest murmur in the heart caves and sends forth proportionate radio signals. Investigators like Dr. Howard L. Moscovitz, at New York City's Mount Sinai

Hospital, have recently picked up with it small sounds never before so distinctly heard from the human heart—sounds helpful in locating heart lesions and malformations.

The combined use of such radio ears and fingers was dramatically demonstrated on May 6, 1958, when Capt. Norman Lee Barr, the U.S. Navy's chief of space medicine and surgery, broke all records for long-distance diagnosis. In his office at Bethesda, Md., Captain Barr picked up a telephone and ordered a Navy man swinging in the open basket of a balloon 40,000 feet above Minneapolis, Minn.—nearly 1,200 miles away—to come down immediately. Transducers attached to the balloonist's body had flashed to Barr, via radio and telephone, a combination of instrument readings which told him that the aviator was developing a critical high-altitude reaction called Wolff-Parkinson-White syndrome. The lightning diagnosis probably saved the balloonist from being dangerously incapacitated.

Such a performance means that doctors continents apart may soon be able to confer on the diagnosis or condition of a patient with virtually as much accuracy as if they were all in the same room with him. Similarly, when the big medical centers install the necessary receiving equipment, any doctor who has a few transducer "buttons" will be able to present a patient's true inside condition to specialists, by either radio or telephone, and obtain quick counsel.

Until now doctors have been limited to making brief "spot checks" of patients. When one comes to the office for a checkup, the doctor can only guess at what has been happening inside him in the year or so since his last visit, or what will go on happening after he leaves. Now space-age pickup devices, which the patient can wear almost as easily and comfortably as a button on his lapel, give doctors the means of staying with him, even inside him, for as long as is desired. While he goes about his business, these minute electronic ears continuously listen and record their findings for later reference. This may constitute one of the greatest breakthroughs in medical history.

The day is not far off when transducers may be used as a protection and comfort by chronic but active heart patients as they go about their work and play. These people could wear at all times a tiny heart microphone whose messages would be radioed constantly to a computing machine at a local medical center. In the event of impending trouble, the computer would flash danger signals to alert the patient's doctor.

These new communications methods offer an entirely fresh approach to medical research. We've learned a lot about separate organs, separate diseases, but we've had no way of knowing how the whole body operates with all its parts functioning together. Consequently, we still know little about what constitutes normality—health.

Today, delicate instruments can pick up, record, transmit or display 18 different body functions in the same split-second. As more transducers are developed, we shall be able to register literally hundreds of previously unknown medical factors in the period of one heartbeat. Electronic computers can record all these factors, plus myriad subtle changes and interrelationships within the body, and analyze, file and index the information for future reference. By linking the computer's brain to the eyes, ears and fingers of transducers, we may be able to find out what constitutes health. When we do, we should be able to detect quickly any signs of abnormality creeping into the body. We may learn to knock out diseases before they really get started.

Dr. Louis M. Orr, president of the American Medical Association, declared recently: "Our rapidly expanding population will require either more care from doctors, or some means by which people can maintain health with less medical service. Automation linked with preventive medicine appears to be the answer."

INTRODUCTION TO DR. STEVENSON

Senator MUSKIE. We have had statistics on the fact that 10 million Americans alone have some form of mental health problem, and I came up intimately with that problem in my 4 years as Governor of my State, so I have some appreciation of its effect upon the taxpayers, and appropriations, as well as the human.

It is natural that the committee turns to one of the distinguished experts in the field of mental health, a distinguished psychiatrist, who

serves as national and international consultant for the leading American voluntary organization in the field, the National Association for Mental Health, Dr. George Stevenson.

It is a pleasure to welcome you here this morning.

Dr. STEVENSON. It is a pleasure to be here. I note that you are pressed for time—

Senator MUSKIE. We are not that pressed for time. We will be pleased to hear your statement.

STATEMENT OF GEORGE S. STEVENSON, M.D., CONSULTANT, THE NATIONAL ASSOCIATION FOR MENTAL HEALTH, INC.

Dr. STEVENSON. Mental afflictions are a major problem everywhere in the world and interestingly do not seem to discriminate for or against any one part of the world. Of course, certain mental disorders, such as those accompanying old age, are found less frequently where the span of life is short.

Where among the disorders of man do mental afflictions rate in importance? Measured by mortality they would not seem to rate high, but death is only a limited measure of the failure of living. The public health field has long ago shifted from mortality as an exclusive criterion of health. It now considers that the satisfaction and effectiveness of living is a significant measure also. By this token mental illness towers high among the plagues that beset man.

THE TOLL OF MENTAL ILLNESS

Numerically, according to a study made in Baltimore by Pasa-manick, it seriously handicaps about one-tenth of the population at any one time. Its impact however, is much greater for the seriousness to the victim runs the full range from mild to complete incapacitation. At any one time it hospitalizes or completely incapacitates about 1 in 150 of the population. It is serious not only to the victim, but to society as a whole, and at present the mentally ill in mental hospitals occupy more than half of the total hospital beds.

The family may be disorganized and the public loaded with a financial burden. In New York State this amounts to one-third of the State's operating budget. This does not count expenditures for local or private hospitalization. It does not include veterans hospitals in which about half of the patients are primarily psychiatric and which pay from 2 to 10 times the cost per patient in State hospitals, depending on the State. It does not include the hospitals of our defense services. These figures do not include the social costs of the neuroses, and psychopathic character disorders upon which delinquency and crime depend so heavily.

Mental disorder, especially schizophrenia, strikes down and often holds down for a lifetime many of the young in whom society has invested much. It often invades successful lives in their final years of old age, destroying what should be the happy climax of a successful life for the individual and his family.

It is a plague about which we have extensive scientific ignorance, unused scientific knowledge, and promising but unpursued leads. It is a problem about which the public is only beginning to gain hope to the point of lending its support for research, experimentation, and the utilization of what we already know.

COMPLEXITIES OF MENTAL ILLNESS

For most countries of the world the elementary facts for rating the importance of mental illness have never been elicited. We do not know to what extent and how the different conditions of life influence the occurrence of this or that form of mental disorder. These facts we should know. It must be kept in mind that mental disorder is not the manifestation of a single etiological disease like poliomyelitis or tuberculosis, but literally over 100 diseases. In some of these disorders physical causes dominate; in others psychological and social forces are potent. Each must be researched, prevented and treated as separately as diabetes and coronary thrombosis.

The success with one of these diseases, for example, schizophrenia, may not help at all with another, such as cerebral arteriosclerosis.

Generalizations applied to the whole group are, therefore, more apt to be wrong than right. Some of the conditions for the elucidation and effective treatment of any one of these disorders may be found in remote parts of the world and in greatly varying cultures, and will be productive only when full advantage is taken of comparative studies in different countries and cultures, perhaps coincidentally as was projected for the International Geophysical Year, and in a more modest way projected for the World Mental Health Year to begin in 1960 under the auspices of the World Federation for Mental Health. This is a nongovernmental, multiprofessional international organization of 111 citizen and professional societies enjoying consultative relationships with the United Nations and its specialized agencies such as WHO and UNESCO.

Sometimes we try to set up carefully designed experiments here to introduce environmental, climatic, or cultural conditions artificially that may be found naturally in other parts of the world. We have special chambers for studying the effects of altered atmospheric pressure on mental stability, while there are people who live under these conditions normally as in Peru and Tibet.

Often we go to great pains to establish experimental and research instrumentalities, facilities, or conditions and draw on our limited pool of professional personnel when these already exist elsewhere.

CONTRIBUTIONS BY FOREIGN LABORATORIES

I think, for example, of the excellent setup for the study of pre-natal and birth influences and accidents at the Karolinska Institute in Stockholm, which your chairman has mentioned. Good evidence that this research center is really a world service is found in its use for providing training for scientists from other countries, and the way it has cooperated in research with the Association for the Aid of Crippled Children in the United States. This is significant to the study of mental deficiency. This is an example of a good meet-

ing ground for those concerned with neurological diseases and those concerned with mental disorder.

The schizophrenia research program conducted by the Supreme Council, 33°, Scottish Rite Freemasonry, Northern Masonic Jurisdiction, through the National Association for Mental Health, has found it advisable on occasion to make grants abroad—on one occasion to Canada and on another occasion for a study in Bali.

In the past, it was not generally appreciated how much we depended upon the scientists, laboratories, and hospitals of other countries for the provision of therapeutic and diagnostic techniques in psychiatry. That this is beginning to be understood even by patients now is shown in an article in the May 1959 issue of the UNESCO Courier where in an article entitled "I Was a Mental Patient" by Herve Bazin, an esteemed member of the Goncourt Academy in France, says:

Let it not be forgotten, too, that every country has had its contribution to make. It was at Gheel, in Belgium, that long, long ago the disciples of St. Dymphna first took pity on the insane. It was in Spain that St. John of God built the first asylum. Electric shock therapy was the work of an Italian, Cerletti; insulin treatment of an Austrian, Sakel; lobotomy of a Portuguese, Moniz. The work of the Russians on conditioned reflexes; of the Germans on genetics; of the French on drugs and the pathology of the brain; of the English, of the Dutch, of the Danes and of countless others, constitutes one whole in which the knowledge of some is matched by the wisdom of others, often more skilled in the practical application.

Cerletti, in Italy, by the way, was a guest at the 1959 meeting of the American Psychiatric Association, where a great deal of attention was given to the development of new drugs to combat depression. Kuhn, of Germany, made the first clinical observations on one of the most effective of these drugs.

Within the past few months discoveries in genetics have been reported from England (April 4, 1959, the Lancet) following a report from France which provides the first breakthrough in an effort to understand one of the most common of the most serious forms of mental deficiency, that is Mongolism. The fact that these independent and at least partially mutually confirming findings should have come from a small part of the world is evidence of the force but still too slow spread of research influence. If this spread had taken place more rapidly, it is quite possible that it would have brought about added findings in other parts of the world.

In addition to the above mentioned contributions to our diagnostic and therapeutic services, it might be pointed out that antabuse, a drug developed to combat alcoholism, was a product of Denmark. The unlocked mental hospital, the close correlation of hospital and community psychiatry, is having an impact on us now after many years of development in England.

Of course, the fact that medical services in England are not fragmented as ours are as between Federal, State, and local, fosters the development and has resulted in the refinement of many services to the mentally ill in the community that we have given little attention to in this country. For example, the provision of psychiatric service to patients in their homes. With us it is often necessary to intervene by police action in order to get a patient to a clinic or hospital.

OTHER FOREIGN ACHIEVEMENTS

Amsterdam provides psychiatric service on a 24-hour-a-day basis. The French pioneered in the use of chlorpromazine, and India in the use of snake root, resperine, the two main tranquilizing drugs which have been probably responsible for the decline in population of a number of our mental hospitals. It was Austria that gave us psychoanalysis for neuroses, insulin-shock therapy already referred to for schizophrenia and fever therapy for general paresis and so also it was Hungary that gave us metrazol-shock therapy. It was in Australia that the effects of rubella (German measles) in the mother early in pregnancy was found to be so disastrous to the mental development of the child, and it was France that gave us the Binet test and Switzerland the Rorschach test.

It is understandable that the lack of contact between different parts of the world should have existed in the past in view of the absence of an international agency such as the World Health Organization. In fact, even within our own boundaries we find a fragmentation and lack of communication between Federal, State, and local activities and lack of contact between the various States. We have chosen here to operate under these fragmented conditions. The responsibility devolves upon us to see that our operations are as effective as they are under the unified services in European countries.

The World Health Organization chose mental health as the focus of World Health Day in 1959, and accordingly chose to devote a special issue of World Health—May-June 1959 issue—to mental health. I have a copy here of that issue, and also the UNESCO Courier to which I have referred.

INSIGHT ON NOMADISM

At the exercises held at the United Nations on World Health Day the World Federation for Mental Health, which arranged the program, brought Dr. Tigani El Mahi from Sudan as one of the principal speakers. It may seem unbelievable that the United States should look to Sudan for assistance in solving some of its mental health problems, but we must keep in mind that nomadism in the United States is a relatively new phenomenon. We have hundreds of thousands of people formerly living a stable community life, but who now have turned to following green pastures as agricultural migrants. What is the effect of this disruption of customs on children? How can they cope with the negligent—if not actually rejecting and hostile communities—in which they live temporarily and whose economy they serve? What kind of customs do these people need to develop in order to achieve the kind of stability that will help them to be mentally healthy and effective citizens under these unstable conditions? The Sudan with over 50 percent of its population accustomed to nomadism from time immemorial can throw some light on how customs have made such a life compatible with mental health and citizen responsibility.

The children of our agricultural migrants rather than the parents themselves are the ones who are going to be looking for a set of customs that will serve them in good stead in living either a stable or a mobile

life. Perhaps we could learn much also from a study of our own traditional nomads, such as the Navajo.

The World Health Organization devoted a considerable part of its March-April 1959 issue also to mental disorders.

DIVERSITY OF TREATMENT IN STATES

There are many parts of the world that have not done as well as we have in borrowing progress from other countries. Still we ourselves had not made the fullest use of what science already can offer us. We need only to note the marked contrast in the number of patients served and the expenditures per patient from State to State to recognize that the retarding influence that afflicts underdeveloped countries is also having its effect here.

It is interesting that some of our less-developed States provide the same ratio of beds to population as does England, where in well-advanced areas hospital service is exceptional. But there is a vast difference behind this similarity. England has reduced the number of hospitalized patients by giving good treatment, especially in the community. However, in these less-developed States the lower hospitalization is a part of a general neglect in this field. They have made little community provision for the mentally ill as an alternative to hospitalization and at the same time have provided little hospitalization.

Our most generous State in terms of hospital service provides one bed for 170 of the population. Near the other extreme is a State which provides only 40 percent as much, that is one bed for 416 of the population. The former State provides \$1,561 a year for each of its hospitalized patients; the latter, while providing for a smaller ratio of patients, also provides only half as much money per patient as the former, that is, \$772 per year. These differences within our own country have their counterparts in differences between countries, and it may mean much to the mentally ill in the United States if we can learn how these other parts of the world progress.

PSYCHIATRY IN U.S.S.R.

Senator MUSKIE. Thank you very much for your statement. I have a few questions I would like to ask.

You made some reference in your statement to the contribution which has been made by many countries to the development of our knowledge in this field. I wonder if you would comment specifically with respect to the state of development of psychiatry in the Soviet Union? I would appreciate any observations you might have as to cooperation in the field of mental health as between the United States and the U.S.S.R.

Dr. STEVENSON. I think there is a good deal to be gained by co-operation. My experience with the Soviet Union has not been in that country, but rather in international conferences where on three occasions they have presented papers.

A great deal that they are presenting in their papers goes back to pre-Soviet work, Pavlov especially, and I would say that that pretty much is the limit of the interpretation I can make.

I would say it was very interesting that in one of these conferences, the third one, after these men had an opportunity to rub elbows with those from other countries, they deviated from their approved documents in a way that I interpreted as a kind of a shame to say the things that they had put in their documents which they considered the audience too far from being naive enough to accept.

Senator MUSKIE. You doctors and scientists have ways of saying things that are very refreshing to those of us who are usually on the political stump most of the time, but you said something here that has relationship to what you have been saying, that the public health field has shifted from mortality as an exclusive criterion of health, it now considers the satisfaction and effectiveness of living as a significant measure, also.

Do you suppose this has any relationship to the interest of the Soviets in this field? Are they as concerned with the welfare and happiness of their people as we are here, or does that have an influence upon their hospitalization programs, upon their study and research in the field of mental health?

I am reminded of what I used to read in ancient history of the Spartan's attitude toward the individual.

Dr. STEVENSON. I would only say in my listening to these presentations, the preoccupation was pretty much with disease or the forces that bear upon human behavior, experimentally, and didn't extend out into areas of everyday life, although the conference, itself, had many presentations that focused primarily upon it.

Senator MUSKIE. Are they interested in the field of psychiatry for the purpose of using people in useful places in society, or for the purpose of enabling them to predict human behavior?

Dr. STEVENSON. I can't answer that question. I would be glad to formulate an answer through securing the data, if you have some questions that you would like to have me respond to.

Senator MUSKIE. I think it might be interesting.

PSYCHOPHARMACOLOGY

With respect to the use of drugs for the purpose of relieving anxiety, tension, and other conditions in psychotic patients, would you comment on developments in this field? I know in our mental hospitals in Maine, there was a difference of opinion as between the superintendents of our two major hospitals on the effectiveness of drugs, and I would appreciate some information personally, and I think it would be interesting for the record.

Dr. STEVENSON. I think there is a considerable suspicion of the use of drugs alone. They are effective in bringing about a degree of cooperation on the part of patients that allows the introduction of other methods of treatment.

There is a very natural suspicion on the part of many physicians in the communities to which patients return from the mental hospitals, because the dosages that are necessary in psychiatry are tremendous as compared to the dosages necessary for other uses of these drugs, and so often it is difficult to secure cooperation of the general physician in continuing larger doses. Like many other forms of treatment, it is just too easy to depend solely upon a drug that seems to solve a problem for the moment.

A very good example of this is found in the Veterans' Administration. The VA is able to give hospital treatment legally for non-service-connected problems, but they are not able to give the followup service, and they have no arrangement with the States whereby a veteran discharged from a veterans' hospital is transferred to the State to receive the same kind of followup that he would if he came from a State hospital.

This becomes serious where he has gotten out of the hospital by virtue of these drugs, and then there is suddenly no means of carrying on the treatment.

Senator MUSKIE. Are drugs being used in other countries to the same extent or greater extent than here?

Dr. STEVENSON. I don't know about quantitatively, but in a way we are a debtor nation when it comes to drugs. As I indicated, with two or three of them we have done a great deal of refinement and experimentation, but much of the original production of therapeutic techniques, including drugs, is an import.

Senator MUSKIE. Are they still being used primarily on an experimental or research basis, or are they a part of hospital routine.

Dr. STEVENSON. They are a large part of the hospital routine. For 2 or 3 years the hospitals suffered from inadequate appropriations for them. What I am implying is that there was a much larger potential use than was being realized. I don't know that that continues. I have not run into instances of that lately.

WORLD MENTAL HEALTH YEAR

Senator MUSKIE. You made reference to the World Mental Health Year, and I wonder if you can give us some comment with respect to the projects that are contemplated during that Year.

Dr. STEVENSON. Yes, the World Mental Health Year opened with World Health Day of this year and continues until August 1961, when a Congress will be held in Paris.

The World Mental Health Year is focused on five areas of mental health. It is concerned with mental health and child development, with the teaching of mental health principles, with the mental health of moving people, migrants, with mental health in industry, and studies of the cause and distribution of mental illness.

The World Federation for Mental Health has a coordinator to whom is reported all of the things that are being done which may be either initiated by the World Federation of Mental Health or initiated locally. These are reported to him, and it is his position to try to bring into line the related things that are going on in different parts of the world, and to go further to promote in different parts of the world things that may complement something, let's say, being done here.

It was hoped originally that there would be a full-time coordinator for each of these five fields. They have been only able to realize that partially, but there are 111 member associations belonging to the World Federation, and in the United States the 30-some members are operating through a joint steering committee, and this steering committee meets about once every 6 weeks, and is both encouraging and revealing projects that are going on, and has about \$50,000 worth of projects in operation.

One of these is in a way a portion related to an epidemiological study being made by WHO, our portion being to study the reaction of the public, the attitudes of the public toward mental illness and health.

The other has to do with the attitudes of the public as determined by practice toward the returning mental patient, the one who has been hospitalized, and this has the collaboration financially and otherwise of the Office of Vocational Rehabilitation. These are the two largest that are going on. But then there are other studies, as well.

The first one that I mentioned is not limited to the United States. The study will take place in four countries.

Senator MUSKIE. I appreciate your testimony very much. As Senator Humphrey has said to other witnesses, there are many other questions we would like to ask, but the time is getting late.

Thank you very much, sir.

We have one other witness, and I must say I appreciate his patience. Last Thursday we heard with pleasure from Dr. Clement Smith, a pediatrician of the Boston Lying-In Hospital, and in the course of his remarks he paid a well deserved tribute to his colleagues at Johns Hopkins. We are now happy to welcome Dr. Nicholson J. Eastman. Dr. Eastman has in particular served as chairman of two expert World Health Organization activities on internal care and midwife training. We are delighted to hear from you, Dr. Eastman.

STATEMENT OF NICHOLSON EASTMAN, M.D., PROFESSOR OF OBSTETRICS, THE JOHNS HOPKINS UNIVERSITY

Dr. EASTMAN. Thank you very much, Senator.

International research in obstetrics has rich potentialities. These stem chiefly from the different incidence of various complications of pregnancy among different peoples and the information to be gained therefrom in respect to causation and prevention.

First, racial incidence of choriocarcinoma or cancer of the placenta. The word "racial" as used throughout this statement refers not only to the three major races but also to various subethnic stocks, such as the Melanesians.

Choriocarcinoma, that is to say, cancer of the afterbirth, is 10 to 20 times more frequent among the mothers of southeast Asia than it is in Occidental women.

Senator MUSKIE. So it can't be connected with cigarette smoking?

Dr. EASTMAN. No.

Although a rare complication of pregnancy in the Occident, choriocarcinoma wherever seen is one of the most rapidly lethal of malignant tumors and is almost 100 percent fatal. The high frequency of this disease in southeast Asia has long been recognized by students of the subject and is one of the major enigmas of obstetrics. The importance which medical scientists assign to this problem is shown by the fact that the International Society of Geographic Pathology will devote an entire afternoon to the topic at its meeting to be held in London in August 1960.

This problem invites inquiry from various standpoints among which is the bearing it may have on the causation of cancer in general. Other types of cancer are no more frequent among the natives of southeast

Asia than elsewhere. Why should this particular type of carcinoma be seen there so frequently? It appears to be a disease chiefly of the indigent who live, in most instances, in squalor and at starvation levels. cursory observations suggest, moreover, that the high frequency of choriocarcinoma in southeast Asia may not be entirely a racial characteristic because it is believed to be much less frequent in north China than in south China.

The above circumstances have suggested to several pathologists who have worked in the Orient that some unknown virus may be the cause of choriocarcinoma. In carcinoma research in general, more and more attention is being paid to the likelihood of a viral etiology. Thus, Dmochowski's review of the subject of viral infection in relation to malignant tumors contains approximately 1,000 references ("Cancer," Butterworth & Co., Ltd., London, vol. 1, 214-305, 1957).

In discussing this problem with leading obstetricians in medical schools in most of the large cities of southeast Asia, I have found them eager to cooperate in its exploration. The medical schools referred to include those in Manila, Hong Kong, Saigon, Bangkok, Djakarta, Taipei, and Tokyo. I am certain that the department of obstetrics and gynecology in each of these centers would be most pleased to assign some capable member of the department to compile data on the disease in his particular locality as part of a collaborative study.

In addition to statistical data, blood from patients suffering from this disease could be drawn and submitted to viral studies either locally or in this country. A central office would have to be established, of course, either in the United States or in southeast Asia for the purpose of correlating the work in the several centers and analyzing the data. It is my understanding that the Armed Forces Institute of Pathology has already planned such a study.

TOXEMIAS OF PREGNANCY

Second, environmental factors in the etiology of the toxemias of pregnancy.

The toxemias of pregnancy, including eclampsia—that is to say, convulsions in pregnancy—are extremely common and the most frequent cause of maternal death in certain areas of the world, whereas in others, the disease is relatively rare.

For instance, eclampsia is either the first or second most common cause of maternal death in Jamaica, the Philippines, Indonesia, and certain parts of India. Contrariwise, missionary doctors who have worked for many years in central Africa state that they have never seen a case among African natives living in their natural habitat but that in towns and cities of central Africa the disease is seen occasionally. There is reason to believe that diet plays an important part in this geographic distribution of eclampsia but factual data are lacking.

Confirmation of the rarity of eclampsia in tropical Africa and a study of the diets of mothers in that area, in contrast to the diets in countries where the disease is frequent, would yield valuable information about one of the most serious complications of pregnancy the world over. Dr. Bannerman, a highly trained native obstetrician of

Accra, Ghana, and director of the Accra Maternity Hospital, has evinced interest in this problem and would be a valuable collaborator in the Gulf of Guinea area of Africa.

CONGENITAL ABNORMALITIES

Third, racial incidence of congenital abnormalities.

Of the 172,000 infants who die in the United States each year in close association with the process of being born, about 15 percent die because of congenital malformations. The incidence of congenital malformations in this country is higher in the white than in the Negro. In other words, there is a definite racial difference in the frequency of congenital abnormalities in these two races in this country, and this gives reason to suspect that similar racial differences may exist among other peoples.

On the basis of 6 years observation in north China in the 1920's and 1930's, and 6 months observation in Hong Kong in 1955-56, I have the impression that congenital malformations are more frequent among the Chinese, but this is just a cursory impression.

The main question here is whether the congenital malformations are due chiefly to hereditary factors or to poor intrauterine environment, including poor nutrition, poor hygiene and the toxic action of various viruses early in pregnancy. We do know that environmental derangements can cause congenital malformations. The most conspicuous example of this fact is the role of German measles during the first 3 months of pregnancy in causing congenital cataracts, heart disease, and deafness. In experimental animals, moreover, congenital malformations may be produced by various dietary deficiencies and by various hormonal aberrations. The determination of the incidence of congenital abnormalities in various races and under various circumstances of diet, hygiene, and infection would provide valuable basic information in respect to the causation of these conditions.

PREMATURE BIRTH

Fourth, racial incidence of premature birth.

Premature birth is not only the most important cause of neonatal death but also of cerebral palsy. In about 60 percent of cases, the cause is unknown. A baby is classified as premature if it weighs 2,500 grams—5½ pounds—or less at birth. This criterion of prematurity is satisfactory for Caucasians but it is probably not suitable for most other ethnic stocks, such as the Negroid, Mongoloid, and Melanesian, since their infants at birth and at all gestational ages are smaller.

Thus, by the 2,500 gram standard the incidence of premature birth is 7 percent among Caucasians and 11 and 12 percent among Filipinos and Negroes, respectively. It is probably even higher among the Burmese, Malaysians, Thais, and Vietnamese. Indeed, anthropologists maintain that many of these latter peoples have inherited Pygmy genes from the aboriginal inhabitants of the area. This problem lends itself to statistical study; its elucidation would contribute much to our knowledge of the cause and prevention of premature birth.

These four research projects in obstetrics give promise of benefiting mothers and their newborn babies throughout the world. Moreover, if they can be organized and supervised, with intelligence, by persons sympathetic to Asians and Africans, they will inevitably redound to warmer international relationships.

Senator MUSKIE. Thank you very much, Doctor, for your statement. I am not going to hold you up for too many questions, because it is getting late, I suspect, for both of us.

OBSTETRICS IN U.S.S.R.

I would appreciate it if you would comment as regards your understanding of the state of development of obstetrics in the U.S.S.R.

Dr. EASTMAN. I have never visited Soviet Russia, and therefore cannot speak with any degree of familiarity about the development of obstetrics in that area.

My only information is based upon conversations which I have had with one visiting obstetrician from Moscow, who was in Baltimore a few months ago and discussed with me at some length what was going on there in maternity care. Just how valid her statements were, I am not in a position to say.

One of the shortcomings of maternity care in the United States is the shortage of hospital beds devoted to maternity cases. The stay of patients in our maternity hospitals has fallen from a period of 10 to 14 days, 15 years ago, to an average these days which ranges, shamefully, between 3 and 5 days.

It seems to me that both mothers and particularly infants suffer from this very short period of hospital stay, particularly in regard to the mother learning how to look after her baby, in respect to the development of breast feeding, and so forth.

Now, I am told that the situation in Moscow, in this respect, at least, is much better in that there are an adequate number of hospital beds so that the patients actually stay in the hospital from 10 to 14 days. Moreover, there are many beds available for pregnancies complicated with one or another condition.

According to her statements, moreover, the number of obstetricians and gynecologists per 10,000 of population is greater than it is in the United States. According to her, accordingly, the obstetrical personnel available to give service is larger.

From other sources, I have learned, but this is just hearsay talk, that the technical level of obstetrical practice is not as high as it is in this country, but I fear that I am not in a position to answer your question with any degree of assurance.

Senator MUSKIE. Is there more emphasis on natural childbirth, away from the use of anesthesia and drugs during delivery?

Dr. EASTMAN. Yes, I think so and this is true pretty much throughout the world. But here again is an area where research would be of interest because the psychological reaction of mothers in various parts of the world differ. The Chinese, for instance, apparently seem to experience very little pain. We might describe it merely as discomfort, in the course of childbirth.

Contrariwise, I am told that the Indians appear to experience great pain. In Rangoon, at the maternity hospital, the clientele is equally divided between Indians, Burmese, and Chinese. You have an opportunity there to compare the reactions of these various groups to the uterine contractions of labor. It was there that I gained the impression that the Indians differ in this respect from the Burmese and Chinese.

I believe that less medication is being used in Russia than in the United States, but here in the United States over the last decade there has been a great diminution in the administration of pain-relieving drugs in obstetrical practice.

Senator MUSKIE. I have had two in the last 2 years myself, so I am an observer of the latest techniques.

Could you tell us, offhand, Doctor, something about the extent to which American obstetrics has tended to be indebted to foreign innovations, or is this a peculiarly American art?

EVOLUTION OF OBSTETRICS

Dr. EASTMAN. No; far from it. The evolution of obstetrics may be described somewhat as follows, from an international viewpoint.

During the 17th century, France was the leader in obstetrics, and her outstanding obstetricians of that period made many important advances.

During the 18th century, England took the leadership, and the great obstetricians of that period contributed much of our knowledge.

During the 19th century, Germany, as is true of so many other branches of medicine, became the outstanding area for obstetrics, and many important contributions were made there. We like to think that in the 20th century the United States may assume a similar leadership, but that may be wishful thinking.

The most important contributions to obstetric knowledge are the discovery of the cause of child-bed fever, which stemmed from a Hungarian working in Budapest and Vienna. The first use of anesthesia in obstetrics was in Edinburgh, Scotland; Sir James Simpson.

Now, I might enumerate many other advances in obstetrics that have come from foreign areas.

As for contributions of the United States, in comparison, the most important contribution in the United States to obstetrics was the introduction of prenatal care, the care of the woman in the weeks before childbirth, which, incidentally, was a contribution of the nursing profession to obstetrics. It originated in Boston back in 1901 or 1902. Historically, back in the 1860's and 1870's, pioneer surgeons working in the outposts of American civilization had much to do with the development of cesarean section. The development of ergot, a drug used to contract the uterus after childbirth to prevent post-mortem hemorrhage, was introduced by a Connecticut doctor named Stearns. But I would say that the major contributions to obstetrics came over the past centuries from foreign countries.

Senator MUSKIE. Doctor, I think we must bring this hearing to a close today, and I do appreciate your comments.

Dr. EASTMAN. It has been a very great privilege to be here and learn about the fine work that you are going to do.

MATERIAL TO BE PUBLISHED IN APPENDIX VOLUME

Senator MUSKIE. Thank you, sir.

This marks the conclusion of the present 2 days of hearings by this subcommittee in its international health study.

Senator Humphrey had asked me to point out that these hearings have necessarily concentrated solely on the highlights of certain key fields of interest in medical research.

The hearings have not touched at all upon the second major field of interest to the subcommittee—international medical assistance.

In the short time which was available to us to hold these hearings, we felt that it would be preferable to concentrate on the research phase.

We are glad to say, however, that the committee has accumulated a wealth of information on medical assistance problems as such in the underdeveloped countries of the world.

Senator Humphrey has asked me to reiterate that the subcommittee will publish certain material in the appendix volume which will supplement very significantly the testimony which we have heard on these two days.

CHART ON OVERSEAS TECHNICAL ASSISTANCE AND RESEARCH

Within this volume, we seek to lay the groundwork, so to speak, for future subcommittee review. One of our particular aims toward that review is to bring together preliminary information on the Federal Government's total oversea health commitments. To help get a general "picture," there appears following this page an additional chart, highlighting this total story.

It will be recalled that, earlier within this volume (p. 123), a chart depicted the Federal agencies engaged in medical research.

By contrast, the present chart (which was likewise prepared by our staff), includes three features:

(a) It cites all the Federal agencies contributing in any way to international health (whether through research or through technical assistance).

(b) It includes as a footnote a reference to the magnitudes of technical assistance to underdeveloped areas (i.e., nonresearch aid), as well as to medical research.

(c) It summarizes for each agency in a few words the nature of its particular contribution to world health.

This is only a preliminary presentation. It will be supplemented by detailed text in part 2 and in our other future publications.

Finally, may I note that, immediately following the transcript of these hearings, there will be printed:

(a) Biographies of our witnesses; and

(b) A list of the publications which will have been issued by the subcommittee as of the date this volume (Part 1) is published.

MATERIAL TO BE FURNISHED BY MEMBERS FOR THE
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 wealth of information on medical assistance problems as such in the
 undeveloped countries of the world.
 Senator Humphrey has asked me to reiterate that the subcommittee
 will publish certain material in the appendix volume which will sup-
 plement very significantly the testimony which we have heard on these
 two days.
 Senator Minor. Thank you, sir. I am glad to hear that the
 committee is the composition of the present 2 days of hearings by this
 subcommittee in the international health field. I am glad to hear that
 Senator Humphrey had asked me to point out that these hearings
 have necessarily concentrated solely on the highlights of certain key
 fields of interest in medical research, research and the overall
 field. The hearings have not touched at all upon the second major field of
 interest in the international health field, medical assistance.
 In the short time which was available to us to hold these hearings,
 we felt that it would be preferable to concentrate on the research phase.
 We are glad to say, however, that the committee has formulated a
 wealth of information on medical assistance problems as such in the
 undeveloped countries of the world.
 Senator Humphrey has asked me to reiterate that the subcommittee
 will publish certain material in the appendix volume which will sup-
 plement very significantly the testimony which we have heard on these
 two days.

SOME HIGHLIGHTS OF INTERNATIONAL ACTIVITIES OF A MEDICAL OR HEALTH-RELATED NATURE INCLUDING BIO-MEDICAL RESEARCH BY AGENCIES OF THE U.S. GOVERNMENT

DEPT. OF HEALTH, EDUCATION & WELFARE

PUBLIC HEALTH SERVICE

Office of Surgeon-General
Division of International Health

National Institutes of Health

Bureau of State Services

Bureau of Medical Sciences

Division of Foreign Quarantine

National Library of Medicine

OFFICE OF VOCATIONAL REHABILITATION

SOCIAL SECURITY ADMINISTRATION

Children's Bureau

DEPARTMENT OF DEFENSE

Department of The Army
Department of The Air Force
Department of The Navy

National Security Military Assistance Programs

NATIONAL SCIENCE FOUNDATION

VETERANS ADMINISTRATION

Regional Office, Manila

NATIONAL ACADEMY OF SCIENCES- NATIONAL RESEARCH COUNCIL

Division of Medical Sciences
Office of Scientific Personnel
Office of International Relations

TECHNICAL PHASES OF U.S. COOPERATION
IN INTERNATIONAL HEALTH PROGRAMS
AND ORGANIZATIONS

OVERSEAS RESEARCH GRANTS
SUPPORT OF SCIENTIFIC ASSEMBLIES
EXCHANGES
SCIENTIFIC INFORMATION
COOPERATION WITH W.H.O.

EXCHANGE ARRANGEMENTS
COMMUNICABLE DISEASE CENTER AND
OTHER STUDIES

COOPERATION OF NURSING PERSONNEL
HOSPITAL RESEARCH

HEALTH INSPECTION OF PERSONS, SHIPS,
AIRCRAFT

EXCHANGE OF INFORMATION

EXCHANGE ARRANGEMENTS

TECHNICAL COOPERATION ON INTER-
NATIONAL PROGRAMS INVOLVING
CHILDREN'S HEALTH (UNICEF, etc.)

OVERSEAS CONTRACTS AND OTHER SUPPORT
FOR RESEARCH IN BIOLOGICAL, MEDICAL
AND BEHAVIORAL SCIENCES

MEDICAL EQUIPMENT, SUPPLIES
NUTRITIONAL SURVEYS
MEDICAL TRAINING

GRANTS FOR BASIC RESEARCH AND FACILITIES

GRANTS TO PHILIPPINES FOR MEDICAL CARE

STUDIES IN MEDICINE, SANITARY ENGINEERING, etc.
EXCHANGE PROGRAMS (FULBRIGHT, SMITH-MUNDT, ETC.)
INTERNATIONAL SCIENTIFIC MEETINGS

WORLD

HEALTH

POLICIES OF FOREIGN RELATIONS INCLUDING
BILATERAL HEALTH ASSISTANCE

POLICIES OF US PARTICIPATION, INCLUDING
CONTRIBUTIONS TO INTER-GOVERNMENTAL
ORGANIZATIONS (WHO, PAHO, UNICEF,
UNRWA, IAEA, ILO Etc.)

LIFE SCIENCES EXCHANGES

MALARIA ERADICATION
COMMUNITY WATER SYSTEMS
COUNTRY HEALTH PROGRAMS
MEDICAL DEMONSTRATION SHIP

ADVICE ON VOLUNTARY FOOD AND
OTHER SHIPMENTS

DOLLAR HEALTH LOANS

WATER SUPPLY AND SEWERAGE LOANS

RESEARCH IN FOREIGN "OFF-SITE" FACILITY PROGRAM

ATOMIC BOMB CASUALTY COMMISSION

TRAINING, EDUCATION AND INFORMATION

TOPICAL CONFERENCES

VETERINARY RESEARCH
SCIENTIFIC INFORMATION EXCHANGE

FARM COMMODITY SUPPLIES UNDER PUBLIC LAW 480
TECHNICAL COOPERATION WITH FOOD AND
AGRICULTURE ORGANIZATION

RADIATION RESEARCH
TECHNICAL INFORMATION

ADMINISTRATION OF APPROPRIATIONS
TO TRUST TERRITORIES OF THE PACIFIC ISLANDS

TECHNICAL COOPERATION WITH INTERNATIONAL
LABOR ORGANIZATION ON OCCUPATIONAL HEALTH

INFORMATION ON RESEARCH PROJECTS

DEPARTMENT OF STATE

International Educational Exchange Service

INTERNATIONAL COOPERATION ADMINISTRATION

Office of Public Health

Advisory Council on Voluntary Foreign Aid

EXPORT - IMPORT BANK

DEVELOPMENT LOAN FUND

ATOMIC ENERGY COMMISSION

Division of Biology and Medicine

Division of International Affairs

Office of Special Projects

DEPARTMENT OF AGRICULTURE

Agriculture Research Service

Commodity Credit Corporation

Foreign Agriculture Service

DEPARTMENT OF COMMERCE

National Bureau of Standards

Office of Technical Reports

DEPARTMENT OF THE INTERIOR

DEPARTMENT OF LABOR

SMITHSONIAN INSTITUTION

Bio-Sciences Information Exchange

Note on U.S. Expenditures Involved:

In the 1959 Fiscal Year, total actual expenditures under all U.S.- supported programs abroad for purposes of health aggregated \$123 million.

Activities by the various agencies as shown above involved widely different magnitudes of expenditure. There were numerous comparatively small amounts. In some instances, international activity involved but a few agency personnel who simultaneously were engaged in domestic work.

In terms of the actual volume of funds involved, the 7 largest official expenditures for international health during the 1959 Fiscal Year were in these agencies and programs.

International Cooperation Administration	\$77.7 million
Development Loan Fund	21.8 million
U.S. Contributions to multilateral organizations	15.3 million
Defense Dept. activity	14.2 million
State Department support	7.6 million
Dept. of Health, Education, and Welfare support	6.5 million
Export-Import Bank Loans	5.1 million

Most of the work was for technical assistance in under-developed areas rather than for research. Details as to these and other expenditures will be presented in the subcommittee's Interim Report.

INTERNATIONAL HEALTH STUDY
SUBCOMMITTEE ON REORGANIZATION & INTERNATIONAL ORGANIZATIONS
COMMITTEE ON GOVERNMENT OPERATIONS
UNITED STATES SENATE

CHIEF	DEPARTMENT OF DEFENSE
ASST. CHIEF	Department of the Army
SEC. FOR	Department of the Navy
AND	OFFICE OF MEDICAL REHABILITATION
EXC.	
REC.	
INT.	
REC.	
YAS.	
REV.	
HOS.	
GRS.	
OLH.	
COF.	
EXC.	
COG.	
SCI.	
EXC.	
STG.	
EXG.	
INT.	
YAS.	
INT.	
REC.	

NATIONAL ACADEMY OF SCIENCES-
NATIONAL RESEARCH COUNCIL

Division of Medical Sciences
Office of Scientific Personnel
Office of International Relations
Division of International Health

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
 OFFICE OF INTERNATIONAL HEALTH
 In the 1959 Fiscal Year, total actual expenditures under all U.S. -
 programs abroad for purposes of health aggregated \$123 million.
 Activities by the various agencies as shown above involved widely
 magnitudes of expenditure. There were numerous comparatively small
 in some instances, international activity involved but a few agency per-
 simultaneously were engaged in domestic work.
 In terms of the actual volume of funds involved, the 7 largest office
 for international health during the 1959 Fiscal Year were in these
 and programs.
 International Cooperation Administration
 Development Loan Fund
 U.S. Contributions to multilateral organizations
 Defense Dept. activity
 State Department support
 Dept. of Health, Education, and Welfare support
 Export-Import Bank Loans
 277.7 mil.
 21.8 mil.
 18.3 mil.
 14.2 mil.
 7.6 mil.
 6.5 mil.
 2.1 mil.
 Most of the work was for technical assistance in under-developed
 than for research. Details as to these and other expenditures will be
 the subcommittee's interim report.

BIOGRAPHIES OF WITNESSES

BORTZ, Edward LeRoy, physician; b. Greensburg, Pa., Feb. 10, 1896; s. Adam Franklin and Anna Margaret (Wineman) B.; student Pa. State Coll., 1915-17; A.B., Harvard, 1919; M.D. Harvard Med. Sch., 1923; LL.D., honorary, Hahnemann Med. Col., 1948; grad. work pathology, U. of Vienna, Erdheim's Clinic, Vienna and Christeller's Clinic, Berlin, 1925-26; D. Sc., Pennsylvania Military College, 1950; m. Margaret Sophia Welty, December 27, 1926; 1 son, Walter Michael. Interne Lankenau Hosp., 1923-25; spl. work pathology, Mayo Clinic, 1925, U. of Ill. Med. Sch., 1925; instr. dept. of pathology, U. of Pa. Sch. of Medicine, 1930-32; asso. prof. medicine. Grad. Sch. of Medicine, U. of Pa., since 1932, chief med. service B, Lankenau Hosp., since 1932, pres. med. staff since 1949; asst. editor, *Cyclopedia of Medicine*, since 1929. Certified by Am. Bd. Internal Medicine, 1937. Mem. Coll. of Physicians of Phila., Am. Coll. Physicians (gov. Eastern Pa.; regent since 1949), A.M.A. (chmn. council on sci. assembly 1944-47; chmn. com. on nat. emergency service 1946-47; in charge sci. program Centennial Celebration, Atlantic City, 1947; v.p. 1946; pres. 1947), Am. Clin. and Climatol. Assn., Phila. County Med. Soc. (life mem.; pres. 1940-41), Pa. State Med. Soc. (hon.) Alpha Omega Alpha; fgn. corr. mem. Soc. of Internal Medicine of Med. Assn. of the Argentine. Hon. med. cons. to surgeon gen. of U.S. Navy; mem. med. adv. bd. Nat. Resources Security Bd.; cons. Council on Nat. Emergency Med. Service. Awarded meritorious service medal Commonwealth of Pa. for work on pneumonia comm. of State Med. Soc., 1939. Served as pilot Army Air Corps, World War I; capt. M.C., U.S.N., with marines in Iwo Jima, and in atomic bomb area, World War II. Presbyterian Club: Union League (Philadelphia). Author: book: *Diabetes Control*; also numerous articles on nutrition, metabolism and geriatrics. Asst. editor: *The Cyclopedia of Medicine, Surgery and Specialties*. Home: 70 W. Princeton Rd., Cynwyd, Pa. Office: 2021 W. Girard Av., Phila. 30.

EASTMAN, Nicholson Joseph, obstetrician; b. Crawfordsville, Ind., Jan. 20, 1895; s. Thomas Barker and Ota (Nicholson) E.; A.B., Yale U., 1916, M.D., Ind. U. Sch. of Medicine, 1921; m. Lo Retta Bernice Rutz, July 7, 1925; children—Elizabeth, Thomas Barker. Instr. obstetrics, Indiana U. Sch. of Medicine, 1922-24; asso. in obstetrics and gynecology, Peiping Union Med. Coll., 1924-28; instr. and asso. in obstetrics, Johns Hopkins U., 1928-33; prof. obstetrics and gynecology, Peiping Union Med. Coll., 1933-35; prof. obstetrics, Johns Hopkins U. since 1935, obstetrician-in-chief, Johns Hopkins Hosp., 1935-. Vis. prof. obstetrics, Univ. Hong Kong, 1955-56. Chairman Advisory Committee on Maternal and Child Health Services, Children's Bur., 1943-46; chmn. World Health Orgn. expert com. on maternity care, also chairman expert committee on midwife tng.; dir. Passano Found. Editor-in-chief, *Obst. and Gynec. Survey*. Mem. Am. Gynecol. Soc., Am. Assn. Obstetricians and Gynecologists (pres. 1953), Am. Acad. Cerebral Palsy (pres. 1957), A.M.A., Edinburgh Obst. Soc., S. Atlantic Asso. Obst. and Gynec. (hon.), Balt. City Med. Soc., Soc. Exptl. Biology and Medicine, Am. Gynecology Club, Sigma Xi. Author: *Williams Obstetrics*, 1950; *Expectant Motherhood*, 1940-47; co-author (with L. Zabriskie), *Nurses Handbook of Obstetrics*, 1943; numerous articles on obstetrical subjects. Meth. Clubs: Seignior (P. Q., Canada); Elkridge (Baltimore). Home: 1 E. 34th St. Office: Johns Hopkins Hosp., Balt. 5.

LENNOX, William Gordon, physician; b. Colorado Springs, Colo., July 18, 1884; s. William and Annabelle (Cowgill) L.; A.B., Colo. Coll., 1909, Sc.D., 1929; M.D., Harvard, 1913; A.M., U. Denver, 1921; Sc.D. (hon.), Boston U., 1948; student Peking Union Lang. Sch., 1916-17; m. Emma Buchtel, June 18, 1910; children—Mary Belle (Mrs. Holger Jansson), Margaret Agnes (Mrs.

Fritz Buchthal). In dept. medicine Peking Union Med. Coll., 1917-20; engaged in research in epilepsy and migraine Boston, 1921—; asst. prof. neurology, med. sch. Harvard, 1935-48, asso. prof. neurology, 1948-54, emeritus, 1954—; pres. Elsinore Cattle Co. Founder Am. Epilepsy League. Recipient Lasker award, 1951. Mem. Internat. League Against Epilepsy (pres. 1935-49), Alpha Omega Alpha, Sigma Chi. Author: *The Health of Missionary Families in China*, 1921; *Epilepsy from the Standpoint of Physiology and Treatment*, 1928; *Science and Seizures*; *New Light on Epilepsy and Migraine*, 1941. Home: 47 Dudley Rd., Newton Center 59, Mass.

MEAD, Margaret, anthropologist; b. Phila., Pa., Dec. 16, 1901; d. Edward Sherwood and Emily (Fogg) Mead; student De Pauw U., 1919-20; B.A., Barnard College, 1923; M.A., Columbia University, 1924, Ph.D., 1929; 1 daughter, Catherine Bateson, Fellow Nat. Research Council, in Samoa, 1925-26; assistant curator ethnology, Am. Museum Natural History since 1926; and asso. curator ethnology since 1942; exec. sec., com. on food habits, Nat. Research Council, 1942-45; fellow Social Sci. Research Council, in Admiralty Islands, 1928-29; expdn. to New Guinea, 1931-33, 1936-39, and in 1953; dir. Columbia U. Research in Contemporary Cultures, 1948-52; adj. professor anthropology Columbia, 1954—Mem. Am. Anthropol. Soc., Am. Ethnol. Soc. N.Y. Academy of Sci., A.A.A.S., American Association of University Women, American Orthopsychiatry Assn., Am. Sociometric Assn., Soc. for Applied Anthropol., Polynesian Society, Society of Women Geographers, Institute for Intercultural Studies, World Federation for Mental Health (president 1956-57), S.P.S.S.I., Nat. Assn. for Mental Health Phi Beta Kappa. Episcopalian. Author: *Coming of Age in Samoa*, 1928; *An Inquiry into the Question of Cultural Stability in Polynesia*, 1928; *Growing up in New Guinea*, 1930; *The Changing Culture of an Indian Tribe*, 1932; *Sex and Temperament in Three Primitive Societies*, 1935; *And Keep Your Powder Dry*, 1942; *Palinese Character: A Photographic Analysis* (with Gregory Bateson), 1942; *Male and Female*, 1948, *Soviet Attitudes Toward Authority* (with Frances Macgregor), 1951; *Growth and Culture: A Photographic Study of Balinese Childhood*, 1951; Editor: *Cooperation and Competition Among Primitive Peoples*, 1937; *Primitive Heritage* (with Nicholas Calas), 1953; *The Study of Culture at a Distance* (with Rhoda Metraux), 1953; *Themes in a French Culture*, 1954; *Childhood in Contemporary Cultures*, 1955; *New Lives for Old*, 1956. Contbr. on Oceanic ethnology and relationship between psychology and culture. Home: 193 Waverly Pl. Office: Am. Museum of Natural History, N.Y.C.

MULLER, Hermann Joseph (mül'lër), biologist; b. N.Y. City, Dec. 21, 1890; s. Hermann J. and Frances L. (Lyons) M.; B.A., Columbia, 1910, M.A., 1911, Ph. D., 1916, D. Sc., 1949; D. Sc., U. of Edinburgh, 1940; m. Jessie M. Jacobs, June 11, 1923; 1 son, David Eugene; m. 2d, Dorothea Kantorowicz, May 20, 1939; 1 daughter, Helen Juliette. Instructor biology, Rice Institute, Houston, Texas, 1915-18, in charge dept., 1916-18; instr. zoölogy, Columbia, 1918-20; asso. prof. zoölogy, U. of Texas, 1920-25, prof., 1925-36; senior geneticist Inst. of Genetics, Moscow, 1933-37; research assoc. and lecturer Inst. Animal Genetics, U. of Edinburgh, 1937-40; research assoc. in biology, Amherst Coll., 1940-42, visiting prof. 1942-45; prof. zoology, Indiana U., since 1945, Distinguished Service professor, 1953—. Engaged in genetics research, 1911—, conducted by breeding experiments on the fruit fly *Drosophila*; analysis of arrangement and method of recombination of hereditary units; explanation of so-called mutations in the evening primrose; studies on mutation and evolution; theory of the gene; artificial transmutation of the gene by X-rays; production of chromosome changes; heredity in man. Recipient of the Kimber Genetics award, 1955. Nobel laureate in physiology, med., 1946; foreign mem., Royal Swedish Acad. Sci., Royal Danish Acad. Sci., Royal Soc., London, Genetical Soc. Japan, Nat. Inst. Sci. India; mem. A.A.A.S., Am. Humanist Assn. (pres. 1955-56), Nat. Acad. Sci., American Soc. Naturalists, Soc. for Study of Evolution, American Society Zoölogists, Society Experimental Biology and Medicine, Am. Genetic Assn., Genetics Soc. America, Am. Society Human Genetics, American Assn. Univ. Profs. (honorary) Genetical Soc. (British), Am. Acad. Arts and Sci., Am. Philos. Soc. (hon.) Mendelian Soc. of Lund, (fgn.) Accademia Nazionale del Lincei, Sigma Xi, Phi Beta Kappa; Eighth International Congress Genetics

(pres.), 1948. Author: *The Mechanism of Mendelian Heredity* (with others), 1915, 22; *Out of the Night*, 1935; *Genetics, Medicine and Man* (with others), 1947; also papers and lectures on biol. and genetic subjects. Home: 1001 E. First St. Address: Indiana University, Bloomington, Ind.

PAPANICOLAOU, George Nicholas, scientist; born in Coumi, Greece on May 13, 1883. He received his M.D. from the University of Athens in 1904, and his Ph.D. from the University of Munich in 1910. He married Mary Mavroyeni on September 10, 1910, and came to the United States in 1913. Naturalized in 1927.

Positions: Physiologist in the expedition of Oceanographical Institute of Monaco, 1911; assistant, Department of Pathology of the New York Hospital, 1913. Since 1913, successively assistant, instructor, assistant professor of Anatomy, professor of Clinical Anatomy and Professor Emeritus, Cornell University Medical College.

Director of the Papanicolaou Research Laboratory of Cornell University Medical College; consultant to the Papanicolaou Cytology Laboratory of the Department of Pathology of the Cornell University Medical College; and to the Kate Depew Strang Prevention Clinic of the Memorial Center. Permanent honorary consultant for the Society of Pelvic Surgeons. Honorary consultant to St. Luke's Hospital.

Research: Morphology and physiology of organs of reproduction, sex hormones, exfoliative cytology in animals and man, exfoliative cytology in endocrinology and cancer research.

Awards: Borden Award, Association of American Medical Colleges, 1948; Amory Award, American Association of Arts and Sciences, 1948; Lasker Award, American Public Health Association, 1950; First award of the order of AHEPA, as the most outstanding American Scientist of Greek descent, 1951; the Honor Medal of the American Cancer Society, 1952; the Wien Award for Exfoliative Cytology, 1953; the Modern Medicine Award for distinguished achievement in 1954; the Bertner Award, 1955; The Passano Award, 1956; Honorary Fellowship, International College of Surgeons, 1956; Honorary Fellowship, College of American Pathologists, 1956; Honorary Fellowship, American College of Clinical Pathologists, 1956; Honorary Award, German Gynecological Society, 1956; Honorary Award, Virginia Division of the American Cancer Society, 1956; Alvarenga Prize, 1957; Century Award for 1957; General Federation of Women's Clubs; Gold Medal, Greek Red Cross, 1957; Honorary Award, Brazilian Cytology Society, 1957; Honorary Member, James Ewing Society, 1958.

Presentation: The Cross of the Grand Commander of the Royal Order of Phoenix, presented by the King of Greece, in December of 1953; the Royal Order of George the First, presented by the Greek Government, in April of 1957.

Honorary Member: American Society for the Study of Sterility; Obstetrical-Gynecological Society of Buenos Aires; Obstetrical and Gynecological Society of Athens; First Argentine Congress on Cancer, 1952; New York Academy of Sciences; American Association for the Advancement of Science; Academy of Athens.

Honorary Degrees: University of Athens, Greece; University of Turin, Italy; Hahnemann Medical College of Philadelphia.

Corresponding Member: Academy of Athens, 1932.

Founding Member: New York Cancer Society; Inter-Society Cytology Council (Past-President).

Member: The American Association of Anatomists; American Association for the Advancement of Science; American Association of Cancer Research; Harvey Society; New York Academy of Sciences; New York Academy of Medicine; Society for Experimental Biology and Medicine; Association for the Study of Internal Secretions; Gerontological Society; Univeristy Club.

Member of the Greek Orthodox Church.

Author: *The Sexual Cycle in the Human Female as Revealed by Vaginal Smears*, 1933; *Diagnosis of Uterine Cancer by the Vaginal Smear*, 1943; *Epithelia of Woman's Reproductive Organs*, 1948; *Atlas of Exfoliative Cytology*, 1954; Supplement No. 1 of *Atlas of Exfoliative Cytology*, 1956; over 100 original scientific articles.

Addresses: Home, 104 Knollwood Avenue, Douglaston 63, L.I.; office, Cornell University Medical College, 1300 York Avenue, New York 21, N.Y.

PIORE, Emanuel Ruben (pee-o'-ree), physicist; b. Wilno, Russia, July 19, 1908; s. Ruben and Olga (Gegusin) P.; came to U.S., 1917, naturalized, 1924; A.B., U. Wis., 1930, Ph. D., 1935; m. E. Nora Kahn, Aug. 26, 1931; children—Michael Joseph, Margot Deborah, Jane Ann. Asst. instr. U. Wis., 1930-35; research physicist Radio Corp. Am., 1935-38; engr. in charge television lab. C.B.S., 1938-42; head spl. weapons group bur. ships U.S. Navy, 1942-44; head electronics br. Office Naval Research, 1946-47, dir. phys. sci., 1947-48, dep. for natural sci., 1949-51, chief sci., 1951-55; v.p., dir. Avco Mfg. Corp., 1955-56; dir. research IBM Corp., 1956—; physicist research lab. electronics Mass. Inst. Tech., 1948-49; cons. sci. adv. com. ODM. Trustee, mem. corp. Woods Hole Oceanographic Instn.; mem. vis. com. to elec. engring. dept. Mass. Inst. Tech. Served as lt. comdr. USNR, 1944-46. Fellow Am. Phys. Soc., Inst. Radio Engrs. (administrv. com.); mem. Sci. Research Soc. Am., Washington Acad. Sci., Philos. Club: Cosmos (Washington). Home: 355 College Rd., N.Y.C. 71. Office: 590 Madison Av., N.Y.C. 22.

SABIN, Albert Bruce, med. research; b. Bialystok, Russia, Aug. 26, 1906; s. Jacob and Tilly (Krugman) S.; came to U.S., 1921; naturalized, 1930; student Coll. of Dentistry, New York U., 1924-26; B.S., N.Y.U., 1928, M.D., 1931; m. Sylvia Tregillus, Sept. 12, 1935; children—Deborah, Amy. Research asso. bacteriology N.Y.U. Coll. Med., 1926-32; house physician Bellevue Hosp., N.Y.C., 1932-34; fellow in med. Nat. Research Council, Lister Inst., Eng., 1934; asst. Rockefeller Inst., N.Y.C., 1935-37, associate, 1937-39; asso. prof. of pediatric Univ. of Cincinnati Coll. of Medicine, 1939-46; professor of research pediatrics since 1946. Fellow Children's Hosp. Research Foundation since 1939. Consultant to Secretary of War on epidemic diseases, and mem. of U.S. Army Comm. for Neurotropic Viruses Dis. 1941—. Maj. USA, to serve with Board for Investigation and Control of Epidemic Diseases in the Army, Preventive Medicine Division, Office of Surgeon General, 1943; promoted to lieutenant colonel, 1944. Awarded Legion of Merit, 1945. Received Theobald Smith award in med. science (\$1,000 and medal) from A.A.A.S. chiefly for research in pneumonia and infantile paralysis, 1939; E. Mead Johnson award for research on virus diseases of nervous system, Am. Acad. of Pediatrics, 1941. Fellow Am. Assn. for Advancement Sci., Am. Acad. Arts and Sciences; mem. Assn. of American Physicians, Soc. for Pediatric Research, Nat. Acad. Scis., Soc. Am. Bacteriologists, Soc. Exptl. Biology and Medicine, Am. Soc. Clin. Investigation, Am. Pediatric Soc., Am. Soc. Tropical Medicine and Hygiene, Am. Epidemiol. Soc., Soc. Cubana de Microbiologia, Am. Assn. of Immunologists, Harvey Soc., Alpha Omega Alpha, Sigma XI. Contbr. numerous papers to journ. on pneumococcus infection, infantile paralysis, virus diseases of nervous system, and other topics relating to various infectious diseases. Home: 403 Lafayette Av. Office: The Children's Hospital Research Foundation, Elland and Bethesda Av., Cincinnati 29, Ohio.

SHANNON, James A., med. investigator, educator; b. Hollis, N.Y., Aug. 9, 1904; s. James A. and Anna (Margison) S., A.B.; Holy Cross Coll., Mass., 1925, D. Soc. (hon.); M.D., N.Y.U., 1929, Ph. D., 1935; m. Alice Waterhouse, June 24, 1933; children—Alice, James Anthony. Intern Bellevue Hosp., N.Y.C., 1929-31; asst., dept. physiology N.Y.U. Coll. Medicine, 1931-32, instr., 1932-35, asst. prof. 1935-40, asst. prof. dept. of medicine, 1941, asso. prof., 1941-46; dir. of research service N.Y.U. Med. Div., Goldwater Meml. Hosp., 1942-46; dir. Squibb & Sons, Squibb Inst. Med. Research, 1946-49; asso. dir. in charge research Nat. Heart Inst., 1949-52; asso. dir. Nat. Insts. Health, 1952-55; director, National Institute of Health, 1955—. Consultant sec. war (tropical diseases), 1943-46; spl. cons. to surgeon gen. USPHS, 1946-49, asst. surgeon gen. 1952—; mem. Bd. for Coordination of Malarial Studies, chmn. of clin. panel, 1943-46; mem. Nat. Research Council subcom. on shock, 1952-56, exec. com., mem.-at-large, 1953-55, Pub. Health Service rep., 1955-58, Div. Med. Scis., chmn. panel on malaria, 1951-56; U.S. National Com. Internat. Union Physiol. Sciences, 1955-56; World Health Organization Expert, advisory panel on malaria, 1956-61. Director Gorgas Memorial Inst. Tropical and Preventive Medicine. Recipient Medal for Merit. Fellow N.Y. Acad. Medicine; mem. Am. Physiol. Soc., Am. Soc. Clin. Investigation, Soc. Exptl. Biology and Medicine, Harvey Soc., Am. Pub. Health Assn., Assn. Am. Physicians, A.A.A.S., Am. Pharm. Society, Alpha Omega Alpha, Sigma

XI. Contbr. articles relating to physiology and med. to med. journs. Mem. editorial bds. Jour. Chronic Diseases, Jour. Pharm. and Exptl. Therapeutics, Jour. Exptl. Biology and Medicine. Home: 12 North Dr., Bethesda 14. Md.

SMITH, Clement Andrew, pediatrician; b. Ann Arbor, Mich., Nov. 19, 1901; s. Shirley Wheeler and Sara Spencer (Browne) S.; A.B., U. Mich. 1923, A.M., 1925, M.D., 1928; A.M., Harvard, 1949; m. Margaret Beal Earhart, Feb. 6, 1926; children—Pamela, Margaret (Mrs. Eric Herz), Hilary Janet. Intern, resident pediatrics University Hosp., Ann Arbor, 1928-30; resident Children's Hosp., Boston, 1930-31, chief infants service, 1949—; instr. pediatrics U. Mich., 1932; various teaching assignments pediatrics Harvard Med. Sch., 1933-43, asso. prof., 1945-49; prof. pediatrics Wayne U. and med. director Children's Hosp. of Mich., Detroit, 1943-45; asso. prof. pediatrics Boston Lying-In Hosp. and dir. research on newborn, 1949—cons. children's med. service Mass. Gen. Hosp.; cons. pediatrician Mass. Eye and Ear Infirmary. Diplomate Am. Bd. Pediatrics. Mem. A.M.A. (council foods and nutrition), Am. Acad. Pediatrics, Soc., Societe de Pediatrie (Paris), Sigma Xi, Phi Gamma Delta, Alpha Omega Alpha. Club: Harvard (Boston). Author: *The Physiology of the Newborn Infant*, 1945. Mem. editorial bd. *Etudes Neo-natales*, Paris. Contbr. profl. journs. Home: 37 Fayerweather St., Cambridge 38, Mass. Office: 221 Longwood Av., Boston 15.

STEVENSON, George Salvadore, child psychiatrist; b. Phila., Oct. 5, 1892; s. George Edward and Anna (Musso) S., B.S., Bucknell U., Lewisburg, Pa., 1915, M.S. 1919, hon. Sc.D., 1940; M.D., Johns Hopkins, 1919; m. Amy Llewellyn Patterson, Sept. 2, 1920; children—Anne Elizabeth, Amy Llewellyn, William Chandler. Resident house officer, Johns Hopkins Hosp., 1919-20; asst. in neuropathology, N.Y. State Psychiatric Inst., 1920-22; instr. nervous and mental diseases, Cornell U. Med. Sch., 1920-22, 1929-34; psychiatrist Training Sch., Vineland, N.J., 1922-24; asst. prof. nervous and mental diseases and dir. psychopathic dept. Minn. Gen. Hosp., U. of Minn., 1924-26, visiting neuropsychiatrist, 1925-26; lecturer Postgrad. Sch., Columbia, 1932-36; field consultant, prevention of delinquency, Nat. Com. for Mental Hygiene, 1926-27, dir. div. on Community Clinics, 1927-39, med. dir., 1939-50; consultant National Association for Mental Health. Recipient Lord and Taylor Award, 1953. Fellow American Orthopsychiatric Association (ex-secretary, ex-treasurer, ex-pres.), Am. Psychiat. Association; member Central Neuro-psychiatric Assn., American Assn. on Mental Deficiency, Soc. for Research in Child Development. Author, *Child Guidance Clinics—A Quarter Century of Development* (with G. Smith), 1934; *Mental Health Planning for Social Action*, 1956. Editor *Mental Hygiene*, *Administrative Medicine*. Contbr. to professional journs. Home: R.D. 1, Box 556 W. Front St., Red Bank, N.J. Office: 10 Columbus Circle, N.Y.C. 19.

WHITE, Paul Dudley, physician; b. Roxbury, Mass., June 6, 1886; s. Herbert Warren (M.D.) and Elizabeth A. (Dudley) W.; prep. edn Roxbury Latin School, Roxbury, Mass.; A.B., Harvard, 1908, M.D., 1911, D.Sc., 1950; grad. student Univ. Coll. Hosp. Med. Sch., London, 1913-14; honoris causa, Charles U., Prague, 1948, Athens U., Greece, 1948; Salonica Univ., Greece, 1948; D.Sc., University of Southern California, 1953; married Ina Reid, June 28, 1924; children—Penelope Dudley, Alexander Warren. Intern Mass. Gen. Hosp., 1911-13; study abroad as Harvard traveling fellow, in London, 1913-14, in Vienna, 1928-29; resident in medicine, Mass. Gen. Hosp., 1914-17, 1919-20; teaching fellow to clin. prof. med., Harvard Med. Sch., since 1914; engaged in reasearch, practice, and teaching, especially in the field of heart disease. Served as med. officer Base Hosp., No. 22, B.E.F., France, 1916, with A.E.F., France, 1917-19; med. officer, Am. Red Cross, Greece, 1919; honored by Greek decorations, 1919; chmn. Am. Med. teaching mission to Czechoslovakia, 1946; honored by Czech. and Cuban decorations; decorated Legion d'Honneur, 1951; recipient Lasker award for distinguished achievement in the field of cardiovascular diseases; chmn. Am. Med. Teaching Mission to Greece and Italy, 1948; mission to Pakistan, India, Israel, and Greece, 1952, USSR, 1956. Chmn. com. on cardiovascular disease NRC, 1940-46. Exec. dir. Nat. Advisory Heart Council, 1948-56. Mem.

Am. Acad. Arts and Scis., A.M.A. (distinguished service medal, 1952), Am. Heart Assn. (past pres.), Royal Soc. Medicine (England), the Internat. Soc. Cardiology (president), Nat. Acad. Medicine of France, Cardiac Society of Great Britain and Ireland, also cardiol. soc., of France, Mexico, Czechoslovakia, Brazil and Argentina, Assn. Am. Physicians, American Clin. and Climatol. Assn., Am. Soc. Clin. Investigation, Am. Coll. of Physicians, N.E. Heart Assn., Mass. Med. Soc., Aesculapian Club, Alpha Omega Alpha. Baptist. Clubs: Harvard Club (Boston); St. Botolph, Saturday (Boston). Author: Heart Disease, 1931, fourth edit., the 1951; Heart Disease In General Practice, 1937; Electrocardiography in Practice (with Ashton Graybiel), 3d edit., 1952; Coronary Heart Disease in Young Adults (with Menard Gertler), 1954; Clues in the Diagnosis and Treatment of Heart Disease, 1955. Contributing journals. Home: 200 Marsh St., Belmont, Mass. Office: 264 Beacon St., Boston.

COMMITTEE PRINTS ISSUED BY SUBCOMMITTEE IN INTERNATIONAL HEALTH STUDY

[As of the date of printing Part I]

Committee Print No. 1 (S. Rept. 160, 86th Cong.) was entitled "International Medical Research—A Compilation of Background Materials" (117 pp.). It set forth highlights of international research contributions in most of the major fields of disease, in addition to fulfilling other background purposes.

Committee Print No. 2 was entitled "Statutory Authority for Medical and Other Health-Related Research in the U.S. Government—The Basis for International Cooperation" (66 pp.). It contained the texts of the legal authority for medical research efforts by diverse agencies of the U.S. Government.

Committee Print No. 3 (S. Rept. 161, 86th Cong.) was entitled "The Status of World Health—In Outline Text and Chart" (81 pp.). Within it were presented charts on the incidence of certain major diseases throughout the world.

Committee Print No. 4 was entitled "The United States and the World Health Organization—Teamwork for Mankind's Well-Being" (145 pp.). It represented a personal report of the chairman of the subcommittee on the subject of WHO, based upon his conferences with the organization's officials and other authorities in Europe and on subsequent review.

Committee Print No. 5 (S. Rept. 1009, 86th Cong.) was entitled "Cancer—A Worldwide Menace, Some Facts and Figures on Its Incidence in the United States and Abroad" (40 pp.). It presented text and charts on the patterns of occurrence of malignant neoplasms in different countries of the world.

Committee Print No. 6 was entitled "Patterns of Incidence of Certain Diseases Throughout the World—Opportunities for Research Through Epidemiology" (50 pp.). It summarized epidemiological leads on important chronic and degenerative diseases in various nations. These leads, if followed carefully, may provide insight in the chain of discovery as to the cause and cure of maladies.

Committee Print No. 7 was entitled "The National Science Foundation and the Life Sciences" (96 pp.). It describes domestic and international activities of the National Science Foundation and, principally, its work in the life sciences.

Committee Print No. 8 (S. Rept. 1038, 86th Cong.) was entitled "Rehabilitation of the Disabled in Thirty-Seven Countries of the World—Domestic Programs and International Activities in Technical Assistance" (153 pp.). It summarized activities in rehabilitation carried on in the United States and in other nations by official and nongovernmental organizations. The account of the official work

abroad included assistance rendered by U.S. Government, foreign government and intergovernmental organizations.

Committee Print No. 9 was entitled "Health in the Americas and the Pan American Health Organization—Program of the Pan American Health Organization and the World Health Organization in the Americas" (105 pp.). It presented a summary of activities of this intergovernmental organization. This includes its activity as regards communicable diseases, specific health problems, environmental sanitation, health services and facilities, coordination of research, health manpower as well as PAHO's possible future role.

Committee Print No. 1 (S. Rept. 100, 80th Cong.) was entitled "International Medical Research—A Compilation of Background Materials" (117 pp.). It set forth highlights of international research contributions in most of the major fields of disease, in addition to fulfilling other background purposes.

Committee Print No. 2 was entitled "Statutory Authority for Medical and Other Health-Related Research in the U.S. Government—The Basis for International Cooperation" (66 pp.). It contained the text of the legal authority for medical research efforts by diverse agencies of the U.S. Government.

Committee Print No. 3 (S. Rept. 101, 80th Cong.) was entitled "The Status of World Health—An Outline Text and Chart" (81 pp.). Within it were presented charts on the incidence of certain major diseases throughout the world.

Committee Print No. 4 was entitled "The United States and the World Health Organization—Framework for America's Well-Being" (145 pp.). It represented a personal report of the chairman of the subcommittee on the subject of WHO, based upon his conferences with the organization's officials and other authorities in Europe and on subsequent review.

Committee Print No. 5 (S. Rept. 100, 80th Cong.) was entitled "Cancer—A Worldwide Menace: Some Facts and Figures on Its Incidence in the United States and Abroad" (40 pp.). It presented text and charts on the patterns of occurrence of malignant neoplasms in different countries of the world.

Committee Print No. 6 was entitled "Patterns of Incidence of Certain Diseases Throughout the World—Opportunities for Research Through Epidemiology" (56 pp.). It summarized epidemiological data on important chronic and degenerative diseases in various nations. These data, if followed carefully, may provide insight in the chain of discovery as to the cause and cure of maladies.

Committee Print No. 7 was entitled "The National Science Foundation and the Life Sciences" (36 pp.). It describes domestic and international activities of the National Science Foundation and primarily its work in the life sciences.

Committee Print No. 8 (S. Rept. 103, 80th Cong.) was entitled "Rehabilitation of the Disabled in Thirty-Six Countries of the World—Domestic Programs and International Activities in Technical Assistance" (153 pp.). It summarized activities in rehabilitation carried on in the United States and in other nations by official and nongovernmental organizations. The account of the official work

APPENDIX

TRANSCRIPT OF CONFERENCES IN EUROPE DURING OFFICIAL REVIEW, NOVEMBER-DECEMBER 1958 (WITH TEXTS OF RELATED CORRESPONDENCE AND MEMORANDUMS)

Senator HUMPHREY. As I indicated at the start of the committee's hearings, this appendix is a compendium of information gathered during and as a result of my official trip to Western Europe in November and December 1958.

Within an intensive schedule of 3 weeks, conferences were held with a large number of health officials and other governmental leaders. Out of these meetings have come a long series of followup letters and memoranda, which have proven invaluable for the subcommittee's review.

Moreover, the files of the subcommittee now contain considerable amounts of additional literature—articles, annual reports, monographs, proceedings, and other information which these foreign officials were kind enough to give to us at the time or which they sent to us in the months which have followed.

I believe that, together, this information represents perhaps the largest compendium of information which has ever been compiled by a committee of the Congress on medical research abroad. In addition, we have compiled a very large body of information on international medical assistance.

CONFEREES IN EUROPE

The reader will find in the Introduction to Committee Print No. 4 published by the subcommittee, other references to our review in Europe. I should like to record now the names of a few of the many individuals with whom the project director, Mr. Julius N. Cahn, and I conferred:

PARIS, FRANCE

M. Bernard Chenot, Minister of Health.
Prof. Louis Bugnard, Director, National Institute of Hygiene.
Prof. Robert Debre, Member Executive Board, United Nations Children's Fund.
Dr. J. F. Delafresnaye, Executive Secretary, Council of International Organizations in Medical Sciences.
Prof. Georges Schapira and Prof. Jean Claude Dreyfus, Laboratory of Bio-Chemical Medical Research.
Prof. Maurice Lamy, Medical Genetics Clinic, Hopital des Enfants Malades.
Dr. Raymond Latarjet, Director, L'Institut de Radium.
Prof. Jacques Trefouel, Director, Pasteur Institute (together with Profs. Andre Lwoff and Francois Jacob).
Dr. A. Minkowski, Director, Neo-Natal Research Center, Maternity Hospital.

Also included in conferences in Paris at my invitation:

Prof. M. W. Woerdeman, Chancellor, University of Amsterdam and Chairman of the Excerpta Medica Foundation (together with Mr. E. van Tongeren, Director of the foundation, both of Amsterdam).

STOCKHOLM, SWEDEN

Rector Sten Friberg, Karolinska Institute, together with:
 Prof. Hugo Theorell, Bio-Chemical Department, Nobel Medical Institute.
 Prof. T. Caspersson, Department of Medical Cell Research and Genetics, Nobel Medical Institute.
 Prof. B. Malmgren, Bacteriology Department, Karolinska Institute.

Also present in Stockholm at my invitation:

Prof. Henri Tagnon, Institute Jules Bordet, Brussels.
 Dr. David Karnovsky, Sloan-Kettering Institute, New York.

HELSINKI, FINLAND

Prof. A. I. Virtanen, President, Finnish Academy of Sciences.
 Prof. Eero Vroma, State Serum Institute.
 Prof. Arvo Ylppo, Children's Castle.
 Dr. Eero Hillbom, Research Institute for the Brain-Damaged.
 Dr. Paavo A. Kuusisto, National Board of Medicine.
 Prof. Ilamari Vartiainen, Dean of medical faculty, University of Helsinki.
 Dr. M. Karvonen, Institute of Occupational Health.
 Prof. Nillo Hallman, University Clinic for Children's Diseases.

MOSCOW, SOVIET UNION

Prof. Semyon Sarkisov, Vice Chairman, Academy of Medical Sciences.
 Prof. V. M. Zdhanov, Deputy Minister of Health.
 Prof. Nicholas Blochin, Director, Institute of Experimental Pathology and Therapy of Cancer.
 Dr. V. Negovsky, Institute of Physical Resuscitation.

NORWAY

Dr. Leiv Kreyberg, Rikshospitalet.
 Dr. Lorentz Eldjarn, Radium Hospital.

UNITED KINGDOM

Sir Harold Himsworth, United Kingdom Medical Research Council.

Many additional experts were present at our various conferences, and often provided helpful insight. Sometimes as many as 15 scientists were grouped with us around the conference table.

In most instances, we asked each and every one of the conferees whether we might have their permission to record the conference by means of a tape recording. In every instance that we asked consent was freely given.

STAFF MEMBERS PRESENT

In Paris and Geneva, accompanying me were:

Mr. Walter Reynolds, chief clerk and staff director, Committee on Government Operations.

Mr. Eli Nobleman, professional staff member; and

Mr. Julius N. Cahn, director of the medical research project.

Thereafter, Mr. Cahn and I visited scientists in other cities of Europe while Mr. Reynolds and Mr. Nobleman conducted other reviews for the committee elsewhere.

Accompanying me on my visit to Moscow, Helsinki, and Stockholm was Dr. Michael Shimkin, Russian-speaking editor of the Journal of the National Cancer Institute, Bethesda, and Chief of the Biometry Branch of that Institute at that time. Dr. Shimkin was of great service to us.

During our overall tour, Mr. Cahn and I attempted to get the benefit of the judgment of as many outstanding individuals as possible and to see at firsthand their institutions. Unfortunately, we had less time to spend in each particular institution than we had hoped for.

EXPLORATORY TRIP AND SUBSEQUENT REPORTS

However, we supplemented our brief visits by helpful correspondence thereafter. In many instances, detailed memorandums were forwarded by our conferees to supplement the oral discussion.

Further, it should be pointed out that my own trip had been preceded a month earlier—in October and in early November 1958—by an exploratory tour which Mr. Cahn had made of many of the institutions. Thereby, during our November–December tour, we were able to focus carefully and rapidly on the points of major interest.

To conserve official funds, we did not attempt to have a stenotypist accompany us in the many cities visited. The alternative—tape recording of discussion for transcribing later—is not the most satisfactory method for a permanent record. Nevertheless, it served our basic purpose.

THE LANGUAGE BARRIER

It should be noted that most of the discussions were in English. Foreign conferees were faced with the difficulty of the language barrier.

In every instance, however, the foreign scientists were very gracious and accommodating; they did their best to give, usually in English, a series of observations which might be of genuine worth to the subcommittee.

Throughout this appendix, we have not attempted with but few exceptions to make more than minor grammatical corrections of the phrases used by the foreign scientists to whom English is not a first language. We have instead, by and large, reprinted their comments verbatim. It must be borne in mind that these foreign scientists who spoke to us or who wrote to us in English are to be commended for going out of their way to speak in our language. We have by and large preserved their original comments intact rather than risk unintentional altering of the concepts which they may have had in mind.

The men and women with whom we spoke were and are busy people. Without hesitation, however, they interrupted their labor to welcome us and to do everything they could to accommodate our information needs.

INITIAL CONFERENCE IN PARIS

The initial conference was held at the American Embassy in Paris on November 17, 1958. Seated around the table were:

Prof. Louis Bugnard, director, National Institute of Hygiene; Dr. J. F. Delafresnaye, executive secretary, Council of International Organizations in Medical Sciences; Prof. M. W. Woerdenman, chancellor, University of Amsterdam and chairman of the Excerpta Medica Foundation; and Mr. E. Van Tongeren, director of the foundation.

Also present were Mr. Walter Reynolds, chief clerk and staff director, Committee on Government Operations; Mr. Eli Nobleman, professional staff member; and Mr. Julius N. Cahn, project director, international health study.

MEMORANDUMS FROM INH AND CNRS

Professor Bugnard led off with an extremely helpful report with regard to biomedical research in France. He described the work of the National Institute of Hygiene and touched upon the activity of the National Center of Scientific Research, as headed by his colleague, Prof. J. Coulomb.

Professor Bugnard's comments supplemented observations which we received at a series of other meetings in Paris, at which Mr. Bernard Chenot, Minister of Health, and Prof. Robert Debre, among others were present.

Dr. Delafresnaye followed, describing CIOMS organization and activity.

In the instance of our first two conferees, Professor Bugnard and Dr. Delafresnaye, I have selected materials for the record which were forwarded by both of these individuals. The oral presentation which they made at the time proved extremely helpful to us for our immediate purpose. It gave us an initial understanding which proved invaluable.

However, we believe that the important subjects which Professor Bugnard and Dr. Delafresnaye covered may perhaps best be conveyed for the permanent record through the memorandums which they forwarded.

I should like to say at this point that Professor Bugnard was one of our hosts during our brief stay in France. He could hardly have been more cooperative or helpful.

The initial two items, therefore, which follow consist of (a) a presentation which he conveyed as regards medical research in France and (b) one which his colleague, Prof. J. Coulomb, subsequently conveyed, concentrating on the work of the French National Center of Scientific Research.

In the instance of both memorandums, we have translated from the original French. The respective French agencies are not therefore, responsible for any unintentional inaccuracies which may have developed in the process of our translation.

The third group of items which follow—including Dr. Delafresnaye's memorandum on CIOMS will be supplemented in other publications by the subcommittee. These will be devoted at greater length to the extremely important contributions which CIOMS can make and has already made in international medical science.

PERSONAL OBSERVATIONS ON RESEARCH

Within this appendix, may I note that I have prefaced each section by a series of observations based upon my personal findings. I have done so in order to help provide some measure of perspective rather than simply publish information without any helpful background.

It should however be clearly understood that observations in these introductory paragraphs are not intended to represent the judgment of the subcommittee as a whole. The fact is that because of other commitments, additional members of the subcommittee did not find it possible to accompany me on the trip to Europe and therefore could not join in a first-hand review.

So, the viewpoints, which are set forth herein, cannot be construed as representing a commitment on the part of my colleagues.

As has been pointed out in each of our committee prints to date, only in the report of the subcommittee as such will the conclusions of the six members of the subcommittee be formally stated.

1. MEMORANDUM ON MEDICAL RESEARCH IN FRANCE PREPARED BY PROF.
L. BUGNARD, DIRECTOR, NATIONAL INSTITUTE OF HYGIENE

[Translation (French)]

MINISTRY OF PUBLIC HEALTH,
INSTITUT NATIONAL D'HYGIENE,
Paris, November 6, 1958.

THE DIRECTOR

[Senate Government Operations Committee, World Health Study].

DEAR MR. CAHN: Following the conversation which we had in my office at the end of October, I send you a summary on the organization of Medical Research in France and the facilities already in existence. Of course, this résumé does not pretend to be complete, but it will give you a general idea concerning our active organizations, the funds available to us at this time, and our laboratories. The summary was collated for your use.

I should be very happy to see you in Paris again soon. We are proposing, together with Professor Debré, to organize visits which the Senators, of whom you have spoken to me, might make to the Paris hospitals after November 15.

Believe me, dear Mr. Cahn, with sentiments of devotion,

PROF. L. BUGNARD,
Institut National d'Hygiène,
3, Rue Léon-Bonnat,
Paris 16, France.

1 enclosure.

[Translation (French)]

NOTE ON MEDICAL RESEARCH IN FRANCE

I. GENERAL ORGANIZATION OF MEDICAL RESEARCH

Medical and biological research in France rests principally on collaboration, on the one hand, of universities and hospitals, and, on the other hand, of national research organizations such as the "Institut National d'Hygiène" and the "Centre National de la Recherche Scientifique." The organization and functioning of medical research are essentially guaranteed by the national organizations, i. e., the "Institut National d'Hygiène" and the "Centre National de la Recherche Scientifique."

Institut National d'Hygiène

The INH, attached to the Ministry of Public Health and Population, is an organ of coordination and direction of medical research proper, as well as an organ of documentation on sanitary affairs.

Its activity is, in consequence, more essentially oriented toward aid for applied and clinical research. Its principal duties are:

Instigation of laboratory work and investigations with a view to improvement in living conditions; the prevention, diagnosis, and treatment of disease; study of conditions for applying scientific progress to human welfare;

Collation and dissemination of technical documentation concerning the state of health prevailing in the different countries of the world;
 Organization of a corps of medical researchers and technicians;
 Development and expansion of existing medical research centers and establishment of new additional centers.

The present number of INH researchers stands at about 150.

Centre National de la Recherche Scientifique

It is the mission of the CNRS, a financially autonomous public institution attached to the Ministry of National Education, to encourage, instigate, and coordinate all types of scientific research.

The CNRS:

(1) Subsidizes most of the public and private research laboratories, at the recommendation of the National Committee for Scientific Research and its specialized divisions. This aid can assume multiple forms:

- Allocations to researchers;
- Remunerations of technical collaborators;
- Subventions of materials and equipment;
- Expenditures for special missions;
- Subventions for publications.

(2) Has its own research laboratories.

Principally oriented toward basic research, the CNRS contributes important aid to scientific research in biology and medicine.

Medical research in the universities

Research conducted by teachers of higher education in the field of biology and medicine is carried on essentially by Schools of Medicine and Pharmacy in liaison with the clinical services of Hospitals.

Certain research is also effected within the framework of Schools of Science or of large establishments such as the "Collège de France".

These laboratories are quite generally subsidized by the "Centre National de la Recherche Scientifique".

Medical research in the hospitals

Numerous medical research laboratories operate within the framework of Hospitals, most frequently in liaison with University services. They generally specialize in a certain type of research designed for the orientation of the clinical service to which the laboratory is attached.

Some of these laboratories are independent of the University. We refer, in particular, to the Paris Research Centers (now numbering 11) of the "Claude Bernard Association", established to develop and/or expand the biological and medical research carried on in the Public Welfare hospitals in Paris.

These laboratories are subsidized by the "Institut National d'Hygiène" and, to a certain extent, by the CNRS.

In addition, we should mention the existence of laboratories under the jurisdiction of the technical services of different ministerial departments, mainly the laboratories of the Armed Forces Health Service, as well as of private research centers. The most important private institution is the "Institut Pasteur" which works in very close liaison with the CNRS and the INH.

II. SCIENTIFIC RESEARCH IN BIOLOGY AND MEDICINE WITHIN THE CNRS

The CNRS pursues two courses of action:

- General aid to research;
- Establishment and operation of its own laboratories.

(1) Aid provided for biological and medical research

Within the framework of the National Committee for Scientific Research, three groups are interested in medical research:

- "Medicine"—experimental pathology, pharmacodynamics, and experimental therapeutics;
- "Biology"—in particular, the Physiology and Cellular Biology divisions;
- "Sociology and Social Psychology".

The number of researchers working in these different sections at the present time is divided as follows:

"Medicine"-----	147
"Biology," "Physiology"-----	154
"Cellular Biology"-----	78
"Sociology and Social Psychology"-----	142

(2) *CNRS laboratories*

The CNRS administers, itself and directly, a certain number of laboratories for biological and medical research:

"Institut de Recherches Scientifiques sur le Cancer" (Institute for Scientific Cancer Research) (Villejuif); Director: Mr. Oberling, Member of the Academy of Medicine, Professor at the Collège de France.

"Centre d'Etudes de Physiologie Nerveuse et d'Electrophysiologie" (Study Center of Neurophysiology and Electrophysiology) (Paris); Director: Mr. Fessard, Professor at the Collège de France.

"Laboratoire d'Embryologie et Tératologie Expérimentales" (Laboratory for Experimental Embryology and Teratology) (Paris); Director: Mr. E. Wolff, Professor at the Collège de France.

"Laboratoire de Génétique Physiologique" (Laboratory of Physiological Genetics) (Gif-sur-Yvette); Director: Mr. Ephrussi, Professor, School of Sciences, Paris.

"Centre d'Etudes Scientifiques de l'Homme" (Center for the Scientific Study of Human Behaviorism) (Paris); Director: Mr. Soula, Honorary Professor at the School of Medicine, Toulouse.

"Laboratoire de Microscopie Electronique Appliquée à la Biologie" (Laboratory for Electronic Microscopy Applied to Biology) (Paris); Director: Mr. Grasse, Member of the Institute, Professor at the School of Sciences.

"Laboratoire de Biochimie de la Nutrition" (Laboratory for Nutritional Biology) (Bellevue); Director: Mr. Jacquot, Director of Research.

"Laboratoire de Physiologie de la Nutrition" (Laboratory for Nutritional Physiology) (Paris); Director: Mrs. Randoin, Member of the Academy of Medicine.

"Centre National de Coordination des Etudes et Recherches sur la Nutrition et l'Alimentation" (National Center for Coordination of Nutritional and Alimentary Studies and Research); Director: Mr. Terroine, Honorary Professor at the School of Sciences, Strasbourg.

"Centre de Sélection des Animaux de Laboratoire" (Selection Center for Laboratory Animals) (Gif-sur-Yvette); Director: Mr. Sabourdy.

An Institute of Biochemistry is under construction, within the overall group of Biology Laboratories at Gif-sur-Yvette.

The CNRS is also building an Institute of Physiology as well as a Study Center for Surgical Techniques.

2. MEMORANDUM ON RELATED PHASES OF MEDICAL RESEARCH IN FRANCE PREPARED BY PROF. J. COULOMB, DIRECTOR, NATIONAL CENTER FOR SCIENTIFIC RESEARCH

MINISTRY OF NATIONAL EDUCATION,
NATIONAL CENTER FOR SCIENTIFIC RESEARCH,
FIFTH BUREAU (ME/JB-No. 1098),
Paris, November 17, 1958.

Mr. JULIUS N. CAHN,
Director Medical Research Project.

DEAR PROFESSOR AND COLLEAGUE: I have the honor to transmit to you, as agreed during our conversation of October 19, a very brief summary on Medical Research in France, for your information and that of the delegation of U.S. Senators who are interested in this question.

Please accept, dear professor and colleague, the expression of my best sentiments.

(Signed)

J. COULOMB,
Centre National de la Recherche Scientifique,
13, Quai Anatole France,
Paris VII, France.

SCIENTIFIC RESEARCH IN MEDICINE IN FRANCE

Two national agencies are in charge, specifically, of the organization and financing of Scientific Research in Medicine—the Institut National d'Hygiène, under the jurisdiction of the Ministry of Public Health and Population, and the Centre National de la Recherche Scientifique, under the jurisdiction of the Ministry of National Education—aided by a certain number of official agencies and private institutions.

On the other hand, to a large extent the training of researchers, and the financing of numerous university laboratories, are under the jurisdiction of the Administration of Higher Education (Schools of Medicine), and consequently, under that of the Ministry of National Education.

NATIONAL AGENCIES

I. *Institut National d'Hygiène (INH)*

The Institute is a financially autonomous, public institution. It is in charge, within the frame of reference of the Ministry of Public Health and Population, of the organization, coordination, and financing of Scientific Research in Medicine, especially insofar as clinical research is concerned and work performed in liaison with the hospital services. It is, in addition, responsible for the organization of statistical investigations pertaining to health and general hygiene in the country. For conducting Scientific Research in Medicine, the Institute:

(a) Appoints researchers, who must devote all of their time to research, and who are divided into the following categories: Research trainee (duration one year, subject to extension for another year), assistant researcher (duration one year, subject to extension), researcher (three years, subject to extension), senior researcher (duration five years, subject to extension).

The salaries of these researchers are the same as those received by members of the higher education system, with the following equivalents: trainee—three-fourths of the remuneration received by a faculty instructor; assistant researcher—remuneration received by a faculty instructor; researcher—remuneration received by an associate professor; senior researcher—remuneration received by an assistant professor; director of research—remuneration received by a full professor.

The researchers are not officials; they are appointed on a contract basis, for definite periods of time. Their tenure may be extended. The retirement age is the same as that of the members of the higher education system, in the equivalent age group. They are entitled to a retirement pension, toward which they make annual contributions, jointly with the INH.

(b) Appoints technical collaborators who aid the researchers in the performance of their work. This category may comprise widely different specializations: technicians, technical aides, laboratory workers, etc.

Their salaries are comparable to those paid in industry.

Appointments are made for a period of one year, subject to renewal.

(c) Gives subventions for equipment and operating costs. The subventions are given either to the directors of laboratories employing researchers, or to the researchers themselves. They are made according to need, and are subject to renewal on an annual basis.

The research is carried on in University or Hospital Laboratories or in specialized Research Institutions. The researchers work either individually, in contact with a hospital service, or in a laboratory of the School of Medicine, or as teams in specialized research units. It has been possible to build a certain number of laboratories in recent years, generally on the premises of large hospitals where they operate in close touch with the sick-wards or the teaching centers. The building program for research units is now well underway.

The organization of statistical investigations is entrusted to a medical staff which is attached to INH; to the effect, several services are in existence working on a permanent basis—"Service de Nutrition" [Nutrition Service], "Service du Cancer" [Cancer Service], "Service de la Tuberculose" [Tuberculosis Service], "Service des Maladies Vénériennes" [Venereal Disease Service], "Service des Maladies Infectieuses" [Infectious Disease Service], "Service de Maternité et Pédiatrie" [Maternity and Pediatrics Service], "Service de Stomatologie" [Stomatological Service], "Service de Lutte Contre l'Alcoolisme" [Anti-Alcohol-

ism Service], "Service d'Hygiène Générale" [General Hygiene Service], "Service d'Hygiène Industrielle" [Industrial Hygiene Service], "Service de Statistique" [Statistical Service], "Service du Calcul" [Cost Estimate Service]. Each of these Services is under the direction of a physician.

The problems of demography, especially their social aspect, are studied by a specialized agency, the "Institut National d'Etudes Démographiques" [National Institute of Demographic Studies], under the jurisdiction of the Ministry of Public Health and Population, which also conducts its own research work in this field.

II. Centre National de la Recherche Scientifique (CNRS)

The Center is a public, financially autonomous establishment, under the jurisdiction of the Ministry of National Education. Its mission is to develop, orient, and coordinate all types of scientific research. The general activities of the Center are determined by a National Committee which is composed of 13 groups and sub-divided into 31 sections.

The groups conducting, more particularly, research in human and medical biology are "Biology", "Experimental Medicine", and "Sociology and Social Psychology". For medical research, "Experimental Medicine" is the preponderant group. The coordination of the work between INH and CNRS in the field of Medical Research is excellent: The Director of INH is both president of the "Medicine" group of CNRS and a member of the board of directors of that organization. The Director General of CNRS is a member of the Administrative Council and of the Scientific Committee of INH. Without concise limits having been defined, it is understood that the "Medicine" group of CNRS is more oriented toward supplying aid for Basic Research in biology and medicine, while INH takes care more particularly of applied biological, medical, and clinical research.

The status of the CNRS researchers and technical collaborators is the same as that of the INH personnel.

CNRS has been able to build in recent years a number of Institutes designed for human and medical research.

The program is implemented, as is that of INH, within the framework of the national four year appointment plan.

Certain research problems pertaining to healthy and sick persons are also taken up in laboratories set up or subsidized by the central research agencies under the jurisdiction of the Commissioner of Atomic Energy, the Ministry of Agriculture (nutritional problems), the Ministry for Overseas France, the Ministry of Labor (occupational medical problems). The collaboration of INH, which is not as close as that established with CNRS, is represented in joint project committees.

III. University

It is not necessary to stress the role of the University in the advance of research. The teachers of higher education, especially those attached to the Schools of Medicine, have a double task: Teaching, and advancing our knowledge by putting research projects into effect. Their role in the training of researchers is an essential one.

OFFICIAL AGENCIES

I. Caisse Nationale de Sécurité Sociale

The Social Security agencies, which are largely responsible for financing medical care in France, have contributed aid to the development of Medical Research.

The "National Social Security Fund" set up ten years ago, in close liaison with INH, is a fund, which is subject to extension on an annual basis, designed to finance contracts for research and scientific investigation between the "National Fund" and the researchers which bear on specific subjects, most frequently relating to clinical and therapeutical research problems. The Director of INH is in charge of the scientific supervision of research work which is performed.

In addition, the National Fund has set up a certain number of research laboratories, the operation of which is guaranteed in its entirety, in particular on behalf of the "Centre National de la Transfusion Sanguine" [National Blood Transfusion Center], at various cardiovascular surgery centers.

Certain "Regional Social Security Funds" have also contributed aid, which is sometimes considerable, to provincial medical research laboratories.

II. Hospitals

In hospitals, the operation of their routine laboratories is essentially assured by the hospital administrations. However, in certain specialized hospital set-ups, such as "Anti-Cancer Fight Centers" or "Regional Blood Transfusion Centers", very important specialized research laboratories are frequently organized directly and subsidized within the framework of the Public Health Administration.

III. City of Paris and Department of the Seine

Several years ago the City of Paris and Département de la Seine financed a society providing aid to Scientific Research in Medicine, i.e., the "Association Claude-Bernard", which takes care only of the Paris and Seine hospitals and has made possible the establishment of the ten Medical Research units which are listed below. Here again the coordination with CNRS and INH is excellent; the latter two organizations have taken over the payment of salaries to researchers and technical collaborators working in the units of the "Association Claude-Bernard".

PRIVATE AGENCIES

I. Institut Pasteur

A recognized public service institution, the "Institut Pasteur", was founded by international subsidy.

The role of the "Institut" in medical discovery is a fundamental one, and its research laboratories are world renowned.

Its budget is guaranteed by nonprofit exploitation of the discoveries made in its laboratories and of its capital returns. Numerous researchers and technical aids of INH and CNRS work in the laboratories of the "Institut Pasteur".

There are, in addition, various other societies providing aid to Scientific Research in Medicine such as the "Association pour le Développement de la Recherche Scientifique Médicale Française", the "Fondation Rothschild", and the "Fondation Le Pied à l'Etrier".

Up to now, aid to private medical research has been rather insignificant. The large French pharmaceutical firms have their own private research laboratories and did not subsidize research at the National level.

However, on September 25, 1958, the French Government issued a decree permitting the subsidization of Scientific Research by deductions from income tax receipts. It is, however, impossible to say what this highly desirable measure will contribute to the development of nonprofit Scientific Research in France.

BUDGETARY RESOURCES

The funds available to INH and CNRS at the present time come from the national government.

During the year 1950, these two agencies had at their disposal an approximate total of 900 million francs (almost equally divided between the two agencies). These allocations were used for the payment of remunerations to researchers, technical aids, purchase of materials, and for coverage of the operating costs of the laboratories which had received aid.

Furthermore, in 1956, special allocations, making possible the construction and equipment of research laboratories, were given to INH and CNRS, under the National appropriations. In 1956 and 1957, INH was able to expend for the above purpose about 600 million francs. For the 1958-59 [budget] plan, an estimated 2.5 billion francs were earmarked for INH. But the plan is not yet underway.

On a nationwide basis, the total number of researchers remunerated by INH and CNRS (almost equally divided between the two agencies) is about 350; that of the technical collaborators, about 210.

It is practically impossible to tell what portion of the budget of the universities, is earmarked for research. Essentially, it is to cover the remuneration of the professors and their assistants, as well as the operation of the laboratories of the School of Medicine.

The subvention of the "Caisse Nationale de la Sécurité Sociale" for Medical Research in 1958 amounted to 90 million francs, making possible the payment of staff salaries and covering certain expenditures for equipment and the

operating costs in connection with subsidized research programs. A portion of the funds was applied to the financing of national inquiries into problems pertaining to medicine and hygiene.

The subvention paid to the "Association Claude-Bernard" in 1958 amounted to 60 million francs, permitting the payment of salaries to about 30 researchers and 30 technical collaborators working in the Paris laboratories of the Association.

ACHIEVEMENTS

As we have already indicated, the research work is carried on in the laboratories of the Schools of Medicine, in the laboratories of the Hospital Services, in the Specialized Research Units, and in the Research Institutes. We list below the present principal research centers, which are now in existence in Paris and which have a certain number of researchers and technical collaborators, whose efforts are geared to the study of specialized problems of biological and medical interest.

Immunopathology (A.C.B.)—"Hôpital St. Antoine": Professor Kourilsky.
Study and Standardization of B.C.G. Vaccine—"Centre International de l'France": Dr. L. P. Lévy.

Therapeutics of Tuberculosis—"Hôpital de Brévannes": Dr. Noufflard.

Acute Articular Rheumatism—"Centre International de l'Enfance": Dr. Mozziconacci.

Poliomyelitis—"Hôpital Claude-Bernard": Professor Mollaret and Dr. Pocidalo.

Muscular Biochemistry, Hemoglobin—"Hôpital des Enfants-Malades": Professor Schapira.

Cardiovascular Afflictions (A.C.B.)—"Hôpital Boucicaut": Professor Lenègre.

Cardiovascular Afflictions—"Hôpital Lariboisière": Professor Soulié.

Experimental Cardiovascular Surgery (A.C.B.)—"Hôpital Broussais": Professor d'Allaines, Dr. Vaysse.

Experimental Cardiovascular and Pulmonary Surgery—"Hôpital Marie-Lannelongue": Dr. Lenfant, Professor Dejours.

Dietetics and Nutrition—"Hôpital Bichat": Dr. Trémolières.

Center for Nutritional Research—"Centre de Recherche sur la Nutrition": Mme. Randouin.

Child Nutrition, particularly in the Tropical Zones—"Hôpital des Enfants Malades": Dr. Royer.

Kidney Insufficiency (A.C.B.)—"Hôpital Necker": Professor Hamburger.

Rheumatology—"Hôpital Cochin": Professor Coste and Professor Delbarre.

Digestive Pathology—"Hôpital Bichat": Dr. Lamblin and Dr. Bonfils.

Hepaticophysiology—"Hôpital St. Antoine": Dr. Caroli.

Neonatal Biology (A.C.B.)—"Hôpital Baudelocque": Dr. Minkowski.

Physiopathology of the Placenta—"Hôpital St. Antoine": Professor M. Mayer and Dr. Panigel.

Infectious Diseases—"Hôpital Claude-Bernard": Dr. Reilly and Dr. Fournier.

Allergy (A.C.B.)—"Hôpital Broussais": Dr. Halpern.

Calcic Metabolism—"Hôpital Lariboisière": Dr. Lichtwitz.

Human Genetics—"Hôpital des Enfants Malades": Professor Lamy.

Neurophysiology (A.C.B.)—"Hôpital de la Salpêtrière": Dr. Scherer.

"Centre de Neurophysiologie et d'Electrophysiologie": Dr. Fessard.

"Centre d'Etudes Scientifiques de l'Homme": Professor Soula.

Medical Application of Radioisotopes (A.C.B.)—"Hôpital Baujon": Professor Fauvert.

Biological Research Center of the Atomic Energy Commission—"Institut d'Etudes Nucléaires de Saclay": Professor Coursaget.

Leukemias and Blood Diseases (A.C.B.)—"Hôpital St. Louis": Professor J. Bernard.

(Cancer Research Institute) "Institut de Recherches sur le Cancer"—Villejuif: Professor Oberling.

(Clinical Center—Villejuif) "Institut Gustave-Roussy": Professor Denoix.

"Institut Curie" (Cancer): Dr. Latarjet and Professor Lacassagne.

(Clinical Center—Cancer): Dr. Courtial, Dr. Jammet, and Dr. Baclesse.

Research Group Investigating the Dangers Contained in Tobacco—"I.N.H.": Mr. Cuzin.

Gerontology (A.C.B.)—"Hôpital Ste. Perrine": Professor Bourlière.

Blood Transfusion—"Institut National": Dr. Soulier, Dr. Bessis, Dr. Levin, and Dr. Dausset.

Reaction of the human organism to medication (A.C.B.)—"Faculté de Pharmacie": Mr. Lechat.

We finally call to mind the ensemble of laboratories constituting the "Institut Pasteur", and the numerous research teams that have made it an outstanding center of medical and biological research.

EXCHANGE OF RESEARCHERS WITH FOREIGN COUNTRIES

The "Direction Générale des Relations Culturelles" [Office of the Director General for Cultural Relations], under the jurisdiction of the Ministry of Foreign Affairs, each year awards some twenty grants of fellowships, for a period of ten months, to French researchers to make it possible for them to work in research laboratories in foreign countries.

The "Commission Franco-Américaine d'Echanges Culturels" (Fulbright Fund) facilitates such travel and contributes to trips by researchers to France. The Smith-Mundt Fund also provides French doctors with funds enabling them to go to the United States for the purpose of working in specialized laboratories.

In 1958, the "National Institutes of Health of Bethesda" inaugurated, in conjunction with INH, a program of fellowships for young French medical researchers desirous of working in the United States. This program is in a stage of development.

CONCLUSIONS

In the last few years an effort was made further to develop Medical Research both in Paris and in the Provinces. It should be followed up and expanded. The significance of the practical consequences of Medical Research, the quality of our young French researchers, their intelligence, imagination, and enthusiasm, justify this demand.

Efforts relative to international collaboration must be intensified with a view to:

(a) Exchange of qualified researchers, teaching of techniques and specialties, and increase of returns by having gifted young people with different, often complementary, qualifications work together;

(b) Sanitary health inquiries of global interest conducted under similar and standardized conditions designed to collect data and to utilize, or, benefit from them.

Prof. L. BUGNARD,
Institut National d'Hygiène.

NOVEMBER 6, 1958.

3. WORK OF COUNCIL OF INTERNATIONAL ORGANIZATIONS FOR MEDICAL SCIENCES

A. MEMORANDUM FROM DR. J. F. DELAFRESNAYE, EXECUTIVE SECRETARY

Since the very first international congresses held during the second half of the last century, the complaint was raised that once a congress ended, there was nothing to link it with the next. It was generally felt that some sort of secretariat should be maintained for communication purposes between congresses.

International associations, societies and unions were created to fill the gap and in 1909 the 16th International Medical Congress went a step further and created a Permanent Commission for International Medical Congresses which would have overall authority over the organization of meetings. The idea was too ambitious and the attempt failed.

In 1946, the United Nations founded UNESCO to deal with educational, scientific and cultural problems and shortly afterwards the World Health Organization to deal with international problems of health and disease. These two organizations in turn brought about the formation of CIOMS which was originally called the Council for the Co-ordination of International Congresses of Medical Sciences.

FORMATION OF THE COUNCIL FOR THE CO-ORDINATION OF INTERNATIONAL CONGRESSES OF MEDICAL SCIENCES—CCICMS

The CCICMS was founded in Brussels, in April 1949, under the joint auspices of WHO and UNESCO.

The objective, as set out in Article 3 of its constitution, reads:

"The object of the Council is to facilitate exchanges of views and scientific information in the medical sciences * * *".

The means by which this objective can be attained are stated as follows: " * * * by securing continuity and co-ordination between *international congresses* of medical sciences, by making their work known and by furnishing their organizers with material aid where necessary".

As a result of the experience gained during the first three years of activity, it was felt that, if the Council was to reach its objective it could not neglect other forms of international collaboration such as conferences, symposia, seminars, medical documentation, etc., which also aim at increasing exchanges between disciplines and countries.

Accordingly, at the Second General Assembly of the Council, at Geneva, in April 1952, Article 3 of the statutes was amended. The part of the sentence defining the overall objective of the organization remained unchanged but the part defining the means to be employed was altered. Article 3 now reads:

"The object of the Council is to facilitate exchanges of views and scientific information in the medical sciences by securing co-ordination between *international associations* of medical sciences, by making their work known and by furnishing to them material aid where necessary."

The present name of the organization was adopted to reflect this objective and its structural organization.

PROGRAMME

The programme of the organization has gradually evolved to meet changing circumstances. Operating at the nongovernmental level it does not duplicate the work of either UNESCO or WHO. It may be said to be concerned:

- with co-ordination and promotion of multidisciplinary activities (see Exhibit I);
- with assistance to member-organizations (see Exhibit II);
- with questions which do not fall within the competence of any one of its member-organizations but are of interest to all of them (see Exhibit III).

1. Co-ordination and promotion of interdisciplinary activities

1.1. To bring together international congresses on related subjects and to avoid clashes, close contact is maintained with congress plans of all member-organizations. A register of congresses is kept, and calendars are published regularly.

1.2. To achieve broader co-ordination, the Council is at present engaged in helping member-organizations belonging to closely related fields to set up joint committees with a view to better cooperation.

1.3. To foster interdisciplinary exchanges the Council organizes symposia in virtue of its own international contacts and by calling upon the services of a great number of scientists connected with its member-organizations. The subjects are chosen because they are new and speculative and can be organized in connection with international congresses from which it is possible to draw on part of their membership.

1.4. In addition, the CIOMS stimulates member-organizations to hold symposia of their own on themes which are common to more than one medical discipline because small meetings are particularly effective in the study of problems on a high technical level.

2. Assistance to member-organizations

2.1. The Council has studied the goals of international meetings and the organizational problems that must be solved to achieve success. The CIOMS has published a monograph entitled "The Planning of International Meetings" summarizing the Council's views on the matter. The Council is now engaged in a long term programme aimed at raising the standard of international meetings.

2.2. The Council gives advisory services to member-organizations in respect to their meetings. This is given either directly by the Secretariat or by arranging "Congress Planning Meetings" at which the officers responsible for the congresses to be held in a given year are brought together to discuss their plans.

2.3. In certain cases, grants are made to enable member-organizations to bring together the main rapporteurs of a congress in order to avoid overlapping of the main papers or to prepare the discussion at the congress by organizing pre-congress symposia.

2.4. In special cases the Council takes the responsibility of organizing the simultaneous interpretation service for a congress and bears parts of the cost.

2.5. The Council gives small subventions to congresses to enable member-organizations to establish administrative machinery to obtain support for themselves.

2.6. Postgraduate courses are encouraged and financed on the occasion of selected congresses and other meetings, taking advantage of the presence of outstanding foreign scientists in the host country.

2.7. Travel grants are given to young scientists to enable them to attend selected congresses and priority is given to workers belonging to countries with currency restrictions. These grants are derived from the funds provided by UNESCO.

3. *Activities of general interest*

3.1. Through international symposia convened by the Council under its own authority, the organization studies problems of a general nature such as the support of medical research, methodology in geographic pathology, controlled clinical trials, etc. The conclusions reached at these meetings are transmitted to member-organizations for further study at the specialized level.

3.2. The Council has been asked to act in an advisory capacity to UNESCO in matters relating to biology and medicine. The CIOMS is officially represented on various UNESCO advisory committees on research, cell biology, laboratory animals, etc.

3.3. The organization has been concerned with problems of medical documentation in general and has attempted to bring order into the section of medical literature devoted to the proceedings of international congresses and conferences. A Bibliography of International Congresses of Medical Sciences has recently been published.

THE STRUCTURE OF THE CIOMS

To carry out its task, the Council was given the structure of a confederation, although this term was never used in its constitution. In this respect it differs from other voluntary organizations in the field of medicine which are concerned with specific branches of medical science.

Article 5 of the constitution, as amended by the 4th General Assembly requires that international members shall be nongovernmental and universal in character, that they shall be "devoted to—

"(a) the encouragement of scientific research into the principles underlying health and into the causes of diseases; or

"(b) the application of the medical sciences to the prevention and cure of disease and to the promotion of health."

Some of these members exist solely for the purpose of conducting international congresses, at intervals of from one to six years, with only a small holding committee between congresses. Others have a wide programme of promotional activities; others again are small groups with a specialized scientific objective.

Delegates from member-organizations compose the Council's General Assembly which convenes every third year to decide policy, to receive reports and to elect an Executive Committee.

Experience gathered during the last few years has led the Executive Committee to study the ways of ensuring the necessary stability of the organization and of improving its efficiency.

As a result of the studies certain proposed amendments were submitted to the Council's 4th General Assembly which decided to modify the composition of the Executive Committee, shorten the terms of office of its members and ensure their automatic rotation. To ensure closer liaison at the national level it was agreed to institute a new category of associate membership. Article 9 of the statutes reads:

"Associate membership in the Council is also open to one national institution per State. This institution may be either—

"(a) the national academy of sciences or the principal academy of medicine or the national council for general or specialized scientific research, or an institution of a similar nature; or

"(b) a national committee broadly representative of the medical sciences, composed of a number of national institutions and sponsored by one of the institutions mentioned in paragraph (a).

"Associate members in this category shall not be eligible to receive subventions from the Council."

National participation in the CIOMS would immeasurably strengthen the organization, enable the Council's coordinating activities to be more effective; allow the views of national adhering organizations to be brought to the attention of CIOMS, permit the Council to function as a mechanism for collaboration between countries at the academic and research levels and bring additional financial support which is urgently needed if the Council is to function as an independent body.

FINANCES

The Council is in receipt of subventions from WHO and UNESCO, of grants from various foundations and granting agencies and receives subscriptions from member-organizations.

Subscriptions from member-organizations can be used without any restrictions but unfortunately they represent only one tenth of the Council's budget. These membership affiliation dues were increased at the 4th General Assembly and the way they are calculated was modified. It must be borne in mind, however, that although certain member-organizations have reached financial stability, the great majority have not. All member-organizations are voluntary, nongovernmental and expressly prohibited by their own statutes from devoting any money to other than the strict purposes for which they exist. The majority of the Council's members are, therefore, unable to pay subscriptions to CIOMS unless it can be shown that in doing so their own work will benefit, at least to an extent comparable to the subscription paid.

Subventions from UNESCO and WHO are subject to certain conditions which are fortunately complementary. However, both organizations take the view that the CIOMS should find sufficient resources to cover eventually its administrative expenses.

It is hoped that national members will also pay annual subscriptions and that these sums, in addition to the subscriptions of the Council's international membership, will cover the running expenses.

CONCLUSION

Since its creation the Council's programme has developed progressively. It is at present involved in adapting its structure to enable it to carry out its function more effectively. It is hoped that in this task the Council will receive the active support of its international members, its sponsoring organizations, WHO and UNESCO, and of representative national bodies. The Council does not seek to impose its views upon its members but simply to advise, encourage and coordinate. Voluntary organizations, if they can accept enough self-discipline to avoid the faults which are the price of their independence, have an essential part to play in the scientific world of today.

EXHIBIT I. COORDINATION AND PROMOTION OF INTERDISCIPLINARY ACTIVITIES

1.1. Coordination:

Calendar of international medical congresses, published twice yearly, covering a period of 5 years.

Calendar of regional medical congresses, published once a year, covering the current year.

Both published in French and English. Circulation: 2,500.

1.2. Example: *The First International Congress of Neurological Sciences*,

Brussels, July 1957, comprising:

3rd International Congress of Neuropathology;

Meeting of the International League against Epilepsy;

6th International Neurological Congress;

1st International Congress of Neurosurgery;

4th International Congress of Electroencephalography and Clinical Neurophysiology;

Symposium Neuroradiologicum.

1.3. Interdisciplinary symposia:

1950

Geographical Pathology and Demography of Cancer, in connection with the International Cancer Congress, London, under the chairmanship of Prof. J. Maisin (Belgium), at Oxford.

Biology and Pathology of Muscle, under the chairmanship of Prof. M. Polonovski (France), at Royaumont, France, in connection with the International Physiological Congress, Copenhagen.

1951

Anoxia of the New-Born Infant, under the chairmanship of Prof. Marcel Le-long (France), at London.

1952

Cancer of the Lung (Endemiology), under the chairmanship of Dr. Harold Stewart (U.S.A.), at Louvain, in connection with the International Conference on Geographical Pathology, Liège.

Experimental Diabetes and its Relation to the Clinical Disease, under the chairmanship of Prof. F. G. Young (U.K.) at Leiden, in connection with the 1st International Congress on Diabetes and the International Congress of Biochemistry, Paris.

1953

Brain Mechanisms and Consciousness, under the chairmanship of Prof. H. H. Jasper (Canada), at Ste. Marguerite, Canada, in connection with the 3rd International Congress of E.E.G. Societies, Boston, and with the 19th International Physiological Congress, Montreal.

1954

Glaucoma, under the chairmanship of Sir Stewart Duke-Elder (U.K.), at Ste. Marguerite, Canada, in connection with the 17th International Congress of Ophthalmology, Montreal and New York.

The Support of Medical Research: see under Activities of General Interest.

1955

Physiopathology of the Reticulo-Endothelial System, under the chairmanship of Dr. B. N. Halpern (France), at Gif-sur-Yvette, France, jointly with the Unitarian Service Committee, Inc., New York.

1956

Connective Tissue, under the chairmanship of Prof. R. E. Tunbridge (U.K.), at London.

1957

Abnormal Haemoglobins, under the chairmanship of Prof. C. C. de Silva (Ceylon), at Istanbul, Turkey; supported by the Rockefeller Foundation. Followed by a practical course, organized by UNESCO, for the benefit of workers from the Middle-East region.

Oxygen Supply to the Human Foetus, under the chairmanship of Dr. Clement A. Smith (U.S.A.), at Princeton, N.J.; jointly with the Josiah Macy, Jr. Foundation.

Methodology in Geographic Pathology: see under Activities of General Interest.

1958

Response to Injury, under the chairmanship of Dr. D. P. Cuthbertson (U.K.), at Semmering (Austria).

1.4. Symposia held by member-organizations and others, supported by CIOMS.

1951

Bacterial Growth and its Inhibition, at Rome, organized by WHO.

Influence of Hypophysis and the Adrenal Cortex on Biological Reactions, at Zurich, organized by the International Congress of Allergology.

The Geographical Pathology Commission on Cancer, at Lisbon, organized by the International Union against Cancer.

1952

Aetiology and Pathogenesis of Arteriosclerosis, at Madrid in connection with the International Congress on Comparative Pathology.

Symposium on Haemophilia, at Buenos Aires, organized by the International Congress of Haematology.

The Geographical Pathology and Chemotherapy of Cancer, at Bombay, organized by the International Union against Cancer.

Seminar on the use of Antibiotics in Children's Diseases, in Paris in connection with the International Children's Centre, Paris.

1953

Three scientific commissions, at Copenhagen, organized by the International Congress of Radiology.

Conference on Regeneration and Culture of Tissue, in Lisbon, organized by the Congress of the International Society of Surgery.

The Co-ordination of Psychiatry and Psychological Methods, in Stockholm, organized by the International Society of that name.

1954

Non-Specific Urethritis, at Cannes, organized by the International Union against the Venereal Diseases and Treponematoses.

Three research symposia on Mental Health subjects, in Toronto, organized by the World Federation for Mental Health.

1956

Symposium on Surveys, at Copenhagen, organized by the International Association of Gerontology.

1957

Sensitivity Reactions to Drugs, at Liège (Belgium), organized by the International Society of Clinical Pathology.

1958

Transparency of the Cornea, at Knokke-le-Zoot (Belgium), organized by the International Council of Ophthalmology.

EXHIBIT II. ASSISTANCE TO MEMBER ORGANIZATIONS

2.1. Congress Planning:

"The Planning of International Meetings". Information collected at informal meetings of congress organizers held by CIOMS. First published in the Bulletin series of the Council. Title of the French edition: "L'organisation des réunions internationales".

2.2. Congress planning meetings:

1952, Paris, meeting of representatives of 9 international congresses.

1953, Paris, meeting of representatives of 9 international congresses.

1953, Minneapolis, Minn., meeting of representatives of 6 international congresses.

1955, London, meeting of representatives of 8 international congresses.

2.3. 1955, Paris. Pre-congress Working Party of leading surgeons from 5 countries to co-ordinate papers of the main speakers at the 17th congress of the International Society of Surgery.

2.4. The Council keeps a list of experienced interpreters specializing in medical congresses. It has at its service a chief interpreter who, upon request, recruits teams for congresses of member-organizations in any country of the world.

2.5. Subventions (The amounts granted to congresses are related to the subventions received from UNESCO and WHO) :

1949: \$13,000 to 15 congresses.

1950: \$27,394 to 17 congresses.

1951: \$32,208 to 33 congresses.

1952: \$29,510 to 25 congresses.

1953: \$22,908 to 12 congresses.

1954: \$23,787 to 19 congresses.

1955: \$15,318 to 23 congresses.

1956: \$15,238 to 20 congresses.

1957: \$13,686 to 18 congresses.

2.6. Postgraduate courses organized on the occasion of international medical congresses :

1950

5th International Cancer Congress, Paris.

International Course in Audiology, Stockholm.

1951

International Congress on Anaesthesiology, Paris.

1952

8th Assembly of the International College of Surgeons, Madrid.

4th International Conference on Geographical Pathology, Liège.

1953

5th International Neurological Congress, Lisbon.

5th International Congress of Tropical Medicine and Malaria, Istanbul.

1956

8th International Congress of Radiology, Mexico, D.F.

1957

Symposium on Abnormal Haemoglobins, Istanbul, sponsored by UNESCO, but planned by CIOMS.

2.7. Travel grants to young Research Workers (UNESCO funds) :

These travel grants are given on a regional basis to enable young research workers between the ages of 27 and 40 to attend certain selected congresses. These grants are given to workers who do not conduct any private practices and priority is given to workers belonging to countries with currency restrictions. At the time of writing this report the exact figures for 1958 are not available.

1950: 14 research workers from 11 countries.

1952: 79 research workers from 19 countries.

1953: 26 research workers from 13 countries.

1954: 33 research workers from 16 countries.

1955: 22 research workers from 12 countries.

1956: 31 research workers from 13 countries.

1957: 58 research workers from 21 countries.

1958: 31 research workers from 17 countries.

EXHIBIT III. ACTIVITIES OF GENERAL INTEREST

3.1. General symposia :

3.1.1. The Support of Medical Research: London, 1954, under the chairmanship of Sir Harold Himsworth (U.K.), with representatives of 16 national research organizations. Published in English and French. "The

Support of Medical Research", Blackwell Scientific Publications, Oxford; Charles C. Thomas, Springfield, Ill., The Ryerson Press, Toronto. "L'aide à la recherche médicale", Masson et Cie, Paris.

3.1.2. Methodology in Geographic Pathology: Paris, 1957, under the chairmanship of Dr. Harold F. Dorn (U.S.A.) Purpose: to consider the various techniques of surveys which could be used to determine the incidence of certain non-infectious diseases and to determine the conditions which could usefully be studied by these techniques in order to throw light on their causation. Representatives from 12 countries. To be published in English and in French.

3.2. Advisory functions in the UNESCO programme on Cell Biology:

Study Group on Cell Growth, Paris 1955.

Meeting of experts at Brown University, Providence, R.I., 1956.

Advisory Committee on Research in the Natural Sciences.

Programme of UNESCO, Stockholm, 1957.

Meeting of consultants of the various international unions concerned with cell biology, Paris 1958.

Creation of an International Committee on Laboratory Animals.

3.3. Medical Documentation:

3.3.1. "Nomina Anatomica", revised by the International Anatomical Nomenclature Committee appointed by the 5th International Congress of Anatomists held at Oxford, 1950, approved by the 6th International Congress, Paris, 1955. Meeting of the Committee and cost of publication subsidized by the CIOMS with the help of Unesco. Published 1955 in three languages.

3.3.2. "Bibliography of International Medical Congresses", from 1851 to 1955. Subsidized by UNESCO. Published 1958 simultaneously in France, U.K., U.S.A. and Canada.

EXHIBIT IV. REVENUES OF CIOMS

Budgetary year	UNESCO	WHO	Membership dues
1950.....	\$23,750	\$35,200	\$1,450
1951.....	23,750	35,200	3,900
1952.....	21,000	35,200	3,391
1953.....	19,500	29,000	4,153
1954.....	18,000	25,000	5,521
1955.....	18,000	25,000	2,405
1956.....	18,000	20,000	2,895
1957.....	23,750	20,000	2,295

B. INTERNATIONAL MEDICAL ORGANIZATIONS

Senator HUMPHREY. As Dr. Delafresnaye has indicated in his memorandum, one of the important functions of CIOMS is to offer counsel on sound scheduling of international medical meetings. There are many reasons for this service. The enormous number of international meetings, the wide variety in sites, the considerable effort which must be made in planning for them and in carrying out arrangements—these are but a few of the factors which make necessary sound scheduling.

In my judgment, CIOMS has played an invaluable role in offering counsel for the improvement of the administration of international medical meetings. Indicative of that fact is the excellent 113-page publication, referred to in Dr. Delafresnaye's memorandum, entitled "The Planning of International Meetings." This valuable hand-

book, issued by CIOMS includes such topics as: (1) large international congresses; (2) smaller international conferences; (3) discussion group method; (4) international symposia and seminars; and (5) international committees, et cetera.

A broad number of what might be called "housekeeping" functions are touched upon. These range from arrangements for travel and hotel reservations to details on presentation of papers, the showing of audiovisual materials, planning of scientific exhibits, and other similar activities.

The scientist's time is at a premium; he has little time to spare. Everything that can be done to conserve his time prior to, at and subsequent to an international meeting may, by that measure, increase the productivity of science.

CLARIFICATION OF WHO-CIOMS RELATIONSHIPS

The materials which now follow include information on the nature of organizations which respectively—

(1) are members of CIOMS (itself a nongovernmental organization),

(2) have a relationship with WHO (an intergovernmental organization).

This information is in the form of a reply from Dr. Delafresnaye to an inquiry which I had presented. In this inquiry, I had asked for comments to clarify the differences between the respective lists in (1) and (2) above.

Moreover, by way of further clarification, I have listed, following Dr. Delafresnaye's letter, under separate columns the 58 nongovernmental organizations which are members of CIOMS and those which have relationships with WHO. Many organizations appear in both lists; others are in one list, but not the other; and of course there are many international groups which are in neither.

LETTER OF JULY 15, 1959, FROM CIOMS, DESCRIBING CRITERIA FOR RELATIONSHIP OF NONGOVERNMENTAL ORGANIZATIONS WITH WHO AND CIOMS, RESPECTIVELY

HON. HUBERT H. HUMPHREY,

*Chairman, Subcommittee on Reorganization and International Organizations,
U.S. Senate, Washington, D.C.*

DEAR MR. SENATOR: Thank you for your letter of June 29.

The criteria which should be fulfilled before a nongovernmental organization can be regarded as eligible to be considered for relationship with the World Health Organization are:

(i) The organization shall be concerned with matters falling within the competence of the World Health Organization.

(ii) The aims and purposes of the organization shall be in conformity with the spirit, purposes, and principles of the constitution of the World Health Organization.

(iii) The organization shall be of recognized standing and shall represent a substantial proportion of the persons organized for the purpose of participating in the particular field of interest in which it operates. To meet this requirement, a group of organizations may form a joint committee or other body authorized to act for the group as a whole.

(iv) The organization shall have a directing body and authority to speak for its members through its authorized representatives; evidence of this authority shall be presented if requested.

(v) The organization shall normally be international in its structure and scope, with members who exercise voting rights in relation to its policies or action.

These criteria are to be found in "Basic Documents" (ninth edition) issued by the World Health Organization.

You will note that paragraphs (i) and (ii) are worded very widely. Also, all organizations are on the same footing.

With UNESCO the situation is different. There are two categories of NGO's: Those which have "consultative arrangements" and those which have, in addition, "formal agreements," of which CIOMS is one.

The criteria for membership of the CIOMS are set out in articles 5 and 7 of our statutes for "international members" and in article 9 for "national associate members."

Article 5 reads:

"International membership in the Council is open to nongovernmental organizations of a worldwide character devoted to—

"(a) the encouragement of scientific research into the principles underlying health and into the causes of diseases; or

"(b) the application of the medical sciences to the prevention and cure of disease and to the promotion of health."

Article 7 reads:

"In order to become international members, the international organizations defined in article 5 must meet the following requirements:

"(a) They must have a recognized legal status;

"(b) They must have had at least 5 years of existence, or have already held two international conferences or congresses;

"(c) Organizations composed of individuals must each have at least 150 members belonging to at least 12 different states situated in several regions of the world;

"(d) Organizations composed of national associations must include at least 12 associations situated in several regions of the world."

You will note that our criteria are much more rigid as regards the object of our members; we have clearly focused our membership on "research."

It follows that in the medical field there are three categories of nongovernmental organizations:

(1) Those that enjoy formal relations with WHO but are not members of CIOMS, e.g., the International Federation for Housing and Town Planning.

(2) Those that enjoy formal relations with WHO and are at the same time members of CIOMS, e.g., the International Union Against Cancer.

(3) Those that are members of CIOMS but have not requested official relations with WHO, e.g., the International Union of Physiological Sciences.

I hope I have answered your question.

Yours sincerely,

J. F. DELAFRESNAYE,
Executive Secretary, CIOMS.

Alphabetic list (indexed by keyword in title of group) of organizations in CIOMS and in relationship with WHO, respectively

Organization	CIOMS members ^{1 2}	NGO's in relationship with WHO ^{1 2}
A		
International Air Transport Association.....	—	X
International Association of Allergology.....	X	—
World Federation of Societies of Anaesthesiologists.....	X	X
International Federation of Anatomists.....	X	—
International Union of Architects.....	—	X
International Conference of Audiology.....	X	—
B		
First International Congress of BCG.....	X	—
International Union of Biochemistry.....	X	—
Biometric Society.....	—	X
International Association for Prevention of Blindness.....	X	X
International Society of Blood Transfusion.....	X	X
C		
International Union Against Cancer.....	X	X
European Society of Cardiology.....	X	—
International Society of Cardiology.....	X	X
International Cardiovascular Society.....	X	—
American College of Chest Physicians.....	X	—
International Union for Child Welfare.....	—	X
International Society for Criminology.....	X	X
International Society for the Welfare of Cripples.....	X	X
D		
World Federation of the Deaf.....	—	X
Federation Dentaire Internationale.....	—	X
International Dental Federation.....	X	—
International League of Dermatological Societies.....	—	X
International Committee of Dermatology.....	X	—
International Diabetes Federation.....	X	X
E		
Central Council for Health Education.....	—	X
International Union for Health Education of the Public.....	X	X
International Federation of Societies for Electroencephalography and Clinical Neurophysiology.....	X	—
International League Against Epilepsy.....	X	—
International Society for Normal and Abnormal Ethnopsychology.....	X	—
F		
International Fertility Association.....	—	X
G		
International Society of Gastro-Enterology.....	X	—
International Association of Gerontology.....	X	—
International Federation of Gynecology and Obstetrics.....	—	X

¹ X: Yes. ² —: No.

Alphabetic list (indexed by keyword in title of group) of organizations in CIOMS and in relationship with WHO, respectively—Continued

Organization	CIOMS members ^{1 2}	NGO's in relation- ship with WHO ^{1 2}
H		
International Hospital Federation.....	—	X
International Federation for Housing and Town Planning.....	—	X
International Society of Hydatid Disease.....	X	—
International Hydatidological Association.....	—	X
I		
International Society of Internal Medicine.....	X	—
International Leprosy Association.....	X	X
International Union of Local Authorities.....	—	X
M		
World Medical Association.....	X	X
International Society of History of Medicine.....	X	—
International Academy of Legal Medicine and of Social Medi- cine.....	X	X
Council for International Organizations of Medical Sciences.....	—	X
International Medical-Athletic Federation.....	X	—
World Federation for Mental Health.....	X	X
International Association of Microbiological Societies.....	—	X
International Confederation of Midwives.....	—	X
International Committee on Military Medicine and Pharmacy.....	X	—
N		
International Neurological Congress.....	X	—
World Federation of Neurology.....	—	X
International Council of Nurses.....	—	X
International Committee of Catholic Nurses.....	—	X
International Union of Nutritional Sciences.....	X	—
O		
World Federation of Occupational Therapists.....	—	X
International Federation of Ophthalmological Societies.....	X	—
International Society of Orthopaedic Surgery and Trauma- tology.....	X	—
World Union OSE (Child Relief and Health Protection of Jewish Populations).....	—	X
International Congress of Otolaryngology.....	X	—
P		
International Pediatric Association.....	X	X
International Society of Clinical Pathology.....	X	—
Permanent International Committee of Comparative Pa- thology.....	X	—
International Society of Geographical Pathology.....	X	—
International Pharmaceutical Federation.....	—	X
International Federation of Physical Medicine.....	X	—
World Confederation for Physical Therapy.....	—	X
International Union of Physiological Sciences.....	X	—
International Association for the Coordination of Psychiatry and Psychological Methods.....	X	—
World Congress of Psychiatry.....	X	—

¹ X: Yes. ² —: No.

Alphabetic list (indexed by keyword in title of group) of organizations in CIOMS and in relationship with WHO, respectively—Continued

Organization	CIOMS members ^{1 2}	NGO's in relationship with WHO ^{1 2}
R		
International Commission on Radiological Protection.....	—	X
International Commission on Radiological Units and Measurements.....	—	X
International Congress of Radiology.....	X	—
International Union of Railway Medical Services.....	X	—
International Committee of the Red Cross.....	—	X
League of Red Cross Societies.....	—	X
International League Against Rheumatism.....	X	X
S		
Inter-American Association of Sanitary Engineering.....	—	X
International Conference of Social Work.....	—	X
Federation Internationale De Medicine Sportive.....	—	X
International College of Surgeons.....	X	—
International Society of Surgery.....	X	—
International Federation of Surgical Colleges.....	—	X
T		
International Organization Against Trachoma.....	—	X
International Congress of Tropical Medicine and Malaria.....	X	—
International Union Against Tuberculosis.....	X	X
U		
World Federation of United Nation Associations.....	—	X
International Society of Urology.....	X	—
V		
International Union Against the Venereal Diseases and Treponematoses.....	X	X
World Veterans Federation.....	—	X
World Veterinary Association.....	—	X
W		
Medical Women's International Association.....	X	X

¹ X: Yes. ² —: No.

4. TRANSCRIPT OF CONFERENCE WITH OFFICIALS OF EXCERPTA MEDICA FOUNDATION

Senator HUMPHREY. One of the organizations with which we have been in close contact since the inception of our study is the Excerpta Medica Foundation of Amsterdam.

In the year which has followed our initial meeting in November 1958 with Chancellor M. W. Woerdeman and Mr. E. van Tongeren, we have benefited from many helpful comments which they have forwarded in response to additional specific questions which we have raised with them.

X: Yes. —: No.

CORRESPONDENCE PRINTED AFTER TRANSCRIPT

For example, at the conclusion of the text of the verbatim transcript will be found a report of July 17, 1959, on a trip to the Far East made by Mr. Peter Warren, Director of the Foundation. Mr. Warren had been invited by the subcommittee to convey this report based on his review of the important problems of abstracting Japanese and mainland China medical literature. I am glad to point out that the National Institutes of Health subsequently approved application for grants for abstracting the literature.

Thereafter will also be found messages in response to other specific inquiries we had made as regards (a) specialized disease problems not now abstracted, (b) problems of a master index, and (c) the praiseworthy role of the Netherlands Government in helping to start the Foundation.

TRANSCRIPT OF DISCUSSION IN PARIS, FRANCE, NOVEMBER 17, 1958

Senator HUMPHREY. Professor Woerdeman and Mr. van Tongeren, first, may I say that we are, as you know, especially grateful to you for having come here on a journey all the way from Amsterdam to Paris to be with us this morning.

I am personally happy to meet you both because your presence enables me to bring to your attention an official transcript of a hearing before our Committee on Government Operations on the subject of the Science and Technology Act of 1958. It was during a hearing such as we are having here that I asked Col. Frank B. Rogers, Director of the National Library of Medicine, in the course of his testimony, a few questions relating to his endeavors and the work of the Excerpta Medica Foundation. Dr. Rogers paid you a very high tribute which you surely deserve.

Now without any further ado, I want to suggest to our guests that as you introduce yourselves, you just give a word of background for identification—your professional background and your present position.

Professor WOERDEMAN. I studied medicine in the University of Amsterdam and specialized in anatomy and histology also in Amsterdam. In 1925 I was appointed professor of histology in the University of Amsterdam. I became professor of anatomy and embryology in the University of Groningen in 1926. In 1931 I returned to the University of Amsterdam as professor of anatomy and embryology.

For many years I was secretary general of the Royal Netherlands Academy of Science and for the past 4 years I have been president of the Royal Academy. Since its establishment in 1946 I have served as chairman of the board of the Excerpta Medica Foundation. Finally, in 1953 I was appointed president of the University of Amsterdam.

Senator HUMPHREY. You are indeed a very busy and distinguished man. We are very honored to have you here. Now you may want to just proceed along your own lines and to describe the work of Excerpta Medica.

ORIGIN OF FOUNDATION

Professor WOERDEMAN. I would like to express our great appreciation for your kind invitation which enables us to tell your committee some of the experience gained by the Excerpta Medica Foundation during more than 10 years of large-scale international medical documentation.

During the late war, especially in the occupied countries, we found that research was seriously handicapped by a lack of international contact and international information. This gave birth to the idea of establishing a worldwide organization which perhaps could solve this vast problem. The basic tasks of course were to seek the cooperation of leading scientists throughout the world; to coordinate the great wealth of material and to establish an efficient method of organization on a sound financial basis.

The start was made in 1947 after about 1 year of preparation. In quick succession 15 monthly abstracting journals of *Excerpta Medica* were established covering the whole field of medicine according to the accepted medical educational pattern. Since that time, and with the support of the National Institutes of Health, the Department of Health, Education, and Welfare, and several private research-organizations in the United States, six new abstracting journals have been added to the series in addition to some literature services, devoted to specific diseases such as multiple sclerosis, muscular dystrophy and poliomyelitis. These latter services are provided exclusively for the National Multiple Sclerosis Society, the Muscular Dystrophy Associations of America and the National Foundation respectively, as up-to-date reference services for their thousands of investigators throughout the United States and countries overseas. All these services are published in the English language.

It is encouraging to feel that we were able to solve the difficulties of organization and cooperation which at first seemed insuperable.

EDITORIAL AND ADMINISTRATIVE PHASES

You will understand that there are two important aspects of the work of *Excerpta Medica*. One is the editorial, scientific side, which is dealt with by myself and my colleagues—chief editors, Dr. Morris Fishbein, in Chicago, and Sir Heneage Ogilvie, in London. The other concerns the organizational, administrative, and publishing aspects, the responsibility for which rests in the hands of the two Directors of the Foundation, Mr. E. van Tongeren, in Amsterdam, and Mr. Peter A. Warren, in New York.

OFFICE IN NEW YORK

Since a few years *Excerpta Medica* has its own office and organization in the United States, led by Mr. Warren. This was a natural development. We are of the opinion that only through close contact with the leading medical centers on all continents, our work can be developed to its maximum value for international medical science. Now your country gives so many impulses to medical research, impulses which also have a direct influence on our work, that it was necessary that the *Excerpta Medica* Foundation establish its own organization in the United States in order to intensify the scientific contact with all those organizations and institutes in your country which do such leading work. As a future development it may be desirable to form fully equipped *Excerpta Medica* centers on the remaining continents, now that those in Europe and in the United States have been established. It may be convenient for you to know that Mr. Warren, who cooperated with me in the *Excerpta Medica* Foundation already since 1947, will gladly provide you with any additional information you may wish to obtain after you return to Washington.

NEED FOR ABSTRACTING JAPANESE LITERATURE

I am very happy that you have given us this opportunity to report not only on the achievements but the desirable future development of the *Excerpta Medica* services. We realize, for example, that there are still gaps to be filled. This is especially so in regard to the Oriental literature and in particular that of Japan and China. This was again brought to our notice only a few days ago by a letter from Dr. Nathan W. Shock, Chief of the Gerontology Branch of the National Institutes of Health, who wrote: "Early this spring I was in Japan and was surprised to discover that there is a large body of Japanese literature on gerontology which is largely unknown to western scientists." Other problems arise in the indexing of the material and the search for back information.

Senator HUMPHREY. As I understand from your letter to me of October 23, 1958, Professor Woerdeman, you say that there are somewhere between 40,000 and 60,000 abstracts published every year in Japan, but that we do not have access to one-tenth of this literature because the journals are published in Japanese.

Professor WOERDEMAN. Indeed. We have been in close contact with our Japanese colleagues on this whole project and have come to the conclusion that the publication of approximately 15,000 abstracts would give an adequate and proper coverage of the Japanese literature.

Senator HUMPHREY. Now you mentioned in your letter that representatives of *Excerpta Medica* had been discussing this Japanese abstract problem with the National Institutes of Health.

Mr. VAN TONGEREN. Yes, sir. My colleague, Mr. Warren, who is in close touch with the various divisions of the National Institutes of Health in Bethesda, has discussed the establishing of an abstracting service on Japanese medicine on several occasions with Mr. Scott Adams, Chief Librarian, Dr. Michael B. Shimkin, Chief, Biometry Branch, National Cancer Institute and other officers of the Institutes. The general opinion, as I can myself testify from a visit to the United States, appears to be much in favor of it. It is an untapped source of potentially important information which we feel should be made available to scientists.

Senator HUMPHREY. What is the main problem today, is it financial?

Mr. VAN TONGEREN. Yes. There is still quite a wealth of information available which we feel should be included in our journals, but we are working on a limited budget which precludes our assuming such additional burdens. Nevertheless we hope that the means can be found to support the work still to be done.

Senator HUMPHREY. Did you come to any kind of agreement or understanding with the people of the National Institutes of Health?

Mr. VAN TONGEREN. Well, they invited us to study the project, to consider whether it were feasible and in what manner it could best be organized. This has been done and we are satisfied that there are neither editorial nor technical difficulties involved in establishing it on the lines of our Abstracts of Soviet Medicine. If the necessary financial aid can be extended to the project, it could certainly be developed without great delay.

Senator HUMPHREY. Well, this whole matter of translation, abstracting, and compilation of bibliographies is a subject to which this subcommittee of which I am chairman gave a good deal of attention last year. We took many weeks of testimony in hearings and we did improve the situation in the Government of the United States by providing additional resources and personnel and placing under the National Science Foundation the responsibility for the coordination of abstracting services, dissemination, correlation, translations, and so forth. This is the responsible agency in the Government working with all the many other bureaus and agencies that we have and with private groups. We also provided funds, substantial amounts of funds. I think it would be good to follow up on this.

MAINLAND CHINA LITERATURE

Senator HUMPHREY. Now the other point that was mentioned here by Professor Woerdeman is the medical literature in China.

Professor WOERDEMAN. Yes.

Senator HUMPHREY. You are speaking of the mainland of China.

Professor WOERDEMAN. Yes, sir.

Senator HUMPHREY. Now what information do you have on either the quantity or quality of the publications being printed by the Peiping Government?

Professor WOERDEMAN. This matter has also been studied by Mr. van Tongeren and Mr. Warren following discussions which Mr. Warren has had with representatives of the National Institutes of Health in Bethesda. Perhaps Mr. van Tongeren could give further information about that.

Senator HUMPHREY. Yes; just as you wish.

Mr. VAN TONGEREN. The Chinese medical literature—I am speaking of the mainland—unlike the literature of the U.S.S.R. and Japan, is not abstracted by the Chinese, nor does it appear in any abstracting service at present available. The literature therefore has first to be abstracted. There is not a great volume of Chinese literature—it comprises some 37 medical periodicals, mostly in the specialist field. There are two possibilities of handling this literature. We might try to establish an editorial committee in Peiping, like an editorial committee was formed in Moscow to aid us in the coverage of the Russian literature. For the past 2 years now a group of leading Russian medical scientists, appointed by the Academy of Medical Sciences in Moscow, has given us this very valuable editorial assistance.

Senator HUMPHREY. When you say "us," you mean *Excerpta Medica*?

Mr. VAN TONGEREN. Yes, sir. Through this cooperation with Moscow we receive a great deal of material which would not otherwise be available.

Now, we would like to form a similar editorial committee in Peiping which provides us with the abstracts of the original literature. If that is impossible, then it will be necessary to seek the cooperation of Chinese doctors living outside the mainland, say in Singapore, Indonesia, or Taiwan, and invite their assistance in abstracting the Chinese literature.

Senator HUMPHREY. Is there a good Chinese medical school outside of the Chinese mainland? Is there one at Taiwan?

Mr. VAN TONGEREN. Yes, sir.

Senator HUMPHREY. So you would have no shortage of qualified technical personnel for the translation of the abstracts?

Professor WOERDEMAN. No, I don't think so. But we don't know, of course, whether Taiwan would be willing to cooperate in this project.

Senator HUMPHREY. The problem of mainland China and the Nationalist Government of China might pose a severe problem in this respect; is that correct?

Professor WOERDEMAN. Yes, this is at least conceivable, although it is our sincere belief that the purely scientific work of *Excerpta Medica* should not be hampered by political barriers.

Senator HUMPHREY. Still this might pose a problem. Moreover, is it not desirable that the abstracts be prepared by people who are working in the particular field covered by the original article?

Professor WOERDEMAN. Yes, definitely. This is the basis of our work and this also explains why we have more than 7,000 specialist-abstractors working with us all over the world.

Senator HUMPHREY. Well, now, how would you be able, for example, to establish a group in Peiping to do this abstracting? Does your Government have diplomatic relationships with Peiping?

Professor WOERDEMAN. I am not sure.

Senator HUMPHREY. I don't think so. How might this be done?

Professor WOERDEMAN. Maybe the editorial committee, which is assisting us now in Moscow, would be willing to approach the Chinese Medical Association in Peiping to form such a committee.

Senator HUMPHREY. Great Britain has formal diplomatic relationships with the Chinese on the mainland. The Danish Government, I believe, does too.

Now the other possibility, as you said, was to have the abstracting done outside China. But then you may have the problem of the reliability and the accuracy of the abstract.

Mr. VAN TONGEREN. Well, not necessarily, I think we can organize this satisfactorily. Although, of course, it would be easier to have the abstracts prepared at the source, we could certainly find scientists outside China willing to cooperate with us in this work.

Senator HUMPHREY. I suppose that the weight of your testimony would indicate that the Japanese literature would take priority and is more easily to be realized as the abstracts exist in the Japanese abstracting service?

Mr. VAN TONGEREN. Yes, sir.

Senator HUMPHREY. Julius, I want included in the testimony all the communications that we have with all of our witnesses. In fact, all of the letters that we have received in response to communications addressed to our correspondents should be made a part of the general testimony. And this is particularly true, of course, regarding the letters from the *Excerpta Medica* Foundation.

EXPANSION OF ABSTRACT SERVICE

Professor, do you wish to make any further recommendations? You told us for example that you are cooperating with the Multiple Sclerosis Society, the National Foundation and the Muscular Dystrophy Associations of America in making available special abstracting services in their fields of interest in order to aid research there. Now, could *Excerpta Medica* develop other services of this kind related to other specific areas?

Professor WOERDEMAN. As *Excerpta Medica* has the basic medical literature from which all of its information is derived, there are no editorial or technical difficulties in establishing services in any specific disease area or area of research. For example, we have recently submitted an application for a grant to the National Institutes of Health to establish an abstracting service in the field of human genetics. At the same time, we are proposing to prepare and publish a bibliography of abstracts on human genetics from material published during the past 12 years.

During the past months we have discussed with our boards of editors the feasibility of developing abstracting services in the fields of diabetes and other metabolic diseases; allergy; arthritis; congenital malformations; gastroenterology; hematology; nutrition; infectious diseases; mental health; diseases of the central nervous system (cerebral palsy, epilepsy, cerebrovascular diseases); virus diseases and several other areas. It would be possible for *Excerpta Medica* to develop these and similar literature services for the National Institutes of Health or for other medical institutions if they are needed and if the funds can be made available to support them.

SENATOR HUMPHREY. Well now, as you are contemplating the preparation of a bibliography of the literature on human genetics covering the past 12 years, do you consider it desirable and would it be possible for *Excerpta Medica* to prepare similar bibliographies of abstracts in other fields?

IMPORTANCE OF MASTER INDEX

Professor WOERDEMAN. In those medical fields which have been the subject of scientific research during, say, the past decade, it would indeed be possible to compile similar bibliographies. However, there are constant changes in the trends and focus of research as science progresses and it may well be possible that in another 5 to 10 years scientists will be studying problems which are not recognized as such at this moment. Nevertheless, they will have been doing work and publishing reports of their work which will have led to these new problems. The present system of indexing would not enable us to retrieve the necessary information on these new problems from the back indices as, for the purposes of the current use of *Excerpta Medica*, each abstract is given only three to four index references, all pertaining to the study of current problems.

Much information—probably vital in the future—could only be obtained by a most laborious search of the back issues, abstract by abstract. We believe that new methods of storing information will have to be devised which will make it possible to retrieve references to it in any form and with the minimum of delay.

Senator HUMPHREY. Would it be possible for *Excerpta Medica* to develop an indexing system which would enable you to retrieve vital information of this kind, on any subject and virtually, at a moment's notice?

Mr. VAN TONGEREN. We believe this to be feasible. Undoubtedly we have to seek a long term solution. Owing to the magnitude of the problem the application of mechanical or electronic methods and techniques will have to be studied as they would appear to offer the greatest possibilities for accurate storing and rapid retrieving of information on a scale which could not be achieved by other means. Our general aim would be the establishment of a comprehensive, fully cross-referenced and cumulative master index system. This system, being supplied with the most exhaustive and detailed references to the world's medical literature as recorded by *Excerpta Medica*, should attempt to confine search for information on any given subject, to little more than a "press-button operation." We regard it of the greatest importance that this master index be prepared in a number of copies, so that the system can be established and maintained on the same basis and in the same form in all the large medical centers throughout the United States and in other important centers of the world. We therefore recommend that *Excerpta Medica* make a study of this problem to determine how the master index system can best be established and whether mechanical or electronic methods can be adapted or developed to overcome this growing worldwide problem.

As the many factors affecting the extent and scope of the proposed study cannot be determined until a preliminary investigation has been made and as the costs cannot yet be accurately estimated, we would recommend that sufficient funds be set aside for the purposes of the study with a partial allotment to enable the preliminary investigation to be carried out. If our investigations show that with or without the aid of mechanical or electronic equipment it will be feasible to establish a master index system, the study could be completed in detail and our recommendations submitted.

MILLION ABSTRACTS SINCE 1947

Senator HUMPHREY. Would the present system of printed indices be maintained if the master index were to be established?

Professor WOERDEMAN. Yes, sir, I am definitely of the opinion that these indices will have to be maintained. Since *Excerpta Medica* is used not only by research workers and physicians in clinical practice but also in the educational institutions, it will be necessary to maintain the publication of the indices in this present form. I think, even, we have to improve them and make them more useful by cumulating them periodically.

For example, every year we publish 26 separate subject and authors' indices. For the specialist reader who receives one or perhaps two of the *Excerpta Medica* publications concerned with his own field of interest, no problem arises in retrieving the current information he requires; indeed, this method is both convenient and rapid. For the medical library, serving, say an educational institution and receiving all of the *Excerpta Medica* publications, and thus 26 indices every year, the problem is certainly greater, especially as the volumes cumulate over the years. The *Excerpta Medica* publications appeared for the first time in 1947, since when we have published more than 1 million abstracts. This vast quantity of material is indexed in approximately 250 separate indices. Although a search of the literature to locate information contained in the abstracts covering a specific subject would never require reference to all of them, the problem is nevertheless a growing one, and it would not be unusual, in making a 12-year search of the literature on a given subject, to have to consult perhaps 40 or more indices.

We believe that medical libraries and other institutions regularly using *Excerpta Medica*, could be aided to a considerable degree if we were able to provide them with cumulative subject and authors' indices, say every 10 years. Thus, searching the 200 indices published during a period of 10 years could be reduced to searching 20 covering the literature of the same 10-year period. This would result in a very considerable saving in search time. The American Medical Library Association endorses this point of view and we are assured that its members would greatly welcome the introduction of 10-year cumulative indices to the *Excerpta Medica* abstracts. We have made a preliminary study of the problems involved in publishing these indices. We have come to the conclusion that there would be no major editorial or technical difficulties in preparing cumulative indices for the period 1947-56 and in setting up a simplified administrative system of indexing which would greatly facilitate the publication and reduce the costs of future 10-year cumulative indices. It would be reasonable to expect that subscribers would be able and willing to make a contribution toward the costs by a subscription to the index service. This contribution could be set aside by *Excerpta Medica* toward the costs of publishing future cumulative indices.

I think it will be very useful when we study the use of mechanical or electronic means for compiling the master index system, to see how these means can at the same time be employed for the preparation of future decennial indices.

WORK OF NATIONAL LIBRARY OF MEDICINE

Senator HUMPHREY. Are you familiar with some of the work that has been undertaken in the United States relating to the development of mechanical equipment?

Mr. VAN TONGEREN. Yes, sir; we know something of this and are following the work with the greatest interest.

Senator HUMPHREY. Western Reserve University had a project and I believe the National Academy of Sciences had one.

Mr. REYNOLDS. Do you know of the work of the National Library of Medicine in this field?

Mr. VAN TONGEREN. Yes, we are familiar with this work, as my colleague, Mr. Warren, advises us on these matters. Of course, we receive the excellent reference service, the Current List, prepared by the National Library, which gives the titles and sources of all articles in medical periodicals available at the library.

Mr. REYNOLDS. The information which is gathered at the Library is also indexed, isn't it? Does not this lead to some duplication?

Mr. VAN TONGEREN. The Library provides a title service while *Excerpta Medica* undertakes to give information on the contents by preparing and publishing abstracts of the articles.

Senator HUMPHREY. So it would not be a duplication. They would actually be supplementing each other, is that not so, Doctor?

Professor WOERDEMAN. Indeed, and together I think we are rendering a very valuable service in medical documentation.

Senator HUMPHREY. This falls into line with what we were attempting to do last year. It is very important that we keep the closest coordination at this stage between the groups that are trying to improve indexing and abstracting. We are seeking to improve the dissemination and the collation, the translation, indexing, and abstracting. We are trying to prevent organizations from getting in each others way.

Professor WOERDEMAN. That indeed is our firm opinion too.

Senator HUMPHREY. There is a system of documentation in Washington that is being developed in the Department of Defense that has tremendous prospects. I don't think it has been perfected yet but it is being developed and all of these agencies we have mentioned—the National Library of Medicine, the National Library of Congress and the National Academy of Sciences—are working together.

Mr. VAN TONGEREN. Yes, it is very valuable that duplication is avoided.

Senator HUMPHREY. That is what they are attempting to do, and each one is trying to designate which area it will concentrate on. Then, they will bring all of it together, eventually, and have one agency responsible for each type of information.

By the way, you should be, and I am sure you are, familiar with this splendid article that appeared in the New York Times, Sunday, September 14.

Professor WOERDEMAN. Yes, sir.

Senator HUMPHREY. It is by Dr. Howard Rusk who is a dear friend to all of us. He pointed out again, of course, the importance of medical information to the persons who can utilize it and the work which your Foundation is doing in this respect.

Now what about the lag between knowledge and application—how you are trying in *Excerpta Medica* to remedy this situation? This is a question that comes before us now because of the possibility of new legislation in the Congress of the United States and because of the close working relationship between your Foundation and some of our groups in the United States. What might be the extent of your work? Or what could be the extent of your work, assuming that you have adequate financial resources available or at your disposal?

In other words, how much of the world's medical literature not now abstracted do you feel should be—I don't say could be, but should be—abstracted over and above what you are presently doing, if you had the resources?

TWO THOUSAND FOUR HUNDRED JOURNALS ABSTRACTED

Professor WOERDEMAN. Including the Russian coverage, we are currently abstracting about 2,400 medical journals. Each of these periodicals has been selected for abstracting after consultation and on the advice of the members of our international editorial boards. Each one of our abstracting publications has appointed to it an international editorial board, comprising some 30 to 50 of the leading medical scientists representing all important countries of the world. In our opinion, to complete our coverage, this number of journals should be expanded, especially in certain territories. For example, as I mentioned previously, we feel we should provide a more comprehensive coverage of the Japanese and Chinese medical literature.

Senator HUMPHREY. Have you ever attempted to make a specific estimate and specific budget statement with regard to the abstracting of this additional literature?

Mr. VAN TONGEREN. Not yet, sir. We can readily estimate the printing and publishing costs, but the costs of translation will depend upon the arrangements we are able to make in Japan. We have hesitated to make more than an informal approach to our Japanese colleagues on this particular matter until we can see a way to finance this project. As the work now being done by Japanese scientists appears to have gained a high international reputation and as abstracts of their publications already exist, we feel that priority should be given to the establishing of a Japanese medical abstracting service in the English language. In the meantime we can continue to seek ways to develop a similar service covering the Chinese literature.

HALF-MILLION-DOLLAR EXPENDITURE

Senator HUMPHREY. There is another point I would like to raise and on which I believe there is not too much understanding. I mean the costs involved in abstracting and publishing abstracts on such a scale as your Foundation does.

Professor WOERDEMAN. Indeed, our costs are heavy and I estimate that this year they will amount to some 2 million guilders, Dutch guilders.

Senator HUMPHREY. What would that be in dollars?

Professor WOERDEMAN. About half a million dollars.

Senator HUMPHREY. Does that include payments to abstractors?

Professor WOERDEMAN. With very few exceptions in the case of some special services, all of our 7,000 abstractors cooperate with us on a voluntary basis. I must say that I and my colleagues are extremely grateful for this generous support from all those colleagues all over the world who make our work possible.

Mr. VAN TONGEREN. I would like to add something which Professor Woerdenman does not mention, namely, that neither he nor his colleagues on the chief editorial board, Dr. Morris Fishbein and Sir Heneage Ogilvie, accept any remuneration for all their work on behalf of Excerpta Medica.

BASIS OF EACH ABTRACTOR'S WORK

Senator HUMPHREY. There must be very much work involved here. I must say that I find the attitude of you and all these other distinguished men very generous. When you come to the abstractors, is this a part of professional interest?

Professor WOERDEMAN. Yes, indeed. Our system is that each abstractor is invited to select the specific subject on which he wishes to receive material. Thus, a surgeon who cooperates with us receives those articles on the sub-specialized surgical subjects in which he is most interested, and not in the whole surgical field, unless, of course, he specifies such a choice. In the case of surgery this would, of course, be unlikely. In that way he has access to articles which he would otherwise not see.

Senator HUMPHREY. Oh, I see what you are getting at. In other words if you find that there is a doctor who has an interest in a particular field, let us say the ear, you provide that doctor with all of the information that comes in to you. And as he studies the material he abstracts it for you. So he has the advantage of your being the collecting and disseminating agency on a selective basis. And you have the advantage of receiving the abstract.

Mr. VAN TONGEREN. Yes, sir; that is right.

Senator HUMPHREY. Well, how do you keep these generous volunteers on schedule?

Mr. VAN TONGEREN. That, of course, is a difficult matter. There is no obligation; we ask them to return the abstracts as quickly as possible.

Senator HUMPHREY. I see.

Mr. VAN TONGEREN. And as quickly as possible can mean anything from 4 days to 5 months. That is a drawback, of course.

Senator HUMPHREY. But it works despite that.

Mr. VAN TONGEREN. We feel that no other system would be possible. Not only having regard to the costs, but because the literature is becoming so highly specialized. This means that the abstracting can only be done by scientists who are completely familiar with the subject covered by a particular article. It also explains why it is necessary to have a group of more than 7,000 abstractors cooperating with us.

Senator HUMPHREY. Yes; I see now.

MULTIDISCIPLINARY NEEDS

Mr. CAHN. I would like to ask something about fields which overlap each other, such as biochemistry and medicine, biophysics and medicine.

Mr. VAN TONGEREN. As you undoubtedly know, there exist two outstanding American abstracting services, Chemical Abstracts and Biological Abstracts. Now, we have arrangements with these two services by which their abstracts may be used to supplement Excerpta Medica in instances where we find they are of medical interest. This of course is a reciprocal arrangement.

Senator HUMPHREY. Chemical Abstracts are considered to be outstanding, superior—and you have close working relationships at all times with these two services?

Professor WOERDEMAN. Yes, sir.

Mr. CAHN. This morning we were discussing with Professor Bugnard the subject of the new frontier sciences, so to speak, of medicine. And reference was made to medical physics. I know that Chairman Humphrey would be very much interested in your comments on this as one of the great unfolding fields, to which attention should be paid.

Professor WOERDEMAN. We indeed think it important to consider developing a new abstracting publication of *Excerpta Medica* in this field. That would of course involve the help of physicists. We would have to cover many physics journals which at this moment are not at our disposal. But I think that with the cooperation of physicists and medical scientists it would be possible to provide medical science with an abstracting service in this field.

Senator HUMPHREY. Now, perhaps this would be something that could be facilitated by the International Atomic Energy Agency—

Professor WOERDEMAN. This might certainly be in their field.

Senator HUMPHREY. Or by Euratom.

Now you have said that you feel it is important to enter this field. How do you think you can enter it and when do you think you will?

Professor WOERDEMAN. Well, we could certainly undertake it, as we have the basic organization. This medical physics project would be a matter of building up a similar corps of cooperators as we did for medicine—pure medicine.

Senator HUMPHREY. Yes.

Professor WOERDEMAN. It does not seem an insuperable difficulty.

Senator HUMPHREY. It is something that you are giving thought to now?

Professor WOERDEMAN. Yes, sir.

MASTER INDEX CENTERS

Senator HUMPHREY. To come back to the problem of retrieving back information, do you know of any organization which has what you call a master card index?

Mr. VAN TONGEREN. No, sir; we are all still working with word indexes.

Senator HUMPHREY. This slows up the utilization of information, doesn't it, the lack of the central master system?

Mr. VAN TONGEREN. Yes, indeed. Moreover, it seems to us the only possible way to cover all aspects of the literature and to be able to obtain the information quickly.

Senator HUMPHREY. Where did you say such a master index system would be maintained if you established one?

Mr. VAN TONGEREN. We feel that a few world centers should be established where copies of this material would be maintained. At the same time we think it would be very desirable to have available at those centers all the original material indexed. If a scientist wishes to have back-material he can obtain this through the nearest center, receive copies of the abstracts on the subject of his study and make a selection of what he finally needs. He can then consult the original material at the same time.

Mr. REYNOLDS. The need for all this applies not only to medicine. In the United States we propose to establish institutes in certain fields—meteorology, oceanography, solar energy, and various others. Those are the first ones proposed because they have been debated so many years. The next logical step would be to establish an institute of biology or in chemistry, say, at the University of Minnesota, or in Ohio because that is the center of the chemical abstracts operation; the University of Ohio would be the logical place for that. I also think about the Western Reserve University.

SUBJECTS NOW COVERED

Senator HUMPHREY. You told us that at present you are publishing more than 20 monthly abstracting services, all in English I understand?

Mr. VAN TONGEREN. Yes, sir. The subjects which we cover at present are: anatomy, anthropology, embryology, and histology; physiology, biochemistry, and pharmacology; endocrinology; medical microbiology, immunology, and serology; general pathology and pathological anatomy; internal medicine; pediatrics; neurology and psychiatry; surgery; orthopedics and traumatology; obstetrics and gynecology; otorhinolaryngology; ophthalmology; dermatology and venereology; radiology; chest diseases, cancer; public health, social medicine, and hygiene; cardiovascular diseases; rehabilitation; gerontology and

geriatrics; poliomyelitis; multiple sclerosis; muscular dystrophy; and then in addition to all this we have our two quarterly abstracting services on the U.S.S.R. literature, Abstracts of Soviet Medicine, part I, on the basic sciences and part II on the clinical aspects.

INFORMATION ON DRUGS

Furthermore, our editors collect the pharmacological and chemical synonyms which we find in the literature. As you well know, drugs and other compounds are known in different parts of the world under different names, so it is very useful to compile this information. We publish it under the title "Pharmacological and Chemical Synonyms." Then our editors collect all data from the literature on the untoward side effects of drugs. This information is also published at regular intervals. I have here with me samples of everything we are publishing at present.

Senator HUMPHREY. This is a wealth of material.

Mr. VAN TONGEREN. I will leave this here if you wish.

SUBSCRIPTION COSTS

Senator HUMPHREY. Would you do that? This will be very, very helpful to us. What does it cost in subscription to receive regularly the *Excerpta Medica* literature?

Mr. VAN TONGEREN. With the sample copies are a number of brochures explaining our services, and the subscription fees are also shown.

Senator HUMPHREY. That is very well organized. And I want to be sure that the materials which have been presented to us today, gentlemen, are forwarded back to the offices of our committee so that they can be made, by code number or exhibit number, a part of the master file of testimony.

WORLDWIDE ABSTRACTS

Now I want to ask Professor Woerdeman this question: There is a publication entitled "World-Wide Abstracts of General Medicine"?

Professor WOERDEMAN. Yes, indeed, sir.

Senator HUMPHREY. Would you care to comment on your new publication under the aforementioned title which I believe is being published or issued under the auspices of the Warner-Chilcott Laboratories to American general practitioners. It is a general practitioner's publication, isn't it?

Professor WOERDEMAN. Yes, sir. Until this publication was developed, we had no abstracting journal designed for the general practitioner. All our journals are devoted to specialist subjects. The difficulty is, of course, that in a publication for general practitioners, a very careful selection of material has to be made so that what is published is of immediate practical value. Now with the support of the Warner-Chilcott Laboratories we have been able to establish this service. It is organized in such a way that all of the medical literature received by *Excerpta Medica* is screened editorially four times before the final selection is made. This insures that the most useful material is presented to the general practitioner.

Senator HUMPHREY. I would imagine that this is a very helpful journal for the general practitioner.

Professor WOERDEMAN. Yes, we believe so. We have very gladly undertaken this task as we in the Foundation and the management of the Warner-Chilcott Laboratories both feel that the general practitioner had been too long neglected in the abstracting field. This journal is published and distributed by the Warner-Chilcott Laboratories, while *Excerpta Medica* provides and is responsible for the content.

Senator HUMPHREY. Dr. Morris Fishbein is an American member of your chief editorial board?

Professor WOERDEMAN. Yes, sir; and this journal is under his special supervision.

Senator HUMPHREY. Yes. How long has this been in publication now?

Professor WOERDEMAN. The first issue was published in October 1958.

Senator HUMPHREY. Well, I can well imagine the general practitioner will be delighted because really they are sometimes the forgotten men of medicine. Now to my mind they are, if not the most important, one of the most important to the family man. For it is to him that we take our children, come for advice and for help so frequently.

BACKLOG OF PREVIOUS LITERATURE

Now there is one other question that I wanted to place before you gentlemen, namely, relating to the backlog of literature, the literature that hasn't been translated or abstracted or indexed.

Professor WOERDEMAN. Yes.

Senator HUMPHREY. What are, first of all, the feasibility and secondly the worthwhileness of abstracting selected literature of years gone by, the older material—prior to all the present material which is already abstracted? I note that we should possibly exclude those clinical articles now obsolete, as the literature just wouldn't have any current application.

Professor WOERDEMAN. This is indeed a subject that deserves careful consideration. In basic medicine it would be worthwhile to have excerpts for the last, I would say, 50 years. That would be sufficient but, I agree, only on a selective basis. There are many things which are obsolete now, but there is of course information which retains its value for a long time. Yes, I think excerpts covering let us say, the last 50 years, would be of very great help to research workers. It would also be worthwhile to search the clinical literature of the past, but there even more one would need to be very selective. Due to the rapid progress which has been made in the clinical field, I do not believe that one would need to go further back than say the last 20 years.

Senator HUMPHREY. We have covered a lot of ground now. You have given me an impressive picture of what it involves to run an abstracting service for medicine on such a big scale. We have talked about the sources, so far untapped, such as Japanese literature, also about the automatic data processing or a master index system which could speed up the flow of back-information, in an unprecedented way; about the establishment of special literature services for highly specialized subjects and about the desirability of searching the literature of the past to a certain extent.

Now, to get the picture clear, I would like to put a general, let us say summarizing question: What can be done, if it needs to be done, to improve the dissemination or the giving out of information to the medical sciences that will stimulate more adequate medical care and medical research? Or, to put it in another way: What are the main weak points today in the dissemination of medical information?

SUBSIDY SOURCES

Professor WOERDEMAN. Well, the major problem is still a financial one, of course. Abstracting services are highly expensive and one would miss one's target altogether if scientific information could only be provided at a price beyond the reach of the reader. Most of the abstracting services have to live by the subsidies and grants they receive.

Senator HUMPHREY. Do you get some income from advertisements?

Professor WOERDEMAN. There is a small income from advertising, but not sufficient as a real source of income.

Senator HUMPHREY. How do you receive subsidies or grants—from what groups, organizations, and societies do you receive them?

Professor WOERDEMAN. In the United States, subsidies in the form of grants are received both from the U.S. Government, through the National Institutes of Health, and from private foundations and agencies. These grants are not extended in overall aid of our work but in support of specific services. I am very happy to tell you that we have received very valuable support for some years from the National Foundation which has enabled us to report fully on the problems of poliomyelitis. Similar grants have been extended to us from the American Cancer Society, the Multiple Sclerosis Society and the Muscular Dystrophy Associations of America. Thus, the financial contributions of these societies enable us to provide specialized abstracting services in the specific areas of interest to their members and investigators. Without this welcome and farsighted cooperation of the societies and agencies concerned it would be impossible for us to enter these fields.

Senator HUMPHREY. How many other governments extend subsidies to *Excerpta Medica*?

Mr. VAN TONGEREN. Well, we received an initial subsidy from the Netherlands Government which enabled us to establish the foundation and launch the first publications.

Senator HUMPHREY. Yes, you are speaking of your own Government.

Mr. VAN TONGEREN. Yes, sir. Then, the support we receive from the U.S. Government, to which Professor Woerdeman has just referred, is extended by the various divisions of the National Institutes of Health concerned with specific research problems. Thus, we are aided by grants from the National Cancer Institute in support of our cancer publication; from the National Heart Institute and the National Institute of Mental Health for our cardiovascular diseases and gerontology publications; from the Division of General Medical Sciences which supports our Russian translating and abstracting program; from the Office of Vocational Rehabilitation of the Department of Health, Education, and Welfare in support of our rehabilitation publication. Again, in the absence of such valuable support we would have been unable to introduce these services. I should add that in the case of Government-supported publications which *Excerpta Medica* offers for sale on a subscription basis, it is our aim to make the publications self-supporting or as near self-supporting as possible. In other words, we have been able to reduce appreciably the extent of financial aid from year to year on many of these grants.

Senator HUMPHREY. There is no other governmental aid?

NON-AMERICAN FINANCIAL AID

Mr. VAN TONGEREN. No, sir. I would like to mention that there are several private organizations outside the United States who extend aid to us and made certain aspects of our work possible. For example, the Institut Bunge in Antwerp, the Wellcome Trust in London, the Princess Beatrix Fund in The Hague, the Instituto Venezolano de Neurologia e Investigaciones Cerebrales in Caracas.

Mr. CAHN. So, isn't it a fact, Professor, that where the particular disease specialty is the subject of deep interest by a U.S. Government agency or by a voluntary health agency such as the National Foundation, American Cancer Society, etc., there may be the possibility of a subsidy. But where there is a disease about which there has not been organized interest to date but which may nonetheless intrinsically merit interest, there is no subsidy at present?

Professor WOERDEMAN. That is correct. In these circumstances, and without a financial contribution toward the costs, it would not be possible for us to publish a special abstracting service on such a subject.

Mr. CAHN. And yet you would know, would you not, Doctor, of certain diseases which are of deep interest to medicine because of their widespread incidence, severity, etc. and where you would feel that there is perhaps a genuine need for abstracting, but there is no channel of organized financial support. Is that not correct, sir?

Mr. VAN TONGEREN. Yes, that is correct. Here again, I would like to emphasize the need for the master index system. You see, a particular aspect of research may go unnoticed for years or the need for concentrated and complete documentation may appear only many years later. Still, it would be extremely valuable to be able to retrieve all the relevant references—once the need appears—more or less at the "press of a button." All this information which we gather during the years should be stored so that it is accessible without delay—even when it was not recognized as valuable or pertinent to a certain line of research at an earlier date.

PERINATAL RESEARCH

Mr. CAHN. Yes, I cite as an example the fact that, as Senator Humphrey states, he was deeply interested and impressed by the work done at the neonatal center as reported to him in the field of saving babies—premature babies—in addition to saving full-term babies from mental retardation, epilepsy, brain damage, etc. Here is a field in which there is an unfolding interest in the United States and throughout the world. Yet to my knowledge there is very little organized effort by the organized foundations—private foundations—in this field. And yet would there not be a need for such an abstracting of articles in this field?

Professor WOERDEMAN. Certainly. And that I am convinced should be the trend of our future development. I think we are going in this direction with more and more attention being given to documentation in specific areas of research.

ULCERATIVE COLITIS

Senator HUMPHREY. One of my close friends from Minnesota, Miles Fiterman, has taken the lead along with some others in organizing a special group of physicians, research specialists, in the field of ulcerative colitis, for which they haven't found any treatment as yet.

Professor WOERDEMAN. Yes.

Senator HUMPHREY. Now do you have—would this be the kind of a subject matter for which you might have special abstracts if the funds were available?

Professor WOERDEMAN. Indeed, I think this is a very good example.

Senator HUMPHREY. Thank you very much, Professor Woerdeman. Well gentlemen, is it now a quarter to one? I am supposed to be the host to a luncheon.

MESSAGE OF FAREWELL

Professor BUGNARD. I think that at the end of this meeting, I want on behalf of all the people you saw in Paris and of all the people who are here this morning to thank you, Mr. Senator, for all the work you have done in this field of medical research; and to say to the American Senate how very much we appreciate what you are trying to do and what you will do—you and your coworkers in this important field of medical research. I would like to say that in a better way. I know you are in a hurry and I would like to thank you very much on behalf of all the French people for what you do and what the Americans want to do for medical research, which is so important.

Senator HUMPHREY. Thank you very much, Professor. Thank you very much. And I am sure you will want to include in that sentence the House of Representatives. Without them I don't think we could do much.

Professor WOERDEMAN. Senator Humphrey, I would like to say that we are most impressed by the scope and the thoroughness of the investigation which you have undertaken, in addition to all the many other tasks which must keep you so occupied. I firmly believe that your work will have a very beneficial influence on international medical science. I am most happy that you have granted us both the opportunity of giving you an impression of the work we have already done and an idea of what still could and even should be done.

Senator HUMPHREY. Thank you very much and I want to express our gratitude to both you distinguished gentlemen—to you Professor Woerdeman and to you Mr. van Tongeren—for coming here and giving us so much of your time.

SUPPLEMENTARY CORRESPONDENCE WITH EXCERPTA MEDICA FOUNDATION

FEBRUARY 4, 1959.

Mr. PETER A. WARREN,
Director, Excerpta Medica Foundation,
New York, N.Y.

DEAR MR. WARREN:

One of the phases which I am particularly anxious to explore is the matter of expansion of your abstracting work in those specialized diseases where there is not a well financed private organization to assist in defraying the expenses. I would be interested to know, as I had indicated to Professor Woerdeman, what, in your judgment, would be the highest priorities for new specialized abstracts of this nature, assuming that funds were available from public sources in view of the absence of private finances?

I would welcome, too, further elaboration of the comments on the need for a master index, particularly through electronic or other high-speed processes.

With all good wishes, I am,

Sincerely,

HUBERT H. HUMPHREY,
Subcommittee Chairman.

EXCERPTA MEDICA FOUNDATION,
New York, N.Y., March 17, 1959.

Senator HUBERT H. HUMPHREY,
*Chairman, Subcommittee on Reorganization and International Organizations,
U.S. Senate, Washington, D.C.*

DEAR SENATOR HUMPHREY: I am now able to give you our opinion on the two questions you raised in your letter of February 4, 1959.

It has taken a little time to gather this information as I felt it to be very desirable to consult both with Professor Woerdeman in Amsterdam and with Dr. Morris Fishbein, who, as you may know, represents the United States as a member of our chief editorial board.

There still appear to be many research fields and areas of disease which call for urgent study, but which are either hampered by the lack of a private organization to coordinate and direct the necessary work, or by inadequate funds to defray the cost of developing and establishing comprehensive abstracting services.

We believe that arthritis and diseases of the central nervous system are fields which should be given the highest priority in developing literature services. As you will certainly know, the National Foundation in New York has recently expanded its program beyond the area of poliomyelitis to cover these important subjects, and we have already discussed with their medical advisers the question of expanding our own abstracting program and developing these new services during the next months. We anticipate an early decision on our proposals to the National Foundation.

On page 17 of the transcript of your discussions with Professor Woerdeman in Paris, we referred to studies our editors had made to provide abstracting services which we felt were needed by scientists at this time. Most of these spheres could be regarded as of high priority and within the category of diseases or particular fields of study for which there is no well-financed private organization. To these should be added the following, all of which are, in our opinion, of high priority: Mental retardation; Parkinson's disease; brain research; criminology; schizophrenia; psoriasis; contact dermatitis; and nephrosis. We believe that the expenditure of funds from public sources to aid further studies in these areas by the provision of literature services merits serious consideration.

On the second question which you raise in your letter; namely, elaboration of the need for the master index, we could perhaps express a sounder judgment if we are able to make a preliminary study, especially with regard to method of use and the manner of retrieving the information.

At present it is only possible to retrieve back information contained in the great volume of abstracts published in the past insofar as they have been indexed under a few major index references. There is, of course, a great deal more valuable information contained in this material which may be of utmost importance in the future, but which it is impossible to retrieve in the absence of a very detailed indexing system devised specifically for this purpose.

I have had some tentative discussions here with an authority in the electronics field, and the indications are that it might well take some years to develop such a system. As time goes on, the problems will certainly multiply, and we feel that no time should be lost in initiating a preliminary study. I think it would be unwise, therefore, to elaborate further on the subject until we have had an opportunity to make this study, the requirements for which we hope to be able to estimate and submit to you in the near future.

I know how much Professor Woerdeman and Dr. Fishbein appreciate your interest in Excerpta Medica and the heartwarming encouragement you are extending to our efforts. It should be a great satisfaction to scientists everywhere that, with so many other important duties and responsibilities, you are able to devote so much personal time and thought to the problems which remain to be resolved in the health field.

With my best personal wishes.

Sincerely yours,

PETER A. WARREN, *Director.*

EXCERPTA MEDICA FOUNDATION,
New York, N.Y., July 17, 1959.

Senator HUBERT H. HUMPHREY,
Chairman, Subcommittee on Reorganization and International Organizations,
U.S. Senate, Washington, D.C.

DEAR SENATOR HUMPHREY: I have pleasure in sending you with this letter a memorandum on my visit to Japan and Hong Kong. This memorandum includes our plans for establishing abstracting services covering the Japanese and mainland Chinese medical literature.

If I may provide any supplemental information on these projects, please do not hesitate to let me know.

With my best personal wishes for your future good fortune and success in your distinguished career.

Sincerely yours,

PETER A. WARREN, *Director.*

MEMORANDUM ON THE VISIT OF PETER A. WARREN, DIRECTOR, EXCERPTA MEDICA
FOUNDATION, TO JAPAN AND HONG KONG, APRIL-MAY 1959

INTRODUCTION

1. The main object of my visits to Japan and Hong Kong was to determine whether and how it would be possible to set up in these areas editorial and administrative organizations to provide the foundation with abstract coverage of the medical literature of Japan and of mainland China.

2. I spent approximately 4 weeks in Japan, visiting Tokyo, Nara, Nagoya, Kyoto, Osaka, Kobe, and Yokohama. I visited all the Japanese editors of *Excerpta Medica*, including Prof. T. Yoshida, dean of the faculty of medicine, Tokyo University. I also visited hospitals, medical institutions, and all the leading medical schools and discussed with 30 to 40 professors of medicine and heads of departments our plan to provide an extensive coverage of the Japanese medical literature. During my stay, I was able to meet a number of American physicians, resident in Japan, including U.S. Medical Corps personnel.

3. I was in Hong Kong for approximately 8 days, and during this time had discussions with Dr. L. T. Ride, vice chancellor of the University of Hong Kong, with Prof. Francis E. Stock, dean of the faculty of medicine, and other members of the medical faculty. I also discussed our plan to provide comprehensive coverage of the Chinese medical literature with the librarian of the university. I visited the American consulate in Hong Kong (Mr. Holmes H. Welch), and outlined our plans.

4. It was my desire to visit Peiping during my stay in the Far East, and I was given several introductions to persons who might have been able to facilitate the provision of a visa. However, as it seemed likely that I would have to remain for some 4 to 6 weeks in Hong Kong before the necessary approval could be obtained from Peiping, I was forced to postpone this visit until some later date.

5. Since my return to New York, I have discussed the development of our Chinese abstracting project with Mr. Harold J. Coolidge, executive director of the Pacific Science Board of the National Academy of Sciences. Mr. Coolidge informed me of plans to establish in Hong Kong certain projects of a somewhat similar nature, outside the medical field. Thus, we have been able to coordinate our plans in several important aspects. Both the Japanese and Chinese projects have been discussed personally with Dr. Kenneth Endicott, Associate Director, and with other representatives of the National Institutes of Health, and the National Science Foundation. In view of its assigned responsibility for support of research and training programs in the basic medical sciences, I have also outlined our projects in detail, to Dr. Frederick L. Stone, Assistant Chief of the recently established Division of General Medical Sciences of the NIH. There appears to be general concurrence in the aims and objectives of the foundation in establishing the projects referred to in this report and the suggested manner of organization. There will be no duplication of effort, resources, or services in establishing the program.

PART A. PROJECT TO PUBLISH TRANSLATIONS OF 10,000 JAPANESE MEDICAL ABSTRACTS

6. The results of my visit to Japan and the detailed study which I was able to make of the facilities available have suggested the following method of procedure for the publication of English translations of 10,000 Japanese medical abstracts a year.

Establishment of Japanese editorial board

7. The foundation has arranged to appoint a group of distinguished medical scientists, representing university centers throughout Japan, as members of *Excerpta Medica's* Japanese editorial board. A permanent chairman of the editorial board has been selected and appointed to coordinate all editorial matters concerned with the translating program. The following is a list of the editors who have been selected and approved by the foundation to take part in the program:

Chairman: Prof. T. Yoshida, dean of the faculty of medicine, Tokyo University.
 Anatomy: T. Ogawa, Tokyo University.
 Pharmacology: Y. Kobayashi, Tokyo University.
 Biochemistry: N. Shimazono, Tokyo University.
 Physiology: K. Matsuda, Tokyo University.
 Pharmacy: Y. Ito, Tokyo University.
 Endocrinology: Y. Ito, Tokyo University.
 Bacteriology: T. Akiba, Tokyo University.
 Serology: S. Ueno, Tokyo University.
 Pathology: N. Takizawa, Chiba University.
 Internal medicine: S. Tasaka, Tokyo University.
 Internal medicine: S. Okinaka, Tokyo University.
 Internal medicine: H. Ueda, Tokyo University.
 Internal medicine: Y. Ohshima, Tokyo University.
 Pediatrics: T. Sano, Tohoku University.
 Neurology and psychiatry: H. Akimoto, Tokyo University.
 Neurology and psychiatry: S. Okinaka, Tokyo University.
 Surgery: K. Nakayama, Chiba University.
 Orthopedics: I. Miki, Tokyo University.
 Obstetrics and gynecology: T. Kobayashi, Tokyo University.
 Otorhinolaryngology: J. Ono, Keio University.
 Otorhinolaryngology: I. Kirikae, Tokyo University.
 Ophthalmology: N. Kirisawa, Tohoku University.
 Dermatology: K. Kitamura, Tokyo Medical College.
 Dermatology: T. Ichikawa, Tokyo University.
 Radiology: S. Takahashi, Nagoya University.
 Chest diseases: O. Kitamoto, Tokyo University.
 Cancer: T. Yoshida, Tokyo University.
 Public health: N. Soda, National Institute of Public Health, Tokyo.
 Cardiovascular diseases: M. Mackawa, Kyoto University.
 Rehabilitation: M. Hieda, National Rehabilitation Center, Tokyo.
 Rehabilitation: F. Koike, Hospital for Crippled Children, Tokyo.
 Gerontology: Y. Oshima, Tokyo University.

Selection of abstracts for translation

8. Following discussion with the chairman and other members of the Japanese editorial board, it was considered that a selection of approximately 10,000 abstracts a year from the 80,000 abstracts published in the *Igaku Chuo Zasshi* would provide a most comprehensive review of the important papers and reports appearing in the Japanese medical literature. The selection of 10,000 abstracts will insure that all papers on original work are included in the program. Papers of minor importance, or those which are of interest to the Japanese medical profession only, would be excluded from this program. Duplication of articles published in more than one original journal will be avoided.

9. A primary task of the Japanese editorial board will be to determine the number of translated abstracts to be devoted to the various fields of medical science. As reports on research studies in Japan may be of greater importance and usefulness for international dissemination than many clinical reports, due emphasis will be given to adequate coverage of the theoretical and experimental aspects. Special consideration will be given to those fields in which Japanese scientists are believed to be making the most significant contribution to medical

progress. The Japanese editorial board will also insure that the widest possible coverage is given to those areas of disease which are today the subject of most intensive study by Western medical scientists.

10. Members of the Japanese editorial board will be provided with copies of all issues of the *Igaku Chuo Zasshi*. Upon receipt of these issues, each editor will make a careful selection of abstracts for translation, within the quota allotted to his field. The *Igaku Chuo Zasshi* is published weekly and a constant flow of material can therefore be insured.

Translation of abstracts

11. After selection of the abstracts, the editors will arrange for the preparation of translations by professional members of their own medical departments. In cases where the editor considers that the original abstract is, for any reason inadequate or unsuitable for international dissemination, a new English language abstract will be prepared from the original article. After translation, the Japanese abstracts and the English translations will be returned to the editors for their approval.

Medical supervision of the abstracts

12. As the quality of the English language translations prepared by Japanese physicians may not be of a uniformly high standard, arrangements have been made for the expert medical supervision of all translated abstracts by a small group of American physicians familiar with the Japanese language. The supervision of the abstracts will be coordinated by Dr. Alice Cary, M.D., an American physician attached to the Doshisha University, Kyoto.

Final editing

13. The supervised abstracts will be airmailed to the central editorial offices of the Excerpta Medica Foundation in Amsterdam, the Netherlands. Before publication, all abstracts will be finally edited and classified by an editorial board appointed by the foundation to this project.

Publication of Japanese abstracts

14. The abstracts can be printed, published, and distributed by the Excerpta Medica Foundation as a separate monthly publication under the title, "Abstracts of Japanese Medicine." Alternatively, it would be possible, though less convenient, to include the Japanese abstracts in the relevant specialist publications of Excerpta Medica, according to their subject. As it is desirable to draw the widest possible attention of scientists to the existence and availability of abstracts of the Japanese literature, and as this material can be more easily studied and evaluated if it appears in a separate publication, this method is recommended, at any rate during the first 4 or 5 years of publication. It would be the intention of the editors, in issuing a separate publication, to republish the most important abstracts in the separate sections of Excerpta Medica, thus providing the widest possible dissemination of the material available.

15. In support of medical research in the United States, the Excerpta Medica Foundation would also make available to leading medical schools and hospitals throughout the United States, copies of all issues of Abstracts of Japanese Medicine. (In agreement with the National Institutes of Health, some 400 copies of Excerpta Medica's Abstracts of Soviet Medicine are made available on a quarterly basis, without charge, to important medical institutions in the United States.) Similarly, and in accordance with arrangements which are made in the case of Abstracts of Soviet Medicine, the editors of the leading medical journals throughout the United States could be provided with copies of Abstracts of Japanese Medicine. The editors of these journals are free to select and republish those abstracts which they consider of special interest to their own readers. Abstracts of Japanese Medicine, like all Excerpta Medica publications, would be sold and distributed on a subscription basis throughout the world through the international sales organization set up by the foundation. To bring the publication within the reach of all medical institutions, a subscription fee of approximately \$25 a year is contemplated.

16. After the first year, the anticipated net income from the sale of Abstracts of Japanese Medicine would be deducted from the funds needed to cover the costs of publication during 1961 and would be reflected in a reduction of the continuation grant required for that period. It would be possible to effect a continued reduction in the amount of funds required each year as the subscription lists expand.

Estimated cost of this project

17. The total cost of this project for the first year, including editorial salaries, translating remunerations, supervising remunerations, administrative salaries, technical costs of production, including paper and printing, subscriptions, stationery, promotion, postage, and sales costs, has been estimated at \$82,000, exclusive of overhead costs. An application for a grant to establish this important project has been submitted to the National Institutes of Health.

PART B. PROJECT TO ABSTRACT 4,000 ARTICLES FROM THE MEDICAL LITERATURE OF
MAINLAND CHINA

18. The results of my visit to Hong Kong and the study which I was able to make of the facilities available, have suggested the following method of procedure for the publication of 4,000 English abstracts a year of the mainland Chinese medical literature.

Organization of the Chinese abstracting project in Hong Kong

19. In organizing the translation of Russian abstracts, *Excerpta Medica* was able to appoint a Russian editorial advisory board comprising some 30 to 40 leading Soviet scientists, selected by the Academy of Medical Sciences. In setting up an organization in Japan which could undertake the translation of abstracts of the Japanese medical literature, *Excerpta Medica* similarly arranged to appoint a Japanese editorial advisory board with distinguished representatives from all universities throughout Japan.

20. It would be very desirable ultimately, to have scientific representatives from mainland China cooperating in this Chinese abstracting project. However, communications with Peking and the Chinese medical scientists and institutions are not at this moment sufficiently advanced to insure that this project could be quickly and efficiently organized or centered in that country.

21. As the cooperation of the University of Hong Kong has generously been offered to *Excerpta Medica* by Dr. L. T. Ride, the vice chancellor, and by Prof. F. E. Stock, the dean of the faculty of medicine, the *Excerpta Medica* Foundation proposes that the editorial organization of the project shall be centered in Hong Kong, until such time as the mainland Chinese medical authorities are able and willing to extend a close cooperation from their side.

Administrative organization

22. The University of Hong Kong has also extended to *Excerpta Medica* all the administrative facilities available in the medical library in organizing the project. The medical library already receives most of the mainland Chinese medical periodicals which would form the basis of this abstracting project. The *Excerpta Medica* Foundation will arrange for the library to receive all issues of the remaining medical journals to insure the complete coverage of the literature. A small administrative staff under the direction of the medical librarian will be appointed and located within the medical library building. This administrative staff will receive copies of all Chinese publications for abstracting and will allocate the articles individually to the abstractors in accordance with the editorial policy agreed to by the editors of *Excerpta Medica* and the dean, Professor Stock. The final supervised abstracts will be returned by the editors to the administrative staff for mailing to the central editorial offices of *Excerpta Medica* in Amsterdam, the Netherlands.

Editorial organization

23. Professor Stock will act as permanent chairman of the editorial advisory board in Hong Kong, whose task will be to select expert and qualified abstractors familiar with the English and Chinese languages. The formation of this editorial board is now being completed. All departments of the faculty of medicine will be concerned with this project, and only professional personnel with specialist knowledge of the subject concerned will be responsible for the preparation of the abstracts. This method of organization will insure the highest editorial quality and accuracy of the work. The abstracts will be fully informative, giving all pertinent data contained in the original article. By arrangement with the University of Hong Kong, the foundation will also be in a position to offer readers translations of the original articles at a modest fee to cover the basic costs.

Medical supervision of the abstracts

24. As the English language abstracts may not all be of a uniform standard in terminology, etc., arrangements have been made for medical supervision and

styling of all abstracts by a specialist supervisor appointed by the chairman of the editorial advisory board in Hong Kong.

Final editing

25. The abstracts will be received in the central editorial offices of the Excerpta Medica Foundation in Amsterdam, the Netherlands. Before publication, all abstracts will be finally edited, classified and indexed by an editor under whose general supervision the publication will be issued.

Publication of Chinese abstracts

26. The abstracts can be printed, published, and distributed by the Excerpta Medica Foundation as a separate monthly or quarterly publication under the title, "Abstracts of Chinese Medicine." Alternatively, it would be possible, though less convenient, to include the Chinese abstracts in the relevant specialist publications of Excerpta Medica, according to their subject. As it is desirable to draw the widest possible attention of scientists to the existence and availability of abstracts of the Chinese literature, and as this material can be more easily studied and evaluated if it appears in a separate publication, this method is recommended, at any rate, during the first 4 or 5 years of publication. It would be the intention of the editors, in issuing a separate publication, to republish a selection of the most important abstracts in the separate sections of Excerpta Medica, thus providing the widest possible dissemination of the material available.

27. In support of medical research in the United States, the Excerpta Medica Foundation would also make available to leading medical schools and hospitals throughout the United States copies of all issues of "Abstracts of Chinese Medicine." Similarly, and in accordance with arrangements which are made in the case of "Abstracts of Soviet Medicine," the editors of the leading medical journals throughout the United States could be provided with copies of "Abstracts of Chinese Medicine." The editors of these journals are free to select and republish those abstracts which they consider of special interest to their own readers. "Abstracts of Chinese Medicine," like all Excerpta Medica publications, would be sold and distributed on a subscription basis throughout the world, through the international sales organization set up by the foundation. To bring the publication within the reach of all medical institutions, a subscription fee of approximately \$20 a year is contemplated.

28. After the first year, the anticipated net income from the sale of "Abstracts of Chinese Medicine" would be deducted from the funds needed to cover the costs of publication during 1961 and would be reflected in a reduction of the continuation grant required for that period. It would be possible to effect a continued reduction in the amount of funds required each year as the subscription lists expand.

Estimated cost of this project

29. The total cost of this project for the first year, including editorial salaries, abstracting remunerations, supervising remunerations, administrative salaries, technical costs of production, including paper and printing, subscriptions, stationery, promotion, postage and sales costs, has been estimated at \$41,450 exclusive of overhead costs. An application for a grant to establish this important project has been submitted to the National Institutes of Health.

Conclusion

30. A full report on my visits to Japan and Hong Kong has been submitted to and approved by the chief editorial board of the foundation. Preliminary preparations are now being made to establish both these projects in January 1960 in the anticipation that the necessary funds can be made available. Apart from the unique opportunity which these visits gave me to make known the significance of our work and our aims, I was fortunate in being able to stimulate wide interest and enthusiasm for the development of our proposed translating and abstracting projects in the areas concerned. I encountered the greatest possible good will and received pledges of wholehearted support and cooperation from all our Japanese scientific editors and the members of the medical faculty in the University of Hong Kong. The most detailed arrangements have been completed with the Excerpta Medica business office in Tokyo, which will insure that the program is efficiently administered and coordinated in Japan to permit a regular flow of translated material. Similar administrative arrangements have been made in cooperation with the librarian of the University of Hong Kong, who

will undertake to supervise the administrative work. The close cooperation between the library and the medical faculty will guarantee that the foundation receives, for publication each month, carefully prepared and supervised abstracts of the mainland Chinese literature in all medical fields.

PETER A. WARREN,
Director, Excerpta Medica Foundation.

NEW YORK, July 16, 1959.

LETTER ON THE ROLE OF THE NETHERLANDS IN SUPPORTING EXCERPTA MEDICA
FOUNDATION

EXCERPTA MEDICA,
Amsterdam, the Netherlands, August 3, 1959.

Senator HUBERT H. HUMPHREY,
U.S. Senate, Chairman, Subcommittee on Reorganization and International Organizations, Washington, D.C.

DEAR SENATOR HUMPHREY: When we had the pleasure of discussing with you in Paris the work of the Excerpta Medica Foundation, we mentioned briefly the support of the Netherlands Government which the foundation received in the early period of its development.

It may be appropriate to give you some details of our historical background.

The concept of Excerpta Medica was developed during World War II by a group of Dutch scientists headed by Prof. Dr. M. W. Woerdeman. They sought the advice of experienced publishers and economists in order to be able to gain for themselves an idea regarding the organization necessary for such an undertaking and the consequent financial implications.

Early in the planning stage it became clear that the funds at the disposal of these individual scientists were scarcely sufficient to cover the preparatory expenses, such as establishing contact with scientists all over the world, attracting initial secretarial assistance, and planning the whole operational program. To execute the ambitious program envisaged up to the point where it could be expected that income from subscription fees would begin to provide a real working basis, it became essential to seek substantial support.

Accordingly it was decided to present this scientific program to the Netherlands Government with a formal application for support during the initial stages of its operation. The highest educational and health authorities advised the Government that in their opinion the program presented by Excerpta Medica deserved the most favorable consideration in view of its great significance to the future of national and international medicine. On this advice the Netherlands Government decided to extend a grant in aid of approximate f.1 million, thus enabling Excerpta Medica to launch the publication of its initial 15 abstracting sections.

Thanks to this initial support, Excerpta Medica was able to publish in its initial period some 10,000 pages of abstracts every year. Following the gratifying international recognition which was accorded to our work and the wholehearted support of public institutions such as the National Institutes of Health and many private organizations, we have been able to increase the scope of our work year by year, so that it is now possible for us to provide approximate 25,000 pages of international medical information every year.

Your sincerely,

EXCERPTA MEDICA,
E. VAN TONGEREN, *Director.*

LETTER FROM EXCERPTA MEDICA ON PROPOSED ABSTRACTING SERVICES FOR SPECIAL
FIELDS OF RESEARCH

EXCERPTA MEDICA FOUNDATION,
New York, N.Y., December 17, 1959.

Senator HUBERT H. HUMPHREY,
Chairman, Subcommittee on Reorganization and International Organizations, U.S. Senate, Washington, D.C.

DEAR SENATOR HUMPHREY: Arising from your discussions with the chairman of our board, Prof. M. W. Woerdeman, in Europe last year, our chief editorial board has undertaken a study of the fields of medical research where they consider that specialized abstracting services should be developed.

Our editors have concluded that there are some 24 different areas of medical research which appear to be the subject of intensive study at this time. Clearly, it would not be possible to establish highly specialized abstracting services in all

these different fields simultaneously. The editors have therefore considered establishing a 2- to 3-year program which would enable some of these services to be introduced during the coming year, whilst others would be developed during 1961 or 1962.

The priority which we believe should be accorded to the establishment of these new services is as follows:

Priority 1, for establishment in 1960:

- Arthritis
- Parkinson's disease
- Brain research
- Criminology
- Nephrosis
- Diabetes and other metabolic diseases
- Allergy
- Congenital malformations
- Radiobiology
- Collagen diseases

Priority 2, for establishment in 1961:

- Mental retardation
- Gastroenterology
- Haematology
- Nutrition
- Mental health
- Virus diseases
- Neurogenic disorders

Priority 3, for establishment in 1962:

- Diseases of the central nervous system (cerebral palsy, epilepsy, cerebrovascular diseases)
- Schizophrenia
- Psoriasis
- Contact dermatitis
- Infectious diseases

In some of the areas listed above, the foundation has made advanced plans for introducing specialized abstracting services. Discussions are being held with various private groups who may be in a position to aid us in the initial financing of several of the projects. With few exceptions, however, we believe that it will be found necessary to solicit grants from public funds if these services are to be provided on a comprehensive and up-to-date basis. We would greatly welcome your opinion on their development in the light of your own investigations.

If I may provide you with more detailed information, please do not hesitate to let me know.

With the best personal regards.

Sincerely yours,

EXCERTA MEDICA FOUNDATION,
PETER A. WARREN, *Director*.

5. TRANSCRIPTS OF CONFERENCES IN FRENCH GOVERNMENT LABORATORIES

Senator HUMPHREY. Of the numerous laboratories and hospitals under Government auspices which we visited, we have selected two as representative of our review. The first comprises our discussion of perinatal research with Dr. Alexander Minkowski. The second is a discussion of muscular dystrophy research with Dr. George Schapira.

To each is appended one of the subsequent letters received from these able physicians.

A. CONFERENCE WITH DR. ALEXANDRE MINKOWSKI AND PROF. LOUIS BUGNARD, AT NEONATAL BIOLOGICAL RESEARCH CENTER, PARIS, FRANCE, NOVEMBER 18, 1958

Dr. MINKOWSKI. I am Dr. Minkowski, maître de recherche à l'Institut Nationale d'Hygiène and director of the so-called Neonatal Biological Research Center. Now, if you don't mind, in a few words I would just like to tell you how this originated.

Senator HUMPHREY. Yes.

Dr. MINKOWSKI. In 1946, I was what we call in France chef de clinique at L'Hôpital des Enfants Malades under Professor Debre. Professor Debre succeeded in getting for me a Rockefeller fellowship. At that time I decided to study in the United States everything concerned with the premature and the newborn. The reason for doing so was that I thought that this field should be developed.

Now, interestingly enough, the first incubator was devised—I don't know, something like 70 years ago—by a Frenchman here in this clinic by Tarnier.

It was in the United States that the real interest for the field of premature care and premature survival and premature survey and all problems concerned with the newborn had a new development, starting somewhere around 1935 or 1940, mainly in Chicago with Dr. Julius Hess, who was the pioneer in this field, then through Dr. C. A. Smith (Harvard) and Dr. S. Z. Levine (New York) among others.

I first went to Chicago to get a view on prenatal care. I stayed there for about 4 or 5 months. There I worked with Dr. Julius Hess in the research hospital at Illinois University.

I was happy to get a position as a research Rockefeller fellow under Dr. Clement Smith at Harvard's Department of Physiology of the Newborn.

When I came back here I would have been quite alone if M. Bugnard and Professor Debre hadn't helped me right away; because at that time it was difficult to get into full-time research.

May I tell you what happened in this maternity hospital—would that take too long?

Senator HUMPHREY. No, no, no. Wonderful.

Dr. MINKOWSKI. In this maternity hospital, which is the main university clinic in Paris where there are 4,000 deliveries a year—when I came back in 1947, I would say that most of the premature under 1,500 grams of weight died almost without exception because of lack of department incubators and trained personnel.

My first aim was to try to develop this medical center. Again with some help I started some research on the cause of cerebral hemorrhage in prematures, which is one of the main causes of death in the premature infants.

Senator HUMPHREY. Is that right? I didn't realize that was so.

Dr. MINKOWSKI. Yes. We got our first incubators from UNICEF and from Franco-American groups in Chicago (about 25 incubators).

We developed the department which was built about 7 years ago; we hospitalize around 400 premature and sick newborn per year; together with that we created an outpatient department.

Now just before you came, we held our weekly meeting which is devoted to our survey from birth on, of prematures we have. This covers now more than 2,000 individuals, the oldest are 9 years of age.

Now the oldest child weighed 790 grams at birth. He's now 9½ years old and he is going to school. Now, 790 grams would mean less than 2 pounds. We follow these children.

ACTIVITIES OF THE GROUP

The aim is this: We would like to know what is the meaning of having these premature surviving. The second thing connected with this is: Could we know something about the reason of fetal distress in anoxia? I mean prenatal anoxia.

To do this, we have a full team. We try to study all the aspects of the problem, which means that we (1) first take the exact record of the gestation history; then, if the child is born here we have a complete longitudinal study on the same child and do not have to go back to records in a maternity hospital to know what happened previously; that may not be accurate enough. Now, (2) we take a blood sample in the cord before the first cry and breath—which means that we have the last sample of the fetal blood.

Now, in the States, they do more: They now puncture the placenta during the pregnancy and try to measure oxygen tensions in those samples.

I would just like to explain the general lines—so we have this information and we have done it in about more than 500 cases now.

(3) In order to have a complete view on this, we measure oxygen and saturation capacity and content of this fetal blood and record it so we have the original data on the last sample of fetal blood.

(4) In addition to that we do a neurological examination with a technique which was developed here, taking into account the fact that the premature newborn is in a certain state of development of his nervous structures wherein he responds by special reflexes.

This special technique was devised here and is now applied in some centers in the States, at Yale for instance, where there is a Department of Neurology, with which we worked, and somewhat at the State University of New York. I gave lectures last year in the United States on this subject, which I am going to illustrate soon.

(5) Now, together with this—we take an EEG. You are going to see how it is done in the department. We even have recorded—and I think this is the first time it has been done—the EEG (encephalogram) of unlivable fetuses, because sometimes they are born at 3, 4, and 5 months' fetal age. They are unlivable but in incubators; they can survive something like 2 or 3 days, and they react quite normally. During this lapse of time, we take as many recordings as we can without doing harm to the foetus.

We have been able to have a complete survey on EEG and neurological maturation—

Senator HUMPHREY. Are the electrodes attached to the brain?

Dr. MINKOWSKI. No; to the scalp.

I'll show you that upstairs. And so we took about 2,000 or 2,500 recordings of that kind, which are all in the library. This is another part of the work: Neurology, oxygen measurement by the biochemist, and electroencephalography.

(6) Now of course, we have a Department of Pathology. We have a complete collection of 500 cases of either fetuses or premature or newborn with sections of all organs on which we do routine examinations; the pathologist now is in Boston, with a Rockefeller fellowship, learning and studying neuropathology of the fetal brain, which is an almost unknown field; she is going to participate there in a general inquiry on birth traumas sponsored by the National Institute of Health (Bethesda) and continue it when she returns.

(7) Now, in addition to that, we do X-ray of the skull with a special technique which I may illustrate with slides. And so, with biochemistry, pathology, neurology, and EEG, we try to study the complete development of the fetus, of the premature, and of the newborn. And we do that from, I would say, the fetal age of 3 to 4 months. Now we are studying our prematures; some of them are now 9½ years old.

In connection with that there are special problems involved with biochemistry, namely, we have studied the action of vitamin E, tocopherol, which has an action on the vascular resistance of the small vessels and which may have a certain action in preventing cerebral hemorrhage. I hesitate to say it has a definite action but we note a potential action.

And we have done another piece of work in biochemistry. We found that the fetal blood is sometimes unable to take up oxygen properly. This would mean that even if you can give oxygen to the mother during the labor or oxygen to the premature himself—it won't be taken up; at the moment we are trying to find out why this is so, and we are studying many compounds in the red blood cell, namely, glutathione, glutathione reductase, and magnesium. (The role of magnesium in fetal anoxia was at first noticed by physiologists of the Soviet Union.) We keep in contact with them. We also study electrolytes, and so forth, in order to try to know what's the reason for this. Once we have the reason, we may know a little more about how this oxygen could be totally taken up by the fetus.

As a conclusion of this very brief review, I should like to say that this field is dealing with the embryo and the fetus and is itself in an embryonic state. It's a newborn in the field of research.

I think we have to know what we are doing when we have small prematures surviving. For that, we do the postnatal study very carefully three times a week, for which we get support from the American Association for Aid to Crippled Children. We have had that support for 3 years now. We have a special team doing this. They are here and I present them to you.

We would like, for a small part, to contribute to try to know what fetal anoxia is. We do this for social reasons. In France, there are about 8,000 to 10,000 cerebral palsied children born annually with definite cerebral damage. The reason for us to study very carefully prenatal anoxia is that a small lack of oxygen in the cerebrum of the fetus may cause definite damage.

Senator HUMPHREY. That's prenatal lack of oxygen?

Dr. MINKOWSKI. That's right. Yes. The reason for doing that instead of electroencephalographic, neurological, and pathological study of the brain is that we have no indication when the child is deprived of oxygen in the mother's uterus while he's in distress. Once the child is born, it's too late. The brain is damaged and there is little you can do, as you know, except to put the child in institutions with special people for training. This is a real social problem.

I hope you don't mind straying from the research discussion to tell you the reason for our research. We do not pretend to cover the whole thing which is, I think, immense; but, with our efforts to learn, our small contribution, I think that we have begun to know a little more about it.

Senator HUMPHREY. What institutions or universities or laboratories are studying this in the United States with you?

Dr. MINKOWSKI. I can tell you that last year when I went there, under the guidance of the Rockefeller Foundation, I gave on this subject about 20 lectures on the west coast, the Middle West, and the East. (Stanford, University of California at Los Angeles, University of Colorado, Yale, Harvard, Michael Reese Hospital at Chicago, State University of New York, Johns Hopkins, Louisville, etc.)

Senator HUMPHREY. Did you get to the University of Minnesota?

Dr. MINKOWSKI. Not this time. I went there in 1947, but I have there a link with Dr. Kaiser.

Senator HUMPHREY. Oh, yes.

Dr. MINKOWSKI. You know him?

Senator HUMPHREY. Yes; I do.

Dr. MINKOWSKI. When Dr. Kaiser came back from Sweden, he stopped here for 2 hours. We had a talk in his hotel at midnight. He published an article in our journal, "Prenatal Studies."

Six years ago, I started editing this journal, "Neonatal Studies," bilingual, on research problems on the newborn.

It helps maintain links with all from both sides of the Atlantic who are working on fetal and neonatal life.

Now, coming back to the States, the main university we work with is Yale—Department of Neurology. The people came there last year and the whole technique was discussed with them; they work in the same line as we do here. The name of the doctor is Professor Glaser.

In addition to that, next year, we are going to have two American doctors working here. One is Dr. Parmelee, Jr., associate professor at the University of California, and the other one is Prof. Richard Day, who is professor of pediatrics at the State University of New York.

As an ex-research fellow, as an alumnus of Harvard, I have many links with Harvard Medical School, Dr. Clement Smith, Dr. Janeway. I hope this is an answer to your question.

I'd like to tell you more about our close links with American pediatricians. A. Parmales, Sr., was my first teacher in newborn pediatrics in 1946. He is now about 70 and he's working at the Children's Hospital in Los Angeles. I gave a lecture there in 1957; in 1958 he came here, and was very happy to see the result of the training he gave me.

He saw the department and the team in research, which includes about 10 people full time. His son, who is an associate professor of pediatrics, is coming to work with us next year.

Senator HUMPHREY. Oh, isn't that fine.

TOTAL BUDGET

May I ask a further question or two with reference to research in particular: What is your total research budget for this hospital?

Dr. MINKOWSKI. You mean, not for the hospital but just for what we are doing in this group?

Senator HUMPHREY. Yes. An approximation.

Dr. MINKOWSKI. I have to figure it out. Including the American grant.

I am the maître de recherche working with Professor Bugnard. Some of our people are with CNRS; most of the people are in the Association Claude Bernard. I have in addition to that two people paid by the American grant. So this would be—

Dr. BUGNARD. It would be comparable to 10 or 12—

Dr. MINKOWSKI. Yes. I think it would be between 12 and 14 million francs a year.

Senator HUMPHREY. What would that be in dollars?

Dr. MINKOWSKI. \$63,000 per year.

Senator HUMPHREY. And that takes care of all personnel—

Dr. MINKOWSKI. Surely. But it is rather restrictive.

Senator HUMPHREY. And now how much do you get from the American source?

Dr. MINKOWSKI. I get about—a little more than \$10,000 a year. This is for 3 years, per year \$10,000. So this would be a total for 3 years of \$30,000.

Senator HUMPHREY. Does that come annually?

Dr. MINKOWSKI. Yes. Ten thousand dollars a year for 3 years.

Senator HUMPHREY. Would you find it better, Doctor, to get research grants on a longer term basis?

Dr. MINKOWSKI. Yes, by all means.

Senator HUMPHREY. Would your program work better? Would it facilitate your work if you were to get, say, a 3-year grant instead of a 1? Or a 5-year grant instead of a 1-year? I don't mean that you would necessarily get all the money at once—I mean you would know that you would have a 2 to 3 or 5-year program?

Dr. MINKOWSKI. Well, you see, at the moment I have a program under the grant from the American Association for Aid for Crippled Children which is for 3 years; so I have one doctor and one technician in pathology, who are here for 3 years.

Now, I don't know yet what will happen afterward. Of course, the work may not be terminated. I hope to receive a renewal, but I don't know. I can't count on this. Then, I may have to ask Monsieur Bugnard, or some other organization—

Senator HUMPHREY. Well, Professor Bugnard will be very good to you. I know, he's—

Dr. MINKOWSKI. He will try to help, of course, from French sources and from the money from the town of Paris, Association Claude Bernard.

What we really need is a new small building for our laboratories and a rise in the salaries of the research personnel. As for the equipment, we have what we need, and the number of our personnel is sufficient.

Senator HUMPHREY. In other words, you make a long-term commitment, but you can only have a 1-year budget.

Professor BUGNARD (interposing). Yes. But we know that what is given to Dr. Minkowski will stay for a long time: as long as he will be the head of this unit here. The difficulty here now is much more the need for space and building, as he may tell you.

We should be very glad to be able to build for him the type of small building which Mr. Cahn and I visited yesterday, for the work of a small unit. This is for the sponsorship of a young man and with a staff of young people.

But we have this difficulty, that when we build something in a hospital, it must be built very special for research, because in French hospitals, the people who are in charge of the patients must have special examinations and special qualifications, you see. So, now, what we have to have is wards for the patients. This year what we want to have in a number of hospitals is a special building for research, close to the patients and, at the same time, available for basic research, if they like.

Dr. MINKOWSKI. On a previous question, I should like to add that in the States now, there is a program which—if I am not wrong—is conducted with funds provided by the collaborative project investigating birth injuries.

Senator HUMPHREY. Is that the NIH collaborative project on cerebral palsy and other neurological and sensory disorders of infancy and childhood?

Dr. MINKOWSKI. Yes. We are somewhat connected, of course, with that kind of work. Dr. Glaser is working with NIH too. In the States, I visited some of the centers in which they work on the program. Now the reason for our special work is that we try to develop neurological techniques.

I am sure you know the name of Gesell—the Gesell test.

Senator HUMPHREY. Yes.

Dr. MINKOWSKI. The Gesell tests are devised to study psychological behavior; but to study a premature, a fetus, and a very young newborn, the psychological behavior test doesn't help very much. What we devised was a study of the special reflexes connected with this stage of life.

Mr. CAHN. Dr. Minkowski, in the few moments left on the tape, if I may, may I ask a question which Senator Humphrey has asked others. That is, assuming that you had more resources and building accommodations, and so forth, along what lines of research would you proceed in further development of your project of fetal anoxia and related problems?

LONG-TERM FOLLOWUP

Dr. MINKOWSKI. Yes. I would like to say first that the projects I said in the introduction are going on, we will continue at least for 5 years, because we want to follow up. This is a center in which we can collect not only premature but all children—a lot of children in Paris and the Parisian area—with birth trauma; you see, even when they are full term. We need to pursue this study at least for 5 years and maybe more, until the children have become adolescent, to know the effects on them and what are their capabilities.

Mr. CAHN. Would you just define the categories under birth trauma? What types do you include now under that broad heading?

Dr. MINKOWSKI. In birth trauma, we would say that we have prenatal unknown distress, which is, I think, the main cause. A child is born; everything seems to be normal; no cause for alarm; and then the child either dies or becomes very rapidly neurologically abnormal. This is one phenomenon which intrigues us very much.

Second, of course, everything connected with gestation and labor difficulties.

What we would like also is to cover some of the prenatal phase, which is quite unknown in the human, without doing any harm either to the mother or to the fetus, of course.

Now you have seen that we work in electroencephalography, neurophysiology, bacteriology, biochemistry, and radiology.

But in addition to that we will have a study completed by neurochemistry, which is a quite new field, especially studied in the States. We have here with us a Ph. D. from the Faculté de Sciences, who is a young and very capable woman. We hope that she can get a fellowship for a whole year to study in neurochemistry in the States; because, you see, many phenomena are connected with the appearance of enzymes in the brain. This whole thing is, as I told you, a rather new field. I would be very glad if I could do a little bit of it during my lifetime.

Senator HUMPHREY. Yes, we would be happy now to see these slides.

(Slides and motion picture were shown.)

Mr. MINKOWSKI. On the slides, I have shown:

(1) Close relationship between fetal low oxygenation and abnormal neurological symptoms at birth.

(2) Fetal lung involvement by fungi (*Candida albicans*) that can be prevented by mycostatin.

(3) Undiagnosed fetal lung infections discovered at anatomical examination.

(4) Inability of fetal blood to take up its maximal amount of oxygen.

(5) Influence of vitamin E on fragility of the small vessels in premature infants.

(6) Neurological maturation (movie) of fetuses 3, 4, 5 months, premature 6, 7, 8 months, and full-term infants.

In terms of neurology, a premature born at 6 months of gestation is similar when aged 3 months (its supposed term) to a full-term newborn; in other words, he has the same chance to be as normal as a full-term infant, provided his brain has not been injured at birth.

(7) Electroencephalographic maturation at the same fetal ages.

(8) Long-term prognosis of anoxia, prematurity, and birth trauma.

CENTRE DE RECHERCHES BIOLOGIQUES NÉONATALES,

Paris, November 18, 1959.

DEAR MR. CAHN: Thank you very much for your kind letter of November 4. It is indeed very stimulating to see how much you keep interest on what is going on overseas.

I will try to briefly summarize my last trip to the United States.

As you remember, I had been invited by the National Institute of Neurological Diseases and Blindness with the purpose of exchanging ideas on the collaborative research project directed by Dr. Masland.

I first spent a few days in Bethesda in discussing the methods used and we all agreed that different kinds of approaches are possible: it seems that the Baudelocque's one is different from the NINDB's one and for that reason it is planned to make a comparative study of the two. This will take place within the next few months. Another thing which has been planned is that some of the men working in the NINDB project will come to our center for 1 month in 1960 and discuss with us problems of common interest; namely, neurological examination, followup (you know that we have now a 10-year followup of our own), EEG, statistics, etc.

During my trip in the States, I have visited some of the centers where the NINDB collaborative project is done; namely, Harvard, Columbia, and Johns Hopkins. I must say that I have been extremely impressed not only by the quality and conscientiousness of the workers but also by the fact that this was not at all mechanical work; everybody was anxious to discuss methods and raise problems.

It seems to me then that, besides the statistical data that will emerge from the project, a more important—at least to me—result will be achieved and that is the education and training of a large group of workers in the field connected with congenital alterations of the brain.

In the course of my trip, I also attended the first medical conference on mental retardation at Portland. This was mainly devoted to the biological aspects of the problems which are one of the most promising lines at the moment.

As a member of the steering committee for the next conference to be held in Vienna in 1961, I am trying already to keep a fundamental approach to the problem of mental retardation; we plan also to make the papers very short (with the reports given to the members in advance) so that more discussion can take place than in Portland.

In addition to that, I have attended the ninth International Pediatric Congress in Montreal. This was an exceptionally good meeting in which good basic work was done, which rarely happens in such a large audience (1,600 or more).

Finally, I have discussed some problems connected with my own interest in two places: Johns Hopkins (brain pathology with Dr. D. Clark); Harvard (Dr. Yacovlev's laboratory where our own pathologist is working in brain pathology for the NINDB project; she will be back next July and we will start then to study the histology of the fetal and neonatal respiratory centers in the nervous system); besides, in Dr. C. A. Smith's laboratory, I have exchanged ideas with the Stockholm team on the role of the nervous system in neonatal respiratory distress.

I have also been interested by the very fine study done on the various fetal hemoglobins in Cooperstown. Those very stimulating exchanges are continued in Europe mainly with the teams working in Stockholm, Groningen (Holland, Professor Jonxis), and England.

Finally, I am most grateful to the Association for the Aid of Crippled Children which supports our work with the diligent help of Mr. L. Mayo, whom I could give as an example of the most comprehensive understanding of international cooperation.

We have also now a grant from the National Institutes of Health for a work on biochemical matters.

In view of what I have mentioned, I make the following suggestions for further international perinatal research:

(1) More young Americans should come to Europe and exchange ideas with us (we have here Dr. Parmelee, Jr., from Los Angeles working with us for a year).

(2) Among other things we also provide an accurate knowledge of the research centers in Europe and other continents.

(3) It will be then possible that those centers will get more support from your country, with no intermediates. In this line, I think that the relationships between the laboratories and the foundations in the States are perfectly satisfactory. I should insist once more that the support given should include money for building, although I know that is not yet accepted.

(4) In the prevention of what is commonly called cerebral palsy, the following fields are to be encouraged:

(a) The physiopathology of abnormal pregnancies in animals and humans. This is probably the most unknown and important field at the moment.

(b) Fetal, neonatal, and infant biochemistry with special reference to enzymes.

(c) Neurophysiology and pathology of the fetus, the premature and the new-born (in this field, it would be of extreme importance to have a complete list of the centers working in the Soviet Union).

(d) The genetic aspect, of course, is of major interest; the recent discovery of an abnormal chromosome in Mongolism is a very promising line.

Thank you very much for your kindness and give my best regards to Senator Humphrey.

Sincerely yours,

Dr. ALEXANDRE MINKOWSKI.

B. CONFERENCE WITH PROF. GEORGES SCHAPIRA, HOPITAL DES ENFANTS MALADES, LABORATORY OF BIOCHEMICAL MEDICAL RESEARCH, NOVEMBER 18, 1958

Dr. SCHAPIRA. We are in the laboratory of medical research devoted specially to research in the biochemistry of diseases in general, but we apply it specially to the problems of muscular disease, poliomyelitis, and muscular progressive dystrophy.

Senator HUMPHREY. Yes.

Dr. SCHAPIRA. And in the field of blood diseases.

Senator HUMPHREY. Can I interrupt to say that I have looked over some of your laboratories only briefly, of course, but they are very well equipped. You seem to have exceedingly modern facilities here, very good facilities. And good staff as well.

Dr. SCHAPIRA. We are well equipped. The problem in this lab is not a question of equipment but rather a financial one which I can explain afterwards, if you wish.

Senator HUMPHREY. Yes; indeed.

STAFF OF LABORATORY

Dr. SCHAPIRA. The staff of this lab consists of people who are M.D.'s and Ph. D.'s. We are three professors of biochemistry. In fact we took our degrees in Paris. For myself, I am an M.D. and Ph. D. of the Université of Paris. I studied under Professors Florence and Polonovski.

We are altogether 10 research people. Nine are M.D.'s and one is a Ph. D., and some are former residents in pediatrics; some are preparing for a Ph. D. degree.

Senator HUMPHREY. Yes.

Dr. SCHAPIRA. We have some technicians—not enough of course. But we are very well equipped. I shall discuss our problems.

We are working here in the field of biochemistry of muscle disease. First, it would be helpful to discuss some problems of fundamental biochemistry and then some problems which are directly related to disease. In this condition we were able to describe some new proteins in muscles. We were able to discover a new iron compound in muscle—which was unknown until now. We have discovered the lifespan of the myofibrils, which we were able to measure and which we are studying in an experimental disease—muscular progressive dystrophy in mice. In the United States, a strain of mice with this hereditary disease was discovered and it is very useful in this field.

Senator HUMPHREY. You have in other words received it from the United States.

Dr. SCHAPIRA. Exactly.

Senator HUMPHREY. A strain of mice which has been isolated and which has this disease.

Dr. SCHAPIRA. Yes. They are very expensive, because every little mouse costs \$8.

Senator HUMPHREY. Eight dollars for one mouse?

Dr. SCHAPIRA. With a littermate.

Senator HUMPHREY. Oh, with a mate.

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. But this particular kind of mouse has muscular dystrophy.

Dr. SCHAPIRA. Exactly.

Senator HUMPHREY. And you've been working on and conducting experiments with those here.

Dr. SCHAPIRA. But we are also working with human beings. We explain to them that we are unable to make advances in this field without their cooperation, and they cooperate.

We have been able to describe biochemical disorders of muscles in these people. We were able to discover the first biochemical syndrome in blood which is very useful for an early diagnosis and it was relative to these people that Dr. Dreyfus was in New York this year to explain what we are doing here.

LABORATORY STAFF

Senator HUMPHREY. Now who are the associates or the other doctors that work with you. Will you give us an account please?

Dr. SCHAPIRA. I personally direct this lab. I am an M.D. and Ph. D. and professor of biochemistry in the Faculty of Medicine in Paris.

Senator HUMPHREY. Yes.

Dr. SCHAPIRA. Then here we have Prof. Jean Claude Dreyfus who is also an M.D. and Ph. D. We are altogether, what we call, anciens Internes des Hôpitaux de Paris. He is professor in biochemistry in Dijon. And Prof. Jacques Kruh, who is an M.D. and Ph. D., is professor in biochemistry in Clermont-Ferrand.

We are all working here, because in the university where Dr. Dreyfus and Dr. Kruh are teaching there are no laboratories, not even small ones. They give the lectures once a week and then they work in the lab here.

Senator HUMPHREY. Well, I think we ought to note here for this record that the doctors travel a substantial distance every week to teach—and then they come back here for research.

Dr. SCHAPIRA. Because it is very difficult to perform research outside of Paris; and we have no funds to pay some researcher without teaching, you see?

Senator HUMPHREY. Yes; in other words it requires both teaching and research to be able to make the necessary provision for a living.

Dr. SCHAPIRA. And we are not paid for the research. We are paid for the teaching.

Mr. CAHN. I think that Senator Humphrey would be interested in the sources of your funds, Professor Schapira.

Where does your money come from, what is your total budget?

Dr. SCHAPIRA. I will try to explain exactly what it is.

Here we are in a hospital which belongs to the city of Paris (Assistance Publique) and to the Ministry of National Education. They lend to us the place with the use of gas and electricity and they pay people for the dishwashing and the care of animals.

Senator HUMPHREY. Custodial people, the caretakers.

Dr. SCHAPIRA. Exactly.

Then technicians are paid by the funds which are given by the National Social Security.

Senator HUMPHREY. Oh, yes.

Dr. SCHAPIRA. Because we are involved in the question of prevention, of prophylaxis of diseases. Other researchers are paid by the Centre National de Recherche Scientifique—National Center of Scientific Research—or by the National Institute of Hygiene.

Senator HUMPHREY. Yes. Under Professor Bugnard.

Dr. SCHAPIRA. Yes. Then we have six people who are paid by both these institutions. One of them is now in the United States, at the University of California at Los Angeles, and another in India, for 1 year teaching, and studying some hematological disorders.

Senator HUMPHREY. So you get your money here, first from the National Hygiene Institute.

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. And some from the National Center of Scientific Research. And the head of that is—

Dr. SCHAPIRA. Professor Coulomb.

Senator HUMPHREY. Professor Coulomb, with whom we have visited. Then you receive some from the Social Security Service.

Dr. SCHAPIRA. Yes; but the trouble is that we can obtain expensive apparatus but have most difficulty for little apparatus.

Senator HUMPHREY. You mean you can get money for expensive apparatus sometimes, but for the little things that you need every day you have trouble getting money.

AID FROM MDAA

Dr. SCHAPIRA. Yes; but we have been aided for many years now by the Muscular Dystrophy Associations of America.

Senator HUMPHREY. Yes; I am very glad to hear that, because I work closely with it about once a year in our national contributions program.

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. I will tell the society when I go home of your work and of our visit here.

Dr. SCHAPIRA. We were helped in our applications by two scientists from the United States, Dr. Horecker and Dr. Meister, who visited this lab. I know that they gave good advice and am waiting for their answer now.

For the question of travel, when I was last year visiting in the States I was invited by the National Academy of Science. What impressed me very much was the frequency and the ease with which American scientists travel in your country. They can learn some new techniques and here it is very difficult because we have no funds to travel.

Senator HUMPHREY. Oh, yes.

Dr. SCHAPIRA. For instance, I worked many months on a new technique and by chance the man from the United States who discovered this technique came in this lab and helped me to solve my difficulty. In 1 day the technique was set. So travel would have spared many expensive months of useless work if I could have had the money for it. That would have been much better.

Senator HUMPHREY. Yes.

LACK OF WORKSHOP

Dr. SCHAPIRA. Yes, but I am unable to do that, you see. Another problem we have here is that we have no workshop. We are obliged to spend part of our time to take care and repair our apparatus ourselves.

Senator HUMPHREY. You mean you take care of your own equipment?

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. They don't have any technicians with the tools to devise or repair apparatus?

Dr. SCHAPIRA. We have a workshop, but without tools.

Senator HUMPHREY. But without tools.

Dr. SCHAPIRA. We are talking of troubles, but there are not only troubles, of course.

Senator HUMPHREY. We are talking about things that would be helpful if you had them.

Dr. SCHAPIRA. We applied for the workshop equipment, but I have no answer.

Senator HUMPHREY. The Rockefeller Foundation?

Dr. SCHAPIRA. Yes. Another trouble is the question of wages.

Senator HUMPHREY. For whom?

Dr. SCHAPIRA. What is offered to beginners is very low. And sometimes nothing is offered.

Senator HUMPHREY. I know what you mean. You have so little financially to offer that you can't get people.

MODEST SALARIES

What is the opening salary, Professor? Suppose you get an appointment from INH. How much do you get in francs?

Dr. SCHAPIRA. Something like 60,000 francs.

Senator HUMPHREY. \$150 per month.

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. For a beginner, how long would this continue?

Dr. SCHAPIRA. Two years.

Senator HUMPHREY. Two years, yes.

Dr. SCHAPIRA. So they can stay until a little after 30 at \$150. And they may stay until age 40 at less than \$200.

Senator HUMPHREY. They begin at about age 30 at \$150.

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. And they may stay until age 40 at about \$200.

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. And you have to have a B.S. and an M.D. degree.

Dr. SCHAPIRA. Once they get a teaching job they have decent salaries.

Senator HUMPHREY. In other words what happens is that the young doctor goes out into private practice even though he might be willing to stay in research and thereby make a contribution to advance medicine.

Dr. SCHAPIRA. Surely.

Senator HUMPHREY. But what you have to rely on now are men like yourself here who have earned your position as a teacher and then give your time as researchers.

Dr. SCHAPIRA. Yes; that's right.

Senator HUMPHREY. So you're really giving your time to science.

Mr. CAHN. You told me, Professor, at the last time as I recall, that you received—what was it, \$50,000 from the Muscular Dystrophy Association?

Dr. SCHAPIRA. No; \$20,000.

Senator HUMPHREY. \$20,000; and that actually was the only source of dollars as such; is that not the case?

Dr. SCHAPIRA. That's it.

Senator HUMPHREY. There is no money as such from the hospital, from INH or from any French source. The only source was this, is this correct?

Dr. SCHAPIRA. If we exclude all of the salaries.

Senator HUMPHREY. Yes; I was excluding the salaries.

Dr. SCHAPIRA. If you excluded the salaries I suppose you could. We have something like fr. 10 million and \$20,000 from the United States.

A little more than half, including salaries.

Senator HUMPHREY. For how much did you apply to Rockefeller and to the U.S. Public Health Service?

Dr. SCHAPIRA. To Rockefeller we applied for the little equipment of the workshop. To the Public Health Service \$10,000 and \$10,000; altogether \$20,000.

Senator HUMPHREY. Is this the only muscle chemistry research center, Professor, or are there others in France?

Dr. SCHAPIRA. In biochemistry?

Senator HUMPHREY. Yes, in the biochemistry of muscle?

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. The only one?

Dr. SCHAPIRA. Yes.

TOTAL BUDGET

Senator HUMPHREY. How many people do you have in this center altogether—including your technicians and your research?

Dr. SCHAPIRA. Twenty; something like 20.

Senator HUMPHREY. How much would your total budget be if you were to make just an estimate? How much would the total expenditure be for these better than 20 people and for running this laboratory?

Dr. SCHAPIRA. Including the salaries of everybody?

Senator HUMPHREY. Yes.

Dr. SCHAPIRA. I suppose around \$50,000.

Senator HUMPHREY. Around \$50,000—fifty to fifty-five. That's for the 20-some people.

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. And that includes the maintenance of your equipment?

Dr. SCHAPIRA. Yes; it is not in the best condition, of course.

Senator HUMPHREY. Yes, I know. But this is what you have to use to take care of your equipment, for the salaries of the people.

Dr. SCHAPIRA. That's right.

Senator HUMPHREY. So you get about half of this money from France?

Dr. SCHAPIRA. Yes.

Senator HUMPHREY. And about half of it from the United States?

Dr. SCHAPIRA. Less than half. But I should like to submit a more precise estimate a little later on.

Senator HUMPHREY. Well then you get about 60 percent from France and 40 percent from the States through the Muscular Dystrophy Association.

Dr. SCHAPIRA. Yes; something like that, subject to review.

Senator HUMPHREY. And you have applied for \$20,000 more, which you surely need, don't you?

Dr. SCHAPIRA. Yes; surely.

Mr. CAHN. Are there any other points, Professor, in the few remaining moments before the Senator has to leave?

Dr. SCHAPIRA. No; I don't believe so.

Senator HUMPHREY. Have you all been to the United States?

Dr. KRUH. Yes.

Senator HUMPHREY. You were in the United States at Caltech and Dr. Dreyfus at Washington University at St. Louis: And you are——

Dr. DREYFUS. Dr. Dreyfus.

Senator HUMPHREY. I just want to get these names identified as well as by the voice. You see, with the tape recording it helps us a little in transcribing.

Well we are very grateful to you and I want to thank you for giving us of your time. We have disrupted your day here I know. But it helps us in our study. You know the Congress of the United States is attempting to give more attention to medical research both in the United States and on an international basis. And we are just trying to find out a little bit more as to what good we might be able to do and how some of you people who are in this field of research may feel that we could better use resources if the Congress decides to make them available.

PARIS, December 15, 1959.

Mr. JULIUS CAHN,
*Director, Medical Research Project,
Senate Committee on Government Operations,
Washington, D.C.*

DEAR MR. CAHN: We were extremely honored at the visit Senator H. Humphrey and yourself paid to our laboratory. According to your suggestion I am sending you a full report of our activities, problems, and needs. I wish to thank you again for your interest in our problems and your most valuable help.

Yours very truly,

GEORGES SCHAPIRA, *Professor.*

REPORT ON THE ORGANIZATION, INVESTIGATIONS, PROJECTS, AND NEEDS OF THE
LABORATOIRE DE RECHERCHES DE BIOCHIMIE MÉDICALE À L'HÔPITAL DES ENFANTS
MALADES, PARIS, FRANCE

Director: Prof. Georges Schapira, M.D., Ph.D.

The Laboratoire de Recherches de Biochimie Médicale was created in 1946. It is intended to perform research in biochemical pathology of acquired and congenital diseases in children with special reference to muscle and hemoglobin metabolism in normal and pathological states.

I. ORGANIZATION

The staff

The staff belongs either to the Department of Education Nationale or to the Institut National d'Hygiène (director: Prof. L. Bugnard) or else to the "Centre National de la Recherche Scientifique" (director: Prof. J. Coulomb).

Schapira, Georges, born in Paris, 46 years old. Title in hospitals: Interne des hôpitaux of Paris, 1935. Title in university (faculté de médecine of Paris): assistant, 1940; associate professor, 1946. Title in National Center of Scientific and Medical Research: stagiaire de recherches, 1939; chargé de recherches, 1945; maître de recherches 1947. Degree in medicine: M.D., Paris, 1941. Degrees in sciences: M.S., Paris, 1938; Ph.D., Paris, 1946. Member of the American Chemical Society, the Biochemical Society of London, the International Society of Hematology, the Council of the French Biochemical Society, the French Société de Biologie, the Association des Physiologistes de Langue Française.

Dreyfus, Jean-Claude, born in Rouen (Seine-Maritime), 43 years old. Title in hospitals: Interne des hôpitaux of Paris, 1938; assistant des hôpitaux of Paris, 1946. Title in University: associate professor, 1952; full professor at the School of Medicine of Dijon, 1956. Title in medical research: chargé de recherches, 1950. Degree in medicine: M.D., Paris, 1941. Degrees in sciences: M.S., Paris, 1946; Ph.D., Paris, 1950. Former research fellow in New York University and Washington University, St. Louis. Member of the Biochemical Society of London, the Biochemical Society of Paris, the Association des Physiologistes de Langue Française.

Kruh, Jacques, 36 years old. Title in university: Associate professor in medical biochemistry, 1955. Title in medical research: stagiaire de recherches, 1948; attaché de recherches, 1951. Degree in medicine: M.D., Paris, 1945. Degree in

sciences: M.S., Paris, 1945; Ph.D., Paris, 1952. Research fellow in California Institute of Technology, Pasadena, 1953-54. Member of the Biochemical Society of London, the Biochemical Society of Paris.

Schapira, Fanny, M.D., chargée de recherches au Centre National de la Recherche Scientifique.

Marchaud-Raeber, Lise, Ph. D., attachée de recherches au Centre National de la Recherche Scientifique.

Rosa, Jean, M.D., former interne des hôpitaux of Paris, stagiaire recherches à l'Institut National d'Hygiène.

Padieu, Prudent, M.D., M.S., attaché de recherches à l'Institut National d'Hygiène; on leave of absence at the University of California, Los Angeles.

Labie, Dominique, M.D., attaché de recherches à l'Institut National d'Hygiène; on leave of absence at the University of Pondichery, India.

Rosa, Jean, M.D., former interne des hôpitaux of Paris, stagiaire de recherches au Centre National de la Recherche Scientifique.

Laurent, Renée, M.S., stagiaire de recherches au Centre National de la Recherche Scientifique.

Schwarzmann, Vladimir, M.D., voluntary research fellow.

There are also temporary workers, some French, some foreigners, some of the latter being addressed to our laboratory by the French Foreign Office (Cultural Department). Since the beginning, two U.S. workers, one Belgian, one Greek, one Rumanian, one Chinese, three Italians, one Brazilian, one Egyptian, have been working in this unit.

The technical staff includes one secretary in charge of the administration, three technical assistants, three charwomen and one laboratory attendant.

One afternoon, every week, a mechanic, an electrician, an electronician and a glassworker look after the apparatuses and keep them in good order and eventually achieve technical improvements. They do not belong to our regular team.

Premises

In the beginning the laboratory started its work in a dependency of the Children's Surgical Clinic and then was moved in a few rooms from a former surgical unit which was transformed into a laboratory, and in a part of the former Central Laboratory of "Hôpital Necker," the latter being reserved for the use of isotopes.

At present, it occupies the ground floor of the new Children's Medical Clinic, being separated from the clinic itself by the first-floor laboratories. This disposition is justified by the work that is performed in those different laboratories. On the first floor, laboratories are mostly concerned with routine analysis, while this unit is dedicated to research projects.

The disposition is the following:

The lighted side is divided into three parts:

Laboratory of general biochemistry with an office, a room for the balances and photometers and a washroom.

A central room: library, administration, staff meetings.

Three laboratories designed for the use of isotopes: one with an office, one with a special room for the radioactive animals and a washroom, the third one being a small laboratory.

A room with balances and photometers is common to the three laboratories.

The dark side is also divided into three parts:

Moving boundaries electrophoresis with a contiguous darkroom.

Two laboratories with cold rooms and two high-speed refrigerated centrifuges; in these laboratories the physiology of small animals is investigated.

The two remaining laboratories are dedicated to physical studies: Geiger-Müller and flow counters, various physical apparatuses including three Beckman spectrophotometers, and a fractions collector.

There are also a storeroom for various materials and chemicals, and a workshop.

On the first floor, a constant temperature room is placed at the disposal of the "Laboratoire de Recherches de Biochimie Médicale" for paper chromatography.

On the fourth floor, are the animals' rooms: a kitchen, a washroom, a setup for the disinfection of the cages, special rooms for rats, mice, and rabbits.

Material

It has been supplied by:

1. American Funds:

The "Muscular Dystrophy Associations of America, Inc."
The "Damon Runyon Memorial Fund."
The "Rockefeller Foundation."

2. French Funds:

The "Faculté de Médecine" of Paris.

The "Université."

The "Institut National d'Hygiène."

The "Centre National de la Recherche Scientifique."

The "Société d'Etudes et de Soins pour les Enfants Poliomyélitiques."

The "Caisse Nationale de Sécurité Sociale."

The "Assistance Publique" of Paris.

3. International Fund: The "United Nations International Children's Fund."

Relationship with clinics and other laboratories

In France: The relationship with various scientific organizations is based on investigations carried on in collaboration. Connections are established with the unit of poliomyelitis headed by Prof. S. Thieffry, with the unit of metabolic diseases of Professors Marie and Royer, with the team of geneticists working under Professor Lamy, and with the hematological unit headed by Prof. Jean Bernard.

International relations: Study sojourns of 1 year have been made in the U.S.A. by Prof. J. C. Dreyfus (Dr. A. Keston, New York University, and Prof. C. F. Cori, Washington University, St. Louis), and by Prof. J. Kruh (Dr. H. Borsook, California Institute of Technology, Pasadena). Dr. P. Padieu is working now in the laboratory of Dr. Mommaertz (Los Angeles).

Contacts with foreign countries are established through information trips to England, Belgium, Holland, Switzerland, Italy, and during several international congresses (biochemistry, physiology, medicine, hematology, pediatrics) and symposia. A symposium on muscle (biology and pathology) was held in Royaumont (1950), (the secretary of the symposium was Prof. Georges Schapira); another one was held in Paris during the International Congress of Biochemistry (1952).

We participated (Profs. Schapira, Dreyfus, or Kruh), by invitation, in the following symposia:

Lausanne (Switzerland), 1954, "Symposium on Amino Acids";

New York, 1954, Third Conference of the Muscular Dystrophy Associations of America, Inc.;

London, 1955, "Ciba Foundation Colloquium on Porphyrins";

Utrecht, 1957, "Symposium on Muscle Physiology";

Washington, 1957, "Symposium on Hemoglobin," sponsored by the National Academy of Sciences;

Paris, 1957, "First Conference on the Peaceful Use of Atomic Energy, UNESCO";

New York, 1958, "Enzymes in Blood," sponsored by the New York Academy of Sciences.

Financial supports

The staff is supported financially by the "Ministère de l'Éducation Nationale," the "Centre National de la Recherche Scientifique," by the "Institut National d'Hygiène," by the "Société d'Etudes et de Soins pour les Enfants Poliomyélitiques," and by the "Assistance Publique" of Paris.

Outside France, we have been supported by Muscular Dystrophy Associations of America, Inc., for 7 years, and by the Damon Runyon Memorial Fund for 1 year.

The laboratory is roomed in a place which belongs to "Assistance Publique" of Paris. Consumable supplies are paid for by the "Centre National de la Recherche Scientifique," the "Institut National d'Hygiène," the "Société d'Etudes et de Soins pour les Enfants Poliomyélitiques," and the "Muscular Dystrophy Associations of America, Inc."

We received this year, from French funds, \$33,000 and from Muscular Dystrophy Associations of America, \$19,900.

II. INVESTIGATIONS

We are mostly concerned with the biochemical aspect of diseases with particular reference to muscular disorders and blood diseases.

These problems can be studied in two ways. The most interesting and the most difficult is the one which aims at the explanation of the origin of these diseases by investigating possible biochemical defects. Also, by searching for new means of diagnosis and as often as possible, of early diagnosis. As a result of the latter new therapeutic approaches can be envisaged.

It is difficult to distinguish fundamental research concerning the basic normal process of metabolism and research applied to a pathological problem, since in many cases our fundamental knowledge is still poor and advances are urgently needed. This is the case with the mechanism of the biosynthesis of proteins which is abnormal in cancer as well as in congenital disease. We have found some interesting results in these fields, showing for instance that the same cell is able to synthesize two kinds of hemoglobins, that in muscle some organites have a definite lifespan, while some proteins on the contrary are destroyed and rebuilt in continuous process inside the cell. Some proteins are present only in the fetus: fetal hemoglobin, metamyosin, a protein discovered in our laboratory in fetal muscle. We are trying to understand the meaning of these proteins which disappear soon after birth.

Knowledge of such proteins, as well as of the mechanisms by which they are synthesized, seems to us to be a valuable approach to the knowledge of the metabolism of the cancer cell, and of the process of aging. The evidence that we have found of the dynamic state of hemoglobin provides an excellent tool for the study of aging of the red cells. Some years ago we described a technique for separation of young and old red cells. The heterogenic metabolism of hemoglobins in leukemia as described by us, may provide a new approach for the study of leukemia.

As far as the congenital diseases are concerned we have been interested in the progressive muscular dystrophy, a fatal disease and in hemochromatosis.

Concerning the first disease we have discovered a new means of diagnosis, which appears to be the best biochemical way of early diagnosis; it involves the estimation of an enzyme, aldolase, in blood. The elevation of this enzyme in blood contrasts with its diminution in muscle and the question arises of the significance and the mechanism of the muscular defect in this disease. We have also shown that in this disease there is a very definite disturbance in blood circulation which gives a good approach for a therapeutic attempt now under investigation. It has been shown in the United States that a strain of mice has a hereditary disease very similar to the human. We have studied muscle protein metabolism in these mice and have shown that a definite protein, myosin, which is stable in the normal muscle, is subjected to prompt destruction in this disease. This particularity is probably at the origin of the atrophy.

Our studies on muscle have included research on muscle defects in an acquired disease, poliomyelitis, the muscular atrophy of which can be easily reproduced in the animal by the section of the motor nerve. We have shown an abnormality in a muscle protein which appears as soon as a few minutes after denervation. In another work we have shown some metabolic defects in these denervated muscles involving an abnormal biosynthesis of protein.

It is very important in the study of congenital disease to find if heterozygotes present biochemical abnormalities. Heterozygotes are the people who have only part of the abnormal gene. We hope to succeed in this field of muscular progressive dystrophy. We have succeeded in hemochromatosis, where there is an accumulation of iron in tissues, and half the male offspring display such a defect which allows an early therapy.

III. PROJECTS AND NEEDS

Investigation projects

The work of our laboratory deals with hereditary and abnormal growth. Our knowledge of cellular diseases, including cancer, is still very poor, mostly because the fundamental process of protein biosynthesis and cell growth as well as differentiation is far from being well understood. Therefore we shall continue to devote an important part of our efforts to the study of basic cell biochemistry.

The interesting results we have so far obtained in the detection of biochemical abnormalities in offspring of patients with hemochromatosis, a hereditary disease involving a trouble in iron metabolism, give us the hope to reach equally successful achievements in other congenital disease, like progressive muscular dystrophy, and to trace biochemically the heredity of the disease.

Our studies in the metabolism of muscle and red cell proteins provide examples of molecular physiology in relation to the development of mammals and the problem of aging. This also provides examples of molecular pathology. The early changes occurring in the synthesis of proteins soon after one interrupts the motor nerve, imitating the lesion of poliomyelitis, is one example of our work. Another example is provided by the early changes we have observed and recorded in blood and muscle enzymes in progressive muscular dystrophy.

We expect to develop these investigations further. Progressing in this way we may hope eventually to set up some basic notions for molecular therapy such as the induction of some specific enzyme or the inhibition of some elective enzyme.

Projects of budget

Within the frame of the already well-equipped "Laboratoire de Recherches de Biochimie Médicale" of the "Hôpital des Enfants Malades," several important improvements are aimed at, which can be but imperfectly obtained with our present organization.

Increased and regular credits are highly desirable to achieve a full development and a greater efficiency of our researches.

(a) *Personnel*.—Our staff urgently needs closer and more frequent contacts with other research workers in Europe and the United States to get acquainted with new techniques and to exchange information through personal contacts (such contacts with qualified scientists abroad could save long, useless assays).

Beginners in research: Due to the very low number of available grants in this country, it is very difficult to have beginners taken by official organizations. When accepted, they are very poorly paid.

More technicians are needed who, if available, would free more time for the researchers and allow the latter to do more efficient work. This should be made possible by the fact that the salaries of technicians in this country are lower than in the United States.

A full-time mechanic would be very useful since we are obliged now to call workers from outside to repair or to improve our material.

(b) *Materials*.—The equipment for a mechanical shop is greatly needed for keeping our apparatus in good condition for work and for manufacturing new apparatus.

Heavy and costly equipment is sometimes needed. The fast evolution of technology makes constantly available new apparatuses which help scientific progress by introducing new techniques. It is impossible to make programs in advance, but grants should be given in response to applications for such purchases when they are needed.

Current material and consumable supplies represents by far the basic expense for any laboratory. They are, nevertheless, the most difficult to obtain. This type of expense should be allowed for in every grant.

What do we need? Contracts for 3 or 5 years are in our opinion the best solution. Such contracts will give us security and allow us to make long-run projects, including the appointment of research workers. Short grants do not give us the same possibilities and when they are delayed, which happens often, it makes even short plans impossible.

We are helped through contracts by:

Muscular Dystrophy Association of America, Inc., but we have to apply for renewal of the grant every year.

We have two applications to the U.S. Public Health Service, one concerning the projects in general biochemistry (made by Prof. J. C. Dreyfus), the other concerning the project on biochemistry of red blood cell diseases. We expect an answer by February 1959. We did not apply in these two projects for workshops, trips, and some new apparatus we need.

To sum up: All our annual budget is actually \$53,000, and to have the maximum efficiency we need \$50,000 more every year.

Prof. GEORGES SCHAPIRA.

6. VISITS WITH OTHER FRENCH SCIENTISTS

Senator HUMPHREY. It would consume a great many more pages of this official record to attempt to convey even a partial summary of all of our conferences in France.

I would, for example, want to include in such a summary a report on our very constructive session with Prof. Robert Debre, one of France's great leaders in medical science. I would want to include a report on my visit to the Institute of Radium with its director, Dr. Raymond Latarjet. This outstanding scientist, who has warm ties in the United States, is highly regarded among cancer specialists throughout the world. Following my visit with him, we toured the Radium Hospital which is right next door. Being treated, at that time in the hospital were victims of the nuclear-reactor accident in Yugoslavia. The fact that the hospital was able to save the lives of all but one of the victims of that accident is a tribute to French medical science. This accident is perhaps a grim foretaste of what may happen on other occasions in this nuclear age.

Moreover, I would want to include the helpful contributions of other distinguished French scientists who cooperated with our project director during his trip in October 1958 such as Dr. Charles Oberling and others.

This brief reference may however suffice as a general indication of our indebtedness to our many French friends.

7. MEMORANDUMS FROM SCIENTISTS OF THE PASTEUR INSTITUTE

One of the most fruitful experiences was our visit to the world-esteemed Pasteur Institute. This is a private organization, it should be noted.

There we had the pleasure of discussions with the director of the institute (a member of the Institute of the National Academy of Medicine), Prof. Jacques Trefouel, together with Dr. A. Lwoff, Dr. Francois Jacob, and others.

The name "Pasteur" is, of course, synonymous with scientific brilliance. In every list of the greatest men of science in history, this illustrious name reappears. The name "Pasteur" is a synonym for the genius of France in particular—a nation to which mankind is indebted for countless scientific contributions.

The Pasteur Institute has, however, been the home as well of the contributions of great scientists of many other nationalities. There they have found an ideal setting in which to perform their labors freely and in an atmosphere conducive to the deepest exploration.

I should like to point out that the Pasteur Institute is, thus, both an active center for biological research and a great national and international shrine. In addition to more than 25 departments, there are some 100 laboratories at the Pasteur Institute. From within these famous walls have come some of mankind's greatest discoveries. Pasteur's permanent residence was in the building. There is a large museum there containing various objects with which this great genius worked. He is buried within the building. In the same building is the main library, and there in an urn are the ashes of the great scientist Eli Metchnikoff. France can well be proud not only of the classic discoveries by this institute, but of the current work which is so capably performed there.

Following our visit, scientists at the institute sent us a number of helpful memorandums at our invitation.

I have included in this record two such items. The first is a brief survey of scientific research at the institute as conveyed by Professor Trefouel.

The second is a stimulating proposal for a European institute for molecular biology, as conveyed by Dr. Lwoff. His is a recommendation, along with his colleague, Dr. Jacques Monod, which I feel merits the most careful review on the part of all of those interested in international basic research. Dr. Lwoff is, in his own right, a world famous scientist acclaimed, for example, during his most recent visit to the States for his pioneering work in virology.

Everywhere we journeyed in Europe, whether at the Karolinska Institute in Stockholm or elsewhere we heard praise of the basic and applied research in the Pasteur Institute.

A. TODAY'S SCIENTIFIC RESEARCH AT THE PASTEUR INSTITUTE. MEMORANDUM PRESENTED BY PROF. JACQUES TREFOUEL, DIRECTOR OF THE PASTEUR INSTITUTE

INSTITUT PASTEUR,
Paris, December 23, 1958.

Senator HUBERT H. HUMPHREY,
*Chairman, Subcommittee on Reorganization and International Organizations,
U.S. Senate, Washington, D.C.*

DEAR SENATOR HUMPHREY: I have the pleasure of sending you a short survey of the scientific activity of the Pasteur Institute.

Very sincerely yours,

Professor JACQUES TREFOUEL,

*Membre de l'Institut et de l'Académie Nationale de Médecine, Directeur
de l'Institut Pasteur.*

Pasteur made a revolution in medicine with his studies solving the questions of prevention and treatment of infectious diseases.

He worked in so many fields that it is not easy to make a survey of the continuation of his work. A rapid presentation of the activity of his institute will illustrate the broad inspiration of Pasteur, who succeeded in fighting the rabies virus without the help of the electron microscope.

We will start with the virus department of Pierre Lépine. The results obtained in the fight against poliomyelitis represent a perfect example of what could be expected of virology. In 1953, Lépine and Barski cultivated the polio virus on human tonsilla; at the same time Salk used monkey's kidney cultures; afterward, the virus was inactivated by formol. Now Lépine is utilizing too the culture on monkey's kidney. But he is using selected, endemic, and less virulent strains (270 French strains have been typed and studied). When the culture is developing well, a new medium containing 51 different compounds is used and a separate inoculation is made for each of the three virus types. The virus inactivation is made by the addition of small doses of formol and β -propiolactone. This double inactivation, joined to the selection of less virulent polio strains, are the warrants of innocuity. The proof of the vaccine's efficiency is given by experimentation as well as by statistics: the vaccination fully protects the monkey and the statistics are based upon 1,100,000 vaccinations. The results published by Dr. René Martin, head of the Pasteur Hospital, indicate 85 percent success (presence of antibody toward the three types of virus after injection). This vaccine work is due to Lépine, Mlle. Sautter, MM. Cheroux and Roger.

Daniel, in the same department, is cultivating human cancer cells (HeLa). Atanasiu prepares the rabies antigens.

Dr. Panthier, head of the yellow fever department, is studying the antibody formation and specially allergic reactions after yellow fever vaccination.

At the Radium Institute, Lacassagne, Loiseleur, and Rudali showed the importance of hyaluronidase (spreading factor) for the growth of tumor. Loiseleur prepared an antihyaluronidase serum and showed its beneficial influence on breast-cancer-bearing mice.

Sandor showed a difference in the serum lipids of French and Americans and found striking changes in the glycerides and phosphatides level. He also found an increase in alpha globulines of psychopaths' blood.

Oudin discovered the allotypy, which consists in structure changes of certain proteins characterized by different antigenic specificity. This may explain the impossibility of the kidney graft from one individual to another.

Dervichian and Mlle. Magis are studying the protein-lipid bound in the serum and found a correlation between this bound and the different blood groups.

Grabar succeeded in establishing that the changes in copper metabolism in Wilson disease are due to a lack of copper utilization. He showed the absence of specific constituents in leukemia leucocytes. He is now trying to establish a relation between protein changes in macroglobulinemia and changes in myeloma and cryoglobulinemia. In cases of agammaglobulinemia, a certain amount of gammaglobulines exists, not in sufficient proportion to protect against infection.

The department of enzymology of Jacques Monod is studying microbial physiology. The study of permease enabled Monod to discover specific factors for the penetration in microbes of certain substrates. The discovery of galactoside permease is focusing again the interest on the fundamental problem of cell permeability.

The development of microbial genetics during the last 10 years is really extraordinary. In Lwoff's department, Jacob and Wollman made excellent contributions. The male bacteria inject in the female chromosome fragments but the different genetic characters are transmitted with varying frequency. The explanation was given by Jacob and Wollman: the chromosome is penetrated by one end, a rupture may occur and the gene may not be transferred if it is located far away from the chromosome origin.

The use of calcium 45 enabled Milhaud and Aubert, with the collaboration of René Martin, to study the bone metabolism in the human. With an original method, they can investigate and differentiate the pathways of calcium and detect important pathological changes. They also prepared a synthetic curare, Flaxedil ¹⁴C, to study with C. Chagas, in Brazil, the mechanism of curarization on the electric organ of *Electrophorus electricus* before and after denervation.

The synthesis of Flaxedil was made in the department of therapeutic chemistry by Mme. de Lestrang and essayed by Bovet, who received last year the Nobel Prize for his distinguished works on adrenolytic and antihistaminic drugs.

The study of the properties of benzodioxanes, started by E. Fourneau and Bovet, is now continued by Funke for the chemistry and J. Jacob for the pharmacology: they discovered strong analgesic properties, suitable to clinical use. Most of the work concerns the serotonine antagonists, prepared by M. Julia and the study of sulfones, curing lepra or having fibrillatory properties.

Lamensans is in charge of antibacterial essays. He showed, with Farhi, that the classical ideas concerning the action of sulfa drugs are partially wrong, as PAB and folic acid are not exact antagonists. They demonstrated the necessity of typhoid vaccination after chloramphenicol treatment, which is unable to produce antibody.

Chedid and Boyer established the adrenal stimulating activity of certain bacterial products; it seems that the bacterial substances and ACTH are closely related. P. Nicolle and Le Minor are working on lysotypy, a method enabling the subtyping of bacteria with the help of bacteriophages. For *Escherichia coli*, 11 types of bacteriophage sensitivity exist.

Perez prepares very pure albumin for blood transfusion. Mlle. Faure developed the use of phosphatide for syphilis tests. Laporte is in charge of the center for serological tests and prepares an hemolytic serum of very high activity.

In Dujarric de la Rivière's department, Eyquen is studying the chemotherapy of leukemia and is following properdin blood levels in various diseases. Mme. Kolochine-Erber is a specialist of leptospiroses. Mlle. Cateigne is an expert in influenza research and is preparing a well-controlled vaccine.

Professor Mollaret is interested in nerve viruses and in multirecurrent meningitis.

Mlle. Guillaumie prepares several antigens: *perfringens*, *septicum*, *histolyticum*, *eodematensis*, and *chauvoei* for the manufacture of the corresponding sera of very high purity.

At the Pasteur Institute of Garches, Boquet is studying the effects of the administration to animals of typhoid endotoxin and typhus O antigene associated with ascorbic acid and cortisone.

The department of anaerobic microorganisms of Prévot produces leaven for artificial dung; the retting of Brazilian grass; Botuli mink vaccine; special media for anaerobic microorganisms. Cassagne produces many culture media. Pochon, with Mlle. de Barjac, is a specialist for earth microbiology.

Insects are studied in the department of Roubaud and Balachowski: the cycle of *Ornithodoros capensis* by Colas-Belcour, the larvae of *Simulie* by Grenier, the hereditary transmission of drosophila tumor by Guelelovitch. Toumanoff is working on the insect destruction by pathogenic virus or micro-organisms. Lamy, in Deschinens's department, is working out a test for parasitic antibodies. The department of rickettsia, in the hands of Giroud, established a vaccination against *Rickettsia burneti*, and prepares antibodies for serological tests (Roger). Giroud and Renoud of Tunis obtained trachoma cultures on eggs and mice lungs.

Bretey, in the tuberculosis department, prepares B.C.G. as well as tuberculin. N. Rist and Mme. Grumbach are looking for new tuberculostatic drugs and attribute interesting properties to x-ethylisonicotinic thioamine. Coletsos, with the help of the electron microscope, could realize cultures of B.K. (*Koch bacillus*) which have been wrongfully considered as dead after antibiotic treatment. This fact can explain the big number of new tuberculous patients and is reinforcing the necessity of generalized B.C.G. vaccination.

Chaussinand, head of the lepra department, published a new edition of his book on lepra, insisting on prophylaxis and therapy and giving out the extraordinary results of sulfones treatments. B.C.G. vaccinated rabbits have a positive lepromine reaction and are therefore probably vaccinated against lepra. Floch, director of the Pasteur Institute in Guyane, and Montestruc, director of the Pasteur Institute in La Martinique, are in charge of the treatment.

Mycology and plant physiology are the fields of Segrétain. Drouhet worked out a test for *Candida* infections on the rabbit, useful for the estimation of antifungus drugs. Hirth studied the effect of cortisone on tobacco virus multiplication. Segrétain, Mariat and Drouhet demonstrated the sensitivity of the hamster for histoplasmosis and the antibiotic treatment of mycetozoa in Senegal. The microscopic examination made by J. Levaditi, head of the Department of Pathology, could confirm the efficiency of the antibiotic treatment. The Department of Jacotot is involved in the study of several animal diseases such as myxomatosis, pasteurellosis bovis, brucellosis, which require the preparation of vaccine made partially in the Institute of Laroche Beaulieu (Dordogne), directed by Chevé. The pertussis vaccine and diphtheria-tetanus-pertussis vaccine are prepared there in collaboration with the Vaccine Department of Paris, where Bonnefoi prepares and controls all the vaccines of our institute as well as several cultural media.

In the Institute of Garches, directed by Nicol, all the serums are prepared. It is there that Rouyer developed a rapid method to produce tetanus or staphylococcus toxins by deep cultures. The diphtheria toxin is highly purified by Raynaud, who is further working on the vaccine activity against tuberculosis of compounds extracted from killed B.K, H₂ Rv or of B.C.G.

This very long list of works is only giving a partial picture of the activity bound to the life of the institute which Pasteur created to protect public health: Departments of Production and Departments of Research are working together to translate into fact the dream of the famous founder.

B. MEMORANDUM ON PROPOSED EUROPEAN INSTITUTE FOR MOLECULAR BIOLOGY, CONVEYED BY DR. A. LWOFF

A EUROPEAN INSTITUTE FOR MOLECULAR BIOLOGY

The fundamental biological disciplines: genetics, cell physiology, biochemistry, have been advancing at an extraordinary pace during the past 10 years and these formerly separate approaches are merging today into a new science which transcends the huge diversity of biological phenomena by taking up the problem of life at the level of elementary relationships. The ultimate object of this new biology is to interpret and define the essential living unit, the cell, in terms of the structural, functional, and developmental interrelations of its typical macromolecular constituents. A basis for future advances in this direction is now firmly established by modern concepts dealing for example with the structure of biological macromolecules, and especially with the structure of the hereditary material, the functional relationships between these macromolecules, the synthesis of specific enzymes or the relation between the hereditary material of viruses and host cells. The formation of this new discipline, molecular biology, is probably one of the most significant scientific events of this century. Within this new field, biology may hope to attain a degree of unity comparable

to that of the physical sciences, and its development may endow the biologist with powers of theoretical treatment and prediction hitherto possessed only by the physical scientists.

Besides its fundamental aspect, and because it is the more fundamental biological discipline, molecular biology is directly involved in two of the major medical problems with which we are still challenged—viral diseases and cancer.

Molecular biology is developing most vigorously in the United States where it is already an accepted discipline, as testified for instance by the creation of professorships and of a new journal. It is also represented in Europe by a number of individuals or groups, but its development is hampered by the structure of European universities and research institutes. By its very nature, molecular biology requires the cooperation of scientists with widely different trainings—geneticists, microbiologists, biochemists, physicochemists, crystallographers, physicists. The traditional administrative and educational barriers between these disciplines do not favor, and frequently actively inhibit, the formation of groups attaining the necessary critical size and the promotion of brilliantly gifted individuals. In addition, the lack of space and of funds for equipment has been a significant negative factor, but again the fundamental difficulty in Europe is that the proper administrative and functional structures for the development of molecular biology do not exist, and that their creation by or within the framework of existing institutions meets with great difficulties.

As a result, European scientists working in this field are, even more than others, very strongly attracted to the United States. This is an excellent thing when it contributes to increasing scientific exchange and collaboration between Europe and America. It would be extremely unfortunate if it eventually led to an emigration of European molecular biologists to the United States, resulting in a partial sterilization of European biology.

Such a situation would evidently be contrary to the best interests of the United States itself. Just for the same reasons that the United States is encouraging the economic and industrial development of Europe, its interest is that European science should be developing and flourishing, while maintaining contacts and exchange with American science. Only thus can the Western World hope to meet the tremendous challenges of this second half century.

The continued, efficient development of molecular biology in Europe is dependent upon the creation of an adequate structure. The foundation of an European Institute of Molecular Biology therefore appears as one of the most significant initiatives that could be taken in helping and promoting the science of tomorrow. Such an institute should be European in its structure and scope for three essential reasons:

(a) In order to achieve the initial necessary critical mass and diversity, by calling upon all the best available European specialists, who are at present more or less segregated and isolated in different universities.

(b) Because a European institute could ignore the traditional administrative limitations and separations of European universities.

(c) Because all European cooperative efforts should be encouraged, especially in the realm of cultural endeavors. The remarkable success of CERN has been a test of what can be achieved when the best European scientific minds come to work together in a given field.

The ideal structure for such an institute could be sketched as follows:

The scientific staff should not exceed about 50 people including the permanent staff and temporary visitors. In order to forestall any tendency toward compartmentalization, the Institute should not be divided into departments but should be rather fluidly organized into approximately 10 to 12 nondenominational units each led by a member of the institute, i.e., a senior worker, working with three to five collaborators including more or less permanent staff members, visitors from abroad, and eventually Ph. D. students. All the members should start at the same initial salary, with automatic increase, avoiding any occasion or possibility of competition for promotion.

The international status of the Institute could be insured without recourse to top-heavy Government organizations by submitting the general administration and the appointment of the Director and members, to a board of trustees composed of prominent administrators chosen *ex officio* from the various permanent European institutions (Council of Europe, CECA, Euratom, OECE, etc.) plus a number (e.g., one-quarter or one-sixth) of trustees elected by the members of the Institute.

Very roughly, the initial investment including the building and basic equipment would require \$3 million to be spent over a period of about 3 years.

The budget for the functioning could be approximately estimated as follows:

(1) Maintenance:	
Heating, electricity, gas, and general upkeep.....	\$30,000
Laboratory supply.....	160,000
Library.....	5,000
Mechanical workshop.....	5,000
(2) Personnel:	
12 members (senior workers).....	120,000
Permanent technicians.....	50,000
Nonscientific permanent personnel.....	60,000
Administrative staff.....	10,000

It is assumed in this estimate of personnel budget that only the members (senior workers) would be directly in the pay of the Institute. Other more or less permanent scientific staff members would be fellows of different national or international institutions. It is also assumed in the maintenance budget that members would be allowed to apply for grants from various institutions for the pursuit of their research programs.

It would be possible to reduce considerably the annual budget if all or a large fraction of the members were associated with, and directly paid by, already existing universities or institutions. But this would imply a considerable limitation in the initial organization and in the development of the Institute, when the very object of its foundation would be to overcome such limitations and to assemble the best possible, internationally chosen, group of scientists.

The problem of the implantation of the Institute is of course a major one. It would be necessary to erect it as close as possible to, or preferably within, the grounds of an existing university or research institution in order to increase its power of attraction. It should be located within one of the great centers of culture of Europe. Finally, the initial nucleus of such an Institute will be of decisive importance for its success. At the present time, the largest European nucleus of molecular biologists appears to be in Paris, at the Pasteur Institute. It should suffice to mention the names of André Lwoff, Jacques Monod, François Jacob, Elie Wollman, François Gros, Georges N. Cohen.

All this being considered, the best location for the erection of the Institute appears to be in Paris, either on the free ground still available near the Pasteur Institute, or on the new ground upon which it is envisaged to rebuild the new faculty of sciences.

ETABLISSEMENT

Construction et aménagement:	
Construction.....	\$2,500,000
Equipement de base.....	500,000
Total qui pourraient être mobilisés en 3 années.....	<u>3,000,000</u>

FONCTIONNEMENT

Dépenses d'entretien annuelles:	
Chauffage, eau, gaz, électricité, entretien du bâtiment.....	30,000
Fonctionnement du laboratoire.....	160,000
Bibliothèque.....	5,000
Atelier de mécanique.....	5,000
Total.....	<u>200,000</u>

Personnel:	
10 chefs de service.....	100,000
40 travailleurs.....	300,000
Techniciens.....	100,000
Personnel subalterne.....	60,000
Personnel général, secrétaires, mécaniciens.....	10,000
Total.....	<u>570,000</u>

GENEVA, SWITZERLAND—CONFERENCES WITH WHO OFFICERS, NOVEMBER 20, 21, AND 22, 1958

Senator HUMPHREY. The fourth committee print in this series was devoted to my personal report on the World Health Organization. My visit with Dr. M. G. Candau and his staff was one of the keystones of the entire trip.

There I secured an overall view of the worldwide program of this outstanding intergovernmental organization.

Since the fourth print concentrated on this subject, I will not include within this record additional material on WHO.

I may only state, however, that hardly a month has gone by since our visit a year ago, in which the project director or I have not corresponded with WHO.

OFFICIAL CHANNELS OF COMMUNICATION

It should be carefully noted that we are very cognizant of the fact that the United States is but one of WHO's member governments. The official channel for communication to WHO is, of course, through the U.S. Department of State and we have made many such contacts.

In addition, we have been in touch with WHO through Dr. Leroy Burney, Surgeon General of the U.S. Public Health Service, and through the Director of the Division of International Health, Dr. H. Van Zile Hyde, who has served as a member of WHO's Executive Board.

So many have been the points of interest between ourselves and WHO, however, that we have, in addition, directly contacted the Director General, Dr. Candau, as well as the Directors of the Regional Offices of WHO.

In each instance, of course, we have sought to refrain from imposing upon them, since we well recognize certain official limitations which must necessarily prevail.

Dr. Candau, the Secretariat and the Regional Directors have always responded in a helpful and cordial manner and in a way fully consistent with the official policy framework within which they must operate.

It is, of course, fortunate for the United States that the Expert Advisory Committee which is preparing the groundwork for WHO's medical research program includes the Director of the National Institutes of Health, Dr. James A. Shannon. We have been in very close touch with Dr. Shannon, with the Director of the Office of Research Planning, Dr. Charles Kidd, and with other NIH staff members.

POSSIBLE CLEARINGHOUSE FOR RESEARCH INFORMATION

I may say for the record that one of my interests in connection with WHO research is to explore ways and means by which each of the member nations may better inform one another as (a) to their medical research work which is underway and (b) research work which is completed.

So far as past research is concerned, it is important that the world's scientists be apprised of what has done in the past, whether or not it yielded positive results.

Indeed, it is often almost or as important that a scientist know that a colleague has failed to confirm an hypothesis as it is to know that an hypothesis has been confirmed.

The unfortunate fact of the matter is, however, that at present the world's scientists do not have the information at their fingertips which they should have, even as regards other research work in their own country.

After months and months of subcommittee study, we have confirmed again and again that there is a very serious lag between the time research is completed and the time it becomes known to other interested scientists, even within the same country; particularly when the country has as broad a research program as that of the United States, the United Kingdom or Sweden.

The problem is magnified manyfold as regards communication of results between scientists where a formidable language barrier exists. It may do little good, for example, for a government to send an annual report which may have been 2 years in compilation to a scientific body in another country if the latter does not possess the means to translate it and then actually to assimilate what the report states as regards individual research projects.

What I am emphasizing is that it is not enough merely for science to index and abstract information which has already been published in medical journals or proceedings. Much useful information is never published in medical journals or proceedings, or it is published so late or indexed so casually that its intrinsic value is diminished.

This, then, is one of the phases to which I believe WHO might give attention. Similarly, this type of subject should have the attention of the Council of International Organizations in Medical Sciences and its member organizations.

DIFFICULTIES OF SOLUTION

It would not be feasible now to offer any package remedy, so to speak, for this problem. What the formal mechanism for an international clearinghouse for several clearinghouses might be, under whose auspices, where, with what financing, under what policies as regards public and private participation—these are difficult questions.

Mr. Cahn and I have explored problems like this with medical leaders and their organizations here, with the Bio-Sciences Information Exchange, and other groups as I pointed out in an earlier part of this volume, at the conclusion of Dr. James A. Shannon's testimony.

But WHO, in my personal judgment, might well take leadership in this field, especially through the cooperation of all the organizations which are in relationship with it—each in its specialized field.

BRUSSELS, BELGIUM—VIEWS OF HENRI TAGNON, M.D., ON AMERICAN SUPPORT OF MEDICAL RESEARCH AND ESPECIALLY CANCER RESEARCH IN EUROPE

Senator HUMPHREY. It had been our intention to visit Brussels in order to meet with numerous scientists with whom the subcommittee had been in contact. Unfortunately, the limited time available did not permit us to include Belgium on our tour.

However in the previous exploratory trip, in October 1958, the project director had met with Dr. Henri Tagnon of the Institut Jules Bordet in Brussels. Dr. Tagnon, shortly thereafter, at our invitation prepared a memorandum presenting his views on American support of medical research in Europe with particular reference to the possibility of expanded cancer research. His memorandum stressed the need for intra-European cooperation with American support.

When it became apparent that we could not visit Belgium, in November 1958, I sent word to Dr. Tagnon asking whether it might prove feasible for him to meet with us at one of the other points on our itinerary. Very graciously, Dr. Tagnon agreed to meet us in Stockholm. There, we were able to confer and discuss in somewhat more detail the constructive views which Dr. Tagnon had so kindly presented in the memorandum. The subcommittee is indeed grateful to Dr. Tagnon for his constant helpfulness.

Joining with us in the conference at Stockholm was another distinguished cancer researcher, Dr. David Karnovsky of the Sloan Kettering Institute for Cancer Research, in New York. During the prior meeting in October, the project director had conferred with Dr. Karnovsky and with Dr. Chester Stock at the Bordet Institute. The services of both Dr. Stock and Dr. Karnovsky had been made available through the prompt cooperation of Dr. C. P. Rhoads, late director of the Sloan Kettering Institute. Dr. Rhoads, who subsequently passed on, was likewise of tremendous help to this subcommittee. His colleagues at Sloan Kettering have carried on in his inspiring tradition. Physicians like Dr. Tagnon and Dr. Rhoads, Dr. Stock, and Dr. Karnovsky are the caliber of men to whom the world can and does look with well-merited hope for the ultimate answer to cancer.

STOCKHOLM, SWEDEN, CONFERENCES WITH SWEDISH OFFICIALS—NOVEMBER 24, 25, AND 26, 1958

Senator HUMPHREY. If I were to attempt to single out any one institute in Europe which provided as much or more inspiration from its scientific achievements than any other, it might well be the famous Karolinska Institute in Stockholm.

My visit to but a few of the many buildings and units which comprise the institute was one of the most encouraging of all my experiences on the trip. For, here in this famous institute is located some of the greatest scientific talent to be found anywhere in the world.

Central to the success of our visit in Stockholm was the able rector of the Karolinska Institute, Sten Friberg. During the few hours we spent with Dr. Friberg, he gave us a condensed but invaluable view of biochemical and other research work. Dr. Friberg more-

over commented with great frankness in answer to all our questions, e.g., on the fact that much of modern research depends on relatively high-priced equipment like electron microscopes—particularly in the fundamental studies in which Karolinska may be said to specialize.

At my request Rector Friberg prepared a report on some of the work being performed by each of the various units which I had visited. This report follows.

Thereafter is reprinted the verbatim transcript of two of the conversations which we held—one with the distinguished Nobel Award winner, Prof. Hugo Theorell and the second with Prof. T. Caspersson.

REPORT ON THE KAROLINSKA INSTITUTE

[Director: Prof. Hugo Theorell, Nobel Prize winner in physiology and medicine, 1955]

A. BIOCHEMICAL DEPARTMENT OF THE NOBEL MEDICAL INSTITUTE, STOCKHOLM, 1958

Ever since the establishment of the institute in 1937 the research work has been concentrated upon the respiratory enzymes.

Energy, which is required for the various functions of the body—resorption, rebuilding, secretion, and muscular work, among many others—derives from the food and is set free by a series of reactions in which the food is oxidized to carbon dioxide and water. The enzymes, which mediate this combustion in such a way that the liberated energy can be utilized by the body for the above purposes, are of three kinds. The hemoproteins are nearest to the oxygen side, the dehydrogenases are at the "food side," and the flavoproteins occupy a position in between, grossly seen. All three kinds of enzymes are built up according to the same pattern: A relatively small molecule, the prosthetic group, is bound to a protein moiety. The prosthetic group of the red or brown hemoproteins consists of an iron atom surrounded by a framework of carbon and nitrogen atoms, a porphyrin. The flavoproteins acquire their yellow color from their prosthetic group, which is phosphorylated vitamin B₂. The prosthetic group of the dehydrogenases is loosely bound and may more correctly be called a coenzyme. It contains vitamins of the B-group together with sugar and phosphate.

The following projects are at present being conducted at the institute.

Myoglobin is a hemoprotein in muscular tissue, where it receives oxygen from the blood and stores it until needed. It was crystallized by Theorell in 1932. As shown in 1953 by Theorell and Akeson myoglobin as crystallized from horse muscle can be separated into three slightly different fractions. The differences in amino acid composition of the three fractions are now studied (Theorell, Akeson, and N. Rumen from Yugoslavia). Some collaboration on the myoglobin has been established with the Cavendish Laboratory in Cambridge.

Another hemoprotein, cytochrome c, mediates the electron transport in a reaction that occupies a central position in the cellular oxidation. It was found by Palés—and Theorell in this case as well—that crystallization did not warrant homogeneity, but the hemoprotein could, however, be obtained in the pure form by electrophoresis. Twenty years ago Theorell showed that the linkage between prosthetic group and protein was mediated by sulfur, a novel arrangement at that time. Now the sequence of the amino acids in the neighborhood of the sulfur bonds is being studied and so far the positions of one-seventh of all amino acids in the protein have been mapped. This work is partly carried out in collaboration with H. Tuppy in Vienna. A comparison of cytochrome c from various sources is being carried out by Palés, Levin, and Carlström.

A hemoprotein from leguminous plants, "leghemoglobin," has recently for the first time been crystallized in the institute by N. Ellfolk from Helsinki. Its function is unknown but may be connected to the ability of these plants to utilize atmospheric oxygen.

Two procedures which permit the isolation in the pure state of the prosthetic group of hemoproteins as well as of certain artificial iron porphyrins has recently been described by K. G. Paul. This work, which initially was of purely theoretical interest, has very recently opened a new approach to the under-

standing of the iron utilization in the bone marrow cells. An investigation of a related problem is performed by Paul and L. Engstedt and aims at an understanding of the role of catalase, another hemoprotein, in the red blood cells.

When the hemoproteins are allowed to react with carbon monoxide a compound is formed which is split by light. This effect, known for half a century, was used by Otto Warburg in Berlin 30 years ago as well as by more recent investigators to determine the light absorption and quantity of such hemoproteins which cannot be extracted from the cell structure. J. Schuberth has now shown that the results depend upon what sort of light is used. With visible light a true reversible effect is obtained because of the light absorption of the iron porphyrin. Ultraviolet light on the contrary is absorbed by some amino acids in the protein part. The light energy is transmitted to the iron atoms, causing reduction or oxidation, depending on the conditions.

In collaboration with Prof. G. de Hevesy the formation and breakdown velocities of myoglobin and cytochrome c in rats are studied by labeling both the protein and heme moieties with ^{14}C -glycine.

At different reactions the iron of hemoproteins changes its magnetic properties in a characteristic way. A very sensitive and unique balance for the study of these magnetic properties has been constructed and is in continuous use. A new and powerful method for magnetic research is found in the electron spin resonance absorption, a technique by which the absorption of radar waves in a sample placed in a magnetic field is investigated. A. Ehrenberg has constructed a spectrometer of this type and he and collaborators are investigating various free radicals of biochemical importance. These organic molecules exhibit paramagnetism and are usually very reactive and short-lived entities, but in certain solutions and in solid systems they can be stabilized for a longer time. Free radicals have for some time been postulated as intermediates in many enzyme reactions, but it has not until now been possible to obtain any unambiguous evidence that such intermediates really exist. Ehrenberg and Ludwig (Philadelphia, U.S.A.) have thus demonstrated how free radicals are formed when the old yellow enzyme reacts with the reduced form of the coenzyme triphosphopyridine-nucleotide. The future work aims to determine the structure and properties of these flavin-radicals as well as of other enzyme intermediates and to fit them properly into the reaction schemes.

Organic free radicals are also produced when ionizing radiation (for example, X-rays, δ -rays, and neutrons) interacts with organic material, especially living organisms. These radicals start reaction chains of different types that either lead to harmless products or to products that ultimately manifest themselves as a radiation damage of some kind, e.g., a genetic damage. Hitherto it has only been possible to study the end of these reactions, the final damage. A. Ehrenberg has now, in collaboration with L. Ehrenberg, Stockholm University, been able to study directly, by means of electron spin resonance, the free radicals induced by irradiation in living grass seeds and to correlate the amount and behavior of these radicals to the observed biological damage. The biological effects and reactions to the radicals of different protective and enhancing agents are under investigation.

The working mechanism of some important dehydrogenase and flavoprotein systems are studied in detail by the aid of enzymes produced for the first time in this institute in pure and crystalline shape.

The alcohol oxidizing enzyme in liver, ADH, is at present subject to studies by H. Theorell in collaboration with our guests, Dr. A. Winer, from Duke University, U.S.A., and Dr. J. McKinley McKee, from England. As discovered here some years ago fluorescence measurements are extremely useful for elucidating the complicated chemical reactions between enzyme, coenzyme and substrate. The results of these investigations will have general application to a large group of important enzyme reactions. Fluorescence methods are also used here for studying another class of coenzyme-enzyme reactions. In the so-called old yellow enzyme, that was crystallized by Theorell already in 1934, the fluorescence of the yellow coenzyme disappears when it is bound to the enzyme protein. This phenomenon helped us to determine not only the reaction rates, but also the chemical nature of the groups involved in the binding reaction. Further work is now in progress in order to elucidate the nature of the oxidation-reduction of the enzyme complex in 1-electron steps.

Sten Kistner is studying the immunological properties of the old yellow enzyme. He found that the protein groups binding the coenzyme are not involved in the reaction with the antibody formed in rabbit, but the antibody is

attached so close to the coenzyme that it interferes with the enzymatic reactivity.

In collaboration with N. Wijkvist, department of women's diseases, K. G. Paul has undertaken the purification of an ovarian peptide hormone, relaxin. This exerts a marked influence upon the rate of delivery as well as upon dysmenorrhic reactions by influencing the tonicity of the uterus. With the aid of a recently published assay method the hormone has been purified about 1,000 times. The practical consequence of this work may become considerable. Paul and Wijkvist also observed that the uterine mucous membrane possessed a high activity of peroxidase, another hemoprotein, during some phases of the menstrual cycle. The possible value of this observation for the diagnosis of various diseases, particularly uterus cancer, is under investigation.

Sulfur metabolism is studied by B. Sörbo with the aim of elucidating the various enzymatic steps necessary for the conversion of sulfur containing amino acids to inorganic sulfur compounds. J. G. Ljunggren and B. Sörbo have studied the oxidation of certain antithyroid drugs by the enzyme peroxidase, and this investigation is now pursued further in order to develop new drugs active against thyreotoxicosis. The biosynthesis of the thyroid hormone is furthermore studied by J. G. Ljunggren, with special attention given to the role of peroxidase in this synthesis.

A Japanese visitor to the institute, N. Katunuma, has made an interesting observation on the mechanism for one of the "rebuilding" steps mentioned above. A part of the energy released in the oxidation of the food is used to build up a compound $AMP \sim NH_2$, containing a carbon-nitrogen cyclic substance adenosin, phosphate, and ammonia. This ammonia is readily given over to ketoacids, which thereby are converted to amino acids, the building stones for proteins. Katunuma is now studying the enzyme that produces the energy-rich $AMP \sim NH_2$ compound.

B. DEPARTMENT OF MEDICAL CELL RESEARCH AND GENETICS OF THE NOBEL MEDICAL INSTITUTE

This department is a functional part of the Karolinska Institutet. It was established approximately 12 years ago and was built up entirely around a, at that time, running, specific research line which had been developed during the war by a research group, headed by Prof. T. Caspersson, who was then working in the Institute for Biochemistry of the Karolinska Institutet.

The research program is pure fundamental biological and medical research. The background for this development of the institute was given by the working out of a group of special techniques for quantitative cytochemical studies of the growth process in the individual cell and the opportunities these methods gave for the study specifically of the role of the nucleic acid in protein synthesis and growth processes in general.

Nowadays the field of work is much wider but the keynote is still basic research on growth with quantitative cytochemical techniques. The institute can be described as consisting of three parts: a biophysical subdepartment, which forms the technical backbone of the work in the institute, a biological subdepartment working on the different biological lines, which obviously represent the goal of the work in the institute and a subdepartment for "routine measurements" (cf. below).

The biophysical work gives the technical background for the main part of the biological work. Its aim is development of new techniques for quantitative chemical work on structures within the individual cell, that is in the range of dimensions of a thousandth of a millimeter. Originally the main work was done in the optical spectral range: nowadays much more general techniques have been developed using optical, X-ray—electron microscopical—and several other types of techniques.

In general the practical application of these techniques on biological materials was found to be a quite laborious and time-consuming task. This led to a far-reaching automatization of the measuring devices by mechanical and electric means and also to incorporation of electronic data computation units of different kinds in the instruments. Especially in the very last years this has led to a considerable expansion of the possibilities for applying these types of techniques in different fields in biology and medicine and the scope of the biological work has subsequently been considerably widened. The larger pieces of automatized instrumentation served by especially trained assistants, together form what

was above described as the "subdepartment for routine measurement." There the measurements necessary for the work of the biologists are carried through by specialized personnel on the material prepared by the biologists.

On the biological side the main lines are several, even if all of them are more or less directly concerned with fundamental growth processes. They can be described as falling into the following groups: (1) studies of the mechanism for cell division and of the chemical composition of the gene-carrying material; (2) studies on the mechanism for virus multiplication in individual infected cells; (3) tumor research lines. The last mentioned ones correspond at present to about half the investment of the institute and concern on one side the reactions of the tumor cells to different agents, such as ionizing radiation and chemotherapeutics and on the other hand the chemical changes in the growth regulating system of the cell during the development of cancerous growth.

Even if the basic lines run fairly parallel, the biological program is fairly complex, and a considerable number of different fields are represented by the personnel. The main strength of the institute is probably to be found exactly in the diversity of the backgrounds of the research people joining their efforts to attack fundamental problems of medical and biological interest. Thus the staff contains physicists and chemists and biologists with different backgrounds from botany and virology to normal cell physiology, pathology, and especially tumor pathology.

The staff of the institute is close to 50 persons, everyone included. A certain number of research guests from other countries are received annually preferably on a 1-year basis. After the war we have had such visitors from 30 countries, with Americans as the major group.

The budget comes basically from the Swedish Government on a permanent arrangement and is supplemented with governmental means for special research projects, channeled by the different Swedish research councils. Also the Swedish Anticancer Society, a counterpart of the American Cancer Society, supports certain lines.

In this context we are happy to acknowledge grants from the American side. For a considerable number of years the Rockefeller Foundation has supported different projects especially in the early period during and shortly before the war. This far-seeing support was of basic importance for the development of the present organization. During the last 3 years special projects have also had support from the U.S. Public Health Service, which has considerably strengthened the general program and which is a great source of satisfaction to us.

The contacts with many American research institutions have been close. Research visitors from the United States here have been of two kinds, younger research workers visiting here to learn the specific techniques developed here and more advanced colleagues wanting directly to exploit our techniques and facilities for their own or joint research programs. Altogether 30 to 35 American colleagues have thus stayed here for work for periods longer than 3 months and up to 2 years.

Among the several earlier associate professors here who have reached independent positions in other institutes and in addition to that during the last years have received several American research fellowships should be mentioned in the first line Profs. H. Hydén (histology, Göteborg), A. Engström (biophysics, Stockholm), G. Klein (tumor biology, Stockholm), Drs. B. Theorell and G. Moberger (both in pathology, Stockholm).

The contacts with American institutions have, of course, been a source of satisfaction to us and it is our sincere hope that the American visitors have also been satisfied with their stay here. We hope that these contacts will develop further and at present we are specially glad at plans, developed the very last months, for a collaboration between our institute and the institute of Prof. Sidney Farber at the Harvard Medical School, the laboratory of the Children's Cancer Foundation in Boston. The project aims at a wider approach on the cytochemistry of the cancer cell and also comprises a plan for extended exchange of research personnel in both directions.

C. BACTERIOLOGY DEPARTMENT

The planning and research facilities of the bacteriological department appear from the enclosed papers by B. Malmgren and C.-G. Hedén (Nordisk Medicin, 60, 1077-1098, 1958).

In the scientific study of the antigenic and enzymatic composition of bacteria and in the course of preparing material for the isolation of enzymes or for the production of bacterial vaccines of different types, it is important to have facilities for large-scale cultivation available.

The main interests in the research work of the department are concentrated around questions concerned with the cultivation of bacteria in big volumes and with the fractionation of different bacterial antigens and other products. Many problems of technical, biological, and physicochemical character pose themselves during this work. For a bacteriology department of a medical school, safety problems in connection with the cultivation of pathogens naturally come up. They are of a principally different type in large-scale culture than those dealt with in the case of ordinary cultivation methods. Harvesting living pathogenic bacteria suspended in big volumes of liquid medium is an extremely intricate problem. The experiences from work in ordinary scale, where test tubes and glass vessels of medium sizes are used simply cannot be applied to the large scale preparation of cells or bacterial products. Details of special importance are, e.g., stirring of the medium and the treatment of the culture with air or other gas mixtures. It appears from the publications mentioned that the department has at its disposal a base equipment suitable for scientific work of this type.

The safety measures used when handling large quantities of dangerous bacteria also guard against unwanted bacteria getting access to the equipment from the outside world and thus make possible experiments with nonpathogenous bacteria or with completely sterile environments over extended periods of time. This possibility, together with the general flexibility of the pilot plant, is the natural background to an interest in different continuous culture systems and in using certain parts of the equipment for germ-free life studies (chicken). Bio-engineering is also an important phase in other studies, for instance those concerned with the disintegration of bacteria and with the microbial metabolism of gases. The latter studies include an investigation of bacterial products appearing in the course of growth under very high pressures.

If one of the above lines should be singled out for its particular general significance it would be that concerned with continuous culture techniques. These are important in many connections, among others to the fermentation industry where they offer possibilities to improve the process economy.

Different types of bacteria have already been cultivated in the fermenters set up in the pilot plant. Strains of *Rhodospirillum*, *Leuconostoc*, *Micrococcus lysodeikticus* have for instance been cultivated to yield enzymes of different types. Up until now the only pathogenic microorganisms cultivated are gonococci, staphylococci, *Klebsiella pneumoniae*, *Listeria monocytogenes*, and *Bordetella pertussis*.

The last mentioned bacterium, causative agent of whooping cough, constitutes the model organism of the present scientific work. The reasons for this choice are threefold.

1. *Bordetella pertussis* is a very exacting microorganism with respect to the composition of the nutrient medium; large-scale cultivation, therefore, offers many delicate problems as regards pure culture technique and quality of the bacterial product.
2. Our knowledge of the biochemical structure and of the immunogenic importance and properties of separate bacterial fractions or antigens is very incomplete and to some extent confused.
3. In many parts of the world whooping cough is an important children's disease, which can be effectively controlled by means of specific vaccine prophylaxis.

In spite of the fact that much work has been done on bacterial disintegration, one cannot always in advance recommend the appropriate method for a special bacterium and a special purpose. A systematic study in this field is therefore a prerequisite for the subsequent fractionation work. The elution and separation of different bacterial substances is performed by means of zone-electrophoresis and chromatography in tall cellulose columns. After appropriate treatment and physicochemical characterization the different fractions are tested with respect to their biological and immunological properties.

It can be mentioned that a nucleic acid fraction has been completely separated from all proteins by means of electrophoresis. As a consequence the cell proteins can be further resolved just as successfully as those in serum.

Somewhat aside from the main research program of the bacteriological department allergens from several species of pollen have been highly purified by physicochemical methods. The pollen from ragweed (*Ambrosia elatior*) yielded a highly active preparation according to tests made by Dr. Sherman at Columbia University. It has been possible to elaborate the preparation method on ragweed for application on industrial scale. It is planned to try coupling the active substance to protein in the hope of attaining certain immunogenic properties.

Research work of the type pursued at the bacteriology department is economically very taxing, the costs for media used in 1,000-litre-batches and the demands for technical assistance being high. To make possible the research work of the bacteriological department the institute has received grants from different Swedish funds, and the major part of the work concerning *Bordetella pertussis* has been sponsored by the Office, Chief of Research and Development, U.S. Department of Army, through its European office under contract numbers: DA-91-508-EUC-262/63.

D. PEDIATRIC DEPARTMENT

The great contributions of medical research to the prevention, detection, and therapy of human disease have not so far resulted in substantial relief of the high incidence of death or damage of the newborn infant. The very great and abrupt changes in respiration, in circulation of the blood, and in neurological mechanisms of the infant at the moment of birth are not yet specifically understood. And this deficiency in medical understanding is shown by the comparative lack of advances in therapy of the unready or otherwise abnormal newborn. Robert E. L. Nesbitt, Jr., states in his monograph: "Perinatal Loss in Modern Obstetrics" (Philadelphia 1957):

"Mortality rates for all ages have shown a steady decline in the United States during the past half century. The risk of death among newborns after the first month of life has been reduced to a low point. However, the loss of life in the period around birth remains relatively high despite some decline in recent years. The period of human existence between the end of the 20th week of gestation and the end of the first month of postnatal life presents a greater hazard to the individual than any other period before old age. According to the data of Schlesinger, these deaths constitute about one-half of all reported deaths, including fetal deaths, prior to the 40th birthday."

For the past 4 years our medical research group has been engaged in investigation of the critical adjustment of respiration and circulation of the infant at birth. A unique clinical opportunity has been available for this study in the Stockholm hospitals associated with this department of pediatrics, in which approximately 5,000 births occur each year.

Close teamwork has been developed between the obstetric and pediatric personnel, facilitating these clinical studies. A specially equipped laboratory has been developed for this work. It is equipped for simultaneous recording of motion, respiratory and vascular pressure and flow, and oxygenation of the blood.

Hitherto the investigations have mainly been concentrated on studies of the functional adjustment in healthy newborns. While further studies in healthy newborns have been planned, we will increase our similar studies of newborns with perinatal pathology, begun last year.

We have not only studied in infants with perinatal distress the child's functional adjustment in relation to different methods of resuscitation and other methods used in order to increase the child's capacity of circulation and respiration, but we have also investigated the possibilities of different methods to decrease the body's demand on the impaired circulation and respiration.

In those infants who do not survive the neonatal period, thorough post-mortem examinations are performed. Post-mortem findings will be correlated with the clinical data and the pathophysiological data.

Those children who recover from severe stress in connection with delivery or the neonatal period will be carefully followed regarding growth and development, in order to judge the sequelae of stress, and the benefit (if any) of treatment. For several years we have had associated with the pediatric clinic a longitudinal growth study of normal children. It has thus been planned that the children mentioned above, after the newborn period, will be followed in a way similar to this longitudinal study.

There are notable advantages of international cooperation in this research on the newborn. The differences in background of cooperating scientists, in opportunities for clinical and animal studies, and in laboratory equipment have resulted in a general expansion of research ideas and activities.

We would solicit further international cooperation with the United States of America, in the form of exchange of ideas, personnel, and methods. As is indicated in the attached list of international collaborators, there is already considerable exchange with the scientists of the United States, but with the disadvantages of distance and infrequent personal contacts.

We wish to extend and intensify our newborn studies in Stockholm and also to increase our international association, particularly with the United States. The basic facilities of library, of laboratory and office space and maintenance, as well as clientele association will be in the Karolinska Hospital and associated institutions.

With the newer methods of physiological observation, particularly mass spectrometry gas analysis, and of simultaneous recording of multiple phenomena, we would anticipate substantial increases in scientific information. It is expected that this information may be of strategic value in increasing the understanding of the mechanisms by which the newborn infant achieves independent existence. And, as is true of all knowledge of vital processes, this should be of value in further understanding the failure of some infants to make this transition.

CO-INVESTIGATORS WORKING AT THE PEDIATRIC DEPARTMENT OF KAROLINSKA HOSPITAL
DURING 1956-58

- Forrest H. Adams, UCLA Department of Pediatrics, Los Angeles, Calif.
Henning Andersen, Queen Louise's Children's Hospital, Copenhagen.
G. Ardran, Nuffield Institute for Medical Research, Oxford.
N. Assali, UCLA Department of Obstetrics, Los Angeles, Calif.
Alexander Barry, University of Michigan, Department of Anatomy, Ann Arbor, Mich.
James Bosma, University of Utah, Department of Pediatrics, Salt Lake City, Utah.
Joseph Dancis, New York University, Department of Pediatrics, New York, N.Y.
Olavi Eränkö, University of Helsinki, Department of Anatomy, Helsinki.
Melvin Figley, University of Michigan, Department of Radiology, Ann Arbor, Mich.
Irwin Kaiser, University of Minnesota, Department of Obstetrics, Minneapolis, Minn.
Martti Karvonen, University of Helsinki, Department of Physiology, Helsinki.
F. H. Kemp, United Oxford Hospitals, Department of Radiology, Oxford.
Jonathan Lanman, New York University, Department of Pediatrics, New York, N.Y.
Claude Migeon, Johns Hopkins Hospital, Department of Obstetrics, Baltimore, Md.
James A. Miller, Emory University, Department of Anatomy, Atlanta, Ga.
Bradley Patten, University of Michigan, Department of Anatomy, Ann Arbor, Mich.
Albert Plentl, New York University, Department of Obstetrics, New York, N.Y.
Carl-Eric Råihä, the Children's Hospital, Helsinki.
Hank Truby, Haskins Laboratories, New York, N.Y.
Claude Villee, Harvard University, Department of Biochemistry, Boston, Mass.

E. X-RAY DEPARTMENT

Scientific activities of importance being carried on by this department are—

- Influence of intrabronchial pressure on blood circulation.
- Angiographic visualization of coronary arteries and heart muscle.
- Angiographic diagnosis of mola and chorionepithelioma with special reference to spontaneous regression.
- Angiographic and isotope studies of circulation time in the portal system.
- Angiographic studies of polyarthritis.
- Lymphatic pathways from the prostatic region.
- Venous blood flow in absence of vein valves.
- Deformation of pelvic veins and inferior caval vein by retroperitoneal tumors and tumor metastases.

Simultaneous stereoscopic angiography.

Roentgen cinematography of intestinal peristalsis under normal and pathologic conditions.

Roentgen cinematography of speech disturbances.

The use of television transmission in operative extraction of concretions.

Diagnosis and course of papillitis necroticans.

Diagnosis of sponge kidney.

Etiologic factors in adult polycystic kidney disease with special reference to arterial ruptures.

Nervous disturbances of the urinary bladder: classification; types; influence of complicating cystitis; effect of operative decompression.

Roentgen diagnosis of cystitis.

Roentgen cinematography of peristalsis in kidney, pelvis and ureters.

Movements of diaphragm and ribs in normal and pathologic cases.

Diagnosis of achilles tendon ruptures.

Visualization of carpal ganglia with reference to their origin.

Mathematic analysis of tomographic methods.

Ulcerative colitis with special reference to occurrence of carcinoma.

Polyposis of stomach and colon.

F. DEPARTMENT OF CLINICAL PHYSIOLOGY

The department consists of:

1. The central laboratory of clinical physiology (in the main building of the hospital).

2. The physiological laboratory of the thoracic clinics.

3. The military-medical research center, provisionally accommodated in the thoracic clinic building.

The scientific staff of the department:

Torgny Sjöstrand, M.D., professor.

Bengt Jonsson, M.D., head physician of the physiological laboratory of the thoracic clinics.

Håkan Linderholm, M.D., assistant professor.

Alf Holmgren, M.D., assistant professor.

Bengt Pernow, M.D., assistant professor.

Hans Dunér, M.D., resident.

Tore Strandell, M.L., resident.

Arne Granath, M.L., resident.

Sture Bevegård, M.L., resident.

Lars Sandbreg, M.L., temporary resident.

Richard Hellström, M.L., assistant doctor.

Hjördis Robbe, M.L., scholar for M.D. degree.

Bernhard Tribukait, D.M., scholar for D.M.D. degree.

Bengt Stern, M.L., scholar for M.D. degree.

Bo Söderström, engineer.

Part-time scientists:

Maj Levander-Lindgren, M.D., assistant professor.

Folke Mossfeldt, teacher of gymnastics.

Bengt Åkerblad, M.L.

Klas Linroth, M.D.

A-E Eklund, M.L.

S. O. Liljedahl, M.D., assistant professor.

Lars Engstedt, M.D., assistant professor.

Nils Svanborg, M.L.

C. O. Ovenfors, M.L.

Scientific activities:

1. The regulation of the blood circulation during physical exercise.

2. The effect of physical training on the dimensions of the heart and vascular system.

3. The influence of the body posture on the size and the stroke volume of the heart.

4. The effect of changes of the blood volume on the capacity for physical work.

5. The regulation of the stroke volume of the heart in man.

6. The optimal relations between the anatomical dimensions and the functions of the circulatory organs.

7. The effect of physical training in patients with functional heart disease.
8. Vasoregulatory asthenia—a pathophysiological syndrome with insufficient regulation and circulation.
9. The fat metabolism in skeletal musculature during exercise.
10. The influence of obesity on the function of the heart and the lungs at rest and during exercise.
11. The effect of breathing pure oxygen on the function of the heart under normal and pathological conditions.
12. The recording of the vibrations of the heart wall in different kinds of heart disease.
13. The relationship between the heart volume, the blood volume, and the stroke volume at rest and during work in patients with myocardial affections.
14. The electrocardiogram in upright position during and after physical exercise in patients with arteriosclerotic heart disease.
15. The effect of pregnancy on the heart and blood volume in patients with organic heart disease.
16. The concentration of lactic acid and pyruvic acid in the venous blood from the lower extremities during work in patients with arteriosclerosis in the leg arteries.
17. The effect of different drugs on the adaptation of the circulation during exercise in normals and patients with disturbances of the adjustment of the peripheral circulation.
18. Changes of the compliance, the resistance in the airways, the diffusing capacity and some other measures of the lung function in patients with sarcoidosis.
19. The significance of the diffusing capacity of the lungs for the physical working capacity at high altitudes.
20. The significance of low compliance of the chest wall for the respiratory function at rest and during exercise.
21. The limiting factors of the physical working capacity of old people.
22. The relationship between blood lipids and heart function in patients with arteriosclerosis.
23. The histamine concentration in the blood and the urine in patients with allergic symptoms.
24. The concentration of histamine in blood, urine and sweat during physical exercise.
25. The daily excretions of catecholamines in the kidneys on physically untrained and trained persons.
26. The localization of pheochromocytoma by analysis of catecholamines concentration of the blood from different parts of the caval vein.
27. The influence of the oxygen tension on the total amount of hemoglobin, blood volume, and heart volume.
28. The effect of so-called hemopoetins on the hematopoietic activity.
29. The effect of low barometric pressure on the blood concentration of histamine.
30. The physical working capacity of conscripts and enlisted military personnel.
31. The relationship between the physical profile and the physical working capacity of military personnel.
32. The effect of different kinds of physical activities on the physical working capacity.
33. The endogenous formation of carbon monoxide.
34. Methods of determination of low concentrations of carboxyhemoglobin.
35. The regulation of the circulation during and after anaesthesia and surgical operations on old people.
36. The effect of changes of the blood volume on the circulation in patients with severe burns.
37. The relationship between the alveolar CO method and the radioactive chromium method for determination of the blood volume.
38. The social rehabilitation of pulmonectomized patients.
39. The demands of physical fitness in different kinds of industrial work.
40. Physical training in the medical rehabilitation of patients with neurosis.
41. The influence of smooth muscle-stimulating substances on lung compliance in healthy persons.

G. MEDICAL DEPARTMENT

The Karolinska sjukhuset is one of the two teaching hospitals in Stockholm. The medical department consists of 8 wards containing altogether 184 beds, and 1 out-patient department.

Head of the department is Prof. Henrik Lagerlöf. The associate professors, Gunnar Birke, Börje Ejrup, Lars Egnstedt, Etur Helander, Maj Levander, and Börge Olhagen, partake in the teaching, the research work, and the care of the patients. The immediate responsibility for the patients is taken by 13 assistants and an about equal number of residents. Two courses a year of internal medicine are given for altogether 60 students.

The scientific activity of the medical department has been performed in close collaboration with the department of clinical physiology, the King Gustaf V Research Institute, the surgical and the X-ray departments and the department of thoracic surgery. It has mainly covered circulation, hematology, steroid metabolism, and gastrointestinal function and is developing along these lines.

Studies of the total blood volume and the total hemoglobin by the department (Engstedt, Reizenstein, et al.) have shown, that some persons who are diagnosed as having anemias because of a low hemoglobin concentration may have an increased blood volume and hence a normal total hemoglobin. This fact and the strong correlation between the total amount of hemoglobin and the working capacity in untrained and trained subjects has led to investigations of the effect of changes in the total blood volume or total amount of hemoglobin in different diseases, especially anemias.

The circulatory disturbances in severe burns have been studied extensively by G. Birke in cooperation with colleagues of the surgical and clinical physiological departments. By using prolonged right-sided heart catheterization, valuable information has been obtained regarding the pathogenesis of the shock developing after the second day after the accident. Despite the elevated total blood volume the central blood volume in many cases seems to be insufficient, indicating the need of extra colloids also during this phase of severe burns.

The tendency to pulmonary edema, which is present during the so-called absorption phase, does not seem to be associated with heart failure but it is probably a manifestation of capillary damage in the lungs with a change in permeability on the basis of a direct burn or, possibly, caused by humoral factors or infection.

Urinary excretion of histamine, adrenaline, noradrenaline, and corticosteroids is initially markedly increased and, excepting that of histamine which is normalized within 24-48 hours, it is raised throughout the first week.

The present investigations involve the role of serotonin in the pathogenesis of the capillary damage—the most important factor in burn accidents.

Hypotension is one of the main classical symptoms in manifest adrenal insufficiency. Therefore, Birke et al. have studied the functional reserve capacity of the adrenal cortex in a material with a main symptom of hypotension. The study was performed with an improved method after infusing ACTH intravenously. The patients with hypotension in many cases showed a diminished functional reserve capacity, possibly indicating that the hypotension was due to the altered adrenal function. To elucidate this problem further, the material must be enlarged and other factors important in regulating the blood pressure must be more closely studied. Other clinical conditions (e.g. malabsorption syndrome) will also be investigated in the same manner.

The need of higher heart rate in cases with total block and Adam-Stoke's syncope and of a handy apparatus in cardiac standstill of other causes has led to the construction of a small pacemaker (Elmqvist, Senning, Lagerlöf), which may be placed under the skin of the patient. In a critical situation such a pacemaker—which has now been situated in a patient for 2 months—regulated the heart rhythm for 2 days. Further developments are in progress in this field.

During the last year a new method of determining the different fractions of lipid in the plasma has been developed (Carlson, Pernow). This method has been used to study the effect of muscular work on the utilization of fat. It has been shown that about 50 percent of the energy production may be due to the metabolism of free fatty acids. A transport of neutral fat from the depots to the muscles has been indicated. Further studies are in progress to show the influence of digestion, absorption and of different kinds of diet on the lipid pattern of arterial plasma. The same kind of studies are started in diabetics, who are known to have elevated blood lipids and also an increased tendency to atheromatosis of the arteries.

Of the hematologic studies the development of a quantitative method of studying hemolysis by means of the measurement of carbon monoxide formed during the breakdown of the tetrapyrrole ring is important (Engstedt). It has been correlated to other now available classical measures of blood destruction, e.g. the life span of chromium labeled red cells, and has been used to study the increased blood destruction in severe burns. Other studies now in progress are devoted to the life span of transfused thrombocytes. This problem is of utmost importance in blood damage due to radioactivity. Further studies by Reizenstein have elucidated the enterohepatic circulation of B_{12} . It is further shown that B_{12} is more easily absorbed if bound to animal protein.

The gastrointestinal work (Lagerlöf, Perman) has led to a method to study simultaneously during a meal the secretion and absorption of the stomach, the gastric emptying, the secretion of bile and pancreatic juice, and the absorption of water in the duodenum. The study has shown interesting facts about the interrelation between the inhibition of gastric emptying by acid in duodenum and stimulation of the pancreatic secretion by low pH of the duodenal content. A new physiological contrast meal has been found to be superior to old methods in judging the emptying of the ventricle and the passage of food through the small intestine. The mentioned methods are tools in a greater program of analysing the absorptive and mobile function of the small intestine which—important as they may be for all kinds of gastrointestinal trouble—are still little known.

TRANSCRIPT OF CONFERENCES WITH SWEDISH SCIENTISTS

A. CONFERENCE WITH PROFESSOR HUGO THEORELL, STOCKHOLM, SWEDEN, NOVEMBER 24, 1958

Senator HUMPHREY. We are visiting this afternoon in the Karolinska Institutet at Stockholm, Sweden. I should say, as I said to Dr. Theorell just a little earlier, that we only a few moments ago got off the airplane in our trip from Copenhagen into Stockholm. And I want you to know it was a very good flight, Doctor, a very beautiful flight all the way through.

We are looking forward to an exciting and informative visit here in Stockholm, visiting with some of your associates on Monday or Tuesday. I believe that we have on our list for tomorrow Dr. Caspersson, a leading specialist in cell research and genetics.

But here with us now we have Dr. Hugo Theorell—do I pronounce that right, now?

Dr. THEORELL. Yes, Theorell. Yes.

Senator HUMPHREY. Well, that's pretty good for a half-Norwegian, isn't it? [Laughter.]

Dr. THEORELL. Very good.

Senator HUMPHREY. And we're going to ask Dr. Theorell just a few questions in reference to his own work. But before I do that, am I right, Doctor, that you visited the State of Minnesota and the city of Minneapolis about 2 or 3 years ago?

Dr. THEORELL. Two years ago, in 1956.

Senator HUMPHREY. And were you out there for a medical conference or was it just a personal visit?

Dr. THEORELL. Well, it was a mixed sort of thing. [Laughter.]

Senator HUMPHREY. At our university?

Dr. THEORELL. Yes, I made a sort of lecturing trip in connection with it. I had to go over to be given an honorary doctor's degree in Philadelphia; then I made a lecturing trip to other places.

Senator HUMPHREY. Well, I'm delighted that you included Minnesota in those other places; and, as you were saying earlier to me today, you visited an old friend of mine and one of our most distinguished scientists, Dr. Maurice Vischer, the head of the physiology department of the University of Minnesota. That's correct, isn't it?

Dr. THEORELL. That's correct, and I've seen him many times. The first time was even before the war, when I went up to Minneapolis for some lecturing.

Senator HUMPHREY. Has he been here?

Dr. THEORELL. I don't think so.

Senator HUMPHREY. Well, we'll have to encourage him to make a visit to you.

Dr. THEORELL. Please.

Senator HUMPHREY. I think it would be good for him, and I know that you'd enjoy seeing him once again.

Doctor, just so that we can get the scene set correctly: You are the Secretary of the Nobel Institute.

Dr. THEORELL. Yes. This is the Nobel Institute, which is connected with the Caroline Institute. The Caroline Institute is the medical faculty of the Stockholm University. This is a pure research institute. We don't do any teaching here to students at all. It's only, so to say, advanced research teaching to people coming from Sweden or many from other countries, especially from the United States, I suppose. And so we are involved in pure research.

AMERICAN SCIENTISTS' VISITS

Senator HUMPHREY. You have a number of students from the United States; is that correct?

Dr. THEORELL. Yes, we always have some. I suppose we must have had some 30 or 40 since the war, more or less.

Senator HUMPHREY. You said that the Nobel Institute is part of the Karolinska Institutet?

Dr. THEORELL. Yes; it is attached to the Karolinska from the organizational point of view.

Only this house was in the institutes—either they were earlier in their field or later on they were built at the cost of the Nobel Foundation. You see, this Nobel Prize Foundation has other funds intended for the building of institutes, and they support, give me my salary, for instance, and so forth. That's why I can do research jobs here, and a little teaching on the side.

Senator HUMPHREY. So you have here in the so-called Karolinska Institutet several medical research institutes; is that correct—

Dr. THEORELL. Yes.

Senator HUMPHREY. One of those is in biochemistry?

Dr. THEORELL. Biochemistry; that's here. Another one is cell research.

Senator HUMPHREY. Cell research. That's Dr. Caspersson's?

Dr. THEORELL. And the third one is neurophysiology. That's Professor Granit.

Senator HUMPHREY. And you're the head of the Biochemistry Research Institute. And are you not associated with the Nobel honors in another way?

Dr. THEORELL. Oh, yes; I'm one of the Nobel prizewinners.

Senator HUMPHREY. I wanted to get that on record here. You know, you're too modest. [Laughter.] I knew that you were one of the distinguished recipients of the Nobel Prize.

Now your work in biochemistry is not related to any particular hospital, is it? I mean this is pure research as you say. You're strictly a research institute?

PURE RESEARCH

Dr. THEORELL. Yes. I can do whatever I like, in biochemistry. We don't necessarily have to cure any sort of diseases and so forth; but, on the other hand, it sometimes happens that rich people come along and ask me whether I would like to have some money, for instance, or maybe the opposite: I ask for some money myself and then they come around and say, "Please tell me what sort of diseases can you cure?"

Well, I say, "None at all," of course. "But do you happen to have a clock?"

And they say, "Yes, of course."

"Now, if something goes wrong with it, you ought to show your clock to the dealer. What do you do?"

"I go to the watchmaker," he says.

"Why do you go to the watchmaker?"

"Why, of course, because he knows how to repair it."

And in order to know how to repair it, he must know exactly the construction of the clock. And that's what we are trying to find out. I mean, how the body is made. And that is necessary in order to cure diseases of the body.

Senator HUMPHREY. You are the instructor of those who in a sense become the doctors and cure the disease. You're studying the structure of the body, the cell structure, and so forth; that's correct?

Dr. THEORELL. Yes, and that extends into all nature.

For instance, we raise soybeans down here from a small piece in their roots; they contain a stuff that's closely related to our hemoglobin, for instance. So

that we may go to plants or whatever we like. We aren't restricted to the human body at all.

Senator HUMPHREY. Now, where does the Institute for Biochemistry, for example, get its resources? I mean, does the Government of Sweden contribute to this institute?

Dr. THEORELL. It does; yes.

FINANCIAL SUPPORT

Senator HUMPHREY. And how else are you financially supported? Now, this is important, may I say, for information in the United States and for sharing this information with other people from other countries so they can better understand how we support research.

When I was in France, for example, we sought out the answers of how the French scientist is supported in terms of the research that is being undertaken; and you know, of course, that they have a very difficult time.

Now, in Sweden, the Government helps and supports research; is that correct?

Dr. THEORELL. That's correct. The Government supports a great deal. They support more or less entirely many of their institutes which teach students and so forth, but even those have contributions from other sources.

Now, to start with my own institute here, we have some support from the Nobel Foundation. It may amount to—well, let's speak in dollars; it's easier for you. They may give us around \$30,000 a year. Then we have about the same thing from the Government. But then we have a research council. For instance, we have one Medical Research Council. We spend something like a little more than a million dollars a year but that's for all Sweden. And there's a research council for the natural sciences, and we can get money from there, too.

Senator HUMPHREY. Who supports that research council?

Dr. THEORELL. All the money comes from the Government.

Senator HUMPHREY. Oh, I see.

Dr. SHIMKIN. It may interest the Senator to mention that your institution does get some grants from the National Institutes of Health; do they not? Dr. George Klein and others?

Dr. THEORELL. Yes. Well, Dr. Klein is just next door here. I personally don't have grants from the National Institutes of Health at the moment, but we have had every year for many years from the Rockefeller Foundation, for instance.

Senator HUMPHREY. Well, do you still get that?

Dr. THEORELL. We do, yes. Yes, they are our great friends. We like very much to see them when they come around. [Laughter.]

Senator HUMPHREY. Well, I thank you. That's very good! So—Now, in other words, the financial resources of each of these institutes, the Biochemistry Institute, in this instance—your particular institute—are partly from the Swedish Government, partly from the Nobel Institute, partly from the Rockefeller Institute. You may get some resources from private individuals, too; is that correct?

Dr. THEORELL. I shouldn't say individuals, but there are other foundations too. One foundation gives us several million crowns every year for different research purposes. There are many private foundations for scientific research here.

Senator HUMPHREY. You're quite well supported, in other words?

Dr. THEORELL. Well, that's a thing that you can't expect a scientist ever to admit. [Laughter.]

Senator HUMPHREY. You could always use more.

Dr. THEORELL. Yes. And you see the thing is that all of our agencies become much more expensive year by year. An apparatus would cost a thousand dollars 10 years ago; now it costs \$10,000, \$20,000. So the need of money is increasing at a terrific rate, because our apparatuses get more and more expensive, more complicated, and we have to have them.

Senator HUMPHREY. How many people are associated with you in this institute? How many associates do you have?

Dr. THEORELL. Well—

Senator HUMPHREY. In biochemistry here.

Dr. THEORELL. All in all, I should say we have some 35 people, but that includes technical personnel; so, there are, I should say, something between 15 and maybe up to 20 people working with scientific problems, including young people and so

forth. The permanent staff is something like 10 only. But then we have guests and the young Swedes and so forth.

OTHER NATIONS' SCIENTISTS

Senator HUMPHREY. Do you have people from several countries here as exchange students or as advanced students—

Dr. THEORELL. It's advanced students. They practically always come with fellowships from their own countries.

Senator HUMPHREY. Where do you have them from, right now, let's say? Do you have some from the United States?

Dr. THEORELL. Yes, we have. The United States, Japan, Finland, Denmark, Poland—oh, there may be some more. Every summer, I take the people from the whole institute out to a summer place I have out in an archipelago, and there I took a picture last summer. There are 15 people on the picture, and they happen to be from different countries from all over the world. [Laughter.]

Senator HUMPHREY. From different countries. That's wonderful.

You mentioned Poland, for example. Is there an increasing number or is there any indication of increased interest or participation by scientists from the countries in the eastern sector as we call it, from behind the Iron Curtain?

Dr. THEORELL. Well, we have had a few from Poland and we have still one around. That seems to be a little different from the other countries. We haven't had any from Russia or Czechoslovakia or those countries so far. We have one girl from Yugoslavia, but that's an exception, rather. We have had a few from Poland. I have the impression they are very keen to have connections with western science and so forth. But they have great difficulties to find the financial means—

Senator HUMPHREY. Find the financial means?

Dr. THEORELL. Yes. Oh, yes. And there are other difficulties too. I was in Poland a year ago, or so, lecturing at their academy of sciences, and it's obvious they have great difficulties. They have a lot of underfinanced men still, and so forth. But they are very anxious to get in touch with us here.

Senator HUMPHREY. And do you feel that it's to the benefit of science and of mankind to have these exchanges with people in other countries?

Dr. THEORELL. Oh, no doubt about it. Yes.

Senator HUMPHREY. Freedom of movement and of information?

Dr. THEORELL. It's very, very important, indeed. I really hope we can have a better exchange with these people behind the Iron Curtain, because science is after all something that should be international.

Senator HUMPHREY. Well, that leads me to a point that you may be interested in, Doctor; the Congress of the United States in this coming session, I'd say before next June, will undoubtedly take some action upon a program known as a National Institute of International Medical Research. This is in essence merely strengthening the existing program of international cooperation in the field of research. Senator Lister Hill, of Alabama, one of our top Senators, has introduced this legislation. I'm joining with him in it, and the purpose is to provide additional funds by our Federal Government, additional moneys, to help advance international medical research. Do you feel that this would have a beneficial effect? Do you have any suggestions as to how we might best utilize that money? The amount of money was suggested as \$50 million. Of course, that would have to cover all the many disciplines, all the many areas.

What, if any, recommendations do you have for strengthening international medical research? I don't mean necessarily this particular bill that we have, but the whole field of international medical research.

NEED FOR TRAVEL FUND

Dr. THEORELL. Well, I'm a great believer in teamwork of different kinds. I think there could be done a great deal of good in facilitating younger or maybe even older research workers to go to other places to work together, to solve problems. There is still a great need of money for traveling in some countries. It differs a great deal, I suppose. And I have the impression it's rather easy in the United States, maybe not too easy still, but here it's a particular problem, especially for the younger people. They have to pay their tickets—to go to a medical congress—out of their own pockets.

Senator HUMPHREY. That's one of the serious problems, isn't it, this limitation of funds on travel?

Dr. THEORELL. Yes. It's easier here to get means for, say, apparatuses or for technical assistance and so forth. But this is one of the points. On the whole, a great lot of money you intend to raise for this purpose could certainly be very well used for facilitating people to go and work—not for short periods; that can be done sometimes—but the great thing is to have young people go for a year, say, to another place and work there and settle down and see the conditions.

Senator HUMPHREY. Somebody suggested somewhere in our visits—I believe it was in Paris, possibly Dr. Latarjet over at Radium Institute—that it might be helpful to have, let's say, an Italian student obtain funds to go from, say, a place in Italy to Switzerland or a German student from Germany to Paris.

It isn't always necessary in promoting international research—now, it must be remembered that he was talking to an American—just to have the money for a citizen of the United States to go to London, or for a citizen of the United States to go to Stockholm. Sometimes you do as much or more in promoting the whole field of research by finding a promising, bright, young research person in a country such as Finland and suggest that in order to carry on that research further, it might be good to go to France. Or that if you find one in Spain to possibly have him come to Sweden or to Denmark or to Norway. Really what we're after here is to build, by employing many nationalities, international research.

Now, what is your feeling about that?

Dr. THEORELL. Well, just exactly every word you say, is said by, for instance, Rockefeller Foundation people. They stimulate young students not necessarily to go to the United States. One of my people here, for instance, had a Rockefeller fellowship. He went first to Paris for half a year and then for a year to Munich. And they were very pleased with that. They said there is sometimes loss of money, a waste of money, even, to take them almost around the world when they can do a good job rather nearby. I think that's very obviously a good idea.

Senator HUMPHREY. What is your view in reference to this problem? Some people have felt that it was much better to have tremendously big research facilities, and others have felt that it was better to have just smaller teams working in their own environment, in their own area. Maybe I can explain myself a little better. When people speak of international research institutes, we sometimes think in terms of big buildings, big groupings of people, and vast expenditures where you try to put a tremendous research program into a stepped-up effort.

Do you approve of that or support that as much as you do, let's say, a smaller research effort in several places, in the local environment so that people feel a little bit more accustomed to the environment in which they are working? What is your view?

Dr. THEORELL. My view is there is a sort of optimal size of the group. There have been attempts made to make very big institutes with, say, a thousand people working under a leader and so forth. But, obviously, that leader can't really supervise this whole thing going on. I think no good scientist in the world can make any better job than by having just a few people, say, 20 or 30 people, or something like that. But, then, of course, you shouldn't put him somewhere in a desert alone. It's very important to have other groups nearby and frequent interchange with these groups, and discussions and so forth.

But very big institutes under one leader tend to separate into small groups, nevertheless, and the leader can't supervise it with no one else tying it in, because there is a limitation of the human brain. One can't keep too many things in one's mind, and the best research work, as history tells, has been made by smaller groups. I think the cancer problem, if it could be solved by huge efforts like that, would already be solved; but it's not coming that way. It has to develop in some small groups together with good means.

SCIENTIFIC LITERATURE

Senator HUMPHREY. Now, you were mentioning that you don't want to put people out on the desert. You want to have them where there is a community, where they can keep in contact with each other, that is, with the people in the various areas of scientific endeavor, with the rest of the scientific community.

Well, we're here in the library today, and I notice all of these volumes around me, and these filing cases. What about the condition of scientific research ma-

terial? Is there adequate flow of this material? Is there need for further translations? I mean do we need to step up the programs of translations of abstracts, or bibliographies? This whole matter of compilation of scientific material and the availability of it. How do you view that?

Dr. THEORELL. This is a very important problem indeed. It has been considered to be so expensive that nobody has really touched it seriously; because it's practically impossible to follow this increasing literature. We had a conference in Vienna a couple of months ago about the organization of journals and so forth. There I suggested, for instance, that all journals should make a sort of summary on the top of every article. That would already be much easier, because that would be the abstract of the thing. It could be photographed and so forth. Now, as it is, they put the summary at the end of it; so you have to look all through, and you can't take a picture. That's all small technical detail, but it touches a very, very important problem.

Senator HUMPHREY. We had testimony from *Excerpta Medica*, and they're working a great deal on improving the dissemination of information.

Dr. Woerdeman and Mr. van Tongeren came down from Amsterdam to spend the morning with us. They testified and we transcribed, as we're doing here today, about their views as to how we might improve this whole matter of abstracting, and also to have a master card index of the abstracts, not the abstract itself but a master card index of abstracts. They're doing a tremendous amount of work. They also are interested in some of the mechanical facilities which are capable of finding the abstracts by title.

Is there any work being done in Sweden that you know of relating to the improvement of methods for compiling scientific material or its dissemination, and for abstracting, et cetera?

Dr. THEORELL. Well, I think we have to use electronic memory drums and all sorts of such things. Perhaps one could find a system for organizing the titles so a researcher could really get it out of such an electronic machine. You push a button and then comes everything that's written about it. But even that, of course, requires a great deal of organizational work, because, after all, you have to put it into different headings and so forth. But I know people are interested in making a big memory drum—all sorts of electronic machines. But there is a long step to be taken before they are really in use.

Now, you see, as it is now, with "Chemical Abstracts," for instance. There must be on hand somebody always reading all the articles and making the abstracts and writing and putting it into there. It has to be printed; and then from the printed book it has to be microfilmed.

Senator HUMPHREY. It's very expensive and time consuming.

Dr. THEORELL. It is; yes. And these different languages, too. Of course, we have great difficulty to follow what's published in, say, Russian or Japanese, and all that.

Senator HUMPHREY. That's one of the problems that Dr. Woerdeman, of the *Excerpta Medica*, brought up. He said there's a great lag in the translations of both Japanese and Chinese scientific information.

Dr. THEORELL. Oh, yes.

Senator HUMPHREY. And they're going to try to do something to speed this up.

Do you have contacts here with Soviet biochemists?

Dr. THEORELL. A little. It happens. Considering the fact that it's after all, our next neighbor here, we see a little of the people. They come in big groups and there are ladies, but then they speak Russian; so whatever is said must be translated.

Senator HUMPHREY. Do you have any knowledge of or information about the development of biochemistry in China on the Chinese mainland?

Dr. THEORELL. No.

Senator HUMPHREY. Is there any indication that they're doing anything in that field?

Dr. THEORELL. I don't know.

Senator HUMPHREY. We haven't found anybody that seems to know. It would be interesting to find out, wouldn't it?

Dr. THEORELL. It really would. But very few people know, I should say. I don't think there were any people from China at this last big congress we had in Vienna, for instance. We didn't meet any.

Senator HUMPHREY. When was that congress in Vienna?

Dr. THEORELL. In September.

Senator HUMPHREY. That was the biochemistry conference?

Dr. THEORELL. Yes. International one.

Senator HUMPHREY. Did we have people from the United States in attendance there?

Dr. THEORELL. Oh, yes. Certainly, certainly. There were 5,000 people. There were over 100 from Sweden, alone; then can you imagine how many there were from the United States? [Laughter.]

Senator HUMPHREY. Well, I just wanted to get that on the record. I gathered that we might have had some there. [Laughter.]

STUDY OF NUCLEIC ACIDS

Doctor, what are some of the leading current advances in biochemistry research? What are the most recent developments?

Dr. THEORELL. Well, that's rather easy to say, because you see, after all, biochemistry means the chemistry of life. Our life depends upon mainly two substances only that God gave—nucleic acids. The structure of both of these is so terribly complicated that I think only 10 years ago everybody would have sworn that it would be impossible to solve that problem. Now we are rather close to both. That's the most salient advance that has been made just in the last 10 years, that touches the problem of life, and so forth.

Senator HUMPHREY. We had a wonderful afternoon with some of the top scientists in the Pasteur Institute in Paris—Dr. Lwoff and others.

Dr. THEORELL. Oh, yes; I know. I worked there myself as a young student.

Senator HUMPHREY. They gave me a real lecture on this whole matter of biochemistry. They demonstrated how the normal cell develops and how the virus comes in and attacks the cell.

It really is an amazing study. I was very interested.

So, you would say that whatever there is in biochemistry is rather current, isn't it?

Dr. THEORELL. Yes. It's like an explosion. And Lwoff is really top-notch—I mean, he is doing a difficult piece of research.

FUTURE DIRECTIONS

Senator HUMPHREY. What do you believe future directions of research will be? That's a broad question.

Dr. THEORELL. In biochemistry?

Senator HUMPHREY. Yes.

Dr. THEORELL. Well, there remains a great deal to be done. For instance, we begin to know a little about the mechanism of enzyme action and some proteins that make all reactions to occur in the cells of the body, and so forth. The reactions are so complicated that we are just on the surface of the problem still. We expect a great deal to happen along that line.

BASIC AND APPLIED RESEARCH

Senator HUMPHREY. Would you, Doctor, care to indicate how basic research, which is what you are doing here, has often paid off in applied research? You see, many people will say, "Well, if I'm going to do some research, I want to do it on something that's going to get me well tomorrow or is going to take care of my problems immediately."

Now, basic research, as you indicated earlier, sometimes takes a long time before you really develop something that you can point to. Now, how does basic research pay off in applied research?

Dr. THEORELL. Well, applied research is simply the second step on the stairway here. For instance, it many times happens that we may get some results that seem to have some application on practical problems. Then we hand that over to clinicians, and they work on it immediately.

Take an example: We can isolate an enzyme that happens to be present in the liver and which combusts the alcohol, for instance. That's an alcohol-combustion enzyme. Now, we started with a few theoretical points of view, how the reactions run and so forth. But it was obvious that it could be easily used as a sort of analytical method for small amounts of alcohol. So now that's used forensically here for all sorts of blood tests and so forth. That was a sort of byproduct from purely experimental and theoretical research.

Take, for instance, crystallized red pigment in muscle. We have made a lot of research with that. But then, of course, we saw some sort of clinical aspects—

we handed it to the clinical people and they started on all sorts of diseases where it goes up and down and so forth.

Senator HUMPHREY. So that basic research, which frequently suffers from lack of attention, has in the past in many areas, proved the foundation for applied research. It is at the basic research level that you really make possible ultimate advances in applied research. Is that a fair statement, Doctor?

Dr. THEORELL. That's a fair statement. And it lies within the word, because you must have something to apply the research on before you can make applied research.

Senator HUMPHREY. Well, I wanted to again get this on the record, because every so often in the Congress of the United States, when we are battling for funds for research, somebody will get up and say, "Well, we haven't time to do research into why peas are green or what makes water hot." They want immediate results.

What you're saying here is that the immediate results are the results of basic fundamental research that makes possible applied research.

Dr. THEORELL. May I give you another example of what I mean? For instance, during the war; then, of course fundamental research was taken into the background for a certain time and everybody, all the scientists were put into applied research to solve some immediate problems, say, like getting better anti-malarials, and so forth.

I know in the United States too many of my colleagues were told: Give us better antimalarials. Very much money was spent in that, but very little came out, as a matter of fact. Because the fundamental knowledge was lacking, so to say.

Senator HUMPHREY. That's right.

Dr. THEORELL. You can't push applied science beyond a certain stage, because the fundamental knowledge is what lies below the foundation for applied research.

RECENT NOBEL LAUREATES

Senator HUMPHREY. On another phase, who are some of the others who have received Nobel awards recently in this field of biochemistry?

Dr. THEORELL. Well, we are going to have the pleasure to see three Americans next month here, Beadle, Tatum, and Lederberg.

Senator HUMPHREY. Would you describe their contributions, Doctor, so a layman might understand the significance of what they have discovered?

Dr. THEORELL. Well, you see, Beadle and Tatum discovered the possibility of investigating the metabolism—they discovered some bacteria which had interesting properties and these properties could be changed, because they are a genetic thing, by irradiation and so forth. These were changed. So suddenly those bugs lost the ability to produce just one of the enzymes in the long links. Thus typical diseases came out and so forth. That has been a very, very great help to the study of the whole complicated pattern of their metabolism, these small substances being degraded and built up again. Because they could knock out in different forms, stop the doses at many different points, you see—

Senator HUMPHREY. Oh.

Dr. THEORELL. I mean these genetic changes permitted by irradiating bacteria. In making mutations just like the irradiation from atomic bombs or whatever you like. And it was very interesting.

RADIATION RESEARCH

Senator HUMPHREY. Which brings up another subject. Do you feel that an additional effort should be applied to radiation medicine and radiation research?

Dr. THEORELL. That's of paramount importance, we feel, of course.

Senator HUMPHREY. We talked with the people in the WHO about this. This is why I mention it to you here. We just left them in Geneva. Dr. Candau, Dr. Dorolle, and others were present.

They felt that this was an area that required additional emphasis—a good deal of attention—this whole field of radiation medicine and radiation research.

Dr. THEORELL. No doubt about it. It is very, very important, and very little is known. That's true enough.

Senator HUMPHREY. Where would you say are the leading centers for research in this field?

Dr. THEORELL. Well, of course, you have a lot going on in the United States; that's true. But this isn't really my field.

Senator HUMPHREY. Yes, I understand.

Dr. THEORELL. I think something is going on here too, because it was an early place where irradiation was started, X-rays and so forth. But, I'm not prepared to make a judgment where the best things are done; in any event it requires international cooperation on a broad basis.

AWARD TO DR. THEORELL

Senator HUMPHREY. Doctor, just another question from me and then possibly from my associates here, Dr. Shimkin and Mr. Cahn. I want to find out a little bit more about your own Nobel Prize award.

When did you receive your award?

Dr. THEORELL. Three years ago.

Senator HUMPHREY. Three years ago. In 1955. And on what was this award based?

Dr. THEORELL. It was based on my contributions to the knowledge of oxidation enzymes, the group of enzymes which are particularly busy in the combustion of our foodstuffs and so forth.

Senator HUMPHREY. Doctor Shimkin, do you have any questions you want to place to your distinguished colleague here?

Dr. SHIMKIN. I have no questions at all, but I would like to bring greetings from the National Institutes of Health. I did not know I would have the pleasure to be here today, and if I had known, I would have made it much more official than that. The Karolinska Institutet and the National Institutes of Health have many, many points of connection with which we are very happy and proud.

SWEDEN'S CONTRIBUTIONS

Mr. CAHN. Just one or two questions in the few moments remaining, Doctor, the fame of the Nobel Institute, and of the Karolinska Institutet itself are so familiar to the world that it leads perhaps to this question, which I think would be of interest to the Congress generally.

What in your judgment are the conditions, in Sweden in particular, which have contributed to this flowering of scientific research which one observes here? Now I know that may be difficult for you to answer, particularly in view of your modesty and that of your colleagues. But why is it that there is such universal well-deserved esteem for Swedish research? What is it that Sweden has done here that has accounted for this remarkable contribution to world science?

Dr. THEORELL. Well, as you say, that is a really hard question to answer because I am not at all sure we fully deserve the praise. Of course, one circumstance may be that after all we have had a great advantage of living in peace for 150 years.

Then perhaps it's true to say that it was a rather fine old tradition here from the 18th and 19th centuries, there were some good chemists around here. I suppose there may be differences between different people. Sweden perhaps isn't a great country from other points of view, we have few composers, for example. It may be the materialistic aspects of chemistry, physics, and so forth are something that is perhaps more or less typical here.

IMPORTANCE OF VOLUNTARISM

Mr. CAHN. Senator Humphrey has inquired, Doctor, about the work of private foundations in various countries, and he has emphasized the importance of private philanthropy making optimum contribution to research. Could you comment, then, as regards the work of the Nobel Foundation as such?

Dr. THEORELL. The first aim of the Nobel Foundation is, of course, to grant these prizes. I can tell you that very much work is laid down on that purpose. We all think that's very important indeed to make these in an entirely impartial and international way, because the statutes strictly forbid taking any sort of regard to nationality.

It's a very difficult task. Every summer those who are on the award committees have to write a big book like this in relation to the proposed candidates. Every year there may be proposed around a hundred people for one of the prizes. Then there are, of course, different procedures to select out the best

ones; but those who are there until the last round may be 10 or 15 or so; then we have to read and write a great deal which is, of course, of an advantage to ourselves because we learn by it, of course.

Senator HUMPHREY. And you're on that committee, aren't you?

Well, do you feel that private voluntary action has a very big and important role to play in this medical research field?

Dr. THEORELL. It does in our country. No doubt about that.

Senator HUMPHREY. It's interesting, too, that in countries that have private voluntary action, research seems to advance quite rapidly; and in countries that have less of it, there seems to be some delay or some slowing down. Now, of course, we don't know enough yet about the Soviet Union and all of its activities. But I think that in some of the countries where they depend entirely upon government resources the governments find their budgets pinched occasionally. Take, for example, in France with the Algerian crisis going on. That puts a very severe limitation upon the amount that can be dedicated to research. Had they private groups supplementing it, they might be able to continue on at a higher level.

NEED FOR SCIENTIFIC FREEDOM

Dr. THEORELL. Yes, of course this is true; and there is another point, too. It is that all sort of government activities, of course, tend to be rather bureaucratic and there are formalities and so forth; whereas, of course, the private foundations can help immediately. In the best case you could call up by telephone and say, "Here's a young man. He needs \$10,000 today or tomorrow," and in the best case you can get it.

Of course, these different activities require a certain amount of freedom; because if you put too much bureaucracy on scientific research you have to write down what you intend to do in the next year, you put so-and-so much to an assistant, so-and-so much to an apparatus, et cetera. But, of course, you wouldn't need to make any research if you knew what's actually going to happen. After all, we're dealing with unknowns. Therefore, I think that next day maybe we'll find something or then, let's try another way because this didn't work. That is, for scientific research, one must test. The research worker has to judge himself what he's going to do next. You can't ask a research council every day, "May I take \$10 and put it over to another item?"

Senator HUMPHREY. In other words, there has to be a great deal of freedom of choice and freedom of decision on the part of a research worker in the use of the funds or the resources that are available to him. This means even when you get government moneys there ought to be definite limits to the amount of reporting and the amount of so-called bureaucratic redtape that we have to go through.

Dr. THEORELL. Yes, yes.

Senator HUMPHREY. Has the Swedish Government been able to limit its reporting and its redtape on its research funds fairly well?

Dr. THEORELL. I think so, because we are all scientists sitting in research councils. There aren't any officials from the Government, so to say. They have to write reports, of course, after a year or so, telling what they have been doing, but we don't require them to write big books about it; just enough to show what they have done. And they have a certain amount of freedom to take over money from one item to another.

Senator HUMPHREY. Does the research council have control over the money that the Government appropriates?

Dr. THEORELL. Yes, it has. Of course, you can't put it into an orchestra, say. The money is administered by the central administration, say, of the Karolinska Institutet in this case. You can send the bills there and they will be paid.

Senator HUMPHREY. But the research council will decide how the money is to be expended; is that right?

Dr. THEORELL. Well, you have to say in an application, that I intend to try this and that, and I may need this and that. Then we say "O.K.; that seems all right." We may ask some expert, and so forth. Then they get the money.

Now if they change their purpose entirely, they may write a few lines to the council saying, "That didn't work. May I use the money for some other purpose," and so forth. And in 99 percent of the cases, that would be permitted in such case.

Senator HUMPHREY. Well, I think our time has run out. We've kept you here a full hour, Doctor.

Dr. THEORELL. Ah, well, it was a pleasure, you see.

Senator HUMPHREY. And I'm delighted that we don't have to pay for these professional services—this has been a great gift on your part—and we are so pleased that you'd take this time.

Now, tomorrow, we're going to come back over here to visit with some of your colleagues. I'm sure at that time we'll be seeing you too, if nothing more than just to say hello.

Dr. THEORELL. Yes.

Senator HUMPHREY. And late tonight I'm going to drop Maurice Vischer a note and tell him that I've met his friend.

Dr. THEORELL. Please will you?

B. CONFERENCE WITH PROF. T. CASPERSSON, STOCKHOLM, SWEDEN, NOVEMBER 25, 1958

Dr. CASPERSSON. This department belongs to the medical faculty of the University of Stockholm, the Karolinska Institutet. The institute is a pure research organization built about 15 years ago, aiming at development of biophysical procedure for the study of fundamental growth processes, tumor growths as well as normal growths, their connection being that in order to get closer to the problems of tumor growths one has to widen basic knowledge on normal growths.

What is specific with this institute? It is the development of quantitative procedures by aid of which we can make chemical determinations within the individual structures in the cell nucleus. That is a series of different procedures by aid of which we can detect chemical determinations in objects the size of a thousandth of a millimeter.

The basic lines have been twofold during this whole period. One is the development of new procedures of this kind purely by physical lines; the other has been the use of these procedures for the study of fundamental growth processes. So this institute is a combination, so to say, of people from a great diversity of fields. We are physicists and chemists and bacteriologists and others—the whole size, of the staff, is about 50 people. And then we have institutes which have budded off from the institute, and they have something like 30 or 40 people together.

Senator HUMPHREY. And what do you call those?

Dr. CASPERSSON. One is an Institute for Medical Physics, Professor Engstrom; the other—Prof. George Klein—is an Institute for Tumor Biology.

Senator HUMPHREY. Do you have a cooperative relationship then with the Institute of Biochemistry?

Dr. CASPERSSON. We have very good contacts with several Swedish universities in the institution. I should say we have very strong ties with many American institutions. I really don't know how many Americans we have had here staying a long time, several months up to 2 years, but it must have been somewhere around 40—ever since the war. And that gives us very close contacts with many institutions. In fact one of the things I did when I was over in the United States was to develop cooperation with very magnificent organizations. We hope that we will help to further develop the program of mutual exchange of personnel.

Senator HUMPHREY. Well that was what I wanted to ask you a little more about. Presently how many—you said you have about 50 people—

Dr. CASPERSSON. Yes.

Senator HUMPHREY. In your institute working in your laboratories—

Dr. CASPERSSON. Altogether.

CONTACTS WITH UNITED STATES

Senator HUMPHREY. Do you have any exchange students from the United States, or any exchange professors?

Dr. CASPERSSON. At this moment we do not have any. Last academic year we had four people. Three stayed the whole year and one stayed 4 months. The next two are expected in February.

Senator HUMPHREY. How many of your associates have studied in the United States?

Dr. CASPERSSON. Several of them have been over for short periods. And if I look back to the people who have come out of this institute ever since the war, I believe that at least 20 have been over in the States for short stays. We hope very much to develop these contacts more. We benefit enormously by these

contacts and I hope that the visitors here have had some use from their stays in our place here.

OTHER NATIONS' REPRESENTATION

Senator HUMPHREY. Do you have specialists or research people that come here from other countries in Europe?

Dr. CASPERSSON. Yes.

Senator HUMPHREY. I am interested in trying to find out how much, you might call it cross-fertilization we get by the exchange of ideas here?

Dr. CASPERSSON. The major part of the people who have been coming here have been from European countries. I can't give any set figure of the number—I haven't really calculated—but we had one short time when there were 14 nations here, but then I included several refugees from different countries.

Senator HUMPHREY. Yes.

Dr. CASPERSSON. So 9, 10 nations is not unusual to be here. And that includes, of course, Scandinavian countries and different countries in Western Europe. We have them from practically every country, with the exception of Spain, I believe.

TRAVEL FUND

Senator HUMPHREY. What about the opportunity of your people, not only here in Sweden and in this institute, to travel. I mean the problem of finding adequate funds and resources for travel on the part of people who would like to attend major conferences or for short periods of study? Is this a problem at all here?

Dr. CASPERSSON. It is a great problem, indeed, here. I believe I am right in saying that it is not so difficult to find means and ways for a young person to go over and stay 1 year and learn, say in the United States. But the question of visiting a congress is in force here. It is very difficult. And what I miss especially is opportunities for people to go over for a shorter period than 1 year; staying, for instance, a period of 3 months or something like that. In our institution, for instance, we see that very clearly. We represent a very specialized line and if the people get out of their normal work here for 1 year, it is not easy for them to catch up when they come back.

Senator HUMPHREY. Yes.

Dr. CASPERSSON. But in a series of different occasions we have made arrangements for 3, 4 months, and that has been extremely good. I think that holds true for a great number of institutions here in Sweden.

Senator HUMPHREY. Now Dr. Casperson, we want to thank you for this very brief review of some of the activities of your institute. I know that we could profitably spend hours and hours and weeks and weeks with you.

Dr. CASPERSSON. May I conclude by pointing out that we are sending out far too many elderly men. And it remains quite impossible for a young man to go to a congress.

Senator HUMPHREY. That's the difficult job—for the younger men to go.

Dr. CASPERSSON. Yes.

Senator HUMPHREY. And to the symposia that are held in different parts of Western Europe as well as in the United States.

Dr. CASPERSSON. Yes.

Senator HUMPHREY. This seems to be something that we found to be quite true all over. And it is a problem more acute in certain other countries than it is in Sweden, where you are better financed than in most places.

Just one question—I know we have to move along: How is the financing of your own institute provided?

Dr. CASPERSSON. The basic part comes from the Government on a stable basis; however, only a small part of the total budget. The rest comes from Swedish foundations, plus Governmental money out of research councils. And we have had, I believe, support from the Rockefeller Foundation starting about 25 years ago which has been absolutely decisive for the development of this whole organization, in the early times especially.

Two years ago we got also a grant from the U.S. Public Health Service for a period of 5 years. And that was for the general development of our growth study. It has been extremely helpful. We are very happy about this. One of our main difficulties is to find means for a stable project running over several years—stability and personnel. The main part of our local sources here go only 1 year.

Senator HUMPHREY. And you can't plan properly.

Dr. CASPERSSON. It is difficult to plan, and that is one of the beautiful things I appreciated in the grant we got from the Public Health Service for a 5-year period.

Senator HUMPHREY. Yes.

Dr. CASPERSSON. And I must say they have been very—what would you say—they meant very much for us, and our work.

Senator HUMPHREY. Yes. Well, thank you Dr. Caspersen. By the way, I don't know if you are familiar with our publication on international medical research, but on page 44, there is a reference to one of the most distinguished scientists, Dr. Caspersson. Thank you.

Dr. CASPERSSON. Thank you very much.

CONFERENCES WITH FINNISH OFFICIALS, NOVEMBER 27, 28, AND 29, 1958,
HELSINKI, FINLAND

Senator HUMPHREY. Among the most constructive experiences in the course of our tour of Europe were the days, unfortunately all too brief, which we were able to spend in Finland. While we were very short on time, Finnish medical scientists gave unstintingly in cooperation with us. I was glad to mention this fact in the course of the hearings on Senator Hill's bill, Senate Joint Resolution 41.

During our brief stay, we conferred with a broad number of medical and other officials. Perhaps our finest experience was the conference with the distinguished president of the State Academy of Finland for Arts and Sciences, Prof. A. I. Virtanen. Following our visit, Professor Virtanen prepared a comprehensive memorandum, at my invitation, outlining future possible lines of additional Finnish-American cooperation. This information has been made available to American medical authorities.

From the many places which Mrs. Humphrey, Mr. Cahn and/or I visited, and at which conferences were held, I have selected three for reproduction of pertinent material within this record.

The first was at the Research Institute for the Brain-Damaged. Through the kind cooperation of chief physician Dr. Eero Hillbom, we had a most productive session on the needs for rehabilitation of those suffering with brain damage, whether from war wounds, accidents, congenital defects, or from other causes. Later publications by this committee will be concerned with the crucial problems of further brain research.

A second place which gave us outstanding insight was the famous Children's Castle. There, Mrs. Humphrey's and Mr. Cahn's host was the chief physician, Prof. Arvo Ylppo. While they were touring this outstanding institution, I was visiting the Finnish State Serum Institute, also a vital facility.

A third item included within this record is material bearing upon the Institute of Occupational Health as furnished by Dr. Martti J. Karvonen, who was extremely helpful during and after our visit. I had asked Dr. Karvonen to cite specific financial needs in connection with rehabilitation and other projects and he complied with very precise and useful information.

In each instance, I have reprinted the subsequent memorandums and correspondence rather than the initial verbatim transcript, feeling that the more organized presentation may better serve to acquaint readers with the work of these splendid institutions.

A. MEMORANDUM FROM EERO HILLBOM, M.D., ON THE TREATMENT AND AFTERCARE OF BRAIN-INJURED VETERANS IN FINLAND (1941-58)

According to collected reports, there are 4,700 brain-injured veterans from the wars in Finland of 1939-45. The interests of brain-injured veterans, in addition to those of other war invalids, are promoted by the unifying body, Disabled Ex-Servicemen's Association in Finland, which, through Government assistance, is able to provide also for aftercare treatment of brain-injured veterans. The organization has three establishments for this purpose: the Institute for the Rehabilitation of Brain-Injured Veterans, center of aftercare treatment; the Kauniala Institute, asylum for the severely wounded; and the Suitia Institute sheltered workshop. The Institute for the Rehabilitation of Brain-Injured Veterans is situated in Helsinki, while the others lie in country districts in the neighborhood of Helsinki.

The treatment of the Finnish brain-injured veterans was started in 1939 by the Finnish Red Cross Hospital at the command of the medical department of the defense forces. The hospital was both an examination and a care center. About 4,000 brain injured were examined several times in the hospital during both wars. This work had two purposes: first, to define the quality of the brain injury and to cure on this basis the state of the patients; second, to define exactly the consequences of the injury.

To the first-mentioned part belonged the surgical treatment of the brain injuries (the treatment of the fistula, brain abscesses, the removal of the bone splinters and the large metal ones, the surgical treatment of traumatic epilepsy, the plastic operations of skull defects, the surgical treatment of the pain states and orthopedic treatment of disabling contractions of the limbs). This work was carried on during several years. Encephalography, ventriculography, and angiography examinations were performed according to need.

The neurosurgical treatment was arranged as follows: Due to the character of the war it had been possible to transport the brain-injured almost regularly within 12 hours. As to the primary revisions, the principle had been followed that the cases of under 12 hours were treated radically according to the same principles as already described by Tönnis and Sir Hugh Cairns. The number of patients being occasionally very great, the covering of the dura wound had to be given up. The primary results seemed, however, to be as good as in the cases where covering had been performed. This gives an idea of what kind of patient material was forthcoming when the aftercare was started.

The operation department of the Finnish Red Cross Hospital was situated during the war in a splinterproof part of its basement floor. There were 60 places. The maximum time for the treatment of one patient was generally 6 weeks, the patient, however, being later on examined at stated intervals. The patient capacity of the hospital was thus considerably raised.

The late abscesses were treated according to the generally known principles. A complete extirpation was performed. The experiences showed that the puncture treatment could not be used, as the abscesses were often multilocular and the capsula a thick one. Incidence of epilepsy in cases with penetrating wounds was approximately 50 percent. The surgical treatment of traumatic epilepsy as well was performed according to the general principles. In many cases the brain lesion was, however, so wide that it was not possible to perform total excision of the damaged tissue. For avoiding adhesions a fibrin film or a provisional rubber plate was placed between the cortical surface and the dura. The experiences showed, however, neither method to have the desired results, as peripheral adhesions took place. If possible, the ventriculostomy was performed. These measures provided, of course, that the place to be operated could be covered with a sufficient thick soft tissue. Our material is not sufficient to verify whether the epilepsy frequency after the lege artis performed radical primary revision had been any smaller than in other cases. The evaluation of the results of the surgical treatment of the posttraumatic epilepsy was made yet more difficult as there occurred rather often also cases of a spontaneous cessation of the epileptic seizures.

Organized aftercare treatment started at the end of 1941, when the Finnish Red Cross Hospital opened a special military hospital for this purpose in Helsinki. The aftercare hospital functioned during the whole war period at a schoolhouse, available because of the war's interruption of schoolwork. Immediately upon the end of the war, the undertaking was transferred to the former Home-Guard Officers Training School in Tuusula. The number of

patients had multiplied: 220 beds were reserved for the aftercare of brain-injured veterans.

The hospital received patients who had undergone surgical treatment, and one of its many functions was to watch for the possible appearance of late complications and return any such cases to the surgical hospital. The main feature of the hospital was, however, its rehabilitation program, based on neuropsychiatry and psychology, which it attempted to make as comprehensive as possible in order to satisfy the needs of the individual patients. The patients underwent a complete neuropsychiatric examination, supplemented, if necessary, by examinations, mainly ophthalmologic and otologic, carried out at the university clinics. At the psychology examinations special attention was paid to speech difficulties and to language disturbances in general.

Rehabilitation was begun, on the initiative of Prof. Aarno Snellman, chief physician of the Finnish Red Cross Hospital, with a so-called graded gymnastic system intended to revitalize the functions of brain tissue still capable of functioning, and the hospital engaged a gymnastics teacher to carry out this program. The patients were formed into groups, according to type and degree of injury, each group having its own aim. The weakest patients started exercises lying on the wrestling mat, and after progress could be advanced to other groups which practiced both more involved movement systems and sports, with an emphasis on ball games. It was in the interests of sport that the hospital was transferred to Tuusula, for that environment offered very good opportunities for swimming and skiing. Paretics were given continuous physical treatment.

Remedial treatment of speech disabilities carried out by the hospital psychologist and speech pathologist was a notable part of the rehabilitation program. Among those patients treated in the hospital during and immediately after the war, there were 500 with greater or slighter cases of aphasia. In addition to training for aphasics, systemic retraining in writing and reading had part in the remedial treatment whenever there was the slightest need for it. Further, arithmetic exercises were arranged for the patients, to improve their skill in reckoning and to brush up their mental faculties. Patients who had such great paresis of the right hand as to make writing with that limb impossible took part in graphic exercises for the left hand. To make spontaneous speech easier, especially in difficult aphasia cases, singing training was arranged. As assistance to the psychologist, the staff employed a teacher of the mute to give aphasia training, a national-school teacher to give arithmetic and singing training, and a drawing teacher for training of the left hand. The hospital made available a woodwork shop for occupational therapy, where patients under the guidance of a teacher made chiefly toys, and thus received preliminary work experience. In all remedial training, physical, psychological, pedagogic, and work therapy, regular diaries were kept by the teachers on record cards, on which were noted the exercises and tasks done by patients in each period, and also progress, state of health, change of mood, emotional attitude toward the rehabilitation program, etc.

In general, the patients had to receive aftercare treatment for at least a year, but while treatment was continuing long leaves could be granted for the purpose of helping the patient to a social accommodation. It was considered important that the patients take part in some type of work during their leave, so that by that means the patients could get some idea of their work capacity and endurance subsequent to wounding. Too, patients' vocational training presented an important problem. The injuries many of them had received were so serious as to necessitate the taking up of new occupations, while others had been so young when wounded that they had had no time to learn an occupation.

The general vocational rehabilitation of all war-wounded, established by law, included vocational training for brain-injured veterans, too. The Office for the Vocational Rehabilitation of War Invalids worked as an organ for vocational training, selecting invalids for the training courses on the basis of written applications, doctors' reports, and school and work references. Personal counseling regarding the selection of occupation had not been put into practice. With reference to the brain injured, it was realized at the beginning that it was necessary to become thoroughly acquainted with the individual qualifications of those invalids entering the courses. For this sake the Disabled Ex-Servicemen's Association founded a committee for the vocational rehabilitation of brain-injured veterans, in 1942. The committee included the psychiatrist,

the psychologist, and the social worker of the hospital, and a technical expert. The committee considered the applications of brain-injured veterans desiring to enter the courses, and made its selection on the grounds of personal knowledge of the applicants. Generally, the invalids who entered the courses had been or were patients of the hospital, other applicants, who had been in other hospitals, being called upon to undergo observation at the hospital prior to selection.

A great number of brain-injured veterans received their training at general courses also open to invalids other than the brain-injured. But because the learning process of brain-injured veterans was much slower in general, the Committee for the Vocational Rehabilitation of Brain-Injured Veterans arranged courses intended for brain-injured veterans only. Cobbling, metalwork, and painting courses were arranged at the hospital, and courses in carpentry, furniture polishing, painting, metalwork, gardening, tailoring, and upholstery in other places. It was attempted to form the teaching program in such a way that even the most severely wounded might follow it. Daily worktime was shorter than in the other courses. The standard requisite qualification for entrance to the trade courses was the national school examination, and school courses were arranged at the hospital, therefore, for such patients as had not, for some reason, finished school. Many of the patients were of such an age that, during their childhood, education had not been compulsory in isolated country districts.

The general trade courses for war invalids, in which brain-injured veterans too took part, comprised a much greater scale of occupations than the courses arranged for brain-injured veterans only. Some of the brain-injured veterans took part in courses demanding very great accuracy, such as those for the professions of watchmaker and machine designer. In all, 819 brain-injured veterans were received into trade courses, of whom 157, or 19.2 percent, interrupted their training for different reasons. The percentage of interruptions is not essentially different from that of other invalids.

Nearly half (49.1 percent) went to preparatory courses for handwork trades, the cobbling course being most popular (17.1 percent of all trained). The Committee for the Vocational Rehabilitation of Brain-Injured Veterans naturally promoted the handwork trades. The working capacity of brain-injured veterans can fluctuate considerably, and the brain-injured veteran is often obliged to interrupt his work, e.g., in the case of epileptic seizures. Therefore, the independent trades were considered the most suitable forms of work, as they can be adjusted within certain limits. Especially preferred were such occupations as might be followed in the countryside. A great number of the patients' homes were in the country, and it was held important that the patient should be able to settle again into the environment in which he had been born, and in which he had grown up. The handwork-trade group is the largest, followed by the metalwork group (27.5 percent), agriculture and forestry groups (17.8 percent), and other trades (5.4 percent). Comparatively, more severely wounded veterans have been taken into the agricultural training courses than into other courses, in spite of the heavy work agriculture involves, for it was attempted to arrange agricultural courses for those veterans, in spite of their being severely wounded, who had had farms or small holdings or were allotted them by the land-allotment law. The viewpoint was that when the brain-injured veteran works on his own land he can leave the heaviest work to others and arrange his work according to his health, as is possible in the handwork trade. According to statistics made in 1951, veterans trained for handwork trades had kept best to their occupations (64.9 percent); the second being other groups, not including handwork, agriculture, forestry, and metalwork (63.9 percent); the third, agricultural and forestry course group (61 percent); and the last, metalwork trained (54.6 percent). The differences are not great, but they show that, in spite of the fact that it was attempted to place the lightest-wounded in the metalwork courses, these courses have worst served their purpose.

The hospital tried to rearrange the studies of brain-injured veterans who had been students at places of higher education, while these were still patients in hospital. At the end of 1949, the number of ex-students of higher places of learning who had continued their studies was 100, of whom 94 took their examinations successfully. Until now, as far as is known, the following have taken academic or other equivalent examinations subsequent to wounding: lawyers 13, economists 12, agronomists 8, foresters 7, M.A.'s 6, physicians 5, engineers 5, clergymen 4, political economists 3, sculptors (Finland School of

Fine Arts) 2, Ph. D.'s 1, gymnastics teachers 1, pharmacists 1, architects 1, and sociologists 1: in all 70 patients.

The Suitia Institute, a sheltered workshop, takes part in the aftercare programs. This manor estate from the Middle Ages had passed into the possession of the Finnish State 20 years earlier, and in 1945 it was given to the Disabled Ex-Servicemen's Association to be used as a work-establishment for brain-injured veterans. Upon obtaining possession, the Disabled Ex-Servicemen's Association immediately started renovation and reconstruction. The main residence of the estate, Suitia Castle, was thoroughly renovated, and near it were built housing for 40 persons, a workshop, and family accommodations. Such brain-injured veterans are taken into the institute as have partly retained their working ability, but who have difficulty in obtaining work in open competition, or in keeping their earlier employment; and there they must take part in work according to their health and ability. Brain-injured veterans, both married, with their families, and single, have been placed in the institute. The families each live in separate houses, of which there are 21 on the grounds. Single veterans have full board and lodgings in the castle, which is also the administrative and economic center of the establishment. Nowadays 40 brain-injured veterans have accommodation there, and when their families, and the staff and its families, are taken into account there are in all 130 persons at the establishment. The degree of disability of the brain-injured veterans now living there varies from 30 to 100 percent.

Agricultural and forestry areas, gardens and woodwork shop give the inmates employment. Up to 1957, courses at the institute coming within the trade-training program were arranged in gardening, carpentry, and upholstery, for, in all, 100 brain-injured veterans. The establishment has at its disposal 112 hectares of cultivated land and 230 hectares of forest. The garden covers 4 hectares, and hothouses, 140 square meters. Doors, window frames, kitchen fittings, and furniture are made in the woodwork shop. For their work, the inmates of the institute receive wages equivalent to the general wage level of the district. Deductions are made from the wages for unmarried veterans' full board and lodgings, and for family rents and any provisions the married veterans' families might have received from the establishment. The director of the institute is a person who has taken a university degree in agriculture, and the matron is a trained nurse who runs the nursing according to the doctor's instructions. Once a month the doctor makes his rounds of the brain-injured veterans.

The next measure in the aftercare of brain-injured veterans was for the provision of an institute for wholly disabled, this problem becoming intense as the capacity of the aftercare hospital's serving as a nursing home for brain-injured veterans, on such a scale as had been possible immediately at the end of the war, gradually diminished. The Disabled Ex-Servicemen's Association bought for this purpose a house in the township of Kauniainen, which was converted into the Valmula Asylum, containing 31 beds. The activities of this institute came to an end, however, in 1957, when vacancies at Kauniainen Institute, founded also in Kauniainen by the Disabled Ex-Servicemen's Association in 1946 especially for spinal-cord-injured veterans, became numerous enough to allow for the moving of brain-injured veterans from Valmula into a ward of their own. Both at Valmula and, later, at Kauniainen Institute, it has been arranged for patients to practice crafts, such as carpet weaving, tapestry weaving, lacemaking, etc. The patients in the Kauniainen Institute nowadays take part in gardening work, according to capacity and interest, for which they receive a small wage. Physical treatment is given continuously, and speech training for aphasia has also been arranged. The doctor makes his rounds of the patients weekly.

The original center of aftercare for brain-injured veterans, the aftercare hospital, continued its activities until the beginning of 1949. The Finnish Red Cross had to relinquish the continuous aftercare work, because of the stress of other duties. The Disabled Ex-Servicemen's Association had already begun negotiating the founding of a new hospital with the Government. The Government had accepted the resolution that the aftercare of brain-injured veterans lay within its duties. For practical reasons, however, the founding of the new hospital devolved upon the Disabled Ex-Servicemen's Association, nevertheless, in such a manner that the Ministry of Social Affairs took upon itself the main financing of the hospital. The new hospital, the Institute for the Rehabilitation of Brain-Injured Veterans, was situated at first at Katajanokka, Helsinki, in a big flat, formerly privately owned. From the very beginning it was obvious that

the place was too small, providing room for only 15 beds and the necessary examining rooms and the polyclinic. Because the space was too small the patients had to wait, on average, 6 months for beds. The situation became somewhat easier when, in 1951, the institute moved to a large villa at Haaga, in Helsinki district. Thereupon, 27 patients could be roomed, and space for examination purposes also increased. There was decided improvement in 1957, when the institute was transferred to its present quarters, the building which the Disabled Ex-Servicemen's Association had bought for this purpose.

The present Institute for the Rehabilitation of Brain-Injured Veterans includes three patients' wards, having, altogether, 91 beds, a polyclinic, a psychology department, a social service office, and a department for physical treatment which it was not possible to make as big as was needed. There are at the institute a complete X-ray unit, a laboratory, and an EEG-apparatus which was acquired in 1953, half the cost being paid by the World Veterans' Federation. Even nowadays, patients who are here for examination are sent to the clinics of the University Central Hospital if special examinations which cannot be carried out at the institute are needed, and any necessary neurosurgical operation is done at the Neurosurgical Clinic of the University Central Hospital (Head: Prof. Aarno Snellman). The building also houses the office of the Special Association of Brain-Injured Veterans of the Disabled Ex-Servicemen's Association, which works in close collaboration with the institute.

A great number of patients visits the institute for examination and for doctors' certificates required by the state accident office. In 1957, there were altogether 1,001 patients at the institute for examination and treatment and a further 943 visited the polyclinic during reception hours. Altogether, 1,590 doctors' certificates were written for the state accident office. The psychology department treated 386 patients. Average duration of stay in the institute was 3-4 weeks.

The chief physician of the institute is Dr. Eero Hillbom, and the chief psychologist Prof. Niilo Mäki, both of whom have worked with the aftercare treatment of brain-injured veterans since its inception.

The center of aftercare treatment, the Institute for the Rehabilitation of Brain-Injured Veterans, works in very close collaboration with the other institutes for aftercare, the Suihia Institute and the Kauniala Institute, and thus patients requiring treatment can be placed and treated, without friction, in the separate institutes. Together, the institutes can nowadays cover to a sufficient extent the brain-injured veterans' need for aftercare. However, these institutes still supply, in fact, only the minimum level of accommodation and treatment, so that the freeing of places for the treatment of even a very limited number of civilian brain-injured patients does not seem to be possible for a long time forward.

B. LETTER AND MEMORANDUM FROM ARVO YLLPÖ, M.D., CHILDREN'S CASTLE

Dec. 16, 1958.

Mr. J. N. CAHN,
Project Director of Medical Research, U.S. Senate Committee on Government
Operations, Washington, D.C.

DEAR SIR: Referring to your and Mrs. Humphrey's visit at Children's Castle I hereby enclose a short program of the scientific works mostly concerning newborn and premature infants. As you can see from the program the Children's Castle closely cooperates with the Children's Hospital across the street and our scientific staff is fairly large. Some members of the research staff are mentioned below:

- E. K. Ahvenainen, M.D., assistant professor of pediatrics (pathology and newborn).
- N. Hallman, M.D., professor of pediatrics (metabolism and child development).
- L. Hjelt, M.D., assistant professor of pediatrics (pathology and newborn).
- J. Kauhtio, M.D., assistant professor of pediatrics (EEG and epilepsy).
- K. Koski, assistant professor of dentistry (child dental care and anthropology).
- A. Lehtovaara, professor of psychology (child psychology).
- E. Valanne, M.D., child psychiatrist (child psychiatry).
- Lea Yllpö, M.D., pediatrician (cerebral palsy).
- K. Österlund, M.D., pediatrician (newborn metabolism).

We are also very closely cooperating with the University Lying-In Hospital and are actually taking care of the newborn infants there (around 8,000 births yearly).

The research work in these fields has been going on a small scale for some years. As you were able to see during your visit we are getting some new buildings with better facilities for research work. We are especially keen on developing the laboratory for neuroanatomy and neuropathology which supplements our main children's pathology. I have also had some discussions with a well trained specialist in Switzerland who is going to work with us if we are able to arrange the financial problems.

As you can see from the attached plans we also will continue the work concerning the development of healthy Finnish children. This kind of work is, as you certainly know, well known in the United States and also WHO supports some studies in Europe (not including Finland). We feel, however, that the work going on in Finland also has some general importance. The geographical location of Finland—our study also includes the children of our arctic provinces like Lapland—is unique and the experiences must have main interest.

I would be extremely grateful if you could recommend us and our scientific program to your research committee.

At the same time I am sending a letter and a copy of our program to Senator Humphrey.

With kindest regards,

Yours,

ARVO YLPPÖ,

Archiatre, Chief Physician of the Children's Castle in Helsinki.

DECEMBER 13, 1958.

CHILDREN'S MEDICAL CENTER, HELSINKI—THE UNIVERSITY CHILDREN'S HOSPITAL
AND THE CHILDREN'S CASTLE

Investigator in charge: Arvo Ylppö, M.D.

A. Studies on effect of pregnancy and delivery on the newborn and on the later development of children, especially the nervous system.

B. Development of healthy children in different environments in Finland.

Duration of study: 3-5 years.

Importance of study: During the last years the mortality of infants and children has dramatically decreased. There are, however, still many facts during pregnancy and also during delivery which have an effect on the child and cause damages, especially in the nervous system. The need for careful information about as many as possible details will help to dissolve many of these questions and reduce the number of handicapped children. The followup study gives the information on the early treatments.

Plan of work:

1. Problems of perinatal mortality and morbidity.—The data to be collected: Family history, the health of the mother during pregnancy, perinatal period, complications of delivery, fetal death, autopsy data for all perinatal and infantile deaths.

2. The care of the newborn and premature infants.—The effect of environmental temperature, humidity, oxygen tension, feeding, prevention of infections. Followup results. Pathology of all deaths.

3. The problem of newborn icterus.

4. Cerebral palsy.—The appearance of the first symptoms, the correlation of them to the pregnancy and delivery. Later development of these children. Careful pathology of all deaths.

5. Convulsions.—A careful neurological and EEG study. The material includes the whole childhood.

6. Development of healthy children.—This work has been going on as a preliminary study for a couple of years. The aim is to collect very carefully studied material about 100-150 children in Helsinki and a large survey of 2,500 children from different parts of Finland and to correlate these findings. The working group consists of pediatricians, psychiatrists, psychologists, anthropologists, social workers, and clerks.

Scientific staff:

(1) 1 physician, full time.....	1. 500. 000
2 physicians, half time (2×750,000).....	1. 500. 000
(2) 1 physician, part time.....	750. 000
1 physician, half time.....	750. 000
(3) 1 physician, half time.....	750. 000
(4) 1 physician, full time, pathology.....	1. 500. 000
1 physician, half time.....	750. 000
(5) 1 physician, part time.....	750. 000
1 physician, part time.....	750. 000
(6) 1 physician, full time.....	1. 500. 000
3 physicians, half time (3×750,000).....	2. 250. 000
Subtotal.....	12. 750. 000
Additional staff and funds:	
10 technicians or clerks, full time @ 500,000.....	5. 000. 000
Equipment and material.....	1. 000. 000
Total expenses (yearly) Fmk.....	18. 750. 000

HELSINKI, December 13, 1958.

ARVO YLPPÖ,

Archiat, Chief Physician of the Children's Castle in Helsinki.

C. LETTER AND MEMORANDUM FROM MARTI J. KARVONEN, M.D., PH. D., INSTITUTE OF OCCUPATIONAL HEALTH

INSTITUTE OF OCCUPATIONAL HEALTH,
*Helsinki, Finland, December 13, 1958.*Senator HUBERT H. HUMPHREY,
U.S. Senate,
Washington, D.C.

DEAR SENATOR HUMPHREY: I would like to thank you on behalf of the entire staff of the Institute of Occupational Health for your visit. It was particularly encouraging for us who had the good fortune of meeting you personally, to experience the way in which you opened new avenues of thought in our minds. Your visit was certainly a stimulus.

As you suggested, we have written down the outlines of the major projects now at the planning stage at our institute. These projects have been maturing in our minds gradually. Preparatory work for the realization of some has already been made, as you will see. I hope that the information given will be of value for you.

I have also been in contact with the president of the Finnish Academy, Prof. A. I. Virtanen. I understand that a committee appointed by him will include our research project No. 8 in its list of recommendations for further action.

You asked also for our opinions on some more general points. We use the opportunity for making two suggestions:

(1) If U.S. money is appropriated for medical research in Finland, the distribution of the grants should be held in the hands of experienced American authorities. In this way the advantage of an impartial expert assessment of the value of our work is ensured, which in a small country often is at least as important as a grant. A local committee for advising the applicants will of course be also needed.

(2) When large scale plans are considered, we would like to draw attention to an inter-Scandinavian scheme which now is taking shape: The Institute of Arctic Medicine. A special committee is making the plans. In the establishment of such an institute, U.S. expertise and material aid would certainly be of singular value, particularly since a great amount of experience has been collected in your country on this field.

We all send our best wishes to Mrs. Humphrey and yourself, and we hope to see you some other time as a guest in our country. With the Minnesotans we feel very much like with close relatives.

Sincerely yours,

MARTI J. KARVONEN, M.D., Ph. D.,
Director of the Physiological Department, Institute
of Occupational Health.

INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECTS NOS. 1-9

Background information

The institute is a private institution, run by the Finnish Foundation for Industrial Medicine in a building provided by the State of Finland. The construction was completed in 1951.

The institute's activities cover:

Research in occupational health, i.e. in industrial medicine in a wide sense;

Medical services, both outpatients and inpatients, at the central clinic for occupational diseases in Finland;

Psychological, physiological, and environmental hygiene service work and consultation;

Information and education.

The institute includes the following units:

- (1) Medical department.
- (2) Physiological department.
- (3) Psychological department.
- (4) Department of environmental hygiene.
- (5) Rehabilitation unit.
- (6) Statistical unit.
- (7) Administrative department.

The institute has a staff of 161 persons. Of these 45 are medical, science, or engineering graduates. The annual expenditure is approximately \$450,000. Twenty percent of this is covered by a state appropriation. The activities of the institute bring in 78 percent; the rest is covered by donations from industry etc. When the institute was started, a grant of \$50,000 was obtained from the Rockefeller Foundation for equipment.

Research has been actively carried out; a total of 700 research papers have been published by the staff.

Research program

The attached research projects Nos. 1-9 are long-term investigations of a relatively large scale each. In addition to the projects presented, several studies of smaller scale are currently carried out by other members of the staff.

The research projects and their expenditure are shown in attached lists.

The projects Nos. 3, 4, and 7 are parts of a larger basic investigation, the purpose of which is to develop psychological methods for the adequate job placement of psychically and physically deviating groups (e.g. sensory defects, brain lesions, epilepsy, mental defects). Particular attention is paid to an exact analysis of changes due to the lesion; the phenomenon of compensatory changes is of central importance in this respect.

In first space for project No. 2, but also for studies on cholesterol metabolism (project No. 8), the institute is in need of new research equipment. These are:

- (1) Gas chromatograph with accessories.
- (2) Infrared spectrophotometer with accessories.

The annual distribution of the budget involved for the presented projects is as follows:

	Year							
	1959	1960	1961	1962	1963	1964	1965	1966
Gas chromatograph.....	\$2,800							
Infrared spectrophotometer.....	5,300							
Research project No. 1.....	6,000							
Research project No. 2.....	3,750	\$3,750						
Research project No. 3.....	1,400	1,600						
Research project No. 4.....	1,300	2,300						
Research project No. 5.....	900	2,100	\$1,800					
Research project No. 6.....	600	1,650	1,650					
Research project No. 7.....		600	600	\$1,500	\$3,100			
Research project No. 8.....	5,000	2,500						
Research project No. 9.....	6,000	4,000	4,000	4,000	7,000			
Total.....	33,050	18,500	8,050	5,500	10,100			

NOTE.—Total for the years 1959-63, \$75,200.

INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

List of research projects, Dec. 9, 1958

No.	Field	Subject of the study	Responsible Investigator	Sum
1	Occupational diseases.....	Late effects of carbon monoxide poisoning.	P. Sumari, M.D.....	\$6,000
2	Occupational allergy, skin diseases.	Allergy to oil of turpentine.....	Prof. V. Pirilä, M.D....	7,500
3	Rehabilitation.....	Experimental study on the psychological aptitude structure of the blind and the deaf.	J. Juurmaa, M.A.....	3,000
4	Neuropsychology.....	Psychological aptitude structure, deterioration pattern of brain-injured patients.	J. Weckroth, M.A.....	3,600
5	Mental health.....	Individual differences in tolerance of monotony under various working conditions and its psychological prognosis at the preventive work against stress.	Prof. O. Oksala.....	4,800
6	Psychosomatic medicine.....	Ulcer, stress and personality.....	Helena Hänninen, M.A.	3,900
7	Rehabilitation.....	Predicting of fitness for vocational training and success in practical work by means of psychological tests and physiological measurements: a followup study of 1,000 Finnish disabled persons.	A. Tamminen, M.A....	5,800
8	Cholesterol metabolism, occupational health.	Mechanism of action of 2 industrial poisons on cholesterol metabolism.	E. Karvinen, M.D., Ph.D.	7,500
9	Cardiovascular diseases.....	Incidence of cardiovascular disease in Finland.	M. J. Karvonen, M.D., Ph. D.	25,000
Total.....				67,100

DECEMBER 9, 1958.

INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECT NO. 1

Field.—Occupational diseases.*Subject of the study.*—Late effects of carbon monoxide poisoning.

Outline of the project.—During and after World War II, generator gas was used instead of gasoline as a fuel for motor vehicles in Finland. During that period several thousand drivers and mechanics suffered carbon monoxide poisoning. A detailed examination was made on more than 400 such cases in 1945–46.

The purpose is now to reexamine this group which is unique in the entire world by the same team of investigators who made the study 13 to 14 years ago. The investigation will be valuable also for the assessment of the late effects of anoxia as caused by other circumstances.

In addition to the responsible investigator, the team will consist of the ENT specialist, the ophthalmologist, and the neuropsychiatrist of the institute.

Responsible investigator.—P. Sumari, M.D., age 44. Director of the Medical Department of the Institute of Occupational Health since 1953 and vice director of the same institute. Secretary general of the XII International Congress on Occupational Health, 1957. Member of the Commission Internationale Permanente pour la Médecine du Travail. Research papers on CO poisoning and other topics in industrial medicine. Several study and lecture tours in Europe, some on WHO and ILO travel grants.

Time schedule.—During 1959.*Support needed.*—For personnel, \$6,000.

DECEMBER 9, 1958.

INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECT NO. 2

Field.—Occupational allergy, skin diseases.*Subject of the study.*—Allergy to oil of turpentine.

A. Determination of the eczematogenic agent.

B. Prevention.

Outline of the project.—Turpentine eczema is very common in many countries, e.g., in Scandinavia, including Finland. Here it is the commonest allergic occupational eczema and occurs mainly in painting, cleansing, and household.

In 1950 Professor Hellerström, Sweden, succeeded in proving that turpentine can cause eczema only after oxidation, e.g., after having been stored (exposed to air). Turpentine, however, is composed of different terpenes and it was thought that the eczematogen originates from all these terpenes.

The problem has been studied at the Institute of Occupational Health, Helsinki, during the past 5 years. Thus far we have found that the eczematogen is a hydroperoxide and originates mainly or exclusively from only one of the constituents (Δ^3 -carene) in oil of turpentine. Therefore it seems theoretically possible to prevent turpentine eczema, e.g., by eliminating Δ^3 -carene from oil of turpentine.

The next project is to investigate whether traces of eczematogen can be formed from the other constituents also. This investigation, which forms the basis for a logical study to prevent turpentine eczema, requires (1) gas chromatograph, (2) infrared spectrophotometer, which are included in the application of the Institute of Occupational Health.

The investigation is in essence teamwork between a dermatologist (responsible investigator) and a chemist (Mr. Eero Siltanen, M.S.).

Papers thus far published by the authors on turpentine eczema:

Pirilä, V., and Siltanen, E., "Dermatologica," vol. 110, 144-145, 1955.

Pirilä, V., and Siltanen, E., "Dermatologica," vol. 113, 1-13, 1956.

Pirilä, V., and Siltanen, E., "Dermatologica," vol. 117, 1-8, 1958.

Pirilä, V., and Siltanen, E., "Duodecim," vol. 72, 44-61, 1956.

Pirilä, V., and Siltanen, E., "Proceedings of the XII International Congress on Occupational Health, 1957," vol. III, 400-402, 1958.

Pirilä, V., "Occupational Allergy," lecture held during a course on occupational allergy at The Hague in May 1958, H. E. Stenfort Kroese, N.V., Leiden, 1958.

Pulkkinen, E., Siltanen, E., and Pirilä, V., "Acta Chemica Scandinavica," vol. 12, 1144-1145, 1958.

Responsible investigator.—Prof. Veikko Pirilä, M.D. Age 43 years. Professor of dermatology in University of Helsinki since March 1958, chief dermatologist since 1951, Institute of Occupational Health, Helsinki; 80 scientific publications, mainly in the field of occupational dermatology, including dissertation and several papers on turpentine allergy. (See the list above.) Studied occupational dermatology in Great Britain for 3 months in 1950 (British Council bursary) and in United States of America for 3 months in 1952 (WHO scholarship).

Time schedule.—24 months, 1959-60.

Support needed.—For personnel:

1959:			
Principal investigator	-----	\$1, 800	
Chemist	-----	1, 800	
Expenses	-----	150	
		-----	\$3, 750
1960:			
Principal investigator	-----	1, 800	
Chemist	-----	1, 800	
Expenses	-----	150	
		-----	3, 750
Total	-----		7, 500

INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECT NO. 3

Field.—Rehabilitation.

Subject of the study.—Experimental study on the psychological aptitude structure of the blind and the deaf.

Outline of the project

Background.—About 4 years ago a comprehensive plan was made in Finland to widen the range of occupations open to the blind and the deaf. As a basis for this a specialized psychological study was planned. Its purpose was:

1. To clarify the general aptitudes of the blind and deaf as compared with the normal persons.

2. To develop test methods for determining their individual capacities. The idea was to give an adequate direction to the widening of range of occupations and, on the other hand, to prevent unsuccessful placements. In designing the research project the aim was not only to reach practical goals, but also to shed light on a number of theoretical questions.

Problems.—The study consists of two parts:

Part I. The first part tries to illuminate, among other things, the following points: In what degree is it possible to separate mutually independent ability groups or factors in the aptitude structure of the blind and deaf? To what extent do the blind and deaf master the same tasks with the aid of the same abilities as the normal? The question may also be given the formulation: in what manner do certain abilities depend on certain sensory fields?

Part II. How do certain abilities depend on—

- (a) The degree of blindness/deafness.
- (b) The age at the onset of blindness/deafness.
- (c) The duration of blindness/deafness.
- (d) The chronological age.

Pilot study.—Concerning the blind, an experimental study was started at the Institute of Occupational Health in 1956. The study population consists of 250 blind subjects and 150 seeing persons as a control group.

At present a corresponding study concerning the deaf is at the planning stage.

Responsible investigator.—Jyrki Juurmaa, born 1929, M.A. 1953 (University of Helsinki). Research assistant 1954 and research psychologist 1955 at the Institute of Occupational Health (special area: development of tests and methods for job placement of deviant and handicapped persons), member of the Finnish Psychological Association. Study trips: 1955, England, Holland; 1957, Norway, Sweden. Publications; research papers.

Time schedule.—

1959: The study of the blind continued and finished; development of methods for the study of the deaf.

1960–61: The study of the deaf—

At the Schools of the Deaf in Finland.

For adult deaf workers.

Support needed.—

1959:

(a) For investigator 4 months.....	\$1, 200	
(b) For statistical treatment of data.....	200	\$1, 400

1960:

(a) For investigator 4 months.....	1,200	
(b) For statistical treatment of data.....	400	1, 600

Total.....		3, 000
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INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECT NO. 4

Field.—Neuropsychology.

Subject of the study.—Psychological aptitude structure, deterioration pattern of brain-injured patients.

Outline of the project.—Clinical psychodiagnosis has started to use certain ability measures as an aid to determine the possible mental changes connected with some physical illness or injury. The term "mental deterioration index" (MDI) used in this connection and applied by IQ tests (as, e.g., Babcock, Hunt-Minnesota, Wechsler, etc.) refers to the fact that a certain psycho-physical injury affects the mental performance capacity of a human being unevenly. It means that when the performance of a normal, healthy subject in different tasks (ability tests) usually is relatively on the same level, quite large intra-individual differences ("scatters") may occur in psychologically abnormal subjects. This "unevenness" of individual ability structure is called deterioration. This approach seems to be rather fruitful just for the diagnosis of organic

brain injuries. Yet the central point—"deterioration hypothesis"—has not been satisfactorily verified. So, it is not known whether there really exists deterioration caused by some psychological mechanism or if the "unevenness," e.g., depends on different attitudes toward different tasks.

This shortcoming is due—

(a) To the very subjective rationale of the methods used for determining deterioration pattern; and

(b) To the lack of reliability of the tests used for the measurement of different ability traits.

Pilot study.—During 1958 a test battery has been developed at the institute and 40 brain-injured subjects have been tested. The study is concerning tumor and aneurysm cases only.

The purpose of the planned study is—

1. To test the deterioration hypothesis; by using unidimensional, reliable factor tests; and

2. To clarify the changes of behaviour eventually caused by surgical operation, by comparing tests results obtained at pre- and postoperative examinations.

Subjects to be used—

Clients sent by the Ministry of Social Affairs to the Counseling Section for Disabled of this institute.

Patients from the neurosurgical department of the Finnish Red Cross Hospital, Helsinki.

Responsible investigator.—Johan Weckroth, born 1924, M.A., 1954 (University of Helsinki). Research assistant 1952 and research psychologist 1954 at the Department of Psychology of the Institute of Occupational Health (special area: development of tests and methods for job placement of deviant and handicapped persons), member of the Finnish Psychological Association, lecturer of psychology at the Prison Department of the Ministry of Justice and at the state college of public health nursing (postgraduate students). Study trips: 1954 Sweden, Denmark; 1955, England, Holland; 1958, Norway, Sweden. Publications: research papers.

Time schedule.—

1959: Preparation of test material and examination of patients.

1960: Examination of patients completed, analysis of results.

Support needed.—

1959:

(a) For investigator, 3 months full time	\$900	
(b) For test assistant	400	
		\$1, 300

1960:

(a) For investigator, 5 months full time	1, 500	
(b) For statistical treatment of data	800	
		2, 300

Total		3, 600
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INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECT NO. 5

Field.—Mental health.

Subject of the study.—Individual differences in tolerance of monotony under various working conditions and its psychological prognosis at the inception of preventive work against stress.

Outline of the project.—The first task is to develop methods for measuring the stress caused by monotony at industrial repetitive work. This is done—

1. By analyzing individual differences in daily production curves (registered with a special recording apparatus).

2. By finding other measurable symptoms.

The workers in question are tested with a special test battery, with the aim to find out prognostic methods for selecting workers for repetitive work. The second aim is to find the optimal production curve for work on assembly line.

The basic hypothesis for this study is the regulated rhythm of the physiological energy output; the verification of this is also included in the project.

Responsible investigator.—Prof. Ohto Oksala, professor in industrial psychology at the Technological University, Helsinki (from 1952), and chief of the Psychological Department in the Institute of Occupational Health (from 1951); born 1905; publications: "Psychology of Work" (Finnish, 208 pp. 4 eds.), several papers (in Finnish) on the dynamic field theory, vocational guidance, aptitude testing and the organization of industrial employment.

Time schedule.—

1959: Developing of recording methods and construction of test battery.

1960: Experimental work in factories.

1961: Analysis of results.

Support needed.—

1959: For the investigator, 3 months.....	\$900
1960:	
(a) For the investigator, 4 months.....	\$1, 200
(b) For the montage of recording apparatus and technical assistance.....	900
	2, 100
1961:	
(a) For the investigator, 4 months.....	1, 200
(b) Secretarial and statistical aid.....	600
	1, 800
Total.....	4, 800

DECEMBER 9, 1958.

INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECT NO. 6

Field.—Psychosomatic medicine.

Subject of the study.—Ulcer, stress, and personality.

Outline of the project.—Psychological study of a group of about 100 patients suffering from gastric or duodenal ulcer, a group of normal persons and a group of neurotics as control.

Methods used.—Free and standardized psychological interview, personality tests, and intelligence tests.

Special objects of interest.—(1) Stress situations of the ulcer patients both in recent life situations and in earlier life, life history, and their emotional reactions toward them; (2) relations between the stresses or frustrations found in childhood situations and later emotional attitudes, and (3) mutual comparison of typical life attitudes and manner of living in these groups.

A widely accepted opinion is that the incidence of ulcer largely depends on the psychic stresses in the life situation (work stresses, marriage problems, etc.) of the subject. On the other hand, there is the opinion that the incidence of ulcer largely depends on the stress situations and frustrations in childhood. Accordingly the psychological research has focused on two points: (a) An analysis of the quality of stress situation and frustrations found in childhood and (b) an approach to measure the quantity of the stresses in later life and the ability to tolerate stress. Our intention is to study both the past and the present stress, in the present stress both the outer stresses and the subjects' ability to tolerate stress, and both the quality and the quantity of their emotional reactions to stress.

Responsible investigator.—Helena Hänninen, born 1924, M.A. (University of Helsinki), 1952. Study trip: 1952 Germany. Member of the Finnish Psychological Association. Assistant psychologist at the Nikkilä Psychiatric Clinic, Helsinki, 1950–53. Clinical psychologist at the Institute of Occupational Health, 1954.

As expert consultants concerning medical diagnostic work are the neuropsychiatrists and the specialists in internal medicine at the Medical Department of the Institute of Occupational Health.

Time schedule.—

1959–60: Collection of data.

1960–61: Statistical analysis of results.

Support needed.—

1959: Investigator, 2 months' full time-----	\$600
1960:	
Investigator, 4 months full time-----	\$1, 200
Assistants (statistical routine work, etc.)-----	450
	1, 650
1961:	
Investigator, 4 months-----	1, 200
Assistants -----	450
	1, 650
Total-----	3, 900

INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECT NO. 7

Field.—Rehabilitation.

Theme.—Predicting of fitness for vocational training and success in practical work by means of psychological tests and physiological measurements: a follow-up study of 1,000 Finnish disabled persons.

Outline of the project

Background.—At the initiative of the Ministry of Social Affairs the Institute of Occupational Health established in 1953 the counseling section for disabled persons. The section attempts, in cooperation with various departments of the institute, to examine the fitness of disabled persons for work and occupations. Medical, psychological, and social aspects are considered with an emphasis on cooperative teamwork planning for each client. Thus the psychological department puts at disposal the test equipment and assistants; physiological and medical departments carry out many special examinations such as tests of the function of the circulatory and respiratory systems, X-rays, thorough laboratory tests, etc. The total number of the clients in 1953–58 has been 2,700, between 16 and 40 years of age. Of them two-thirds are men. About 60 percent have gone after the rehabilitation examinations at the institution to various vocational schools, the training period being at least 1 school year, for the majority 2 to 3 years. Therefore, only some of our clients have been at work 2 to 3 years or more, until now, after the training period.

The main task of the counseling section is to conduct the rehabilitation examination and give the statement and recommendations to the Ministry, to the client himself, and to the various officials by whom the actual rehabilitation services are carried out. To get information about the validity and results of its work the section has made attempts to organize a systematic followup service. So far there are some facts about the success in vocational training. The results are encouraging. For example, the number of those who have not succeeded in their chosen training has notably decreased.

Problem.—The primary aim of this followup study is—

1. To find concrete, objective criteria for measuring the success in work;
2. To prove the validity of the aptitude tests;
3. To control the medical assessments;
4. To develop a systematic followup method or a more scientific one for finding out new starting points for improvement of merit rating.

Thus it is possible to see, how strong, e.g., the correlation is between the test results and success in work, and, on the other hand, to develop the aptitude test and assessments for better reliability.

This study is not possible without a team of qualified experts: As consultants (some periods full-time work) are the medical rehabilitation officers of the counseling section, Dr. H. J. Rinne, M.D., now studying in U.S.A. (Bellevue Medical Center); the chief social worker of the section, V. Niemi, M.A., now also in U.S.A. (United Nations fellowship, University of Detroit).

Time schedule.—

1960–62: Orientation to similar studies abroad and preparatory planning of the study:

Organization of the cooperation of various officials and organizations having contacts with the persons in question.

Planning of questionnaires.

Training of raters.

1963: The first field examinations.

1964-66: The examinations continued and finished; summing up of results.

Responsible investigator.—Antti Tamminen, born 1917, M.A. 1944 (University of Helsinki). Psychologist and vocational counselor for war disabled 1943. Psychologist of the Finnish Invalid Foundation 1944-52. Psychologist at the Department of Psychology of the Institute of Occupational Health 1935- (special area: aptitude testing, vocational assessment, and guidance of handicapped persons). Lecturer of psychology at the State College of Nursing, at the College of Social Work and Medical Gymnastics Institute. Fellowships: "Schweizer Europahilfe," grant for studying vocational guidance and applied psychology 1949. U.N. Group Training Course for the Rehabilitation of the Adult Disabled, Scandinavia 1952. UN-ILO-WVF-Seminar of Selective Placement of the Handicapped, Sweden 1955. WCF-UNO-ILO-ISWC-Seminar on Vocational Rehabilitation of the Tuberculous, France 1957. Study trips to Scandinavian countries 1946, 1947, 1951. Member of the Finnish Psychological Association. Member of the State Committee on the Rehabilitation of the Hard-of-Hearing 1955-58. Publication: A followup study concerning Finnish war-disabled trained for metal industry, 1950.

Support needed.—

1960: For responsible investigators 2 months full time.....	\$600
1961: For responsible investigator 2 months full time.....	600
1962: For responsible investigator 2 months full time.....	\$600
3 x 1 for consulting experts.....	900
	1,500
1963: For responsible investigator 2 months full time.....	600
For statistical treatment.....	1,000
Personnel for field work.....	1,500
	3,100
Total.....	5,800

DECEMBER 9, 1958.

INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECT NO. 8

Field.—Cholesterol metabolism, occupational health.

Subject of the study.—Mechanism of action of two industrial poisons on cholesterol metabolism.

(a) Effect of vanadium

(b) Effect of CS₂

Outline of the project

Industrial poisons vanadium and CS₂ have been shown to influence the metabolism of cholesterol.

Vanadium has been reported to decrease the biosynthesis of cholesterol (1) which may be of therapeutic value in the treatment of atherosclerosis (2). It has been suggested also that vanadium may accelerate the catabolism of cholesterol (3).

Exposure to CS₂ has been shown to produce atherosclerosis (4) and hypercholesterolemia (5) which effects may be due to liver injury (5).

The mechanism of action of vanadium and CS₂ on cholesterol metabolism has not been settled definitely.

It is proposed that a study be made to elucidate the mechanism of action of vanadium and CS₂ on cholesterol metabolism.

In normal rats and in rats fed vanadium or exposed to CS₂ gas, the following parameters of cholesterol metabolism will be studied:

1. Biosynthesis of cholesterol from C¹⁴ labeled compounds acetate-1-C¹⁴ and mevalonate-1-C¹⁴.
2. Turnover time of cholesterol-4-C¹⁴.
3. Catabolism of cholesterol-4-C¹⁴ to C¹⁴-bile acids excreted in the feces.
4. Absorption of cholesterol-4-C¹⁴.

5. Fecal excretion of endogenous cholesterol.
6. Transport of cholesterol-4-C¹⁴ in α and β lipoproteins separated by paper electrophoresis.

The methods to be used are those used by Karvinen et al. in earlier studies (6, 7, 8, 9). Paper electrophoresis of α and β lipoproteins will be carried out according to the method used in this laboratory (10).

References:

1. Curran, G. L.: J. Biol. Chem. 210, 765, 1954.
 2. Curran, G. L. and Costello, R. L.: J. Exp. Med. 103, 49, 1956.
 3. Mountain, J. T., Stockwell, F. R. and Stockinger, M. E.: Proc. Soc. Exp. Biol. Med. 92, 582, 1956.
 4. Vigliani, E. C. and Cazzullo, C.: La Medicina del Lavoro 41, 49, 1950.
 5. Sakura, T.: J. Sci. of Labor 33, 49, 1957.
 6. Karvinen, E. and Laakso, P. V.: Federation Proc. 16, 70, 1957.
 7. Karvinen, E.: Federation Proc. 17, 83, 1958.
 8. Karvinen, E.: Factors modifying the absorption and synthesis of cholesterol. Ph. D. Thesis, Univ. of Illinois, Chicago, 1958.
 9. Karvinen, E., Suzuki, R., Prasad, R. C. and Ivy, A. C.: "Elimination of Endogenous Sterol by Biliary Fistula Rats." (To be published.)
 10. Keys, A., Karvonen, M. J. and Fidanza, F.: Lancet II, 175, 1958 (July 26).
- Responsible investigator.*—Esko Karvinen, M.D., Ph. D. (University of Illinois). Born 1922. M.D. University of Helsinki 1952. M.S. in Physiology, University of Illinois 1954, Ph. D. in Physiology, University of Illinois 1958. Assistant, Institute of Physiology, University of Helsinki 1952. Rockefeller Foundation fellow in Physiology, University of Illinois 1952-53. Research assistant, Department of Clinical Science (Physiology), University of Illinois College of Medicine 1954-58. Consultant, Chemical Research Department, Bauer & Black Co., Chicago, Ill. 1956-57. Assistant director, Department of Physiology, Institute of Occupational Health, Helsinki, Finland, since 1958. Publications on gastrointestinal physiology and cholesterol metabolism, mainly with M. J. Karvonen, M.D., Ph. D. (Cambridge), A. C. Ivy, M.D., Ph. D. and Tsung-Min Lin, Ph. D. (Illinois).

Time schedule.—12 months (6 months each in 1959 and 1960).

Support needed.—

1959:

A. For personnel	\$2,000.00
B. For apparatus and supplies:	
Tracerlab "Autoscaler", catalog No. SC-51	1,050.50
Tracerlab present timer, catalog No. SC-42	121.00
Tracerlab shielded manual sample changer, catalog No. SC-596 PS	412.50
Tracerlab Geiger Tube, catalog No. TGC-2	69.85
Tracerlab windowless flow counter, catalog No. SC-16 G	632.50
Tracerlab precipitation apparatus, catalog No. E-8 B	27.50
200 stainless steel planchets (1 inch D by 5/16 inch), catalog No. E-20	26.40
Calibrated radiocarbon powder, catalog No. R-25	30.25
Radioactive chemicals:	
50 microcuries mevalonic acid-1-C ¹⁴	59.00
100 microcuries cholesterol-4-C ¹⁴	70.00
1 millicurie sodium acetate-1-C ¹⁴	75.00
Inactive chemicals and reagents	200.00
Rats, food, other expenses	225.50
	\$5,000.00

1960:

A. For personnel	2,000.00
B. For supplies:	
Inactive chemicals and reagents	300.00
Rats, food, other expenses	200.00
	2,500.00
Total	7,500.00

INSTITUTE OF OCCUPATIONAL HEALTH, HELSINKI, FINLAND

RESEARCH PROJECT NO. 9

Field.—Cardiovascular diseases.

Subject of the study.—Incidence of cardiovascular disease in Finland.

Outline of the project.—Professor Ancel Keys of the University of Minnesota is organizing an international study on the epidemiology of cardiovascular (c-v) disease. Finland has been linked into this scheme, as the recorded mortality from c-v disease is exceptionally high in this country.

In 1956 and 1957 a field study was carried out in two regions of Finland representing widely different levels of recorded cardiovascular mortality. The study covered healthy people; a clinical, electrocardiographic and dietary survey was made. The results of these studies are partly published (1, 2).

Several intriguing problems developed on the basis of the results of the completed study. In order to proceed further in the analysis of factors causing atherosclerosis, exact information on the frequency of various forms of c-v disease in the two areas ought to be secured. This must, of course, be made with the same methods as those used in corresponding studies in other countries. In the international comparison, Finland's role is particularly important, since the other countries involved in the scheme at present represent much lower frequency of c-v disease.

The next step in this plan is to make a 5-year field study of the incidence of c-v diseases in two areas, representing different c-v mortalities. This study will be made in cooperation with the international group.

A detailed plan for the operation of this study has been made. The Finnish members of the team have been trained in corresponding studies in other parts of the world (Greece, Italy, Yugoslavia, United States). International experts will participate in the study. Grants have been secured for the expenditure of the Finnish contingent during the first year from local sources; grants for the international participation and for the operations over the subsequent years have to be obtained from some other sources.

References:

1. Keys, A., Karvonen, M. J. and Fidanza, F.: *Lancet*, II, 175-178, 1958.
2. Roine, P., Pekkarinen, M., Karvonen, M. J. and Kihlberg, J.: *Lancet*, II, 173-175, 1958.

Responsible investigator.—M. J. Karvonen, M.D. (Helsinki), Ph. D. (Cambridge). Age 40. Assistant at the Helsinki University Institute of Physiology 1945-50; lecturer of sport medicine at the Helsinki University School of Physical Education, 1949-56, director of the same school, 1953-56; director of the Physiological Department of the Institute of Occupational Health since 1950. Surgeon General of the Finnish Air Force since 1956; British council scholar at the University of Cambridge 1945-47; study and lecturing visits to several countries, including the United States in 1954 and 1957; 110 research papers and 100 general articles and reviews on physiological and medical subjects.

Time schedule.—1959-64.

Support needed.—

1959: For personnel of 1st clinical and dietary field studies.....	\$6,000
1960: For personnel of followup.....	4,000
1961: For personnel of followup.....	4,000
1962: For personnel of followup.....	4,000
1963: For personnel of 2d clinical and dietary field studies.....	7,000
Total.....	25,000

MOSCOW, SOVIET UNION—CONFERENCES WITH SOVIET OFFICIALS—

NOVEMBER 29, 1958 TO DECEMBER 4, 1959

Senator HUMPHREY. Perhaps the most unusual phase of our tour consisted of our visit to Moscow, November 28 through December 4, 1958.

It was unusual because of the obvious differences which separate the United States and the Soviet Union along ideological, political, economic, and other lines. It was unusual, moreover, in view of the relative unfamiliarity of Americans with Russians, and vice versa.

But, fortunately, it was not unusual in that once again as everywhere else in Europe, we found that medical science represents an ideal "bridge" between nations. No matter how separated they may be by other factors, the physicians and other scientists with whom we conferred in Moscow were as completely cordial in their approach toward international cooperation as were the physicians and scientists everywhere else in Europe.

Symbolizing that cordiality was the sympathetic comment on medical teamwork by the Chairman of the Council of Ministers of the U.S.S.R., Nikita S. Khrushchev. During my talk with the Premier, on December 1, 1958, we concentrated during the entire forepart of our discussion on medical cooperation. I expressed the hope that the 2-year exchange agreement between the United States and the U.S.S.R. which was then due to expire in January 1960 would be renewed. I emphasized particularly the value of strengthened cooperation in medical affairs. Premier Khrushchev expressed assent.

I was delighted to note the signing in Moscow in November 1959 of the 2-year extension of the U.S.-U.S.S.R. exchange agreement.

I would not presume to judge whether my visit in Moscow and a great deal of subsequent subcommittee correspondence with the Soviet Embassy and the Soviet Ministry of Health may have contributed if only in some small part to the extension agreement. If it did, no matter how small may have been the contribution, I feel grateful for having had the opportunity to do whatever I could.

In any event, I had followed up on the beginnings which were set forth earlier within this volume at the time I described the work of the Senate Committee on Foreign Relations and its work on international health.

I have selected for the record four items:

1. The text of the release which I issued in Moscow, December 2, 1958, following my meeting with Premier Khrushchev; then as a followup—

2. Text of a statement at a news conference in Washington on September 30, 1959, by Secretary of Health, Education, and Welfare, Arthur Flemming, with regard to U.S.-U.S.S.R. exchanges;

3. Excerpts of the extension agreement signed November 21, 1959, between the United States and the Soviet Union with specific reference to exchanges in the field of health;

4. Text of a letter received by the subcommittee in response to our invitation from three distinguished Soviet physicians.

A. SENATOR HUMPHREY'S STATEMENT TO THE PRESS, MOSCOW, U.S.S.R., DECEMBER 2, 1958

PREMIER KHRUSHCHEV ENDORSES INTERNATIONAL MEDICAL RESEARCH PROGRAM
SUGGESTED BY SENATOR HUMPHREY

"Enthusiastic approval" has been given by Soviet Premier N. S. Khrushchev to a greatly expanded international medical research program which has been recommended by Senator Hubert Humphrey (Democrat, Minn.).

The favorable reaction of the Soviet Premier was given in the Kremlin during the course of an 8-hour private interview with the Minnesota legislator.

The informal conference covered a broad gamut of foreign policy problems. "I am not today publicly commenting on other phases of the Premier's remarks," Senator Humphrey stated. "I believe in always beginning with areas of agreement, rather than discord."

The third-ranking Democratic member of the Senate Committee on Foreign Relations continued, "I prefer to talk and work on the subject of cooperating to help men live rather than talking only of the danger of a possible combat in which men would die. I do not, therefore, want other more debatable issues which were raised during my long and frank talk with the Premier to obscure this vital question of mankind's efforts for better health."

"Cooperating to conquer cancer, heart disease, and other killing and crippling diseases is one of the principal works for peace which can overcome the high barriers of mutual distrust and suspicion."

"During my interview with the Premier, I had noted that the areas of disagreement between our respective foreign policies remain broad and deep. It does not appear that, for a considerable time, these differences will be resolved. In the meantime, we need to learn how to work together; and the best place to start is in the nonpolitical area."

"The world is hungry for some evidence of effective Soviet-American collaboration. One of the best areas in which to start is in the field of health where mankind has an international organization in which the United States and the U.S.S.R. are already effectively collaborating with 86 other lands, through the World Health Organization. In addition, the scientists and doctors of the United States and the U.S.S.R. already respect one another for their professional competence."

"Prior to meeting with the chairman of the Soviet Council of Ministers of the U.S.S.R., I had brief informal talks during receptions with Ministers Anastas Mikoyan and Frol Kozlov. They too gave spontaneous and warm approval of my recommendations of a health for peace policy."

"Last year, diseases of the heart and circulation killed more than half a million of my countrymen. Second-ranking killer was cancer, which destroyed a quarter of a million Americans. I assume that the toll on Russian citizens was similarly large, just as mankind universally suffers from these and other maladies."

"The time is now to act on health for peace. Human beings are dying today, perhaps at this moment, in Africa from malaria and tuberculosis, in south Asia from other infectious diseases, in the United States, the U.S.S.R., Latin America, Europe, Australia. Politicians may continue to wrangle, but doctors and nurses, midwives, and others can now cure and heal and relieve suffering. And it is the latter goal that mankind desires."

"Mankind has heard enough and seen enough of atom and hydrogen bombs. Now let mankind see and hear more of the only kind of 'destruction' we want—the elimination of man's ancient enemy, disease."

Earlier, Senator Humphrey had presented a series of specific suggestions to Dr. V. M. Zdhanov, Deputy Minister of Health, and Prof. Semyon Sarkisov, vice president of the Academy of Medical Sciences. The suggestions, "all of which met with friendly reactions," included:

(1) Further implementation and broadening of the "very fruitful" medical exchange provisions under the Lacy-Zarubin agreements.

(2) Additional progress in increasing the two-way flow of medical data, including fuller and prompter exchange of publications and abstracts.

(3) A much wider increase in "a phase which is indispensable"—personal contacts between medical scientists in the two countries—through correspondence and visits, as well as in joint participation in international symposia and in panels of experts of the World Health Organization.

(4) "Full speed ahead" on plans for an International Public Health and Medical Research Year, possibly in 1961.

This project was unanimously endorsed by the U.S. Senate in August 1958 in the form of a resolution which had been introduced by Senator Humphrey.

In September 1958, the Ukrainian Soviet Republic offered a draft resolution in the United Nations for the purpose of authorizing such a year. The subject is to be considered by the Executive Board of the WHO in January and by the 12th World Health Assembly, scheduled for May 1959 in Geneva. Dr. Zdhanov serves on the WHO Executive Board and reiterated the Soviet Union's desire for this year.

(5) Joint Soviet-United States collaboration, commencing as soon as possible, "in one particular new project of universal interest"—a campaign for intensified perinatal research, "so as to facilitate healthier babies for mankind. This is a project which Premier Khrushchev specifically endorsed among others."

"Statisticians estimate that every 6 seconds a baby is born in the U.S.S.R., every 7½ seconds a baby in the United States. Unfortunately, we know far too little about why a certain number—a small but significant percentage—of all babies in all countries are born with defects, mental and physical. We must, therefore, broaden research into the perinatal period—the time commencing after the 20th week of pregnancy and extending through the first month after birth. We must find out what biochemical and other changes occur in a pregnant mother's body and in the fetus, which may result in or contribute to brain damage, cerebral palsy, epilepsy, mental retardation, speech and hearing disorders, and the like in the newborn.

"No one can estimate the direct and indirect cost of sick infants to United States and Soviet societies. But far more important than the economic costs of ill babies, throughout their lifetimes, is the cost in human heartbreak. I refer to the personal tragedies in the lives of countless parents because of children, who even prior to entry into this world, are fated to lead incomplete lives because of mental or physical disability.

"Fortunately, the United States has launched an extensive campaign of perinatal study. Now I hope and expect that bilaterally and multilaterally (through WHO) Soviet gynecologists, obstetricians, pediatricians, neurologists, and other specialists will join with ours in making their fullest contributions.

"Someone has said that the first 9 months of a man's life—within his mother's womb—are the most fateful of all his personal history. Science has the obligation to find out more of what occurs in those first 9 months, affecting the life which is developing. Half of all reported deaths in the United States up to the age of 40 occur during the period of only 6 months of the fetus and the newborn.

"There is no parent in the world who would not rejoice to see the United States and the U.S.S.R. mobilize their fullest medical resources on a collaborative project, preferably under WHO auspices, to assure healthier babies for all the human family."

Senator Humphrey came to Moscow principally in his capacity as chairman of a Government operations subcommittee. It had been authorized \$30,000 to make "a full and complete study of any and all matters pertaining to international health, research, assistance, and rehabilitation." Senator Humphrey had sponsored the study resolution.

Findings under the study may contribute to consideration by the Senate next year of major legislation, authorized by Senator Lister Hill, Democrat of Alabama, and co-sponsored by Senator Humphrey, among others. The legislation would authorize creation of a new National Institute of International Medical Research with appropriations of \$50 million annually for the purpose of providing grants to aid overseas medical research.

Before leaving Moscow, Senator Humphrey expects to visit several leading Soviet medical research centers on cancer, cerebrovascular and bacteriological problems.

The Senator has been accompanied by Mrs. Humphrey and by the committee's staff director for the medical research project, Mr. Julius N. Cahn.

The Senator has been joined today by Dr. Michael Shimkin, of the National Cancer Institute who had accompanied him in Stockholm and Helsinki.

During the course of his pre-Russian tour, Senator Humphrey, Mrs. Humphrey, and Mr. Cahn had visited leading medical centers in Western Europe including, among others:

Paris: The Radium Institute and Hospital, the Pasteur Institute, the Maternity Hospital, and the Hospital for Sick Children.

Geneva: The headquarters of the World Health Organization, where consultations were held with Dr. N. G. Candau, Director General, and experts on virology, malaria, genetics, and many other specialties.

Stockholm: The Karolinska Institute's Centers of Bacteriology and Immunology, Children's Hospital, and Institute of Cell Research.

Helsinki: The Brain-Damage Institute, the Institute for Occupational Diseases, Tumor Center, the Children's Hospital, and others.

After leaving Soviet Russia, Senator Humphrey expects to visit briefly in London before returning to Washington.

B. STATEMENT BY ARTHUR S. FLEMMING, SECRETARY OF HEALTH, EDUCATION, AND WELFARE

[Released at conclusion of news conference, Washington, D.C., Wednesday, September 30, 1959]

The recently concluded visit of Chairman Khrushchev to this country provided an opportunity for a useful exchange of views on the relationships between representatives of the U.S. Government and of the Soviet Union in the field of health.

At a meeting on September 26 proposals were discussed for an expansion of the present medical exchange program currently being carried on by the two nations.

The U.S. Government was represented by Dr. Leroy E. Burney, Surgeon General of the Public Health Service, members of his staff and of the Department of State, and the Soviet Union by Dr. A. M. Markov, a member of the Collegium of the Ministry of Public Health of the U.S.S.R. and Dr. V. M. Butrov of the Ministry of Foreign Affairs.

Dr. Burney advises me that the discussions were most cordial, and it was apparent that the representatives of both countries were in agreement on the desirability of expanding health exchanges.

In addition to the exchange of delegations such as have been carried on under the January 27, 1959, agreement (Lacy-Zaroubin agreement), it was agreed that the Public Health Service and the U.S.S.R. Ministry of Health will consider the following points with a view to further discussions:

1. Top medical scientists of both nations would exchange visits to study methods of organization of research programs.

2. Exchange of scientific and technical information on an accelerated and systematic basis would be undertaken between the two nations in order to identify research trends and significant accomplishments by scientists and health workers in both nations.

3. Specific research projects would be sought which would provide for coordinated studies to be carried on according to research plans agreed upon by both countries.

4. Exchanges would be initiated between research scientists to work in the laboratories of both countries in order to familiarize themselves in detail with varying methods of research and to contribute actively to research projects.

The meeting between the health representatives of the two nations was held as part of the general discussions on exchange missions undertaken between Mr. G. A. Zhukov, chairman of the Soviet State Committee for Cultural Relations With Foreign Countries and Ambassador William S. B. Lacy, of the Department of State.

During the visit of Dr. Markov and Dr. Butrov to the Clinical Center of the National Institutes of Health last Friday, both Dr. Burney and I expressed the hope that the exchange of knowledge and shared experience between the Soviet Union, the United States, and other nations would continue to grow.

The association between the scientists and physicians of the two nations that has already taken place has been most useful. American physicians who have visited the Soviet Union, either during the formal exchanges of the past 2 years or as tourists have been warmly received; and we, in turn, have had the pleasure of welcoming a number of Soviet scientists to this country.

The hope and the struggle for better health is one of mankind's oldest concerns. It is a concern shared by all nations and all nations contribute to the total sum of knowledge on how to reduce human suffering and prevent premature death.

America owes and acknowledges a great debt to the scientists of the world. Progress in research and in medicine is not the province of any one nation; and we, as a nation, will continue to benefit materially, as we have in the past, from the discoveries of scientists throughout the world, including, of course, those of the Soviet Union.

The discussions of the past 10 days did not deal directly with the World Health Organization of which both the United States and the U.S.S.R. are members. Any discussion of world health problems and any plans for progress, however, must take this 90-member-nation organization into account.

The U.S. Government believes that one of the best means of contributing to world health progress is through the World Health Organization. It is also a

means through which we, as a nation, can benefit from the experience of other nations.

The United States has given firm support to WHO since its formation in 1947. In addition to contributing about 33 percent of the annual budget, which this year is approximately \$16 million, the United States has actively supported the general programs of WHO for improvement of world health and has contributed substantially to its special programs.

The U.S. Government, in addition to making a special initial grant of \$300,000 in May 1958 to enable the organization to plan an expansion of its role in research, this last May joined with others in voting an increase of the WHO budget by \$500,000 to initiate a program of medical research.

In line with the longstanding U.S. policy of supporting WHO and the cause of world health, I am pleased to be able to make the following announcement:

From mutual security funds authorized by the Congress for fiscal 1960 the United States will now make special voluntary contributions totaling \$6 million to the World Health Organization and the Pan American Health Organization.

Of this amount, \$3 million will go to the WHO's malaria eradication program and \$2 million to the malaria eradication program of PAHO.

This brings to \$19.5 million the total funds contributed by the United States to these two organizations over a period of 3 years for relief of the 250 million persons throughout the world who are ravaged by malaria.

Exclusive of the new funds the United States has contributed \$8 million to the WHO malaria program alone. The other nations have contributed \$500,000. It is our hope that other nations will step up their contributions to this important program.

An additional special grant of \$300,000 is being made to WHO and \$200,000 to PAHO in fiscal year 1960 for studies and technical assistance to member nations for improving their water supplies.

A further special contribution of \$500,000 is being made to WHO for the expansion of its medical research program. Added to the contribution of \$300,000 made by the United States a year ago last May, this amounts to a total special U.S. contribution of \$800,000 for this new WHO program.

The Directing Council of the PAHO, which is its governing body, is now meeting here in Washington. Surgeon General Burney, as chief U.S. delegate, is informing the Directing Council today that the United States is making these special contributions to the PAHO.

Because health is a common goal and the gains of any nation anywhere help advance the common cause, these and similar multilateral undertakings offer a most promising avenue toward better world health.

NOVEMBER 21, 1959.

C. AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS FOR COOPERATION IN EXCHANGES IN THE SCIENTIFIC, TECHNICAL, EDUCATIONAL, AND CULTURAL FIELDS IN 1960-61

By agreement between the Government of the United States of America and the Government of the U.S.S.R., delegations headed on the United States side by Llewellyn E. Thompson, Ambassador Extraordinary and Minister Plenipotentiary of the United States of America to the Union of Soviet Socialist Republics, and on the Soviet side by G. A. Zhukov, Chairman of the State Committee for Cultural Relations with Foreign Countries under the Council of Ministers of the U.S.S.R., conducted negotiations in Moscow from November 6 to 21, 1959, with regard to cooperation in exchanges between the United States of America and the U.S.S.R. in the scientific, technical, educational, and cultural fields in 1960-61. As a result of the negotiations, the United States and the Soviet Union have agreed to provide, during 1960 and 1961, for the specific exchanges which are set forth in the following section, in the hope that they will contribute significantly to the betterment of relations between the two countries, thereby contributing to a lessening of international tension.

SECTION VI. COOPERATION IN THE FIELD OF PUBLIC HEALTH AND MEDICAL SCIENCE

(1) Both parties affirm their interest in intensifying the struggle against serious diseases which are the enemy of all mankind. As a step toward the achievement of this goal both parties will make efforts to put into effect the

agreed program for cooperation in public health and medical science, which for the years 1960-61 contemplates, in particular, the measures described below.

Details of specific exchanges will be agreed upon by direct negotiations between the U.S.S.R. Ministry of Health and the U.S. Public Health Service.

(2) The U.S.S.R. Ministry of Health and the U.S. Public Health Service will facilitate cooperation between scientific-research institutes of the U.S.S.R. and corresponding governmental and the below specified and other mutually agreed upon nongovernmental research organizations of the United States conducting studies on the problems of cancer, cardiovascular illnesses, poliomyelitis, and on other important problems of medicine.

First of all both parties will facilitate the establishment and development of contacts and cooperation between the following Soviet and American scientific institutions:

(a) For the Soviet side; the Institute of Experimental and Clinical Oncology, Academy of Medical Sciences of the U.S.S.R. and for the U.S. side, the Sloan-Kettering Institute and the National Cancer Institute.

(b) For the Soviet side, the Institute of Therapy, Academy of Medical Sciences of the U.S.S.R. and through it other Soviet scientific institutions engaged in the study of cardiovascular diseases; and, for the U.S. side, the National Heart Institute and through it other American scientific institutions engaged in the study of cardiovascular diseases.

(c) For the Soviet side, the Institute for the Study of Poliomyelitis, Academy of Medical Sciences of the U.S.S.R. and, for the U.S. side, the Research Foundation, Children's Hospital, Cincinnati and the National Institutes of Health (Division of Biologics Standards).

The aforementioned organizations shall be encouraged by both parties to exchange plans of scientific-research work and information about research conducted, to organize joint scientific studies, to exchange specialists, and to participate in yearly joint scientific meetings which shall be convened by the aforementioned institutes, or the U.S.S.R. Ministry of Health, or the U.S. Public Health Service, alternately in the United States and the U.S.S.R.

In 1960 such meetings shall take place at the Sloan-Kettering Institute (United States), the National Heart Institute (United States), and the Institute for the Study of Poliomyelitis, U.S.S.R. Academy of Sciences.

(3) Both parties shall facilitate an exchange of high level specialists and junior scientific workers numbering up to 20 persons on each side for a period of up to 1 year on the basis of general reciprocity for familiarization with the work of scientific-research institutes and establishments of the U.S.S.R. and the United States enumerated in paragraph (2) of the present section, and also other scientific establishments of both parties for the exchange of experience, or for the conduct of jointly agreed upon research.

Scientists sent to the yearly joint scientific meetings of the Institutes conducted in accordance with paragraph (2) and members of delegations provided for in paragraph (4) of this section of the agreement are not included in the above specified number (20 persons).

(4) Both parties will provide for an exchange in 1960-61 of five delegations of three to six persons each for a period of 3 to 4 weeks.

Delegations of the Soviet Union will study the following subjects in the United States.

(a) Malignant neoplasms (etiology, pathogenesis, and the therapy of tumors), and also biochemical and histochemical research on tumors;

(b) The pathology of cardiovascular systems (hypertension, arteriosclerosis, coronary insufficiency);

(c) Thoracic surgery (cardiology, artificial circulation of the blood);

(d) Virology (the genetics of viruses);

(e) Industrial medicine and hygiene (organization of scientific research on labor hygiene and occupational diseases, familiarization with scientific research on important problems of labor hygiene such as silicosis, industrial toxicology, physiology of labor, and occupational disease).

U.S. delegations will study the following subjects in the U.S.S.R.:

(a) Infectious diseases and microbiology;

(b) Neurophysiology and pathology;

(c) Metabolism and genetics;

(d) Medical ecology; and

(e) Maternal and child care and related research.

(5) The local expenses of specialists including internal travel involved in the exchanges covered in this section shall, except as otherwise agreed in specific cases by the U.S.S.R. Ministry of Health and the U.S. Public Health Service, be met in the case of visits not exceeding 6 weeks by the sending side and in the case of visits exceeding 6 weeks by the receiving side on terms to be agreed upon in each case between the U.S.S.R. Ministry of Health and the U.S. Public Health Service.

(6) Both parties shall facilitate the publication of works on the most important problems of medical science by American research workers in Soviet medical journals and by Soviet research workers in American medical journals.

(7) Both parties shall facilitate the further development of exchanges of medical journals and books between Soviet and American libraries and institutions, as well as the exchange of medical films.

(8) Both parties agree to inform the World Health Organization of the activities carried out under this section of this agreement.

[Translation]

D. LETTER FROM THREE SOVIET PHYSICIANS ON MEDICAL COOPERATION

Mr. H. H. HUMPHREY,

Chairman of the Subcommittee on Questions of Reorganization and International Organizations of the Committee on Government Operations of the Senate of the U.S.A., Commission Building of the Senate, Washington, U.S.A.

DEAR MR. HUMPHREY: Having carefully acquainted ourselves with the letter received from you and with the memorandum of the Senate subcommittee which you head, we have the honor to state the following:

We share the desire which you have expressed concerning the strengthening of international cooperation among medical scientists and among medical institutions, especially those working on such problems as the fight against cancer, against diseases of the cardiovascular system and against other widespread serious illnesses. However, with regard to the questions raised by you in the letter, and in particular with the idea of organization in the United States of an institute for international medical research, we find it difficult to offer any kind of advice because the memorandum contains only a general declaration concerning the contemplated activity of the institute and does not provide information on its program and the methods of its work.

Furthermore, it appears to us that existing international medical organizations provide a wide possibility for the international cooperation of medical scientists and medical institutions. Soviet scientists take an active part in tens of international organizations and, in cooperation with the scientists of other countries, carry on the fight against diseases which threaten mankind. Obviously, our foremost task is to strengthen in every way possible these international organizations and to increase the cooperation of scientists within their framework, among them within such an authoritative and powerful organization as the World Health Organization.

Allow us to thank you for your courteous information and to associate ourselves with the wishes expressed in the memorandum with regard to the necessity for cooperation of the scientists of all countries on behalf of all humanity.

Many of our colleagues with whom we have exchanged opinions on this question, among them the recipients of your message, share the point of view set forth herein.

Respectfully,

Prof. N. N. BLOKHIN,

Director of the Institute of Experimental and Clinical Oncology of the Academy of Medical Sciences of the U.S.S.R.

Prof. V. V. KOVANOV,

Director of the Moscow Order of Lenin Sechenov Medical Institute,

Dr. M. G. SIROTKINA,

Director of the Second Moscow Pirogov Medical Institute

OSLO, NORWAY—CONFERENCES WITH NORWEGIAN OFFICIALS—
DECEMBER 4, 1958

Senator HUMPHREY. Following our visit to Moscow, there was a brief time in which we were privileged to meet with Norwegian authorities. In that time, we gained helpful understanding on the important contributions which they are making in international medical research. I was glad to have a very useful discussion with, among others, Dr. Lorentz Eldjarn, Radium Hospital, and Dr. Leiv Kreyberg, Riks Hospital. The transcript of the conversation with Dr. Kreyberg, a world-recognized cancer specialist, who has been active in WHO medical research, now follows. Thereafter is found a helpful reply in response to the subcommittee's invitation for comments from Dr. Karl Evang, M.D., surgeon general of the health services of Norway. Dr. Evang was incidentally president of the Second World Health Assembly.

A. TRANSCRIPT OF CONFERENCE WITH DR. LEIV KREYBERG, AT RIKS HOSPITAL, OSLO, NORWAY, DECEMBER 4, 1958

Senator HUMPHREY. We are in Oslo, Norway, today and are visiting with Dr. Kreyberg of Riks Hospital. We have already had a brief but very cordial and friendly visit with this distinguished doctor, and I have asked him to give to us some of his observations relating to medical research both at the pure research and at the clinical level.

Dr. Kreyberg, in order that my colleagues in this committee may know a little more about your background, I'm going to ask you a few personal questions. Tell us just a little bit about your own background and your own specialty of medical knowledge.

Dr. KREYBERG. I was born, sir, in 1896, graduated in 1921, did ordinary junior work in different hospitals, was a professor of normal anatomy for 6 years, then at the Radium Hospital as chief pathologist for 6 years and, since 1938, professor of pathology at University of Oslo. Since 1952 the chair has been divided. I have now the chair of experimental and general pathology and responsibility for the biopsy service at the university clinic at Riks Hospital.

Senator HUMPHREY. Thank you, now, for that splendid background. Now here in Riks Hospital, do you carry on a considerable amount of research in your field of pathology?

Dr. KREYBERG. Sir, it's always difficult to say that you do an important piece of work; but the main job for a professor of pathology in Oslo is to do teaching and also to be responsible for routine work. What we can do of scientific work is in the afternoons and evenings. We have very few situations in Norway where research is isolated from routine work. I very often doubt if it is sound to have too much of it because routine work gives you a certain peace of mind and gives you the happiness to do service work once in a while.

Senator HUMPHREY. Does the medical school here in Oslo have students from other parts of Europe or other parts of the world for short-time studies?

Dr. KREYBERG. Yes, sir; we have a small number, but our language is such that a foreign student from far away will not benefit at the same time while trying to learn a foreign language. For that reason, he will have difficulties, and we do not have as many students as we would like to have. But we have had students from far away countries when they speak English or French or German, because then we can help them in the daily routine.

Senator HUMPHREY. What is the degree of cooperation in the field of medical science between the Scandinavian countries of Norway, Sweden, Denmark, and Finland? Do you have regular conferences of any kind or an organization set up to see that coordination takes place?

Dr. KREYBERG. Well, yes, of course, there is a certain cohesion among the Scandinavian countries. And we have Scandinavian congresses; but distances are so short now that most of us fly over the head of each other and land in England, France, or the United States, where we will seek a larger field for our studies and new acquaintances.

Senator HUMPHREY. You may recall that a little earlier today I mentioned to you the general purpose of our tour and of our study in Europe. Just to put it on the record again, we have visited several countries and, of course, many institutes and hospital and clinics, talking to distinguished doctors and other scientists involved in both basic and clinical research in the field of medical science. What we're seeking to do is to learn of the advisability of stepping up the program of international medical research and international health assistance. One way of doing this is through the World Health Organization, of course.

The United States last year at the World Health Organization Conference in Minneapolis, Minn., offered the WHO \$300,000 additional to outline a program of expanded research. This sum is now being utilized to plan additional research efforts on the part of the World Health Organization.

I'd be interested in getting your views as to what, if anything, more might be done to gain a greater productivity out of our research activities. What suggestions, if any, do you have as to the improvement of medical research on an international basis? You may have some comments on the exchange program, or fellowships, or symposia. Whatever you have to say, we will welcome.

Dr. KREYBERG. Going abroad for attending symposia is always an important thing. Usually those qualified have a chance to travel, also to attend congresses. But the main obstacle in our country is the small number of specialists and also the limited number of general doctors. We have too few. This is caused by the lack of teaching facilities in our country where we admit, have admitted, up to now a hundred a year and will from the coming year, admit 130.

But, at the same time, 600 Norwegian young people are studying medicine in foreign countries, nearly as many at the moment as at home. This explains why we do not have enough qualified manpower to permit those in important positions or leading positions to leave their jobs as often as necessary to keep up with developments.

RADIATION RESEARCH

Senator HUMPHREY. Doctor, one of the problems that we have been looking into and discussing with many of your associates in other parts of Europe is the matter of radioactivity. We have looked into the need of expanded medical training on how to treat radiation sickness or radioactivity as a result of some type of nuclear accident. With all of these nuclear reactors being established or at least underway, there's a possibility—at least there seems to be one—that there may be more victims of radiation burns, for example. Do you believe that this is an area of medicine that requires additional concentration and how do you think we could best move into it if you do?

Dr. KREYBERG. One part of that question I would like to refer to one of my colleagues who has specially worked with this problem, and you will meet him later on this morning.

But there is one problem which is causing some anxiety, and that is the fallout from nuclear tests. In this country where we have rocks, hard rocks, and difficulties with water problems among the islands along the coast, we have to drink surface water. At the moment, we are trying to find out how we can filter or neutralize the dangerous substances in rainwater. It affects tens of thousands of people along the coast. This is a practical problem, and we have to think about these things. We believe it's not so dangerous from ground water for drinking but surface water is an important thing in this country.

Senator HUMPHREY. Therefore the problem of radioactive fallout becomes a very serious one for the public health officials here in Norway and in other countries where there's considerable rock surface or a heavy rock bed, and you're compelled to use surface water for your domestic purposes. Is that correct?

Dr. KREYBERG. Yes, sir; that is correct. How much we should be concerned is a question of evaluation of the situation and taking into consideration many factors still unknown. But for safety's sake we feel that we shouldn't tolerate too much if we can avoid it. And all surplus irradiation we will have to fight one way or another. How important it is, I do not know and I suppose nobody knows.

Senator HUMPHREY. The matter of the treatment of the victims of radioactivity you felt that we might better discuss with your colleague; is that correct?

CANCER EPIDEMIOLOGY

Dr. KREYBERG. Yes, certainly, sir; because he is a leading specialist in the field and he is a very clever man.

Senator HUMPHREY. Are there any unusual patterns of cancer incidence in Norway?

Take, for example, in the United States, as I understand from our medical statistics, lung cancer is extremely common. In India, it's mouth or throat cancer. I wonder if there is any particular type of cancer pattern that is indicated in Norway, as a result of your statistical evidence.

Dr. KREYBERG. There are a few interesting things: In Sweden, throat carcinoma in women is rather common in the north, possibly caused by nutritional disorders. The similar type of cancer is practically unknown in Norway.

So there we may have a clue; because the Norwegian coastal population will eat fish, codfish, cod liver, roe, et cetera, whereas in the interior of north Sweden there will be more margarine, and bread, and coffee. So there is one. It will not affect many people, but it's a very interesting question of geographic pathology.

In Norway, we have a very strong increase of lung cancer in men in towns. It cannot be caused by air pollution because even in the capital the air is comparable to the small market towns in the rural countryside of England. We feel convinced it is connected with tobacco smoking. This seems to be the same type as in the United States and England, but it has not reached the proportions yet as it has in these countries.

CIGARETTES AND CANCER

Senator HUMPHREY. So in Norway, as in other areas, we find some indication of a pattern for this particular disease. You would say that the pattern of lung cancer is not related to what some people call air pollution, but apparently seems to bear a relationship to smoking.

Dr. KREYBERG. It is my conviction from my own figures—and it is based now upon 500 cases carefully, histologically examined—that the tobacco factor is the dominating factor, and air pollution has a very unimportant role in this country. Thereby our experience will have not much if anything of a possible role in countries where smog and air pollution are much stronger than here.

Senator HUMPHREY. Well, Doctor, I believe that we've covered most everything we can in this limited period. There are just one or two other questions that I have in mind: Do you have any type of grants or any types of assistance that come to medical research in Norway from sources in the United States?

I'm thinking, for example, of our U.S. Public Health Service, our National Institutes of Health. (Fortunately, we have Dr. Shimkin here with us this morning from NIH.) Or the Damon Runyan Cancer Fund or Rockefeller Foundation?

Dr. KREYBERG. Sir, I can only state for myself. My own institute is a small one, and we have been forced to use very simple techniques and inexpensive materials; therefore, we have been able to do some small research work with little grants. I have never applied for and have never received any money from the United States nor from any other country outside my own.

Senator HUMPHREY. I gather you're a rather self-reliant individual, which, of course, is one of the truly fine characteristics of a good and a great man.

Dr. KREYBERG. I think it is a necessity of the circumstances.

UNDERSTANDING WITH EASTERN EUROPE

Senator HUMPHREY. Dr. Kreyberg, finally, I'd like to get your views relating to the field of scientific inquiry as it applies to the Iron Curtain countries.

Let me just broaden that a little bit. Some of the men and women that I've talked to have indicated to me the value of scientist-exchange programs, the importance of keeping contacts with people in the scientific world no matter what country they may live in. They feel that science itself should be above politics if it is going to be an effective discipline.

Now would you like to give your views and observations because of your many years of experience in this field?

Dr. KREYBERG. This is probably a political question. But I will not hesitate to answer it and underline that it is my personal opinion.

The thing is that as the world is developing now, we will have either one day to fight a final battle where we will ruin all of us, or we will come to some sort of an agreement where we can develop and let our children live in peace.

One of the means of keeping peace will be a gradual coming together. I see no other field where coming together is more easy than in the medical. In art, there may be controversies, but in medicine there is only one goal and that is to help humanity. And for this reason I have sometimes, first in 1928, traveled through an Iron Curtain country. Last autumn I did the same, partly lecturing. I felt a keen response from my colleagues. One basic thing is that we behave in such a manner that they understand that we are trying to find the same path to foster and develop good relationships. We must not involve ourselves with intrigues or with politically unnecessary discussions, which will only create difficulties for us.

Senator HUMPHREY. Doctor, in the field of science, you mentioned the importance of freedom of inquiry, that is, freedom of study, freedom of choice in terms of the literature, books, and scientific documents that you read. You said that this has a great value in terms of the long-range possibility of making adjustments in the world in which we live. Would you care to comment on that?

Dr. KREYBERG. I think, sir, that many concepts in science and not the least in medicine will change from time to time. It happens that ideas that were used and useful some 10, 20 years ago, were discarded and they come back again under new names. At times we have been, possibly, a little bit too chemical, a little too physical in our thinking, and at times we come back, as for instance, regarding the influence of psychological traumas in bodily diseases. In foreign countries, a development may go in another direction than our own, as it has done, for instance, in Russia, where there is strong underlining of the nervous system. It may be that we in the West will have something to learn from the Russian attitude and it may be that the Russians will have something to learn from us.

Senator HUMPHREY. Thank you very much, Doctor. I believe I can summarize your comments by saying that through the field of medicine in particular we have an opportunity, if you confine yourself to that particular endeavor, to build some areas of agreement and to broaden some areas of understanding.

Dr. KREYBERG. May I add, sir, that this is exactly the words of Descartes over 300 years ago.

Senator HUMPHREY. Well, I feel honored, sir. Thank you.

B. LETTER FROM KARL EVANG, M.D., SURGEON GENERAL OF HEALTH SERVICES

OSLO, June 17, 1959.

Senator HUBERT H. HUMPHREY,
Senate Office Building,
Washington, D.C.

DEAR SENATOR HUMPHREY: I was pleased and honored to receive your letter of March 25, where you invite me to answer the question: "What should the United States Government do in order to help speed the conquest of killing and crippling diseases like cancer, cardiovascular ailments, and the like?"

In your letter and the attached memorandum you further break down this overall question into a series of more special ones.

The twelfth World Health Assembly has just had an opportunity to discuss thoroughly these problems and no doubt the U.S. delegation to the Assembly will be in the position to report as to the opinions expressed at the Assembly and as to the decisions reached.

Following your kind invitation, I may only forward a few personal suggestions:

The most effective way in which the U.S. Government can assist in international medical research and in speeding the conquest of killing and crippling diseases is to strengthen the World Health Organization, which, according to its constitution, ratified by approximately 90 member states, is the directing and coordinating international body in the field of health. As you are no doubt aware, the Pan-American Health Organization acts as regional office of the Americas for the World Health Organization. WHO also is responsible for the medical aspects of UNICEF's programs and has close relationship with FAO, ILO, the World Medical Association, and a number of nongovernmental organizations working in the field of health.

During the discussions in the twelfth World Health Assembly on expanded international activities in the field of medical research, I emphasized that WHO, after having discussed time and again priorities, had finally settled on concentrating on certain fundamental health tasks:

1. Conquest of malaria, tuberculosis, and other widespread communicable diseases, and of diseases like cardiovascular ailments, cancer and the like. Some of these diseases may no doubt be eradicated.
2. Improvement in environmental sanitation.
3. Strengthening of public health services.
4. Education of doctors and auxiliary medical personnel.
5. Improvement in maternal and child health.

In the impressive building which WHO has constructed during its relatively short life, one wall was to my mind missing; namely, medical research. Although research is defined in the constitution as one of the fundamental tasks of WHO, and although research in fact has been integrated with a number of the programs carried out by national governments with assistance and guidance from WHO, medical research internationally up until now did not find a sufficiently broad support from WHO. The reason for this has simply been lack of funds in view of the pressing need especially in the rapidly developing countries of Asia, Africa, Latin America, and the Middle East for meeting health problems of an emergency nature.

The most encouraging feature at the 12th World Health Assembly to my mind, therefore, was that the United States took a lead in increasing the regular budget for research purposes and that a great majority of the member states enthusiastically decided to provide additional contributions within the regular budget for expanded programs in medical research.

The Director General of the World Health Organization, however, anticipating such a move, had drawn up a program for international medical research which for the year 1960 would cost \$2.2 million. The increase in the regular budget for 1960, is therefore far from meeting even this modest goal.

We are hoping, however, that voluntary contributions for international medical research may be added to the regular budget. Provisions for the acceptance of such voluntary contributions have been established.

It was strongly felt, however, by the member states, that WHO should not rely upon voluntary contributions for a special research fund of WHO but should contribute an increased amount on the regular budget for research. It seems that the experience which we have gained through the so-called malaria-eradication fund has contributed toward the motivation of member states. Although a number of countries have contributed toward the malaria-eradication fund, the entire project is now in danger, and, unless more voluntary contributions are forthcoming in the near future, the malaria-eradication program, so far the most impressive and promising action against a widespread disease on an international basis, will run into a crisis.

In your letter you ask what the U.S. Government could do in order "to strengthen cooperation, in particular, among health ministries of the various nations."

Again, may I draw your attention to the fact that the World Health Assemblies have over a period of 11 years gradually developed into a "World Health Parliament." Under the constitution of WHO, members of delegations from various countries should be composed of persons "technically qualified in the field of health." Therefore, WHO is a technical body where public health specialists, medical scientists and practitioners, dentists, and nurses cooperate in planning for better health in the world. In this rather strange postwar period, it has indeed been one of the most encouraging things to watch how cooperation, especially between health authorities in the various countries, has thus been developed. During the 2½ to 3 weeks in which the World Health Assembly is convened, a unique opportunity exists for all member states to ventilate their specific health problems.

At the time when the constitution of WHO was drafted (in the spring of 1946), some of us felt that WHO might probably most profitably start with a budget of about \$25 million and gradually develop from there. Of course, the health problems of the world are such that vast sums are asked for in organizing the fight against disease and death. However, most of the expenses naturally will be covered by governments.

Owing to a series of unfortunate circumstances, however, into which I will not go here, the budget of WHO was fixed at a much lower level, and in spite

of great efforts from many member states it has not yet reached a sum of more than approximately \$17 million.

On the other hand, WHO has gained tremendous experience in handling international health projects, in selecting suitable personnel, and in cooperating with national governments.

Returning to the special question of expanded activities in medical research, it is obvious that one of the conditions of such an expansion is a considerable increase in the number of research workers, meaning scientists and scientific technicians at the various levels. Here we run into the basic problems of selection, education, and special training of scientific personnel. At the present time there seems, in most countries, to be a critical scarcity, especially at the highest level.

There is no doubt that the greatest untapped resources of intellectual and research power are to be found in the less-developed countries of the world, while in most of the well-developed countries people with talent for research now have fair chances.

One of the most effective ways in which one could stimulate medical research, to my mind, therefore, is to improve conditions for the training of research personnel in less-developed countries. Such training, however, must go hand in hand with the development of research institutions in the countries concerned, and, therefore, the task is a vast and complicated one.

As for the proposed International Health and Research Year, it may have been a matter of surprise to you that the 12th World Health Assembly postponed the International Health Year for the time being.

It was most interesting to witness the reactions of responsible health authorities in member states to this idea. While there was general acceptance in principle of the idea as such, a great majority felt that the suggested time was unfortunate. The reasons given were primarily as follows:

1. So many "years" have been and are in the process of being arranged.
2. The World Federation for Mental Health is arranging an international year for mental health in 1960, and confusion undoubtedly would be created if an international health and medical research year should be arranged immediately after the cessation of the mental health year.
3. In the majority of member states of WHO, the daily pressing health problems are such that neither time nor money is easily available for a project of this type.
4. In the less-developed countries of the world, comprising more than half of the world's population, health authorities feel that the most burning problem is to apply the scientific results which have already been achieved.

You also kindly ask about particular health problems in my own country which shed light on major international medical challenges.

Norway, of course, has gone through the same stages as far as mortality and morbidity are concerned as other well-developed countries. The leading causes of death are: (1) Cardiovascular diseases; (2) cancer; (3) old age; (4) violent death, mainly accidents in traffic, homes, and industry.

Research programs, although not on a scale which we would want, are therefore being carried out, both in regard to cardiovascular disease and cancer.

Also rheumatism plays a very great role in Norway, and here we have unfortunately been able to do little up until now as far as research is concerned.

There is at present a keen interest in epidemiological research, and a study on the effect of Salk polio vaccine has just been completed following a small epidemic in the northern part of my country.

So far we have no school for training public health personnel and epidemiologists on a higher level, as none of the five Nordic countries is big enough for the support of such a school on a national basis. I initiated during the Second World War a plan for a cooperative project between the five Nordic countries. The Rockefeller Foundation and the Kellogg Foundation of the United States seemed interested and shortly after the war agreed on Gothenburg in Sweden as a natural site for the advanced school for public health and epidemiology. The municipal authorities of Gothenburg, just in the process of establishing a large clinical center in the city, were extremely cooperative.

However, owing to the lack of funds of the war-torn countries after the Second World War it has not yet been possible to establish the Scandinavian schools of public health and epidemiology. We are, however, running advance

training courses every year and have up till now had support from WHO. This support is now dwindling. It was my feeling that after the school had been in operation for some time we might also establish courses for students from less developed countries.

There exists on a whole a very close cooperation between the Nordic countries in matters of research and of fighting disease. The heads of the public health services meet regularly once a year, survey the situation and coordinate their activities.

Your letter and memorandum raise so many questions of great importance that this letter could easily be prolonged. However, I feel that this might do for the moment. If you feel that additional information is desirable, please do not hesitate in writing me again.

I feel strongly that it would not be right to conclude this letter without conveying through you, Mr. Senator, the warm thanks of the health and research personnel in my country for the long series of generous gifts from various sources in the United States of America. It would certainly take another long letter just to enumerate the individuals and projects which have benefited through American contributions. As far as the Norwegian public health services are concerned I may just mention as an example a generous contribution through the U.S. Public Health Service for a research program (which has now been finalized) on untreated syphilis in Norway, and another grant this year for a research program through the Odontological Research Institute of Oslo.

One field into which we would like very much to enter now but which we have been unable to initiate due to lack of strengthened funds is a study of the health services themselves, the quality of medical care which finally reaches the people, the reasons for divergencies in morbidity and mortality figures in the various parts of the country, and the reaction of the population toward health services as they have been developed in my country over many hundred years.

Yours sincerely,

KARL EVANG, M.D.,
Surgeon General of the Health Services of Norway.

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